

### Gas ultrasonic flowmeter for permanent installation

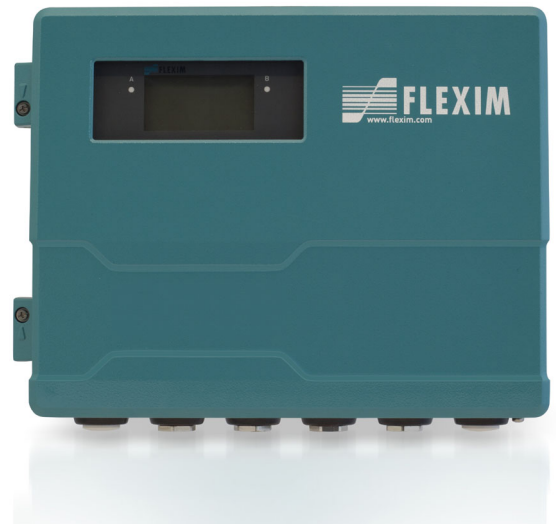
Transmitter for permanent outdoor wall or pipe mounting

#### Features

- Exact and highly reliable bidirectional clamp-on flow measurement of operational and standard volume flow rates as well as mass flow rates
- High measurement accuracy even at very low as well as very high flow rates and independent of the flow direction (bidirectional)
- The measurement is zero point stable, drift free and independent of the pipe material as well as the process pressure (> 3 bar on steel pipes; no minimum pressure for plastic pipes) and the process fluid
- The measurement system also precisely measures wet gas flow rates up to 5 % LVF (liquid volume fraction)
- Advanced self-diagnosis and possibilities for event-based triggering of data recording for the supervision and control of critical processes
- G722 with advanced functionality:
  - Synchronized channel averaging to reduce turbulence-related fluctuations of the measured value
  - Multifunctional digital outputs
- Bidirectional communication and support of common bus technologies (Profibus PA, Foundation Fieldbus, HART, Modbus, BACnet, M-Bus)
- Installation and start-up do not require any pipe work nor any process interruptions
- Transmitter and transducers are separately calibrated (traceable to national standards)
- Automatic loading of calibration data and transducer recognition
- Transducers available for a wide range of inner pipe diameters and fluid temperatures
- Transmitter and transducers for use in hazardous areas are available

#### Applications

- Chemical industry
- Petrochemical industry
- Oil and gas industry
- Manufacturing industries



FLUXUS G72\*\*\*-\*\*\*\*A



FLUXUS G72\*\*\*-\*\*\*\*S



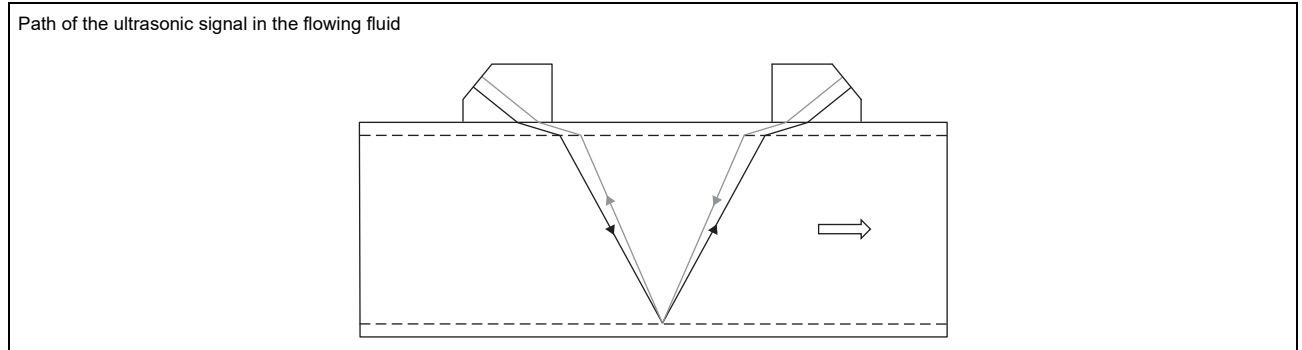
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## Function

### Measurement principle

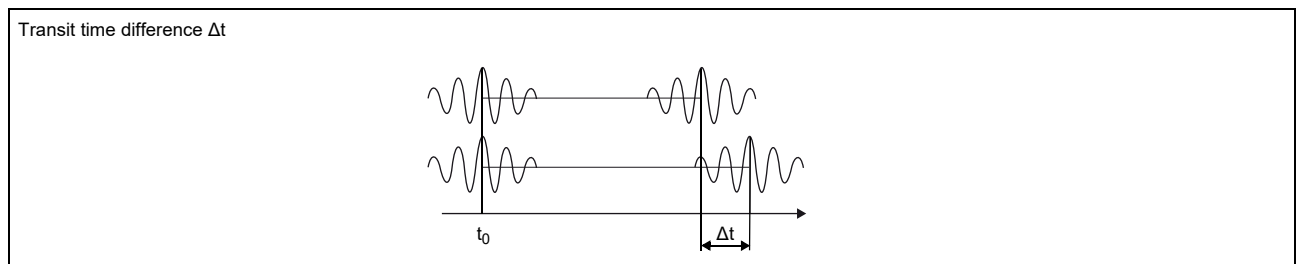
The transducers are mounted on the pipe which is completely filled with the fluid. The ultrasonic signals are emitted alternately by a transducer and received by the other. The physical quantities are determined from the transit times of the ultrasonic signals.



As the fluid where the ultrasound propagates is flowing, the transit time of the ultrasonic signal in flow direction is shorter than the one against the flow direction.

The transit time difference  $\Delta t$  is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow rate.

The integrated microprocessors control the entire measuring cycle. The received ultrasonic signals are checked for measurement usability and evaluated for their reliability. Noise signals are eliminated.



### Calculation of volumetric flow rate

$$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \frac{\Delta t}{2 \cdot t_{\gamma}}$$

where

- $\dot{V}$  - volumetric flow rate
- $k_{Re}$  - fluid mechanics calibration factor
- $A$  - cross-sectional pipe area
- $k_a$  - acoustical calibration factor
- $\Delta t$  - transit time difference
- $t_{\gamma}$  - average of transit times in the fluid

## Calculation of mass flow rate

The mass flow rate is calculated from the operating density and the volumetric flow rate:

$$\dot{m} = \rho \cdot \dot{V}$$

The operating density of the fluid is calculated as the function of pressure and temperature of the fluid:

$$\rho = f(p, T)$$

where

- $\rho$  - operating density
- $p$  - fluid pressure
- $T$  - fluid temperature
- $\dot{m}$  - mass flow rate
- $\dot{V}$  - volumetric flow rate

## Calculation of standard volumetric flow rate

The standard volumetric flow rate can be selected as physical quantity. It is calculated with the following formula:

$$\dot{V}_N = \dot{V} \cdot \frac{p}{p_N} \cdot \frac{T_N}{T} \cdot \frac{1}{K}$$

where

- $\dot{V}_N$  - standard volumetric flow rate
- $\dot{V}$  - operating volumetric flow rate
- $p_N$  - standard pressure (absolute value)
- $p$  - operating pressure (absolute value)
- $T_N$  - standard temperature in K
- $T$  - operating temperature in K
- $K$  - compressibility coefficient of gas: ratio of the compressibility factors of the gas at operating conditions and at standard conditions  $Z/Z_N$

The operational pressure  $p$  and the operational temperature  $T$  of the fluid will be entered directly as fixed values into the transmitter.

or:

If inputs are installed (optional), pressure and temperature can be measured by the customer and fed in the transmitter.

## Calculation of gas energy flow rate (NGE)

For natural gas with changing composition (NGE fluid data sets), the Natural Gas Engine (NGE) can be used to calculate the gas energy flow rate:

$$\Phi = \text{HHV}_V \cdot \dot{V}_N = \text{HHV}_m \cdot \dot{m}$$

$$\text{HHV}_m = \rho_N \cdot \text{HHV}_V$$

where

- $\Phi$  - gas energy flow rate
- $\dot{V}_N$  - standard volumetric flow rate
- $\dot{m}$  - mass flow rate
- $\text{HHV}_V$  - higher heating value, volume-related
- $\text{HHV}_m$  - higher heating value, mass-related
- $\rho_N$  - normalised density

## Number of sound paths

The number of sound paths is the number of transits of the ultrasonic signal through the fluid in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflection arrangement**

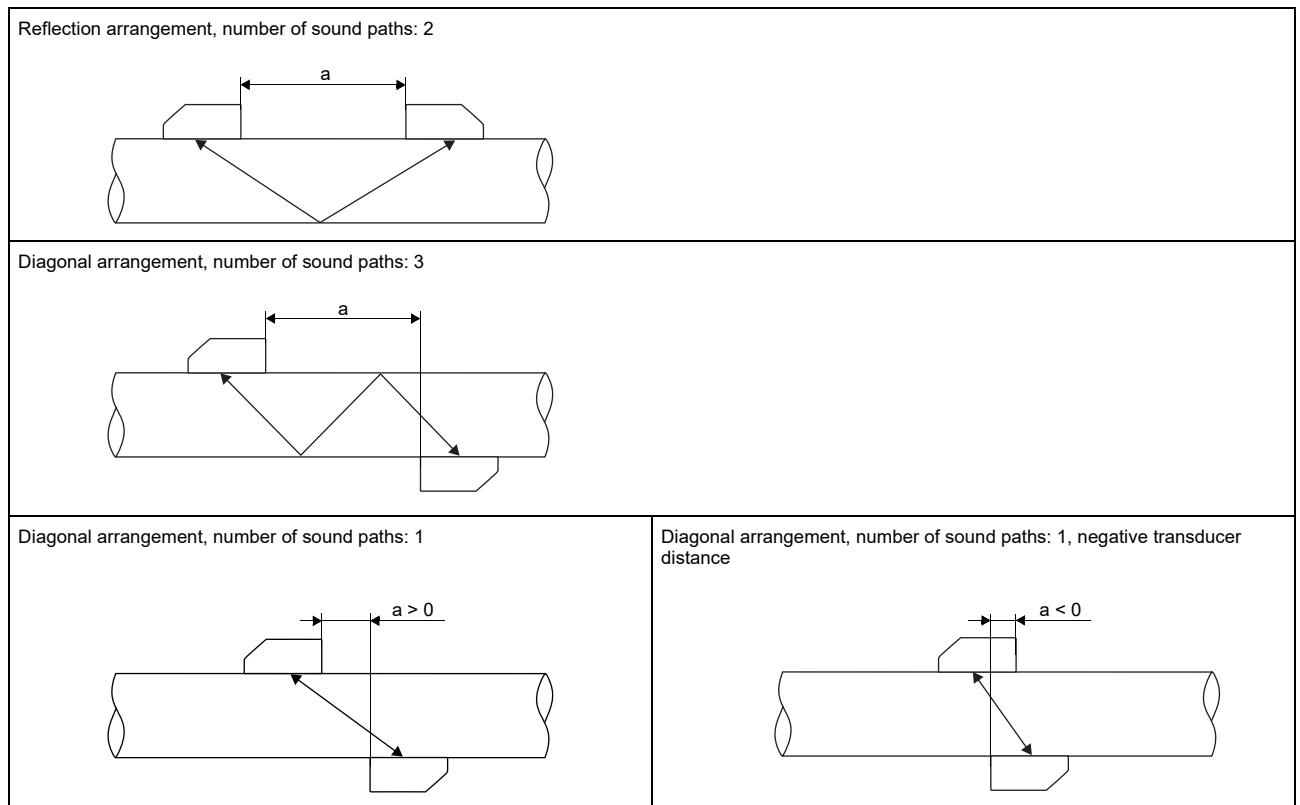
The number of sound paths is even. The transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easy.

- **diagonal arrangement**

The number of sound paths is odd. The transducers are mounted on opposite sides of the pipe. In the case of a high signal attenuation by the fluid, pipe and coatings, diagonal arrangement with 1 sound path will be used.

The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the transmitter.

