OPTISONIC 7300 Technical Datasheet

Ultrasonic gas flowmeter

- Wide application range
- No moving parts and no pressure loss
- Complete solution for gasflow measurement

1.1 Ultrasonic process gas flow measurement

The **OPTISONIC 7300** offers an ultrasonic measurement system dedicated for process gas flow applications. The **OPTISONIC 7300** does not have the limitations that are usually associated with traditional gas flow meters like periodical recalibrations, maintenance, pressure loss and a limited flow range. The **OPTISONIC 7300** combines the advantages of ultrasonic measurement in a way that it is efficient, reliable and easy to use.

① Current input option for calculation to standard conditions
② Process connections

Highlights

- Wide flow range
- Independent of gas density and composition to a large extend
- No maintenance
- No recalibration
- Integrated volume correction to standard conditions using P, T measurement
- No moving parts, no pressure loss

Industries

- Chemicals
- Petrochemicals
- Power plants
- Oil & Gas

Applications

- General process control
- Hydrocarbon gases in petrochemical plants
- Process gases in chemical plants
- Production of natural gas
- Consumption / usage of natural gas
- Usage of fuel gas
- Air flows

1.2 Variants

Version and some general examples

Version
- Available as compact version.

Connection options
- Standard flange range available up to ASME 900 lb / PN 40. Others on request.

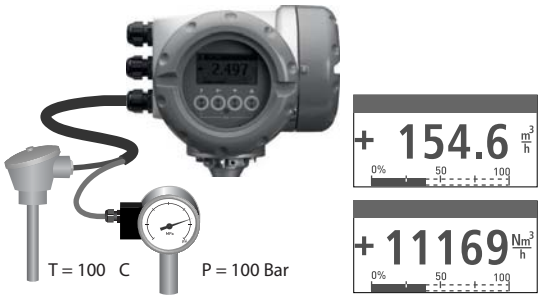
Correction to standard conditions (optional)
- Gas flow volume correction to standard conditions
- Using temperature and pressure inputs

GFC 300 ultrasonic signal converter
- Ex / non-Ex, IP 66/67

1.3 Features

Transducer design
With the innovative patented design of the transducers, the **OPTISONIC 7300** offers a superior application range. This new design allows not only a larger flow and diameter range, but also an extended range of gases that can be measured.

Dedicated to process applications
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.



Calculation to standard conditions
Gas flow is often specified in standard conditions (for example flow at 0 °C and 1 bar a). The gas flow converter GFC 300 optionally has two current inputs. If these are used for pressure and temperature input, the converter can calculate the volume flow to standard conditions. With the input of standard density also mass flow can be calculated.

Diagnostics
Important information about both the process and sensor can be provided by diagnostic values. Examples are gain for information about pollution in the sensor, velocity of sound for changes in the gas composition and signal to noise ratio for changes in the process.

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.

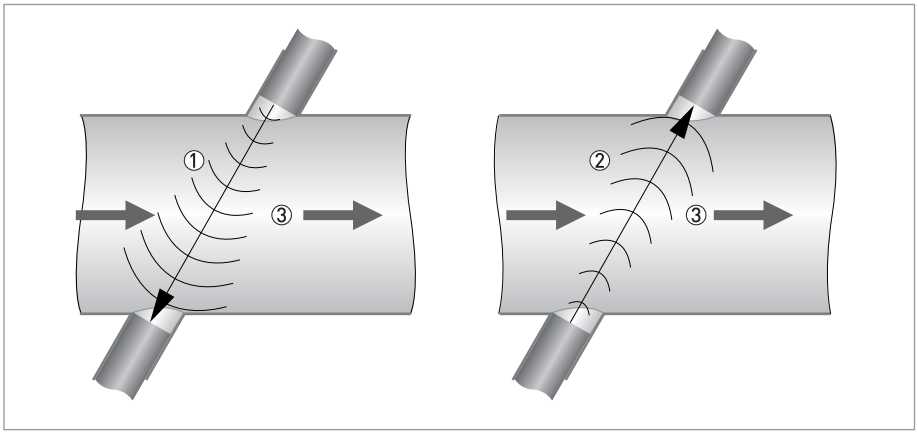


Figure 1-1: Measuring principle

① Sound wave against flow direction
② Sound wave with 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 representative.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).*

Measuring system

Measuring principle	Ultrasonic transit time
Application range	Flow measurement of dry gases
Measured value	
Primary measured value	Transit time
Secondary measured values	Volume flow, corrected volume flow, mass flow, molar mass, flow speed, flow direction, speed of sound, gain, signal to noise ratio, reliability of flow measurement, quality of acoustic signal