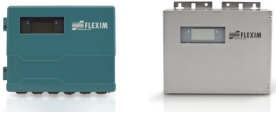
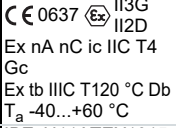
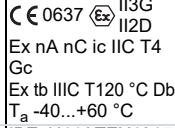




As the transducers can be mounted with the transducer mounting fixture in reflection arrangement or diagonal arrangement, the number of sound paths can be adjusted optimally for the application.



a - transducer distance

# Transmitter

## Technical data

	FLUXUS G721**-NN0*A G721**-NN0*S	FLUXUS G721**-A20*S	FLUXUS G721**-F20*S	FLUXUS G722**-NN0*A G722**-NN0*S	FLUXUS G722**-A20*S	FLUXUS G722**-F20*S
						
design	standard field device nonEx	standard field device zone 2	standard field device FM Class I Div. 2	standard field device nonEx	standard field device zone 2	standard field device FM Class I Div. 2
<b>measurement</b>						
measurement principle	transit time difference correlation principle					
synchronised channel averaging	-			x (2 measuring channels necessary)		
flow velocity	m/s 0.01...35, depending on pipe diameter					
repeatability	0.15 % MV ±0.005 m/s					
fluid	all acoustically conductive gases, e.g. nitrogen, air, oxygen, hydrogen, argon, helium, ethylene, propane					
temperature compensation	corresponding to the recommendations in ANSI/ASME MFC-5.1-2011					
<b>measurement uncertainty (volumetric flow rate)</b>						
measurement uncertainty of the measuring system <sup>1</sup>	±0.3 % MV ±0.005 m/s					
measurement uncertainty at the measuring point	±1...2 % MV ±0.005 m/s, depending on the application					
<b>transmitter</b>						
power supply	<ul style="list-style-type: none"> <li>• 100...230 V/50...60 Hz or</li> <li>• 20...32 V DC or</li> <li>• 11...16 V DC</li> </ul>					
power consumption	W < 15					
number of measuring channels	1, optional: 2			1, optional: 2 (1 measuring point)		
damping	s 0...100 (adjustable)					
measuring cycle	Hz 100...1000 (1 channel)					
response time	s 1 (1 channel), option: 0.02			1 (1 channel), option: 0.02		
housing material	aluminum, powder coated or stainless steel 316L (1.4404)			aluminum, powder coated or stainless steel 316L (1.4404)		
degree of protection	IP66	IP66	IP65	IP66	IP66	IP65
dimensions	mm see dimensional drawing					
weight	kg aluminum housing: 5.4 stainless steel housing: 5.1					
fixation	wall mounting, optional: 2" pipe mounting					
ambient temperature °C	-40...+60 (< -20 °C without operation of the display)	-40...+60 (< -20 °C without operation of the display)	-20...+55/60	-40...+60 (< -20 °C without operation of the display)	-40...+60 (< -20 °C without operation of the display)	-20...+55/60
display	128 x 64 dots, backlight					
menu language	English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian					
<b>explosion protection</b>						
<b>• ATEX/IECEX</b>						
marking	-	 CE 0637 Ex II 3G II 2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db T <sub>a</sub> -40...+60 °C	-	-	 CE 0637 Ex II 3G II 2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db T <sub>a</sub> -40...+60 °C	-
certification ATEX	-	IBExU11ATEX1015	-	-	IBExU11ATEX1015	-
certification IECEX	-	IECEX IBE 11.0008	-	-	IECEX IBE 11.0008	-
<b>• FM</b>						
marking	-	-	G721**-F20*S2, G721**-F20*S3:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T5 G721**-F20*S1:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T4A	-	-	G722**-F20*S2, G722**-F20*S3:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T5 G722**-F20*S1:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T4A

<sup>1</sup> with aperture calibration of the transducers

<sup>2</sup> outside the explosive atmosphere (housing cover open)

<sup>3</sup> with inputs and including parametrisation of the transmitter

	FLUXUS G721**-NN0*A G721**-NN0*S	FLUXUS G721**-A20*S	FLUXUS G721**-F20*S	FLUXUS G722**-NN0*A G722**-NN0*S	FLUXUS G722**-A20*S	FLUXUS G722**-F20*S
<b>measuring functions</b>						
physical quantities	operating volumetric flow rate, standard volumetric flow rate, mass flow rate, flow velocity, gas energy flow rate (NGE)					
totaliser	volume, mass, gas energy (NGE)					
calculation functions	average, difference, sum (2 measuring channels necessary)					
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times					
<b>communication interfaces</b>						
service interfaces	measured value transmission, parametrisation of the transmitter: • USB <sup>2</sup> • LAN <sup>2</sup>					
process interfaces	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • M-Bus • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • M-Bus • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU <sup>3</sup> • BACnet MS/TP • HART <sup>3</sup> • Profibus PA <sup>3</sup> • FF H1 <sup>3</sup> • Modbus TCP <sup>3</sup> • BACnet IP
<b>accessories</b>						
data transmission kit	USB cable					
software	• FluxDiagReader: reading of measured values and parameters, graphical presentation • FluxDiag (optional): reading of measurement data, graphical presentation, report generation, parametrisation of the transmitter					
<b>data logger</b>						
loggable values	all physical quantities, totalised physical quantities and diagnostic values					
capacity	max. 800 000 measured values					
<b>outputs</b>						
	The outputs are galvanically isolated from the transmitter.					
number	on request					
<b>• switchable current output</b>						
	All switchable current outputs are jointly switched to active or passive.					
range	mA	4...20 (3.2...22)				
accuracy		0.04 % MV ±3 µA				
active output		R <sub>ext</sub> < 350 Ω				
passive output		U <sub>ext</sub> = 8...30 V, depending on R <sub>ext</sub> (R <sub>ext</sub> < 1 kΩ at 30 V)				
<b>• HART</b>						
range	mA	4...20				
accuracy		0.1 % MV ±15 µA				
active output		U <sub>int</sub> = 24 V, R <sub>ext</sub> < 500 Ω				
passive output		U <sub>ext</sub> = 10...24 V DC, depending on R <sub>ext</sub> (R <sub>ext</sub> < 1 kΩ at 24 V)				
<b>• voltage output</b>						
range	V	0...1 or 0...10				
accuracy		0...1 V: 0.1 % MV ±1 mV 0...10 V: 0.1 % MV ±10 mV				
internal resistance		R <sub>int</sub> = 500 Ω				
<b>• frequency output</b>						
range	kHz	0...5				
optorelay		24 V/4 mA, R <sub>int</sub> = 66.5 Ω				
<b>• binary output</b>						
optorelay		26 V/100 mA				
Reed relay		48 V/100 mA, R <sub>int</sub> = 22 Ω				
binary output as alarm output						
• functions		limit, change of flow direction or error				
binary output as pulse output						
• functions		mainly for totalising				
• pulse value	units	0.01...1000				
• pulse width	ms	optorelay: 1...1000 Reed relay: 80...1000				

<sup>1</sup> with aperture calibration of the transducers

<sup>2</sup> outside the explosive atmosphere (housing cover open)

<sup>3</sup> with inputs and including parametrisation of the transmitter

	FLUXUS G721**-NN0*A G721**-NN0*S	FLUXUS G721**-A20*S	FLUXUS G721**-F20*S	FLUXUS G722**-NN0*A G722**-NN0*S	FLUXUS G722**-A20*S	FLUXUS G722**-F20*S
<b>• digital output</b>						
functions	-			<ul style="list-style-type: none"> <li>• frequency output</li> <li>• binary output</li> <li>• pulse output</li> </ul>		
number	-			3		
operating parameters	-			5...30 V/< 100 mA		
<b>frequency output</b>						
• range	kHz	-			0...5	
<b>binary output</b>						
• binary output as alarm output	-			limit, change of flow direction or error		
<b>pulse output</b>						
• functions	-			mainly for totalising		
• pulse value	units	-			0.01...1000	
• pulse width	ms	-			0.05...1000	
<b>inputs</b>						
The inputs are galvanically isolated from the transmitter.						
number	max. 4, on request					
<b>• temperature input</b>						
type	Pt100/Pt1000					
connection	4-wire					
range	°C	-150...+560				
resolution	K	0.01				
accuracy	±0.01 % MV ±0.03 K					
<b>• current input</b>						
accuracy	0.1 % MV ±10 µA					
active input	U <sub>int</sub> = 24 V, R <sub>int</sub> = 50 Ω, P <sub>int</sub> < 0.5 W, not short-circuit proof					
• range	mA	0...20				
passive input	R <sub>int</sub> = 50 Ω, P <sub>int</sub> < 0.3 W					
• range	mA	-20...+20				
<b>• voltage input</b>						
range	V	0...1				
accuracy	0.1 % MV ±1 mV					
internal resistance	R <sub>int</sub> = 1 MΩ					
<b>• binary input</b>						
switching signal	5...30 V, 1 mA		5...26 V, 1 mA		5...30 V, 1 mA	
functions	<ul style="list-style-type: none"> <li>• reset of the measured values</li> <li>• reset of the totalisers</li> <li>• stop of the totalisers</li> <li>• activation of the measuring mode for highly dynamic flows</li> </ul>					

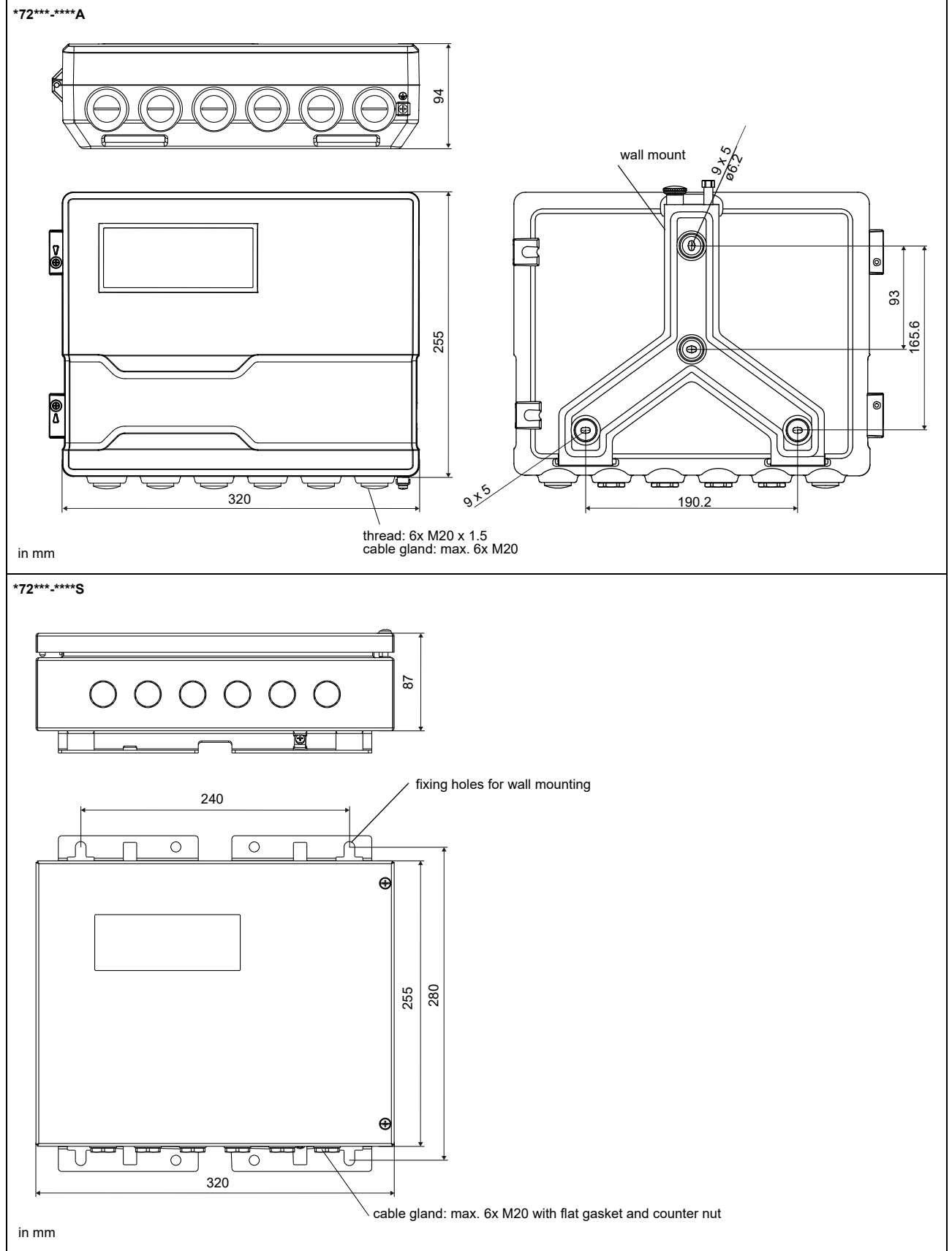
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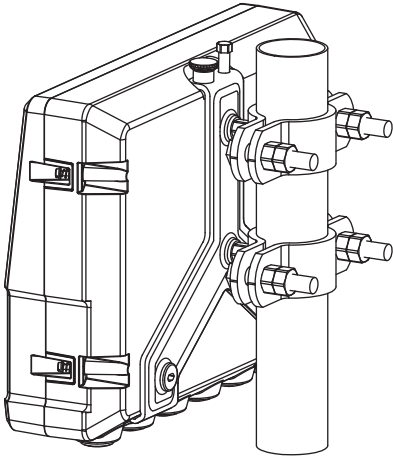