Design

Features	2 path all welded flow sensor with o-ring fitted titanium transducers.
Modular construction	The measurement system consists of a measuring sensor and a signal converter.
Compact version	OPTISONIC 7300 C
Nominal diameter	1 path: DN50...80 / 2...3"
	2 path: DN100...600 / 4"...24"
Measurement range	-30... +30 m/s / -98.4... +98.4 ft/s
Signal converter	
Inputs / outputs	Current (incl. HART®), pulse, frequency and/or status output, limit switch and/or control input (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, diagnosis functions: flowmeter, process, measured value, bargraph
Communication interfaces	Modbus, HART®
Display and user interface	
Graphic display	LC display, backlit white
	Size: 128x64 pixels, corresponds to 59x31 mm = 2.32"x1.22"
	Display turnable in 90° steps.
	The readability of the display could be reduced at ambient temperatures below -25°C / -13°F.
Operator input elements	4 optical keys for operator control of the signal converter without opening the housing.
	Option: Infrared interface (GDC)
Remote control	PACTware® including Device Type Manager (DTM)
	All DTM's and drivers will be available at the internet homepage of the manufacturer.

Display functions	
Menu	Programming of parameters at 2 measured value pages, 1 status page, 1 graphic page (measured values and descriptions adjustable as required)
Language of display texts	English, French, German
Units	Metric, British and US units selectable from list / free unit.

Measuring accuracy

Gas flow (uncorrected)	
Reference conditions (for gas calibration)	Medium: Air
	Temperature: 20°C / 68°F
	Pressure: 1 Bar / 14.5 psig
Theoretical calibration (standard)	DN100..600 / 4…24": < ± 2% of actual measured flow rate, for 1...30 m/s
	DN50..80 / 2…3": < ± 3% of actual measured flow rate, for 1...30 m/s
Gas calibration	DN100..600 / 4…24": < ± 1% of actual measured flow rate, for 1...30 m/s
	DN50..80 / 2…3": < ± 2% of actual measured flow rate, for 1...30 m/s
Repeatability	< ± 0.2%

Operating conditions

Temperature	
Process temperature	-40..+125°C / -40..+257°F
	Carbon steel flanges acc. to EN 1092-1, min. process temperature: -10°C / +14°F
	Carbon steel flanges acc. to ASME, min. process temperature: -29°C / -20°F
	Higher process temperatures on request.
Ambient temperature	Standard (die-cast aluminum converter housing): -40…+65°C / -40…+149°F
	Optional (die-cast stainless steel converter housing): -40... +55°C / -40...+131°F
Storage temperature	-50…+70°C / -58…+158°F
Pressure	
EN 1092-1	DN200…600: PN 10
	DN100…150: PN 16
	DN50...80: PN 40
ASME B16.5	2…24": 150 lb RF
	2…24": 300 lb RF
	2…24": 600 lb RF
	2...14": 900 lb RF

Properties of medium (Other properties on request)	
Physical condition	Dry gas
Density	Standard: 15…45 g/mol
	Option: 5…75 g/mol
Velocity of sound	250…600 m/s

Installation conditions

Installation	For detailed information refer to *Installation* on page 22.
Inlet run	≥ 10 DN
Outlet run	≥ 3 DN
Dimensions and weights	For detailed information refer to *Dimensions and weights* on page 18.

Materials

Sensor	
Flanges (wetted)	Standard: Carbon steel ASTM A105 N
	Option: Stainless steel 316 L, Carbon steel A350 LF2
	Other materials on request.
Tube (wetted)	Standard: Carbon steel ASTM A106 Gr. B or Equivalent
	Option: Stainless steel 316 L, Carbon steel A333 GR6
	Other materials on request.
Nozzles transducer holders (wetted)	Stainless steel 316 Ti (1.4571)
Transducer holders (wetted)	Stainless steel 316 L (1.4404)
Transducers (wetted)	Titanium grade 29
O-rings (wetted)	FKM / FPM
Coating	Polyurethane
Tube transducer cabling, caps transducer holder	Stainless steel 316 L
Converter/ connection-box support:	Stainless steel
Converter	
Converter housing	Standard: Die-cast aluminium, polyurethane coated
	Option: Stainless steel 316 (1.4408)

Electrical connections

Power supply	**Standard**
	100…230 VAC (-15% / +10%), 50/60 Hz
	Option
	24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%)
Power consumption	AC: 22 VA
	DC: 12 W
Cable entries	Standard: M20 x 1.5
	Option: ½" NPT, PF ½

Inputs and outputs

General	All in-and outputs are galvanically isolated from each other and from all other circuits.		
Description of used abbreviations	U_{ext} = external voltage U_{nom} = nominal voltage U_{int} = internal voltage U_o = terminal voltage R_L = resistance of load I_{nom} = nominal current		
Current output			
Output data	Measurement of volume and mass (at constant density), HART® communication.		
Settings	**Without HART®**		
	Q = 0%: 0…15 mA		
	Q = 100%: 10…20 mA		
	Error identification: 3…22 mA		
	With HART®		
	Q = 0%: 4…15 mA		
	Q = 100%: 10…20 mA		
	Error identification: 3…22 mA		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex-i**
Active	U_{int} = 24 VDC $I \leq 22$ mA $R_L \leq 1$ kΩ		U_{int} = 20 VDC $I \leq 22$ mA $R_L \leq 450$ Ω
			U_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
Passive	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 1.8$ V $R_L \leq (U_{ext} - U_o) / I_{max}$		$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 4$ V $R_L \leq (U_{ext} - U_o) / I_{max}$
			U_I = 30 V I_I = 100 mA P_I = 1 W C_I = 10 nF L_I = 0 mH

HART® (in preperation)			
Description	HART® protocol via active and passive current output		
	HART® version: V5		
	Universal HART® parameter: completely integrated		
Load	≥ 250 Ω t HART® test point: Note maximum load for current output!		
Multidrop	Yes, current output = 4 mA		
	Multidrop addresses adjustable in operation menu 1...15		
Device drivers	HART®, AMS, DD / FDT / DTM		
Pulse or frequency output			
Output data	Pulse output: volume flow, mass flow		
	Frequency output: volume flow, mass flow, diagnostic value, flow velocity, coil temperature, conductivity		
Function	Adjustable as pulse of frequency output		
Settings	For Q = 100%: 0.01... 10000 pulses per second or pulses per unit volume.		
	Pulse width: adjustable as automatic, symmetric or fixed (0.05...2000 ms)		
Operating data	Basic I/Os	Modular I/Os	Ex-i
Active	-	U_{nom} = 24 VDC	-
		f_{max} in operating menu set to: **f_{max} ≤ 100 Hz:** I ≤ 20 mA $R_{L, max}$ = 47 kΩ open: I ≤ 0.05 mA closed: $U_{0,nom}$ = 24 V at I = 20 mA	
		F_{max} in operating menu set to: **100 Hz < f_{max} ≤ 10 kHz:** I ≤ 20 mA R_L ≤ 10 kΩ for f ≤ 1 kHz R_L ≤ 1 kΩ for f ≤ 10 kHz open: I ≤ 0.05 mA closed: $U_{0,nom}$ = 22.5 V at I = 1 mA $U_{0,nom}$ = 21.5 V at I = 10 mA $U_{0,nom}$ = 19 V at I = 20 mA	

<table>
<tr><td rowspan="2">Passive</td><td colspan="2">$U_{ext} \leq 32$ VDC</td><td rowspan="2">-</td></tr>
<tr><td colspan="2">f_{max} in operating menu set to:
$f_{max} \leq$ 100 Hz:

$I \leq 100$ mA

$R_{L, max} = 47$ kΩ
$R_{L, max} = (U_{ext} - U_0) / I_{max}$

open:
$I \leq 0.05$ mA at $U_{ext} = 32$ VDC
closed:
$U_{0, max} = 0.2$ V at $I \leq 10$ mA
$U_{0, max} = 2$ V at $I \leq 100$ mA</td></tr>
<tr><td></td><td colspan="2">f_{max} in operating menu set to:
100 Hz < $f_{max} \leq$ 10 kHz:

$I \leq 20$ mA

$R_L \leq 10$ kΩ for $f \leq 1$ kHz
$R_L \leq 1$ kΩ for $f \leq 10$ kHz
$R_{L, max} = (U_{ext} - U_0) / I_{max}$

open:
$I \leq 0.05$ mA at $U_{ext} = 32$ VDC
closed:
$U_{0, max} = 1.5$ V at $I \leq 1$mA
$U_{0, max} = 2.5$ V at $I \leq 10$ mA
$U_{0, max} = 5.0$ V at $I \leq 20$ mA</td><td></td></tr>
<tr><td rowspan="2">NAMUR</td><td rowspan="2">-</td><td rowspan="2">Passive to
EN 60947-5-6

open:
$I_{nom} = 0.6$ mA
closed:
$I_{nom} = 3.8$ mA</td><td>Passive to
EN 60947-5-6

open:
$I_{nom} = 0.43$ mA
closed:
$I_{nom} = 4.5$ mA</td></tr>
<tr><td>$U_I = 30$ V
$I_I = 100$ mA
$P_I = 1$ W
$C_I = 10$ nF
$L_I = 0$ mH</td></tr>
</table>