**Dimensions**



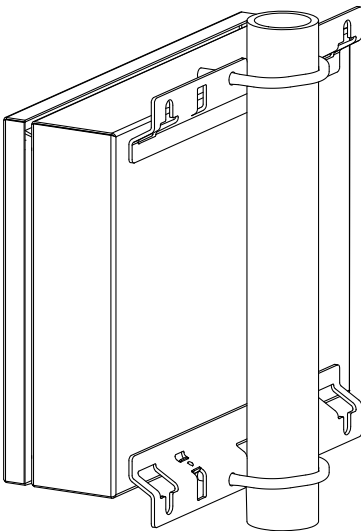
### 2" pipe mounting kit

\*72\*\*\*.\*\*\*\*A



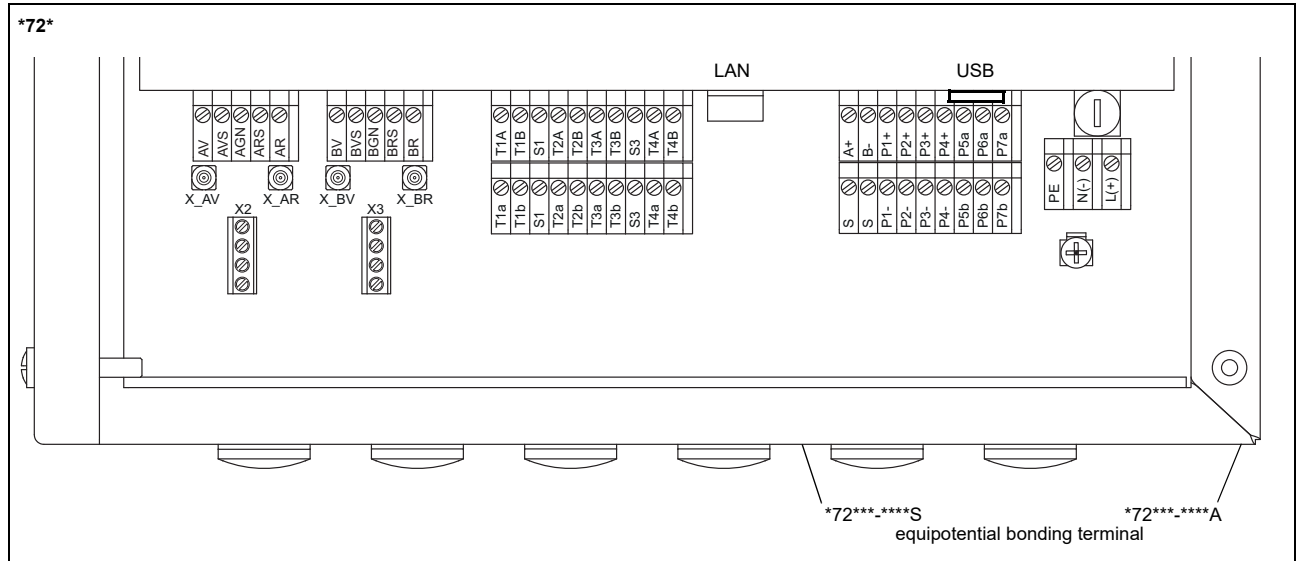
order code:  
ACC-PE-\*721-/PMK4

\*72\*\*\*.\*\*\*\*S



order code:  
ACC-PE-\*721-/PMK6

## Terminal assignment



power supply <sup>1</sup>							
terminal		connection (AC)			connection (DC)		
PE		earth			earth		
N(-)		neutral			-		
L(+)		phase			+		
transducers							
transducer cable (transducers *****8*, ****L1*), extension cable				transducer cable (transducers *****52)			
measuring channel A				measuring channel B			
terminal	connection	terminal	connection	transducer	terminal	terminal	connection
AV	signal	BV	signal	↑	X_AV	X_BV	SMB connector
AVS	shield	BVS	shield				
ARS	shield	BRS	shield	↕	X_AR	X_BR	SMB connector
AR	signal	BR	signal				
outputs <sup>1, 2</sup>							
terminal	connection	terminal	connection	communication interface			
P1+...P4+ P1-...P4-	current output, voltage output, frequency output, binary output (Reed relay), HART (P1)	A+	signal +	<ul style="list-style-type: none"> <li>• RS485<sup>1</sup></li> <li>• Modbus RTU<sup>1</sup></li> <li>• BACnet MS/TP<sup>1</sup></li> <li>• M-Bus<sup>1</sup></li> <li>• Profibus PA<sup>1</sup></li> <li>• FF H1<sup>1</sup></li> </ul>			
		B-	signal -				
		S	shield				
P5a...P7a P5b...P7b	binary output (optorelay), digital output	USB	type B Hi-Speed USB 2.0 Device	<ul style="list-style-type: none"> <li>• service (FluxDiag/FluxDiagReader)</li> <li>• service (FluxDiag/FluxDiagReader)</li> <li>• BACnet IP</li> <li>• Modbus TCP</li> </ul>			
		LAN	RJ45 10/100 Mbps Ethernet				
analog inputs <sup>1, 2</sup>							
terminal	temperature probe		passive sensor	active sensor			
	direct connection	connection with extension cable	connection	connection			
T1a...T4a	red	red	not connected	not connected			
T1A...T4A	red/blue	grey	-	+			
T1b...T4b	white/blue	blue	+	not connected			
T1B...T4B	white	white	not connected	-			
S1, S3	shield	shield	not connected	not connected			
binary inputs <sup>1, 2</sup>							
terminal							
P1+...P2+, P1-...P2-							

<sup>1</sup> cable (by customer):  
 - e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm<sup>2</sup>  
 - outer diameter of the cable (\*72\*\*\*-\*\*\*\*S with ferrite nut): max. 7.6 mm

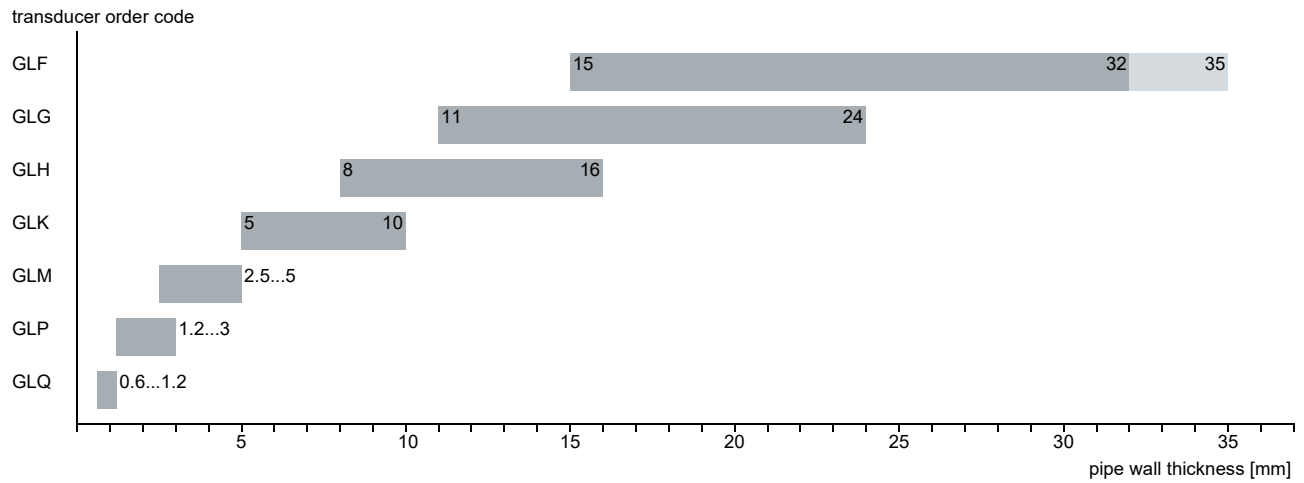
<sup>2</sup> The number, type and terminal assignment are customised.

## Transducers

### Transducer selection

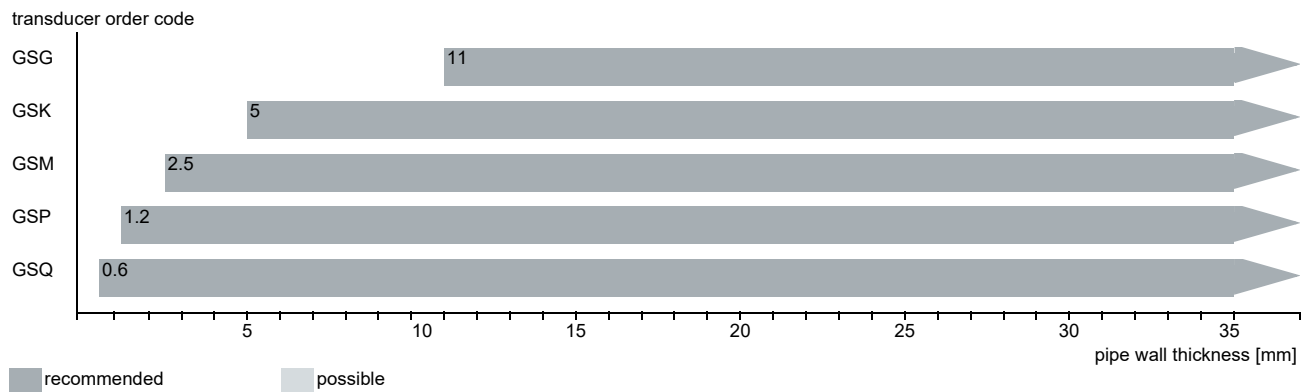
#### Step 1a

Select a Lamb wave transducer:



#### Step 1b

If the pipe wall thickness is not in the range of the Lamb wave transducers, select a shear wave transducer:

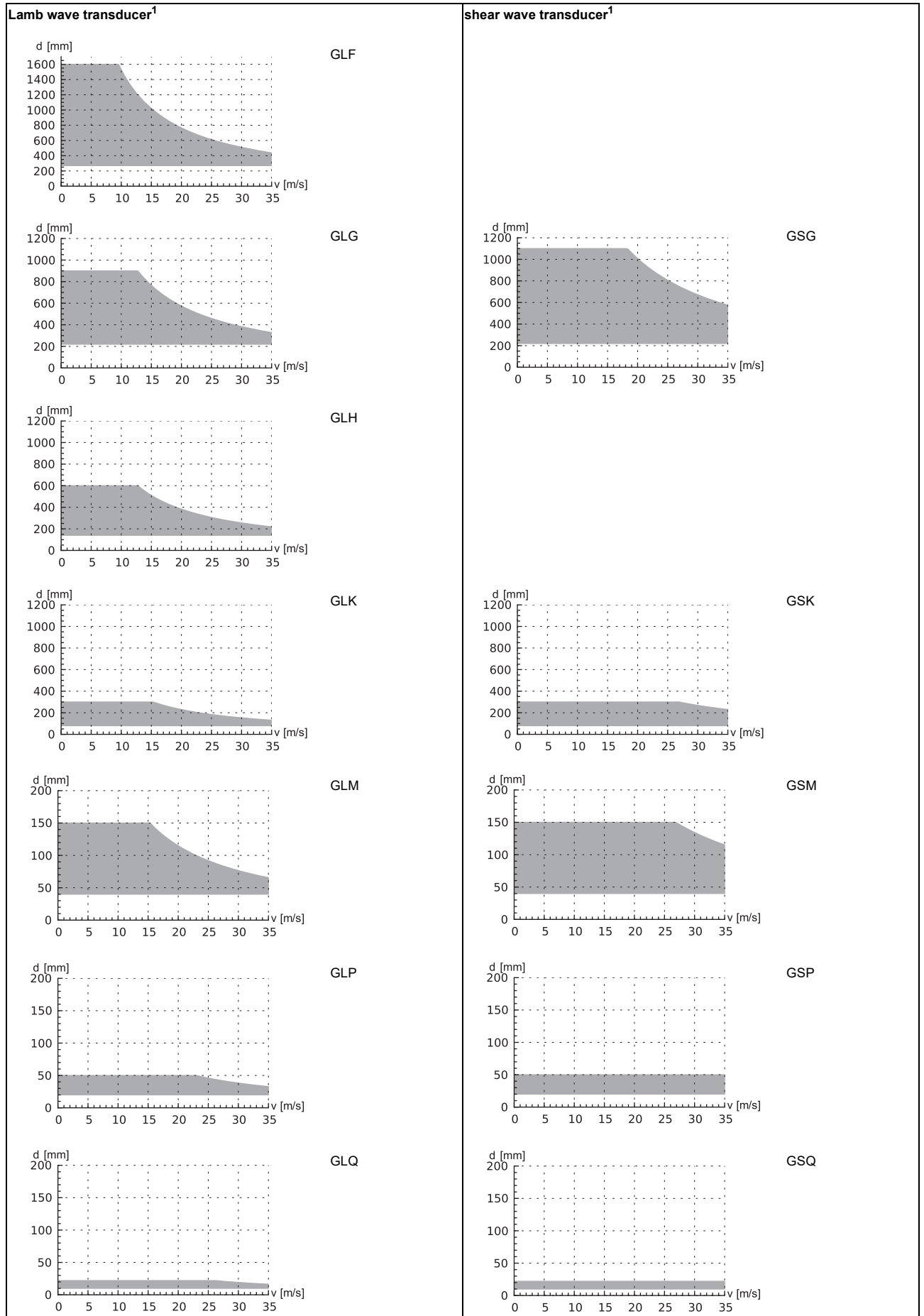


#### Step 2

inner pipe diameter  $d$  dependent on the flow velocity  $v$  of the fluid in the pipe

The transducers are selected from the characteristics (see next page). Lamb wave transducers are selected from the left column, shear wave transducers from the right column.

Lamb wave transducers: If the values  $d$  and  $v$  are not in the range, the diagonal arrangement with 1 sound path may be used, i.e. the same characteristics can be used with doubling the inner pipe diameter. If the values are still not in the range, shear waves transducers regarding the pipe wall thickness have to be selected in step 1b.



<sup>1</sup> inner pipe diameter and max. flow velocity for a typical application with natural gas, nitrogen, oxygen in reflection arrangement with 2 sound paths (Lamb wave transducers)/1 sound path (shear wave transducers)

### Step 3

min. fluid pressure

Lamb wave transducer			
transducer order code	fluid pressure <sup>1</sup> [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GLF	15	10	1
GLG	15	10	1
GLH	15	10	1
GLK	15 (d > 120 mm) 10 (d < 120 mm)	10 (d > 120 mm) 3 (d < 120 mm)	1
GLM	10 (d > 60 mm) 5 (d < 60 mm)	3 (d < 60 mm)	1
GLP	10 (d > 35 mm) 5 (d < 35 mm)	3 (d < 35 mm)	1
GLQ	10 (d > 15 mm) 5 (d < 15 mm)	3 (d < 15 mm)	1

shear wave transducer			
transducer order code	fluid pressure <sup>1</sup> [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GSG	30	20	1
GSK	30	20	1
GSM	30	20	1
GSP	30	20	1
GSQ	30	20	1

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

d - inner pipe diameter

### Example

step					
1	pipe wall thickness	mm	14.3	8.6	38
	selected transducer		GLG or GLH	GLH or GLK	GS
2	inner pipe diameter	mm	581	96.8	143
	max. flow velocity	m/s	15	30	30
	selected transducer		GLG	GLK	GSK
3	min. fluid pressure	bar	20	15	40
	selected transducer		GLG	GLK	GSK

### Step 4

for the characters 4...11 of the transducer order code (ambient temperature, explosion protection, connection system, extension cable) see page 15

### Step 5

for the technical data of the selected transducer see page 16 et seqq.

### Transducer order code

1, 2	3	4	5, 6	7, 8	9...11	no. of character				
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option	description
GS										set of ultrasonic flow transducers for gas measurement, shear wave
GL										set of ultrasonic flow transducers for gas measurement, Lamb wave
	F									0.15 MHz
	G									0.2 MHz
	H									0.3 MHz
	K									0.5 MHz
	M									1 MHz
	P									2 MHz
	Q									4 MHz
		N								normal temperature range
		E								extended temperature range
			NN							not explosion-proof
			A2							ATEX zone 2/IECEX zone 2
			A1							ATEX zone 1/IECEX zone 1
			F2							FM Class I Div. 2
				TS						direct connection or connection via junction box
					XXX					0 m: without extension cable > 0 m: with extension cable
								LC		long transducer cable
								IP68		degree of protection IP68
								OS		housing with stainless steel 316

## Technical data

### Shear wave transducers (zone 2 - FM Class I Div. 2 - nonEx, TS)

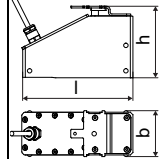
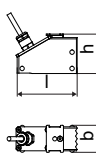
order code		GSG-N**TS/**	GSK-N**TS/**	GSM-N**TS/**	GSP-N**TS/**	GSQ-N**TS/**
technical type		G(DL)G1N52	G(DL)K1N52	G(DL)M2N52	G(DL)P2N52	G(DL)Q2N52
transducer frequency	MHz	0.2	0.5	1	2	4
<b>fluid pressure<sup>1</sup></b>						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
<b>inner pipe diameter d<sup>2</sup></b>						
min. extended	mm	180	60	30	15	7
min. recommended	mm	220	80	40	20	10
max. recommended	mm	900	300	150	50	22
max. extended	mm	1100	360	180	60	30
<b>pipe wall thickness</b>						
min.	mm	11	5	2.5	1.2	0.6
<b>material</b>						
housing		PEEK with stainless steel cover 304 (1.4301), ***.*****/OS: 316L (1.4404)				
contact surface		PEEK				
degree of protection		IP67				
<b>transducer cable</b>						
type		1699				
length	m	5		4		3
length (***.*****/LC)	m	9				
<b>dimensions</b>						
length l	mm	129.5	126.5	64		40
width b	mm	51	51	32		22
height h	mm	67	67.5	40.5		25.5
dimensional drawing						
weight (without cable)	kg	0.47	0.36	0.066		0.016
<b>pipe surface temperature</b>						
min.	°C	-40				
max.	°C	+130				
<b>ambient temperature</b>						
min.	°C	-40				
max.	°C	+130				
temperature compensation		x				
<b>explosion protection</b>						
<b>• ATEX/IECEx</b>						
order code		GSG-NA2TS/**	GSK-NA2TS/**	GSM-NA2TS/**	GSP-NA2TS/**	GSQ-NA2TS/**
pipe surface temperature (Ex)						
• min.	°C	-55				
• max.	°C	gas: +190, dust: +180				
marking		CE 0637  II3G II2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T185 °C Db				
certification ATEX		IBExU10ATEX1163 X				
certification IECEx		IECEx IBE 12.0005X				
<b>• FM</b>						
order code		GSG-NF2TS/**	GSK-NF2TS/**	GSM-NF2TS/**	GSP-NF2TS/**	GSQ-NF2TS/**
pipe surface temperature (Ex)						
• min.	°C	-40				
• max.	°C	+125   +190				
degree of protection		IP66				
marking		NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s



**Shear wave transducers (zone 2 - nonEx, TS, IP68)**

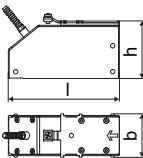
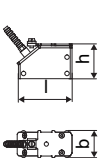
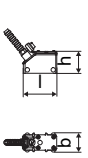

order code		GSG-N**TS/IP68	GSK-N**TS/IP68	GSM-N**TS/IP68	GSP-N**TS/IP68
technical type		GDG1LI8	GDK1LI8	GDM2LI8	GDP2LI8
transducer frequency	MHz	0.2	0.5	1	2
<b>fluid pressure<sup>1</sup></b>					
min. extended	bar	metal pipe: 20			
min.	bar	metal pipe: 30, plastic pipe: 1			
<b>inner pipe diameter d<sup>2</sup></b>					
min. extended	mm	180	60	30	15
min. recommended	mm	220	80	40	20
max. recommended	mm	900	300	150	50
max. extended	mm	1100	360	180	60
<b>pipe wall thickness</b>					
min.	mm	11	5	2.5	1.2
<b>material</b>					
housing		PEEK with stainless steel cover 316Ti (1.4571)			
contact surface		PEEK			
degree of protection		IP68 <sup>3</sup>			
<b>transducer cable</b>					
type		2550			
length	m	12			
<b>dimensions</b>					
length l	mm	130		72	
width b	mm	54		32	
height h	mm	83.5		46	
dimensional drawing					
weight (without cable)	kg	0.43		0.085	
<b>pipe surface temperature</b>					
min.	°C	-40			
max.	°C	+100			
<b>ambient temperature</b>					
min.	°C	-40			
max.	°C	+100			
temperature compensation		x			
<b>explosion protection</b>					
• ATEX/IECEX					
order code		GSG-NA2TS/IP68	GSK-NA2TS/IP68	GSM-NA2TS/IP68	GSP-NA2TS/IP68
pipe surface temperature (Ex)					
• min.	°C	-40			
• max.	°C	gas: +90, dust: +80			
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db			
certification ATEX		IBExU10ATEX1163 X			
certification IECEX		IECEX IBE 12.0005X			

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

<sup>3</sup> test conditions: 3 months/2 bar (20 m)/20 °C

**Shear wave transducers (zone 2 - FM Class I Div. 2 - nonEx, TS, extended temperature range)**

order code		GSG-ENNTS/**	GSK-ENNTS/**	GSM-E**TS/**	GSP-E**TS/**	GSQ-E**TS/**
technical type		G(DL)G1E52	G(DL)K1E52	G(DL)M2E52	G(DL)P2E52	G(DL)Q2E52
transducer frequency	MHz	0.2	0.5	1	2	4
<b>fluid pressure<sup>1</sup></b>						
min. extended	bar	metal pipe: 20		metal pipe: 20		
min.	bar	metal pipe: 30, plastic pipe: 1		metal pipe: 30, plastic pipe: 1		
<b>inner pipe diameter d<sup>2</sup></b>						
min. extended	mm	180	60	30	15	7
min. recommended	mm	220	80	40	20	10
max. recommended	mm	900	300	150	50	22
max. extended	mm	1100	360	180	60	30
<b>pipe wall thickness</b>						
min.	mm	11	5	2.5	1.2	0.6
<b>material</b>						
housing		PPSU with stainless steel cover 304 (1.4301), ***-*****/OS: 316L (1.4404)		PI with stainless steel cover 304 (1.4301), ***-*****/OS: 316L (1.4404)		
contact surface		PPSU		PI		
degree of protection		IP65		IP56		
<b>transducer cable</b>						
type		1699		6111		
length	m	5		4		
length (***)-*****/(LC)	m	9		9		
<b>dimensions</b>						
length l	mm	129.5		64		40
width b	mm	51		32		22
height h	mm	67		40.5		25.5
dimensional drawing						
weight (without cable)	kg	0.82		0.066		0.017
<b>pipe surface temperature</b>						
min.	°C	-40		-30		-30
max.	°C	+170		+240 <sup>3</sup>		+200
<b>ambient temperature</b>						
min.	°C	-40		-30		-30
max.	°C	+170		+40 +60 <sup>4</sup> +200 <sup>5</sup>		+200
temperature compensation		x		x		
<b>explosion protection</b>						
<b>• ATEX/IECEx</b>						
order code		-		GSM-EA2TS/**	GSP-EA2TS/**	GSQ-EA2TS/**
pipe surface temperature (Ex)		-		-45		
• min.	°C	-		gas: +235 <sup>3</sup> , dust: +225 <sup>3</sup>		
• max.	°C	-				
marking		-		CE 0637 (Ex) II 3G II 2D Ex nA IIC T6...T2 Gc Ex tb IIIA T80 °C...230 °C Db		
certification ATEX		-		IBExU10ATEX1163 X		
certification IECEx		-		IECEx IBE 12.0005X		
<b>• FM</b>						
order code		-		GSM-EF2TS/**	GSP-EF2TS/**	GSQ-EF2TS/**
pipe surface temperature (Ex)		-		-40		
• min.	°C	-		+235 <sup>3</sup>		
• max.	°C	-				
degree of protection		-		IP66		
marking		-		 NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860		

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

<sup>3</sup> > +200 °C:  
 Variofix C without cover or Variofix L  
 observe the insulation instruction  
 Ex: ambient temperature max. +40 °C

<sup>4</sup> pipe surface temperature +200...+240 °C: Variofix C without cover

<sup>5</sup> pipe surface temperature max. +200 °C

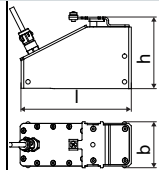
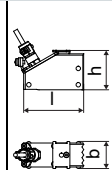

**Shear wave transducers (zone 1, TS)**

order code		GSG-N*1TS/**	GSK-N*1TS/**	GSM-N*1TS/**	GSP-N*1TS/**	GSQ-N*1TS/**
technical type		G(DL)G1N81	G(DL)K1N81	G(DL)M2N81	G(DL)P2N81	G(DL)Q2N81
transducer frequency	MHz	0.2	0.5	1	2	4
<b>fluid pressure<sup>1</sup></b>						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
<b>inner pipe diameter d<sup>2</sup></b>						
min. extended	mm	180	60	30	15	7
min. recommended	mm	220	80	40	20	10
max. recommended	mm	900	300	150	50	22
max. extended	mm	1100	360	180	60	30
<b>pipe wall thickness</b>						
min.	mm	11	5	2.5	1.2	0.6
<b>material</b>						
housing		PEEK with stainless steel cover 304 (1.4301), ***-*****/OS: 316L (1.4404)				
contact surface		PEEK				
degree of protection		IP65	IP66			IP65
<b>transducer cable</b>						
type		1699				
length	m	5		4		3
length (***_*****/LC)	m	9				
<b>dimensions</b>						
length l	mm	129.5	126.5	64		40
width b	mm	51	51	32		22
height h	mm	67	67.5	40.5		25.5
dimensional drawing						
weight (without cable)	kg	0.47	0.36	0.066		0.016
<b>pipe surface temperature</b>						
min.	°C	-40				
max.	°C	+130				
<b>ambient temperature</b>						
min.	°C	-40				
max.	°C	+130				
temperature compensation		x				
<b>explosion protection</b>						
<b>• ATEX/IECEX</b>						
order code		GSG-NA1TS/**	GSK-NA1TS/**	GSM-NA1TS/**	GSP-NA1TS/**	GSQ-NA1TS/**
pipe surface temperature (Ex)						
• min.	°C	-55				
• max.	°C	+180				
marking		CE 0637 Ex II 2G Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T185 °C Db				
certification ATEX		IBExU07ATEX1168 X				
certification IECEX		IECEX IBE 08.0007X				

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

**Shear wave transducers (zone 1, TS, IP68)**

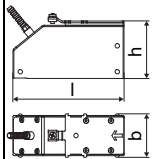
order code		GSG-N*1TS/IP68	GSK-N*1TS/IP68	GSM-N*1TS/IP68	GSP-N*1TS/IP68
technical type		GDG1L11	GDK1L11	GDM2L11	GDP2L11
transducer frequency	MHz	0.2	0.5	1	2
<b>fluid pressure<sup>1</sup></b>					
min. extended	bar	metal pipe: 20			
min.	bar	metal pipe: 30, plastic pipe: 1			
<b>inner pipe diameter d<sup>2</sup></b>					
min. extended	mm	180	60	30	15
min. recommended	mm	220	80	40	20
max. recommended	mm	900	300	150	50
max. extended	mm	1100	360	180	60
<b>pipe wall thickness</b>					
min.	mm	11	5	2.5	1.2
<b>material</b>					
housing		PEEK with stainless steel cover 316Ti (1.4571)			
contact surface		PEEK			
degree of protection		IP68 <sup>3</sup>			
<b>transducer cable</b>					
type		2550			
length	m	12			
<b>dimensions</b>					
length l	mm	130		72	
width b	mm	54		32	
height h	mm	83.5		46	
dimensional drawing					
weight (without cable)	kg	0.43		0.085	
<b>pipe surface temperature</b>					
min.	°C	-40			
max.	°C	+100			
<b>ambient temperature</b>					
min.	°C	-40			
max.	°C	+100			
temperature compensation		x			
<b>explosion protection</b>					
<b>• ATEX/IECEx</b>					
order code		GSG-NA1TS/IP68	GSK-NA1TS/IP68	GSM-NA1TS/IP68	GSP-NA1TS/IP68
pipe surface temperature (Ex)					
• min.	°C	-40			
• max.	°C	+80			
marking		CE 0637  II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db			
certification ATEX		IBExU07ATEX1168 X			
certification IECEx		IECEx IBE 08.0007X			