Status output / limit switch			
Function and settings	Settable as indicator for direction of flow, overflow, error, operating point.		
	Status and/or control: ON or OFF		
Operating data	Basic I/Os	Modular I/Os	Ex-i
Active	-	U_{int} = 24 VDC I ≤ 20 mA $R_{L, max}$ = 47 kΩ open: I ≤ 0.05 mA closed: $U_{0, nom}$ = 24 V at I = 20 mA	-
Passive	U_{ext} ≤ 32 VDC I ≤ 100 mA $R_{L, max}$ = 47 kΩ $R_{L, max}$ = (U_{ext} - U_0) / I_{max} open: I ≤ 0.05 mA at U_{ext} = 32 VDC closed: $U_{0, max}$ = 0.2 V at I ≤ 10 mA $U_{0, max}$ = 2 V at I ≤ 100 mA	U_{ext} = 32 VDC I ≤ 100 mA $R_{L, max}$ = 47 kΩ $R_{L, max}$ = (U_{ext} - U_0) / I_{max} open: I ≤ 0.05 mA at U_{ext} = 32 VDC closed: $U_{0, max}$ = 0.2 V at I ≤ 10 mA $U_{0, max}$ = 2 V at I ≤ 100 mA	-
NAMUR	-	Passive to EN 60947-5-6 open: I_{nom} = 0.6 mA closed: I_{nom} = 3.8 mA	Passive to EN 60947-5-6 open: I_{nom} = 0.43 mA closed: I_{nom} = 4.5 mA U_I = 30 V I_I = 100 mA P_I = 1 W C_I = 10 nF L_I = 0 mH

Control input			
Function	Set value of the outputs to "zero", counter and error reset, range change.		
Operating data	Basic I/Os	Modular I/Os	Ex-i
Active	-	U_{int} = 24 VDC Terminals open: $U_{0, nom}$ = 22 V Terminals bridged: I_{nom} = 4 mA On: $U_0 \geq$ 12 V with I_{nom} = 1.9 mA Off: $U_0 \leq$ 10 V with I_{nom} = 1.9 mA	-
Passive	$U_{ext} \leq$ 32 VDC I_{max} = 6.5 mA at $U_{ext} \leq$ 24 VDC I_{max} = 8.2 mA at $U_{ext} \leq$ 32 VDC Contact closed (On): $U_0 \geq$ 8 V with I_{nom} = 2.8 mA Contact open (Off): $U_0 \leq$ 2.5 V with I_{nom} = 0.4 mA	$U_{ext} \leq$ 32 VDC I_{max} = 9.5 mA at $U_{ext} \leq$ 24 V I_{max} = 9.5 mA at $U_{ext} \leq$ 32 V Contact closed (On): $U_0 \geq$ 3 V with I_{nom} = 1.9 mA Contact open (Off): $U_0 \leq$ 2.5 V with I_{nom} = 1.9 mA	$U_{ext} \leq$ 32 VDC I ≤ 6 mA at U_{ext} = 24 V I ≤ 6.6 mA at U_{ext} = 32 V On: $U_0 \geq$ 5.5 V or I ≥ 4mA Off: $U_0 \leq$ 3.5 V or I ≤ 0.5 mA U_I = 30 V I_I = 100 mA P_I = 1 W C_I = 10 nF L_I = 0 mH
NAMUR	-	Active to EN 60947-5-6 Contact open: $U_{0, nom}$ = 8.7 V Contact closed (On): I_{nom} = 7.8 mA Contact open (off): $U_{0, nom}$ = 6.3 V with I_{nom} = 1.9 mA Identification for open terminals: $U_0 \geq$ 8.1 V with I ≤ 0.1 mA Dentification for short circuited terminals: $U_0 \leq$ 1.2 V with I ≥ 6.7 mA	-

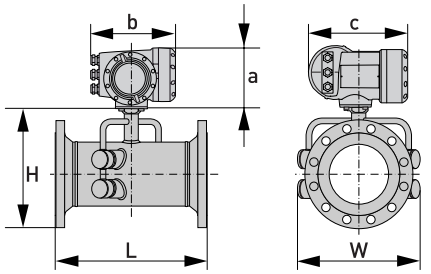
Low-flow cutoff			
On	0...±9.999 m/s; 0...20.0%, settable in 0.1% steps, separately for each current and pulse output.		
Off	0...±9.999 m/s; 0...19.0%, settable in 0.1% steps, separately for each current and pulse output.		
Time constant			
Function	Can be set together for all flow indicators and outputs, or separately for: current, pulse and frequency output, limit switches and the 3 internal counters.		
Time setting	0...100 seconds, settable in 0.1 second steps.		
Current input			
Function	For conversion to standard conditions, input from external temperature and pressure transmitters is required.		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	U_{int} = 24 VDC $I \leq 22$ mA $I_{max} \leq 26$ mA (electronically limited) $U_{0, min}$ = 19 V at $I \leq 22$ mA	U_{int} = 20 VDC $I \leq 22$ mA $U_{0, min}$ = 14 V at $I \leq 22$ mA
			No HART®
		No HART®	U_0 = 24.1 V I_0 = 99 mA P_0 = 0.6 W C_0 = 75 nF / L_0 = 0.5 mH
			No HART®
Passive	-	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $I_{max} \leq 26$ mA (electronically limited) $U_{0, max}$ = 5 V at $I \leq 22$ mA	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_{0, max}$ = 4 V at $I \leq 22$ mA
			No HART®
		No HART®	U_I = 30 V I_I = 100 mA P_I = 1 W C_I = 10 nF L_I =0 mH
			No HART®