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

<sup>3</sup> test conditions: 3 months/2 bar (20 m)/20 °C

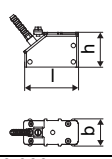
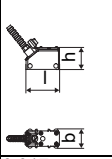

**Shear wave transducers (zone 1, TS, extended temperature range)**

order code		GSG-E*1TS/**	GSK-E*1TS/**
technical type		G(DL)G1E83	G(DL)K1E83
transducer frequency	MHz	0.2	0.5
<b>fluid pressure<sup>1</sup></b>			
min. extended	bar	metal pipe: 20	
min.	bar	metal pipe: 30, plastic pipe: 1	
<b>inner pipe diameter d<sup>2</sup></b>			
min. extended	mm	180	60
min. recommended	mm	220	80
max. recommended	mm	900	300
max. extended	mm	1100	360
<b>pipe wall thickness</b>			
min.	mm	11	5
<b>material</b>			
housing		PPSU with stainless steel cover 304 (1.4301), ***/*****/OS: 316L (1.4404)	
contact surface		PPSU	
degree of protection		IP65	
<b>transducer cable</b>			
type		1699	
length	m	5	
length (***/*****/LC)	m	9	
<b>dimensions</b>			
length l	mm	129.5	
width b	mm	51	
height h	mm	67	
dimensional drawing			
weight (without cable)	kg	0.82	
<b>pipe surface temperature</b>			
min.	°C	-40	
max.	°C	+170	
<b>ambient temperature</b>			
min.	°C	-40	
max.	°C	+170	
temperature compensation		x	
<b>explosion protection</b>			
• ATEX/IECEX			
order code		GSG-EA1TS/**	GSK-EA1TS/**
pipe surface temperature (Ex)			
• min.	°C	-50	
• max.	°C	+155	
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db	
certification ATEX		IBExU07ATEX1168 X	
certification IECEx		IECEX IBE 08.0007X	

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

**Shear wave transducers (zone 1, TS, extended temperature range)**

order code		GSM-E*1TS/**	GSP-E*1TS/**	GSQ-E*1TS/**
technical type		G(DL)M2E85	G(DL)P2E85	G(DL)Q2E85
transducer frequency	MHz	1	2	4
<b>fluid pressure<sup>1</sup></b>				
min. extended	bar	metal pipe: 20		
min.	bar	metal pipe: 30, plastic pipe: 1		
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended	mm	30	15	7
min. recommended	mm	40	20	10
max. recommended	mm	150	50	22
max. extended	mm	180	60	30
<b>pipe wall thickness</b>				
min.	mm	2.5	1.2	0.6
<b>material</b>				
housing		PI with stainless steel cover 304 (1.4301), ***-****/OS: 316L (1.4404)		
contact surface		PI		
degree of protection		IP66		IP56
<b>transducer cable</b>				
type		6111		
length	m	4		3
length (**-****/LC)	m	9		
<b>dimensions</b>				
length l	mm	64		40
width b	mm	32		22
height h	mm	40.5		25.5
dimensional drawing				
weight (without cable)	kg	0.066		0.017
<b>pipe surface temperature</b>				
min.	°C	-30		-30
max.	°C	+240 <sup>3</sup>		+200
<b>ambient temperature</b>				
min.	°C	-30		-30
max.	°C	+40 +200 <sup>4</sup>		+200
temperature compensation		x		
<b>explosion protection</b>				
<b>• ATEX/IECEX</b>				
order code		GSM-EA1TS/**	GSP-EA1TS/**	GSQ-EA1TS/**
pipe surface temperature (Ex)				
• min.	°C	-45		
• max.	°C	+225 <sup>3</sup>		
marking		CE 0637  II2G II2D Ex q IIC T6...T2 Gb Ex tb IIIA T80 °C...T230 °C Db		
certification ATEX		IBExU07ATEX1168 X		
certification IECEX		IECEX IBE 08.0007X		

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

<sup>3</sup> > +200 °C :  
 Variofix L or Variofix C  
 observe the insulation instruction  
 ambient temperature max. +40 °C

<sup>4</sup> pipe surface temperature max. +200 °C

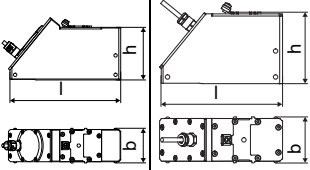
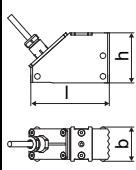
**Lamb wave transducers (zone 2 - FM Class I Div. 2 - nonEx, TS)**

order code		GLF-N**TS/**	GLG-N**TS/**	GLH-N**TS/**	GLK-N**TS/**	GLM-N**TS/**	GLP-N**TS/**	GLQ-N**TS/**
technical type		G(RT)F1N52	G(RT)G1N52	G(RT)H1N52	G(RT)K1N52	G(RT)M1N52	G(RT)P1N52	G(RT)Q1N52
transducer frequency	MHZ	0.15	0.2	0.3	0.5	1	2	4
<b>fluid pressure<sup>1</sup></b>								
min. extended	bar	metal pipe: 10			metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)	metal pipe: 3 (d < 15 mm)
min.	bar	metal pipe: 15 plastic pipe: 1			metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1	metal pipe: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1	metal pipe: 10 (d > 15 mm) 5 (d < 15 mm) plastic pipe: 1
<b>inner pipe diameter d<sup>2</sup></b>								
min. extended	mm	220	180	110	60	30	15	7
min. recommended	mm	270	220	140	80	40	20	10
max. recommended	mm	1200	900	600	300	150	50	22
max. extended	mm	1600	1400	1000	360	180	60	30
<b>pipe wall thickness</b>								
min.	mm	15	11	8	5	2.5	1.2	0.6
max.	mm	32	24	16	10	5	3	1.2
max. extended	mm	35	-	-	-	-	-	-
<b>material</b>								
housing		PPSU with stainless steel cover 316Ti (1.4571)	PPSU with stainless steel cover 304 (1.4301), ***-*****/OS: 316L (1.4404)					
contact surface		PPSU						
degree of protection		IP54	IP67	IP65				
<b>transducer cable</b>								
type		1699						
length	m	5	4				3	
length (***-*****/LC)	m	9						
<b>dimensions</b>								
length l	mm	163	128.5			74	42	
width b	mm	54	51			32	22	
height h	mm	91.3	67.5			40.5	25.5	
dimensional drawing								
weight (without cable)	kg	0.935	0.471			0.077	0.019	
<b>pipe surface temperature</b>								
min.	°C	-40						
max.	°C	+130						
<b>ambient temperature</b>								
min.	°C	-40						
max.	°C	+130						
temperature compensation		x						
<b>explosion protection</b>								
<b>• ATEX/IECEx</b>								
order code		GLF-NA2TS/**	GLG-NA2TS/**	GLH-NA2TS/**	GLK-NA2TS/**	GLM-NA2TS/**	GLP-NA2TS/**	GLQ-NA2TS/**
pipe surface temperature (Ex)		<ul style="list-style-type: none"> <li>min. °C -50</li> <li>max. °C gas: +165, dust: +155</li> </ul>						
marking		CE 0637 Ex II 3G II 2D Ex nA IIC T6...T3 Gc Ex tb IIIA T80 °C...T160 °C Db	CE 0637 Ex II 3G II 2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T160 °C Db					
certification ATEX		IBExU10ATEX1163 X						
certification IECEx		IECEx IBE 12.0005X						
<b>• FM</b>								
order code		GLF-NF2TS/**	GLG-NF2TS/**	GLH-NF2TS/**	GLK-NF2TS/**	GLM-NF2TS/**	GLP-NF2TS/**	GLQ-NF2TS/**
pipe surface temperature (Ex)		<ul style="list-style-type: none"> <li>min. °C -40</li> <li>max. °C +165</li> </ul>						
degree of protection		IP66						
marking		NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860						

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)  
 inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

**Lamb wave transducers (zone 2 - nonEx, TS, IP68)**

order code		GLF-N**TS/IP68	GLG-N**TS/IP68	GLH-N**TS/IP68	GLK-N**TS/IP68	GLM-N**TS/IP68	GLP-N**TS/IP68
technical type		GRF1LI8	GRG1LI8	GRH1LI8	GRK1LI8	GRM1LI8	GRP1LI8
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
<b>fluid pressure<sup>1</sup></b>							
min. extended	bar	metal pipe: 10			metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)
min.	bar	metal pipe: 15 plastic pipe: 1			metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1	metal pipe: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1
<b>inner pipe diameter d<sup>2</sup></b>							
min. extended	mm	220	180	110	60	30	15
min. recommended	mm	270	220	140	80	40	20
max. recommended	mm	1200	900	600	300	150	50
max. extended	mm	1600	1400	1000	360	180	60
<b>pipe wall thickness</b>							
min.	mm	15	11	8	5	2.5	1.2
max.	mm	32	24	16	10	5	3
max. extended	mm	35	-	-	-	-	-
<b>material</b>							
housing		PPSU with stainless steel cover 316Ti (1.4571)					
contact surface		PPSU					
degree of protection		IP68 <sup>3</sup>					
<b>transducer cable</b>							
type		2550					
length	m	12					
<b>dimensions</b>							
length l	mm	173	143.5			73	
width b	mm	54	54			31.6	
height h	mm	91.5	83.5			46	
dimensional drawing							
weight (without cable)	kg	1.36	0.639			0.093	
<b>pipe surface temperature</b>							
min.	°C	-40					
max.	°C	+100					
<b>ambient temperature</b>							
min.	°C	-40					
max.	°C	+100					
temperature compensation		x					
<b>explosion protection</b>							
<b>• ATEX/IECEX</b>							
order code		GLF-NA2TS/IP68	GLG-NA2TS/IP68	GLH-NA2TS/IP68	GLK-NA2TS/IP68	GLM-NA2TS/IP68	GLP-NA2TS/IP68
pipe surface temperature (Ex)							
• min.	°C	-40					
• max.	°C	gas: +90, dust: +80					
marking		CE 0637 Ex II 3G II 2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db					
certification ATEX		IBExU10ATEX1163 X					
certification IECEX		IECEX IBE 12.0005X					

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)  
 inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

<sup>3</sup> test conditions: 3 months/2 bar (20 m)/20 °C



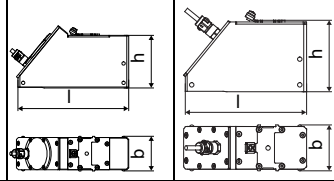
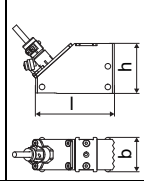
**Lamb wave transducers (zone 1, TS)**

order code		GLF-N*1TS/**	GLG-N*1TS/**	GLH-N*1TS/**	GLK-N*1TS/**	GLM-N*1TS/**	GLP-N*1TS/**	GLQ-N*1TS/**
technical type		G(RT)F1N83	G(RT)G1N83	G(RT)H1N83	G(RT)K1N83	G(RT)M1N83	G(RT)P1N83	G(RT)Q1N83
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2	4
<b>fluid pressure<sup>1</sup></b>								
min. extended	bar	metal pipe: 10			metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)	metal pipe: 3 (d < 15 mm)
min.	bar	metal pipe: 15 plastic pipe: 1			metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1	metal pipe: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1	metal pipe: 10 (d > 15 mm) 5 (d < 15 mm) plastic pipe: 1
<b>inner pipe diameter d<sup>2</sup></b>								
min. extended	mm	220	180	110	60	30	15	7
min. recommended	mm	270	220	140	80	40	20	10
max. recommended	mm	1200	900	600	300	150	50	22
max. extended	mm	1600	1400	1000	360	180	60	30
<b>pipe wall thickness</b>								
min.	mm	15	11	8	5	2.5	1.2	0.6
max.	mm	32	24	16	10	5	3	1.2
max. extended	mm	35	-	-	-	-	-	-
<b>material</b>								
housing		PPSU with stainless steel cover 304 (1.4301), ***-****/OS: 316L, 316Ti (1.4404, 1.4571)			PPSU with stainless steel cover 304 (1.4301), ***-****/OS: 316L (1.4404)			
contact surface		PPSU						
degree of protection		IP54			IP66		IP65	
<b>transducer cable</b>								
type		1699						
length	m	5			4		3	
length (**-****/LC)	m	9						
<b>dimensions</b>								
length l	mm	163			128.5		74	
width b	mm	54			51		32	
height h	mm	91.3			67.5		40.5	
dimensional drawing								
weight (without cable)	kg	0.935			0.471		0.077	
<b>pipe surface temperature</b>								
min.	°C	-40						
max.	°C	+130						
<b>ambient temperature</b>								
min.	°C	-40						
max.	°C	+130						
temperature compensation		x						
<b>explosion protection</b>								
<b>• ATEX/IECEx</b>								
order code		GLF-NA1TS/**	GLG-NA1TS/**	GLH-NA1TS/**	GLK-NA1TS/**	GLM-NA1TS/**	GLP-NA1TS/**	GLQ-NA1TS/**
pipe surface temperature (Ex)								
• min.	°C	-50						
• max.	°C	+155						
marking		CE0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIA T80 °C...T160 °C Db			CE0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db			
certification ATEX		IBExU07ATEX1168 X						
certification IECEx		IECEx IBE 08.0007X						

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:  
typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)  
inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

**Lamb wave transducers (zone 1, TS, IP68)**

order code		GLF-N*1TS/IP68	GLG-N*1TS/IP68	GLH-N*1TS/IP68	GLK-N*1TS/IP68	GLM-N*1TS/IP68	GLP-N*1TS/IP68
technical type		GRF1LI3	GRG1LI3	GRH1LI3	GRK1LI3	GRM1LI3	GRP1LI3
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
<b>fluid pressure<sup>1</sup></b>							
min. extended	bar	metal pipe: 10	metal pipe: 10	metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)
min.	bar	metal pipe: 15 plastic pipe: 1	metal pipe: 15 plastic pipe: 1	metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1	metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1	metal pipe: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1
<b>inner pipe diameter d<sup>2</sup></b>							
min. extended	mm	220	180	110	60	30	15
min. recommended	mm	270	220	140	80	40	20
max. recommended	mm	1200	900	600	300	150	50
max. extended	mm	1600	1400	1000	360	180	60
<b>pipe wall thickness</b>							
min.	mm	15	11	8	5	2.5	1.2
max.	mm	32	24	16	10	5	3
max. extended	mm	35	-	-	-	-	-
<b>material</b>							
housing		PPSU with stainless steel cover 316Ti (1.4571)	PPSU with stainless steel cover 316Ti (1.4571)				
contact surface		PPSU	PPSU				
degree of protection		IP68 <sup>3</sup>	IP68 <sup>3</sup>				
<b>transducer cable</b>							
type		2550	2550				
length	m	12	12				
<b>dimensions</b>							
length l	mm	173	143.5				
width b	mm	54	54				
height h	mm	91.5	83.5				
dimensional drawing							
weight (without cable)	kg	1.36	0.639	0.093			
<b>pipe surface temperature</b>							
min.	°C	-40	-40				
max.	°C	+100	+100				
<b>ambient temperature</b>							
min.	°C	-40	-40				
max.	°C	+100	+100				
temperature compensation		x	x				
<b>explosion protection</b>							
<b>• ATEX/IECEX</b>							
order code		GLF-NA1TS/IP68	GLG-NA1TS/IP68	GLH-NA1TS/IP68	GLK-NA1TS/IP68	GLM-NA1TS/IP68	GLP-NA1TS/IP68
pipe surface temperature (Ex)							
• min.	°C	-40					
• max.	°C	+80					
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db					
certification ATEX		IBExU07ATEX1168 X					
certification IECEX		IECEX IBE 08.0007X					

<sup>1</sup> depending on the application, typical absolute value for natural gas, nitrogen, compressed air

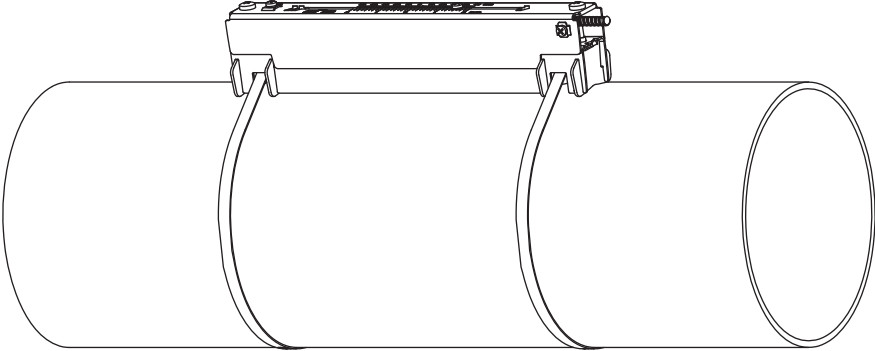
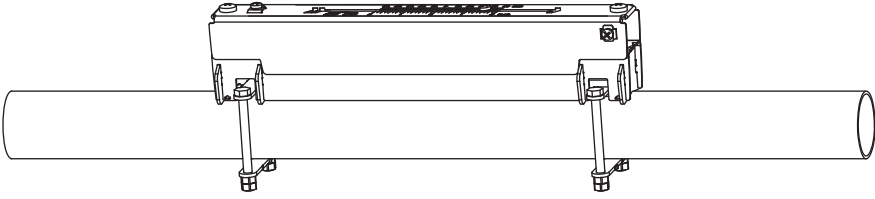
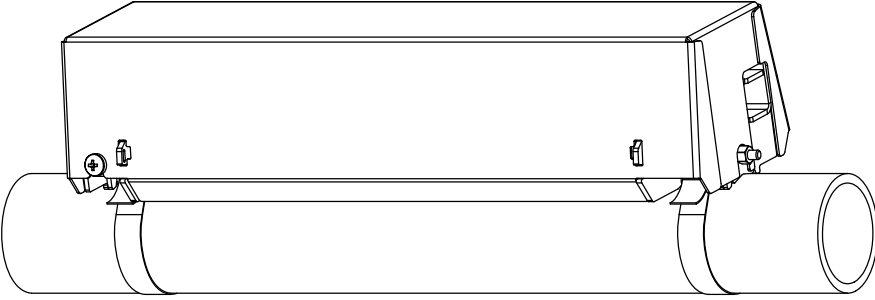
<sup>2</sup> Lamb wave transducer:  
 typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)  
 inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

<sup>3</sup> test conditions: 3 months/2 bar (20 m)/20 °C

## Transducer mounting fixture

### Order code

1, 2	3	4	5	6	7...9	no. of character
transducer mounting fixture	transducer	measurement arrangement	size	fixation	outer pipe diameter	option
						description
VL						Variofix L
VC						Variofix C
	F					transducers with transducer frequency F
	K					transducers with transducer frequency G, H, K
	M					transducers with transducer frequency M, P
	Q					transducers with transducer frequency Q
		D				reflection arrangement or diagonal arrangement
		R				reflection arrangement
			S			small
			M			medium
			L			large
				B		bolts
				S		tension straps
				W		welding
				N		without fixation
					002	10...20 mm
					004	20...40 mm
					T36	40...360 mm
					013	10...130 mm
					036	130...360 mm
					092	360...920 mm
					200	920...2000 mm
						IP68 for transducers with degree of protection IP68
						OS housing with stainless steel 316
						Z special design

<p><b>Variofix L (VLK, VLM, VLQ)</b></p> 	<p>material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006)  option OS: 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568)  inner length:  <b>VLK:</b> 348 mm,  option IP68: 368 mm  <b>VLM:</b> 234 mm  <b>VLQ:</b> 176 mm  dimensions:  <b>VLK:</b> 423 x 90 x 93 mm  option IP68: 443 x 94 x 105 mm  <b>VLM:</b> 309 x 57 x 63 mm  <b>VLQ:</b> 247 x 43 x 47 mm</p>
<p><b>Variofix L with bolt mounting plates (VL*-**-B)</b></p> 	<p>material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006)  option OS: 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568)  inner length:  <b>VLM:</b> 234 mm  <b>VLQ:</b> 176 mm  dimensions:  <b>VLM:</b> 309 x 57 x 63 mm  <b>VLQ:</b> 247 x 43 x 47 mm  outer pipe diameter:  max. 48 mm</p>
<p><b>Variofix C (VC)</b></p> 	<p>material: stainless steel 316Ti (1.4571)  inner length:  <b>VCF-*L, VCK-*L:</b> 500 mm  <b>VCF-*S, VCK-*S:</b> 350 mm  <b>VCM:</b> 400 mm  <b>VCQ:</b> 250 mm  dimensions:  <b>VCF-*L, VCK-*L:</b> 560 x 126 x 125 mm  <b>VCF-*S, VCK-*S:</b> 410 x 126 x 125 mm  <b>VCM:</b> 460 x 96 x 82 mm  <b>VCQ:</b> 310 x 85 x 71 mm</p>

## Coupling materials for transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range (4th character of transducer order code = E)		
	< 100 °C	< 170 °C	< 150 °C	< 200 °C	200...240 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or H or coupling foil type VT	coupling foil type TF
long time measurement	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type TF

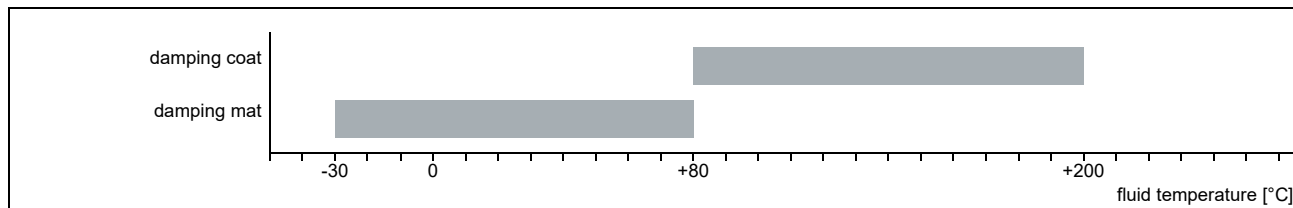
type VT: fluid temperature 200 °C: min. 2 years

### Technical data

type	ambient temperature °C
coupling compound type N	-30...+130
coupling compound type E	-30...+200
coupling compound type H	-30...+250
coupling foil type VT	-10...+200
coupling foil type TF	200...240

### Damping material (optional)

Damping material will be used for the gas measurement to reduce acoustic noise influences on the measurement.



### Damping mats

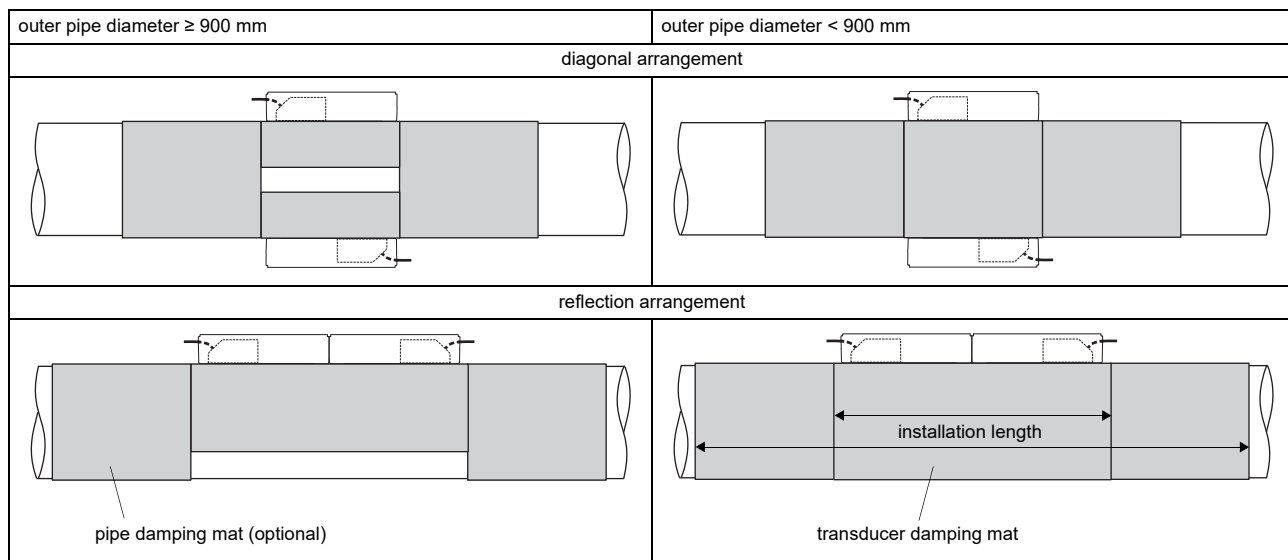
Damping mats will be used for the gas measurement to reduce acoustic noise influences on the measurement.

#### transducer damping mat

Transducer damping mats will be installed below the transducers.

#### pipe damping mat

Pipe damping mats will be installed if the sound propagation is disturbed at reflection points (e.g. flange, weld). Depending on the noise, the pipe damping mats will be installed at one or both sides of the transducer damping mat. If the local conditions are unknown, pipe damping mats should be installed.