MODBUS (in preparation)	
Description	Modbus RTU, Master / Slave, RS485
Address range	1…247
Supported function codes	03, 04, 16
Broadcast	Supported with function code 16
Supported Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

Approvals and certificates

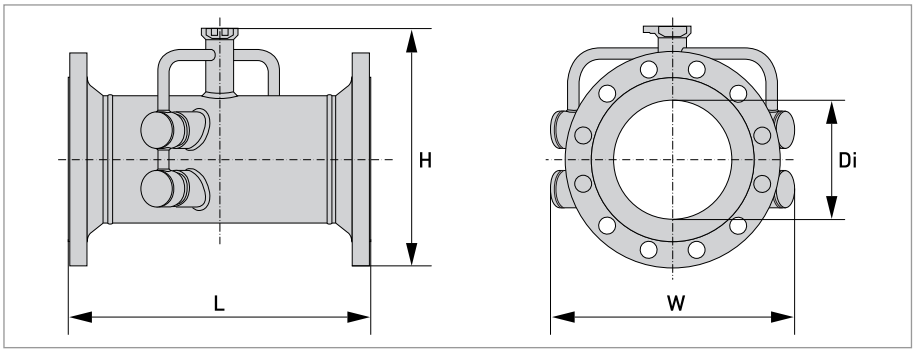
CE	
	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Electromagnetic compatibility	Directive: 2004/108/EC, NAMUR NE21/04
	Harmonized standard: EN 61326-1 : 2006
Low Voltage Directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010 : 2001
Pressure equipment directive	Directive: 97/23/EC
	Category I, II, III or SEP
	Fluid group 1
	Production module H
Other approvals and standards	
Non-Ex	Standard
Hazardous areas	
	Please check the relevant ex documentation for details.
ATEX	PTB 10 ATEX 1052
Protection category acc. to IEC 529 / EN 60529	**Signal converter**
	Compact (C): IP 66/67 (NEMA 4X/6)
	All sensors
	IP 67 (NEMA 6)
Vibration resistance	IEC 68-2-64
Shock resistance	IEC 68-2-27

2.2 Dimensions and weights

Compact version		a = 155 mm / 6.1"
		b = 230 mm / 9.1" ①
		c = 260 mm / 10.2"
		Total height = H + a

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

2.2.1 Gas flow sensor, carbon steel



EN 1092-1

Nominal size		Dimensions [mm]				Approx weight [kg]
DN	PN [Bar]	L	H	W	Di	
200	PN 10	460	368	429	202.7	46
250	PN 10	530	423	474	254.5	66
300	PN 10	580	473	517	304.8	81
350	PN 10	610	519	542	333.4	109
400	PN 10	640	575	583	381.0	141
450	PN 10	620	625	623	427.0	170
500	PN 10	670	678	670	478.0	202
600	PN 10	790	784	780	579.6	278

Nominal size		Dimensions [mm]				Approx weight [kg]
DN	PN [Bar]	L	H	W	Di	
100	PN 16	490	254	337	97.1	24
125	PN 16	520	283	359	122.3	32
150	PN 16	540	315	387	154.1	35

Nominal size		Dimensions [mm]				Approx weight [kg]
DN	PN [Bar]	L	H	W	Di	
50	PN 40	320	196	300	49.3	11
65	PN 40	350	216	313	62.1	14
80	PN 40	480	230	324	73.7	19

ASME 150 lb

Nominal size	Dimensions [inches]				Approx weight [lb]
	L	H	W	Di	
2"	14.2	7.5	11.8	1.9	22
2½"	15.0	8.3	12.2	2.3	33
3"	20.5	8.9	12.8	2.9	44
4"	21.7	10.1	13.3	3.8	64
5"	23.2	11.2	14.1	4.8	84
6"	24.4	12.2	15.2	6.1	90
8"	21.2	14.5	16.9	8.0	130
10"	24.0	16.9	18.7	10.0	185
12"	26.4	19.4	20.4	12.0	266
14"	28.7	21.0	21.3	13.1	352
16"	30.3	23.3	23.5	15.0	462
18"	30.7	25.0	25.0	16.8	570
20"	32.7	27.3	27.5	18.8	607
24"	35.8	31.5	32.0	22.8	904

ASME 300 lb

Nominal size	Dimensions [inches]				Approx weight [lb]
	L	H	W	Di	
2"	15.0	7.7	11.8	1.9	27
2½"	15.4	8.5	12.2	2.3	38
3"	21.3	9.3	12.8	2.9	53
4"	22.4	10.7	13.3	3.8	86
5"	24.0	11.7	14.1	4.8	115
6"	25.2	13.0	5.0	5.8	146
8"	22.0	15.3	16.6	7.6	207
10"	25.2	17.6	18.3	9.6	309
12"	28.0	20.1	20.5	11.4	452
14"	29.9	22.0	23.0	12.5	609
16"	31.9	24.3	25.5	14.3	785
18"	33.1	26.5	28.0	16.4	926
20"	36.6	28.8	30.5	18.0	1237
24"	38.2	33.5	36.0	22.0	1715

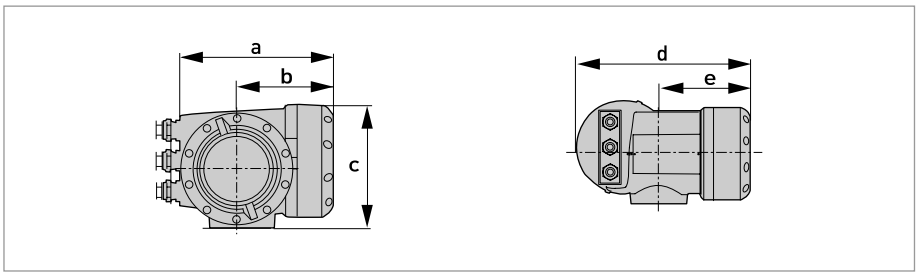
ASME 600 lb

Nominal size	Dimensions [inches]				Approx weight [lb]
	L	H	W	Di	
2"	15.7	7.7	11.5	1.7	33
2½"	16.1	8.5	12.0	2.1	44
3"	22.0	9.3	12.5	2.6	66
4"	24.4	11.1	13.1	3.6	119
5"	26.0	12.7	14.1	4.8	183
6"	27.2	13.8	15.0	5.8	223
8"	24.4	16.1	16.5	7.4	333
10"	27.2	18.3	20.0	9.3	531
12"	28.3	20.9	22.0	11.2	655
14"	29.9	22.4	23.7	12.1	798
16"	32.7	25.0	27.0	14.0	1105
18"	34.6	27.1	29.3	15.6	1389
20"	35.4	29.5	32.0	17.6	1695
24"	38.2	34.0	37.0	21.2	2438

ASME 900 lb

Nominal size	Dimensions [inches]				Approx weight [lb]
	L	H	W	Di	
2"	17.7	8.7	11.5	1.7	64
2½"	18.1	9.6	12.0	2.1	86
3"	23.6	9.9	12.5	2.6	119
4"	26.8	11.4	13.0	3.4	157
5"	26.8	12.6	13.7	3.2	240
6"	28.7	14.3	15.0	5.2	335
8"	26.8	17.0	18.5	6.8	545
10"	29.9	19.6	21.5	8.5	838
12"	31.9	21.9	24.0	10.1	1168
14"	33.9	23.1	25.2	11.2	1382

2.2.2 Converter housing



Compact housing (C)

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

Dimensions and weights in inches and lb

Version	Dimensions [inches]							Weight [lb]
	a	b	c	d	e	g	h	
C	7.75	4.75	6.10	10.20	5.40	-	-	9.30

3.1 Intended use

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

3.2 Environmental requirements

- Humidity: 5...80 % RH
- Ambient temperature: -40…+65°C / -40…+148°F
- Storage temperature: -50…+70°C / -58…+158°F
- Suitable for indoor and outdoor use and certified for operating up to an altitude of 2000 m / 6562 ft
- IP class 66/67

3.3 Installation requirements signal converter

- Allow 10…20 cm / 3.9…7.9" of space at the sides and rear of the signal converter to permit free air circulation.
- Protect signal converter against direct solar radiation, install a sunshield if necessary.
- Signal converters installed in switchgear cabinets require adequate cooling, e.g. by fan or heat exchanger.
- Do not expose the signal converter to intense vibration.

3.4 Installation requirements sensor

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

The OPTISONIC 7300 is in principle designed for the measurement of dry gas flow. The collection of liquid in the transducers can interrupt 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 flowsensor in a horizontal position in a slightly descending line.
- Orientate the flowsensor 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.