### Technical data

type		E30R4	E30R3
order code		ACC-PE-GNNN-/DPD2	ACC-PE-GNNN-/DPD1
width	mm	225	50
thickness	mm	0.7	
length (per roll)	m	10	
weight	kg/m <sup>2</sup>	1.015	
ambient temperature	°C	-30...+80	
properties		self-adhesive	

### Dimensioning

transducer		damping mat							
transducer mounting fixture	order code	type	number of layers	transducer damping mat			transducer damping mat + 2x pipe damping mat		
				max. installation length	number of rolls <sup>1</sup>		max. installation length	number of rolls <sup>1</sup>	
					[mm]	standard <sup>2</sup>		extended <sup>2</sup>	[mm]
<b>VarioFix L</b>									
VLK	GLG	E30R4	3	890	4	4	1830	9	12
	GSG		3		4	4		10	
	GLH		2		3	7			
	GLK		1		1	2			
	GSK		1		1	2			
VLK-*L-****/IP68	GLG	E30R4	3	930	5	5	1910	10	13
	GSG		3		5	11			
	GLH		2		3	7			
	GLK		1		1	2			
	GSK		1		1	2			
VLM	GLM	E30R3	1	660	1	1	1360	2	2
	GSM		1		1	2			
	GLP		1		1	1			
	GSP		1		1	1			
VLQ	GLQ	E30R3	1	540	1	1	1120	1	1
	GSQ		1		1	1			
<b>Variofix C</b>									
VCF-*L-****/IP68	GLF	E30R4	3	1160	6	6	2360	13	15
VCK-*L-****/IP68	GLG	E30R4	3	1160	6	6	2360	11	14
	GSG		3		6	12			
	GLH		2		4	8			
	GLK		1		1	2			
VCF-*S-****/IP68	GSK	E30R4	1	860	1	1	1760	2	2
	GLF		3		4	9			
	GLG		3		4	10			
	GLH		2		3	7			
VCK-*S-****/IP68	GLK	E30R4	1	860	1	1	1760	1	1
	GSG		3		4	8			
	GLH		2		3	5			
	GLK		1		1	1			
VCM	GSK	E30R3	1	960	1	1	1960	1	1
	GLM		1		2	3			
	GSM		1		2	3			
	GLP		1		1	1			
VCQ	GSP	E30R3	1	660	1	1	1360	1	1
	GLQ		1		1	1			
	GLK		1		1	1			
	GSQ		1		1	1			

<sup>1</sup> calculation on the base of:  
 max. installation length (installation of one transducer mounting fixture per transducer in reflection arrangement) and  
 max. recommended pipe diameter (standard) or max. extended pipe diameter (extended)

<sup>2</sup> calculation of the number of rolls when both transducers are mounted in one transducer mounting fixture (reflection arrangement) or in diagonal arrangement: number of rolls/2 and round up to the nearest integer

### Damping coat

For high temperatures it is recommended to apply the damping coat onto the pipe.

### Technical data

order code	ACC-PE-GNNN-/DPL1
material	multipolymeric matrix/inorganic ceramic coating
packing drum	I 1
properties	heat resistant, inert

Observe installation instructions (TI\_DampingCoat).

### Dimensioning

transducer frequency	number of packing drums		
	outer pipe diameter		
	≤300 mm	≤500	≤700
F	3	4	5
G	2	3	4
H	2	2	3
K	2	2	-
M	2	-	-
P	1	-	-
Q	1	-	-

### Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
<p>JB01</p>	<p>transmitter</p>	<p>****G*</p>
<p>JB01, JBP2, JBP3</p>	<p>transmitter</p>	<p>****L*</p>
<p>JB02, JB03, JB04</p>	<p>transmitter</p>	<p>****52</p>



**Cable**

transducer cable				
type		1699	2550	6111
weight	kg/m	0.094	0.035	0.092
ambient temperature	°C	-55...+200	-40...+100	-100...+225
properties			longitudinal watertight	
cable jacket				
material		PTFE	PUR	PFA
outer diameter	mm	2.9	5.2 ±0.2	2.7
thickness	mm	0.3	0.9	0.5
colour		brown	grey	white
shield		x	x	x
sheath				
material		stainless steel 304 (1.4301) option OS: 316Ti (1.4571)	-	stainless steel 304 (1.4301) option OS: 316Ti (1.4571)
outer diameter	mm	8	-	8

extension cable				
type		2615	5245	
order code		ACC-PE- GNNN-/EXEXXX	ACC-PE- GNNN-/EXA1XXX	
weight	kg/m	0.18	0.38	
ambient temperature	°C	-30...+70	-30...+70	
properties		halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2	halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2	
cable jacket				
material		PUR	PUR	
outer diameter	mm	max. 12	max. 12	
thickness	mm	2	2	
colour		black	black	
shield		x	x	
sheath				
material		-	steel wire braid with copolymer sheath	
outer diameter	mm	-	max. 15.5	

XXX - cable length in m

**Cable length**

transducer frequency		F, G, H, K		M, P		Q		S	
connection system TS									
transducers technical type		x	l	x	l	x	l	x	l
*(DR)**8*	m	5	≤ 300	4	≤ 300	3	≤ 90	-	-
option LC: *(LT)**8*	m	9	≤ 300	9	≤ 300	9	≤ 90	-	-
*(DR)**5*	m	5	≤ 300	4	≤ 300	3	≤ 90	2	≤ 40
option LC: *(LT)**5*	m	9	≤ 300	9	≤ 300	9	≤ 90	-	-
option IP68: ****L*	m	12	≤ 300	12	≤ 300	-	-	-	-

x - transducer cable length

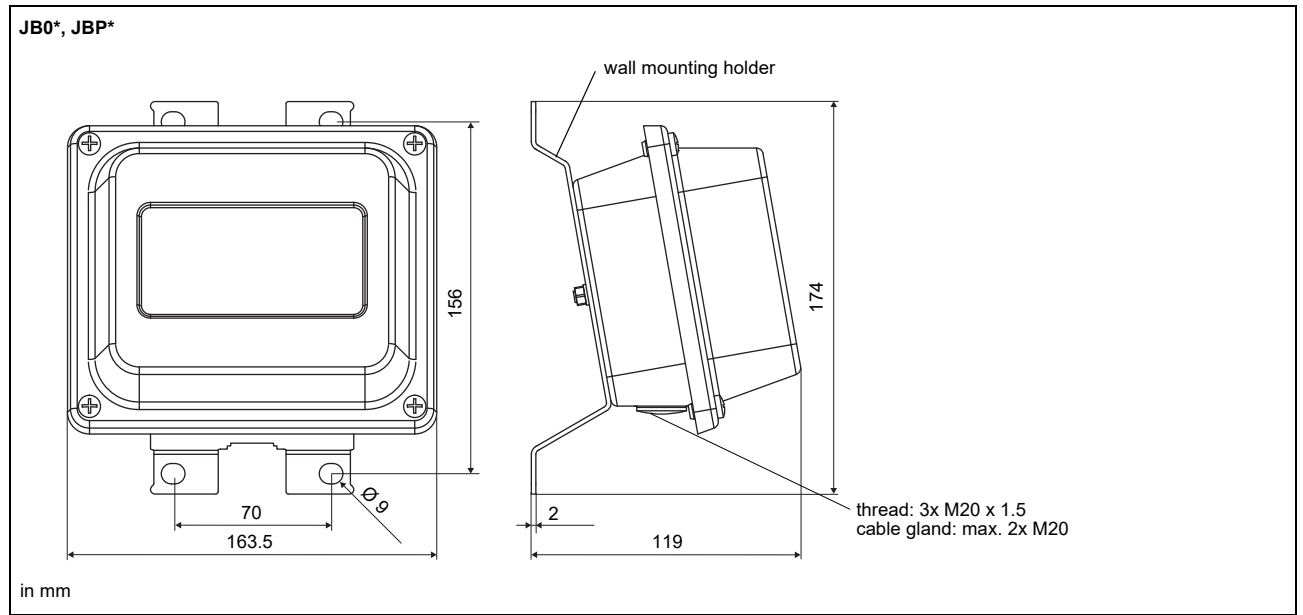
l - max. length of extension cable (depending on the application)

# Junction box

## Technical data

JB01S4E3M, JBP2, JBP3			
weight	kg	1.2 kg	
fixation		wall mounting optional: 2" pipe mounting	
<b>material</b>			
housing		stainless steel 316L (1.4404)	
gasket		silicone	
degree of protection		IP67	
<b>ambient temperature</b>			
min.	°C	-40	
max.	°C	+80	
<b>explosion protection</b>			
• ATEX/IECEX (zone 1)			
junction box		JB01S4E3M	
marking		CE 0637 Ex II2G II2D Ex eb mb IIC T6...T4 Gb Ex tb IIC T100 °C Db Ta -40...+70/80 °C	
certification ATEX		IBExU06ATEX1161	
certification IECEX		IECEX IBE 08.0006	
type of protection		gas: increased safety decoupled network: encapsulation dust: protection by enclosure	
• ATEX (zone 2)			
junction box		JBP2	
marking		CE Ex II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIC T 100 °C Dc Ta -40...+(70)80 °C	
<b>Connection</b>			
<b>Transducers</b>			
terminal strip	terminal	connection	transducer
KL1	V	signal	↑
	VS	internal shield	↕
	RS	internal shield	↕
	R	signal	↕
<b>Extension cable</b>			
terminal strip	terminal	connection	
KL2	TV	signal	
	TVS	internal shield	
	TRS	internal shield	
	TR	signal	
JB02, JB03, JB04			
weight	kg	1.2 kg	
fixation		wall mounting optional: 2" pipe mounting	
<b>material</b>			
housing		stainless steel 316L (1.4404)	
gasket		silicone	
degree of protection		IP67	
<b>ambient temperature</b>			
min.	°C	-40	
max.	°C	+80	
<b>explosion protection</b>			
• ATEX			
junction box		JB02	
marking		CE Ex II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIC T 100 °C Dc Ta -40...+(70)80 °C	
• FM			
junction box		JB04	
marking		FM APPROVED NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C	
<b>Connection</b>			
<b>Transducers</b>			
terminal strip	terminal	connection	transducer
	XV	SMB connector	↑
	XR	SMB connector	↕
<b>Extension cable</b>			
terminal strip	terminal	connection	
KL2	TV	signal	
	TVS	internal shield	
	TRS	internal shield	
	TR	signal	

## Dimensions

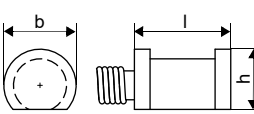
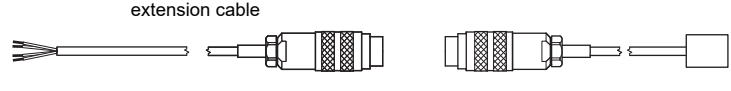
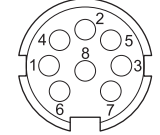


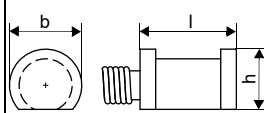
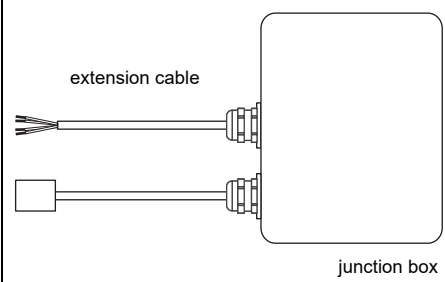
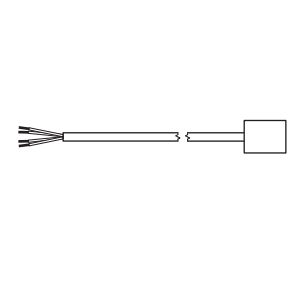
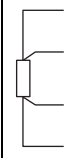
## 2" pipe mounting kit

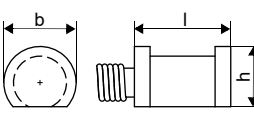

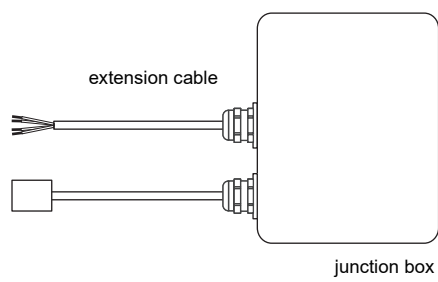
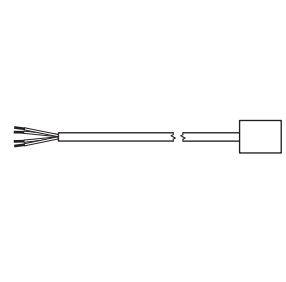














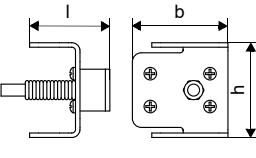
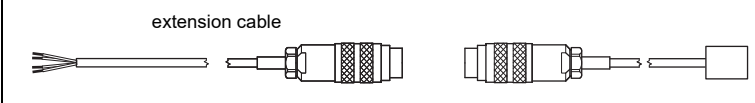
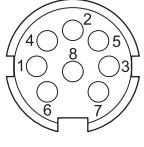
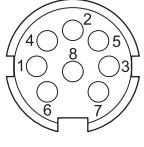
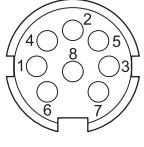
# Clamp-on temperature probe (optional)

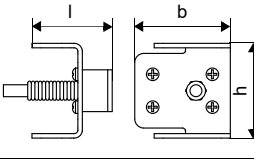
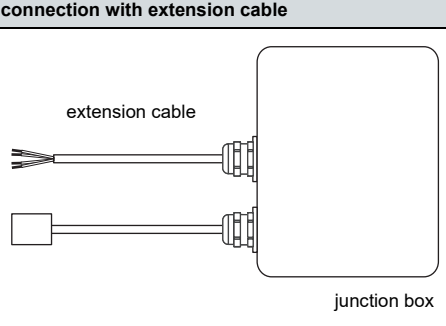
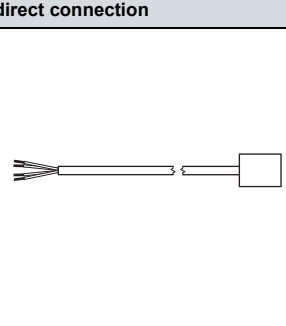
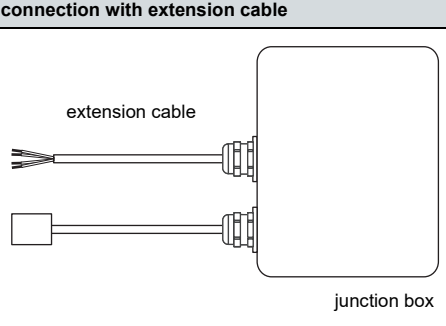
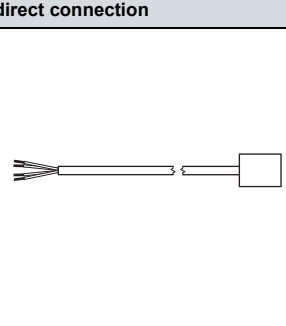
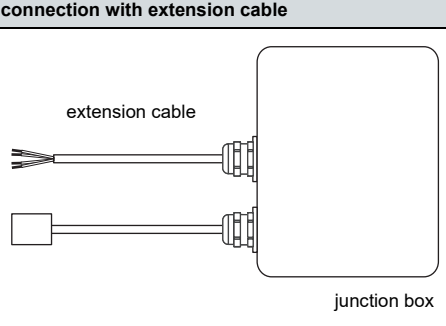
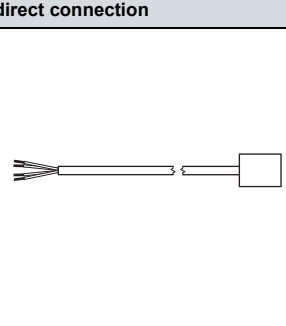
## Technical data

PT12N				
order code	<ul style="list-style-type: none"> <li>ACC-PO-#601-/T311</li> <li>ACC-PO-#601-/T511 (matched)</li> </ul>			
design	clamp-on with connector			
type	Pt100			
connection	4-wire			
measuring range	°C -30...+250			
accuracy T	$\pm(0.15 \text{ }^\circ\text{C} + 2 \cdot 10^{-3} \cdot  T \text{ [}^\circ\text{C]} )$ class A			
accuracy $\Delta T$ (2x Pt matched according to EN 1434-1)	$\leq 0.1 \text{ K}$ ( $3 \text{ K} < \Delta T < 6 \text{ K}$ ), more corresponding to EN 1434-1			
response time	s 50 ( $t_{50}$ , $T_1 = 25 \text{ }^\circ\text{C}$ , $T_2 = 60 \text{ }^\circ\text{C}$ )			
housing	aluminum			
degree of protection	IP54			
<b>dimensions</b>				
length l	mm 20			
width b	mm 15			
height h	mm 13			
dimensional drawing				
weight	kg 0.25 (without connector)			
<b>accessories</b>				
thermal conductivity paste 200 °C	x			
thermal conductivity foil 250 °C	x			
<b>Connection system</b>				
<b>direct connection/connection with extension cable</b>				
				
<b>Connection</b>				
	<b>temperature probe</b>	<b>extension cable</b>	<b>connector</b>	
	red	grey	2	
	red/blue	red	6	
	white/blue	blue	1	
	white	white	7	
<b>Cable</b>				
		<b>temperature probe</b>	<b>extension cable</b>	
type		4 x 0.22 mm <sup>2</sup>	LIYCY 8 x 0.14 mm <sup>2</sup>	
standard length	m	3	5/10/25	
max. length	m	-	200	
ambient temperature	°C	-90...+200	-25...+80	
min. bend radius	mm	27	68	
<b>cable jacket</b>				
material		PFA	PVC	
outer diameter	mm	3.8 ±0.15	4.8 ±2	
colour		black	grey	

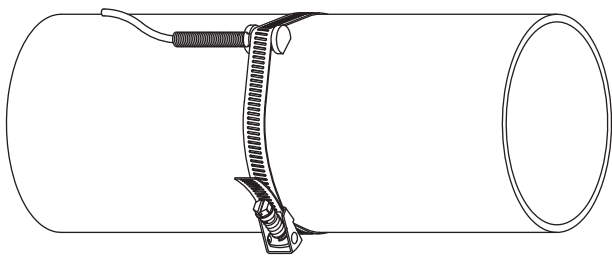
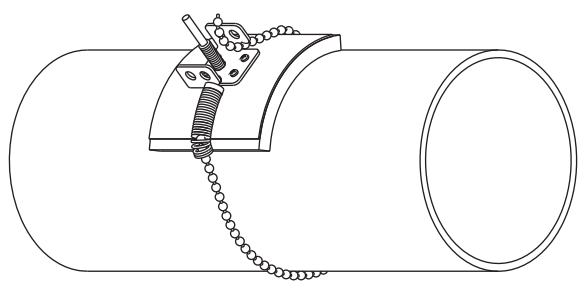
PT12N		
order code		<ul style="list-style-type: none"> <li>ACC-PE-GNNN-/T312</li> <li>ACC-PE-GNNN-/T512 (matched)</li> </ul>
design		clamp-on
type		Pt100
connection		4-wire
measuring range	°C	-30...+250
accuracy T		$\pm(0.15 \text{ °C} + 2 \cdot 10^{-3} \cdot  T \text{ [°C]} )$ class A
accuracy $\Delta T$ (2x Pt matched according to EN 1434-1)		$\leq 0.1 \text{ K}$ ( $3 \text{ K} < \Delta T < 6 \text{ K}$ ), more corresponding to EN 1434-1
response time	s	50 ( $t_{50}$ , $T_1 = 25 \text{ °C}$ , $T_2 = 60 \text{ °C}$ )
housing		aluminum
degree of protection		IP54
<b>dimensions</b>		
length l	mm	20
width b	mm	15
height h	mm	13
dimensional drawing		
weight	kg	0.25
<b>accessories</b>		
thermal conductivity foil 250 °C		x
<b>Connection system</b>		
<b>connection with extension cable</b>		<b>direct connection</b>
		
<b>Connection</b>		
	<b>temperature probe</b>	
	red	
	red/blue	
	white/blue	
	white	
<b>Cable</b>		
	<b>temperature probe</b>	<b>extension cable</b>
type	4 x 0.22 mm <sup>2</sup>	LIYCY 8 x 0.14 mm <sup>2</sup>
standard length	m	3
max. length	m	-
ambient temperature	°C	-90...+200
min. bend radius	mm	27
<b>cable jacket</b>		
material	PFA	PVC
outer diameter	mm	3.8 ±0.15
colour	black	grey

PT12N												
order code	<ul style="list-style-type: none"> <li>• ACC-PE-GNNN-/T322</li> <li>• ACC-PE-GNNN-/T522 (matched)</li> </ul>											
design	clamp-on ATEX											
type	Pt100											
connection	4-wire											
measuring range	°C -30...+250											
accuracy T	±(0.15 °C + 2 · 10 <sup>-3</sup> ·  T [°C] ) class A											
accuracy ΔT (2x Pt matched according to EN 1434-1)	≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1											
response time	s	50										
housing	aluminum											
degree of protection	IP67											
<b>dimensions</b>												
length l	mm	20										
width b	mm	15										
height h	mm	13										
dimensional drawing												
weight	kg	0.25										
<b>accessories</b>												
thermal conductivity foil 250 °C	x											
<b>explosion protection</b>												
• ATEX												
marking	 II3G Ex nA IIC T6...T2 Gc Ta -30...+250 °C											
<b>Connection system</b>												
<b>connection with extension cable</b>		<b>direct connection</b>										
												
<b>Connection</b>												
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	red											
	red/blue											
	white											
	white/blue											
<b>Cable</b>												
	<b>temperature probe</b>	<b>extension cable</b>										
type	4 x 0.25 mm <sup>2</sup>	LIYCY 8 x 0.14 mm <sup>2</sup>										
standard length	m 3	5/10/25										
max. length	m -	200										
ambient temperature	°C	-25...+80										
min. bend radius	mm	68										
<b>cable jacket</b>												
material	PTFE	PVC										
outer diameter	mm	4.8 ±2										
colour	black	grey										

PT12F																															
order code	<ul style="list-style-type: none"> <li>• ACC-PO-#601-/T111</li> <li>• ACC-PO-#601-/T211 (matched)</li> </ul>																														
design	clamp-on short response time, with connector																														
type	Pt100																														
connection	4-wire																														
measuring range	°C -50...+250																														
accuracy T	$\pm(0.15 \text{ °C} + 2 \cdot 10^{-3} \cdot  T \text{ [°C]} )$ class A																														
accuracy $\Delta T$ (2x Pt matched according to EN 1434-1)	$\leq 0.1 \text{ K}$ ( $3 \text{ K} < \Delta T < 6 \text{ K}$ ), more corresponding to EN 1434-1																														
response time	s 8 (t50, T1 = 25 °C, T2 = 60 °C)																														
housing	PEEK, stainless steel 304 (1.4301), copper																														
degree of protection	IP54																														
<b>dimensions</b>																															
length l	mm 14																														
width b	mm 30																														
height h	mm 27																														
dimensional drawing																															
weight	kg 0.32 (without connector)																														
<b>accessories</b>																															
thermal conductivity paste 200 °C	x																														
thermal conductivity foil 250 °C	x																														
plastic protection plate, insulation foam	x																														
<b>Connection system</b>																															
																															
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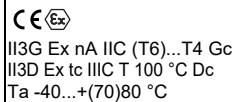
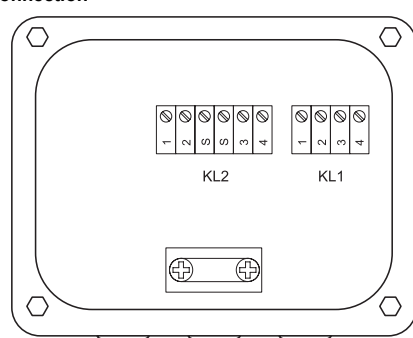
PT12F																															
order code	• ACC-PE-GNNN-/T112																														
design	clamp-on short response time																														
type	Pt100																														
connection	4-wire																														
measuring range	°C -50...+250																														
accuracy T	$\pm(0.15 \text{ °C} + 2 \cdot 10^{-3} \cdot  T \text{ [°C]} )$ class A																														
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**Fixation**

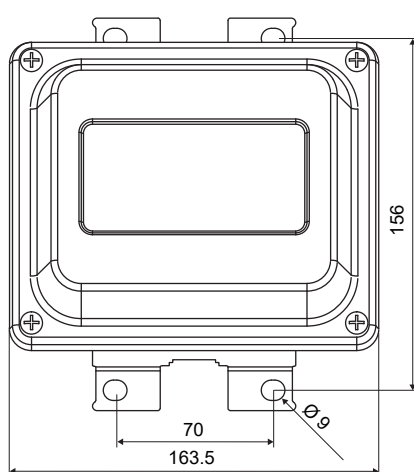
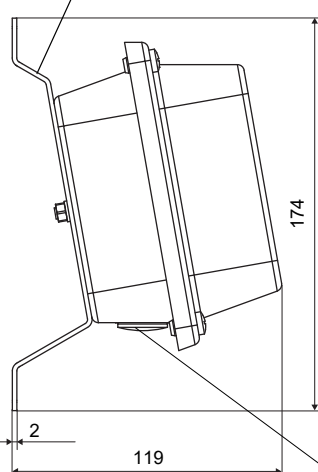
<p><b>tension strap PT12N</b></p> 	<p>material: stainless steel 301 (1.4310), 410 (1.4006) thermal insulation necessary</p>
<p><b>ball chain PT12F</b></p> 	<p>material: stainless steel 316L (1.4404) length: 1 m</p>



### Junction box

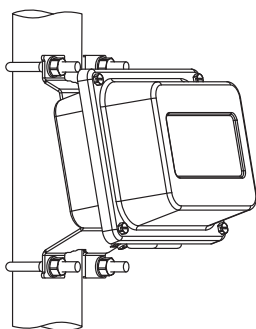
JBT2, JBT3																									
order code	<ul style="list-style-type: none"> <li>• JBT2: ACC-PE-GNNN-/JB4</li> <li>• JBT3: ACC-PE-GNNN-/JB6</li> </ul>																								
weight	kg 1.2 kg																								
fixation	wall mounting optional: 2" pipe mounting																								
<b>material</b>																									
housing	stainless steel 316L (1.4404)																								
gasket	silicone																								
degree of protection	IP67																								
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min.	°C -40																								
max.	°C +80																								
<b>explosion protection</b>																									
• ATEX																									
junction box marking	JBT2																								
																									
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>Connection</b></p>  </div> <div style="width: 45%;"> <p><b>Temperature probe</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL1</td> <td>1</td> <td>red</td> </tr> <tr> <td>2</td> <td>red/blue</td> </tr> <tr> <td>3</td> <td>white</td> </tr> <tr> <td>4</td> <td>white/blue</td> </tr> </tbody> </table> <p><b>Extension cable</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL2</td> <td>1</td> <td>red</td> </tr> <tr> <td>2</td> <td>grey</td> </tr> <tr> <td>3</td> <td>white</td> </tr> <tr> <td>4</td> <td>blue</td> </tr> </tbody> </table> </div> </div>		terminal strip	terminal	connection	KL1	1	red	2	red/blue	3	white	4	white/blue	terminal strip	terminal	connection	KL2	1	red	2	grey	3	white	4	blue
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### Dimensions

JBT*
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>in mm</p> </div> <div style="text-align: center;">  <p>thread: 3x M20 x 1.5 cable gland: max. 2x M12</p> </div> </div>

## 2" pipe mounting kit

JB\*\*



order code:  
ACC-PE-GNNN-/JBPMK4

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Germany  
Tel.: +49 (30) 93 66 76 60  
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e-mail: [info@flexim.com](mailto:info@flexim.com)

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Errors excepted.

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