3.4.1 Inlet and outlet

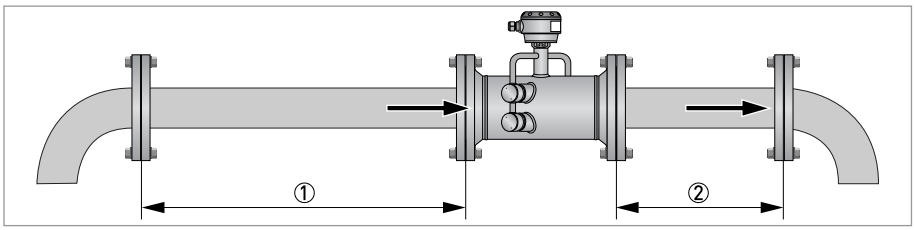


Figure 3-1: Recommended inlet and outlet

① ≥ 10 DN
② ≥ 3 DN

3.4.2 Vertical mounting

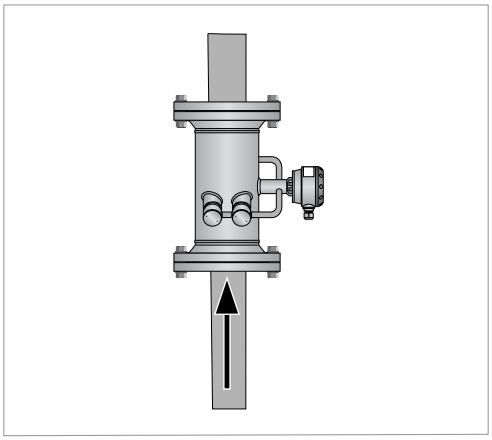


Figure 3-2: Vertical mounting

*Vertical mounting **only** with dry gas. Never mount vertically with risk on condensation or wet gas.*

3.4.3 Mounting position

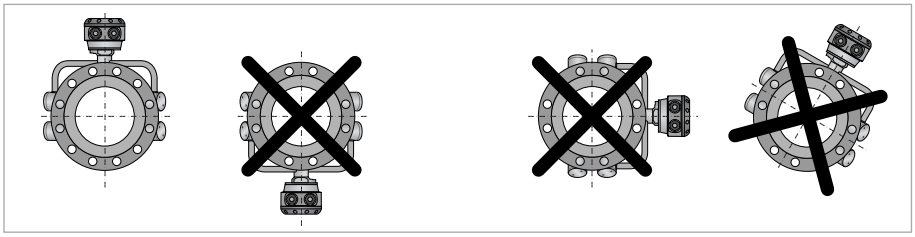


Figure 3-3: Mounting position

3.4.4 Vibration

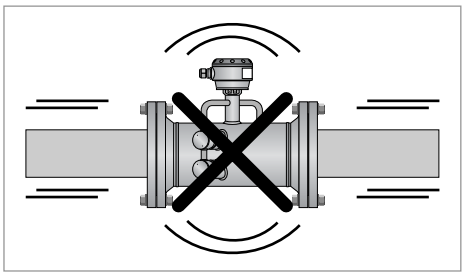


Figure 3-4: Avoid vibrations

3.4.5 Control valve

To avoid distorted flowprofiles and interference caused by valve noise in the sensor, control valves or pressure reducers should not be installed in the same pipeline as the flowmeter. In case this is required, please contact the manufacturer.

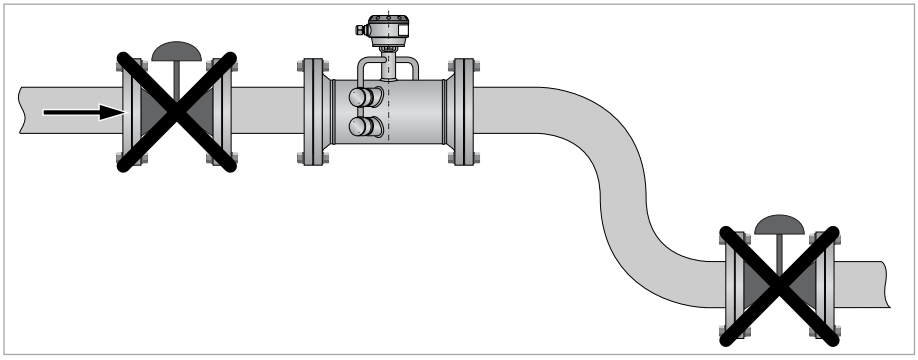


Figure 3-5: Control valve

3.4.6 Flange deviation

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

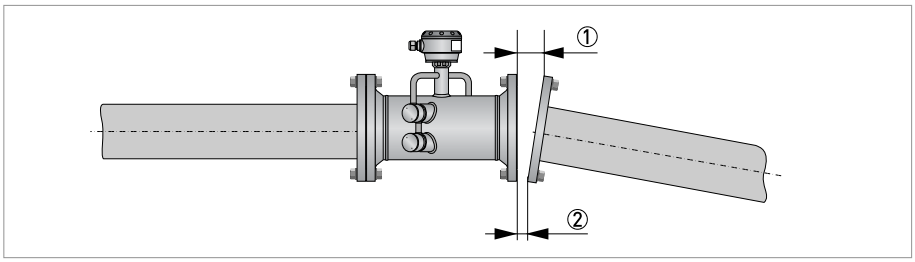


Figure 3-6: Flange deviation

① L_{max}
② L_{min}

3.4.7 T-section

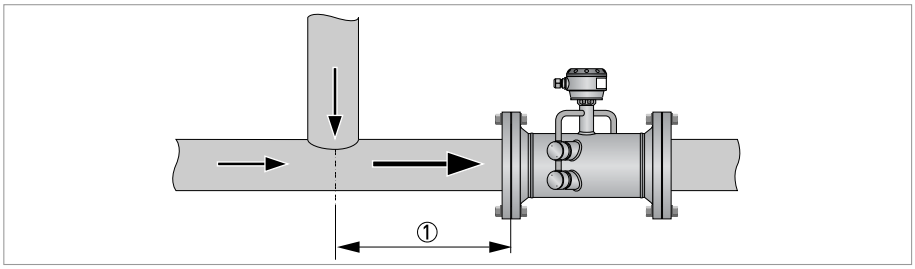


Figure 3-7: Distance after T-sections

① ≥ 10 DN

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!

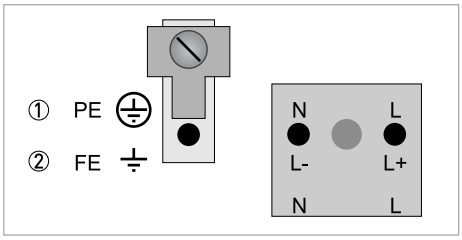
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

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 Power supply

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 VAC/DC (AC: -15% / +10%; DC: -25% / +30%), 22 VA or 12 W

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

100...230 VAC

- Connect the protective ground conductor PE of the mains power supply to the separate terminal in the terminal compartment of the signal converter.
- Connect the live conductor to the L terminal and the neutral conductor to the N terminal.

24 VAC/DC

- Connect a functional ground FE 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) (VDE 0100 / VDE 0106 and/or IEC 364 / IEC 536 or relevant national regulations).

4.3 Inputs and outputs, overview

4.3.1 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 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.

4.3.2 Description of the CG number

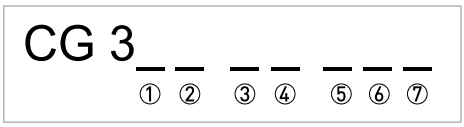


Figure 4-1: Marking (CG number) of the electronics module and input/output variants

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

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, frequency, status output or limit switch (changeable)
P_p / S_p	E	Passive pulse, frequency, status output or limit switch (changeable)
P_N / S_N	F	Passive pulse, frequency, 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 acc. to EN 60947-5-6. Errors indicated on LC display. Error messages possible via status output.
IIn_a	P	Active current input
IIn_p	R	Passive current input
-	8	No additional module installed
-	0	No further module possible

4.3.3 Fixed, non-alterable input/output versions

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

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

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-
Basic in-/output (I/O) (Standard)									
1 0 0		I_p + HART® passive ①		S_p / C_p passive ②		S_p passive		P_p / S_p passive ②	
	I_a + HART® active ①								
Ex-i in-/outputs (Option)									
2 0 0						I_a + HART® active		P_N / S_N NAMUR ②	
3 0 0						I_p + HART® passive		P_N / S_N NAMUR ②	
2 1 0		I_a active		P_N / S_N NAMUR C_p passive ②		I_a + HART® active		P_N / S_N NAMUR ②	
3 1 0		I_a active		P_N / S_N NAMUR C_p passive ②		I_p + HART® passive		P_N / S_N NAMUR ②	
2 2 0		I_p passive		P_N / S_N NAMUR C_p passive ②		I_a + HART® active		P_N / S_N NAMUR ②	
3 2 0		I_p passive		P_N / S_N NAMUR C_p passive ②		I_p + HART® passive		P_N / S_N NAMUR ②	

① Function changed by reconnecting
② Changeable

4.3.4 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	
Modbus (Option)									
G _ _ ②		max. 2 optional modules for term. A + B					Common	Sign. B (D1)	Sign. A (D0)
H _ _ ③		max. 2 optional modules for term. A + B					Common	Sign. B (D1)	Sign. A (D0)

① Changeable
② Not activated bus terminator
③ Activated bus terminator

Please fill in this form and fax or email it to your local representive. 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:	
Medium	
Gas composition:	
CO_2 content:	
H_2 content:	
Density:	
Velocity of sound:	
Flowrate	
Normal:	
Minimum:	
Maximum:	
Temperature	
Normal:	
Minimum:	
Maximum:	
Pressure	
Normal:	
Minimum:	
Maximum:	

Piping details

Nominal pipe size:	
Outer diameter:	
Wall thickness / schedule:	
Pipe material:	
Pipe condition (old / new / painted / internal scaling / exterior rust):	
Liner material:	
Liner thickness:	
Straight inlet / outlet section (DN):	
Upstream situation (elbows, valves, pumps):	
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):	
Analog output (4-20 mA)	
Pulse (specify minimum pulse width, pulse value):	
Digital protocol:	
Accessories:	

KROHNE product overview

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

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www.krohne.com

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