

Steam ultrasonic flowmeter for permanent installation

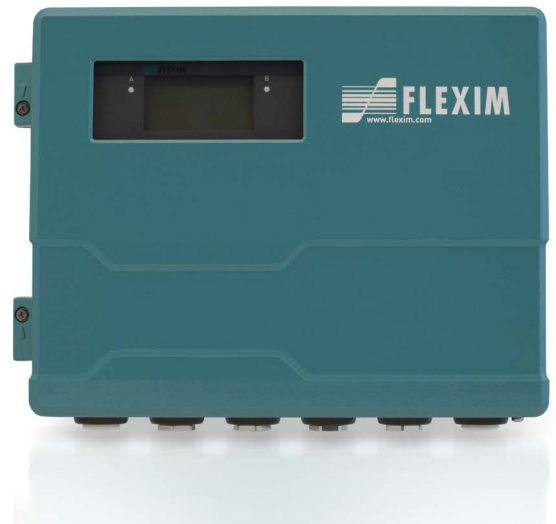
Transmitter for permanent outdoor wall or pipe mounting

Features

- Exact and highly reliable measurement of saturated and superheated steam for temperatures up to max. 180 °C by means of the clamp-on principle
- Physical quantities volumetric flow rate and mass flow rate available in a transmitter without additional steam calculator
- Installation and start-up do not require any pipe work and are carried out without any process interruptions and cooling down of the steam system
- Non-invasive, wear-free and pressure constant measurement
- Maintenance-free acoustic coupling using permanent coupling foil
- High measurement accuracy even at very low as well and high flow rates and independent of the flow direction (bidirectional)
- Automatic loading of calibration data and transducer recognition
- Bidirectional communication and support of common bus technologies (Modbus, Profibus PA, Foundation Fieldbus, BACnet)
- Advanced self-diagnosis and possibilities for event-based triggering of data recording for the supervision and control of critical processes
- Transmitter and transducers for use in hazardous areas are available
- Transmitter and transducers are separately calibrated (traceable to national standards)
- The measurement is zero point stable and drift free

Applications

- Food and beverage industry
- Pharmaceutical industry
- Chemical industry
- Manufacturing industries



FLUXUS G721ST (aluminum housing)



FLUXUS G721ST (stainless steel housing)



Variofix L

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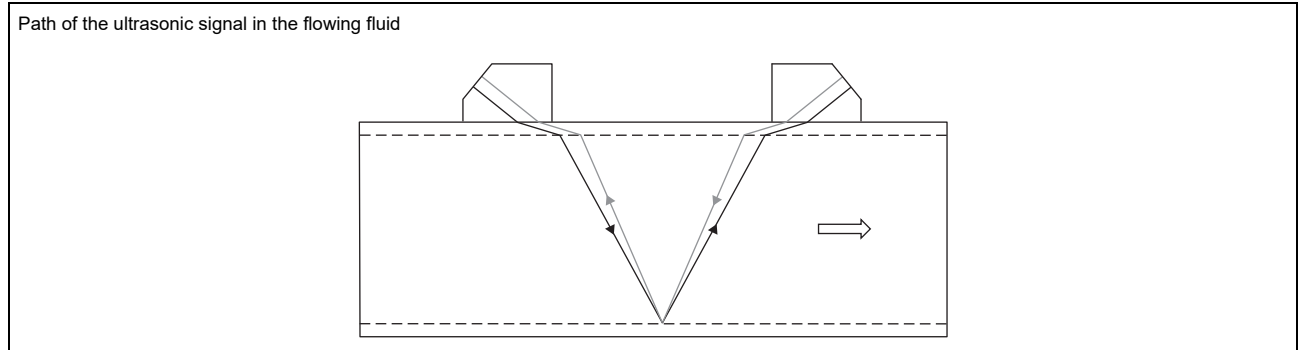
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Function

Measurement principle

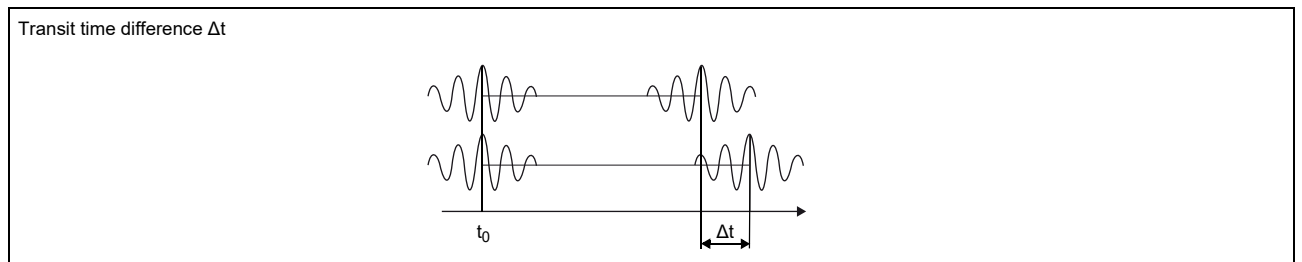
The transducers are mounted on the pipe which is completely filled with the fluid. The ultrasonic signals are emitted alternately by a transducer and received by the other. The physical quantities are determined from the transit times of the ultrasonic signals.



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 Δt 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
- Δt - transit time difference
- t_{γ} - 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

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

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**

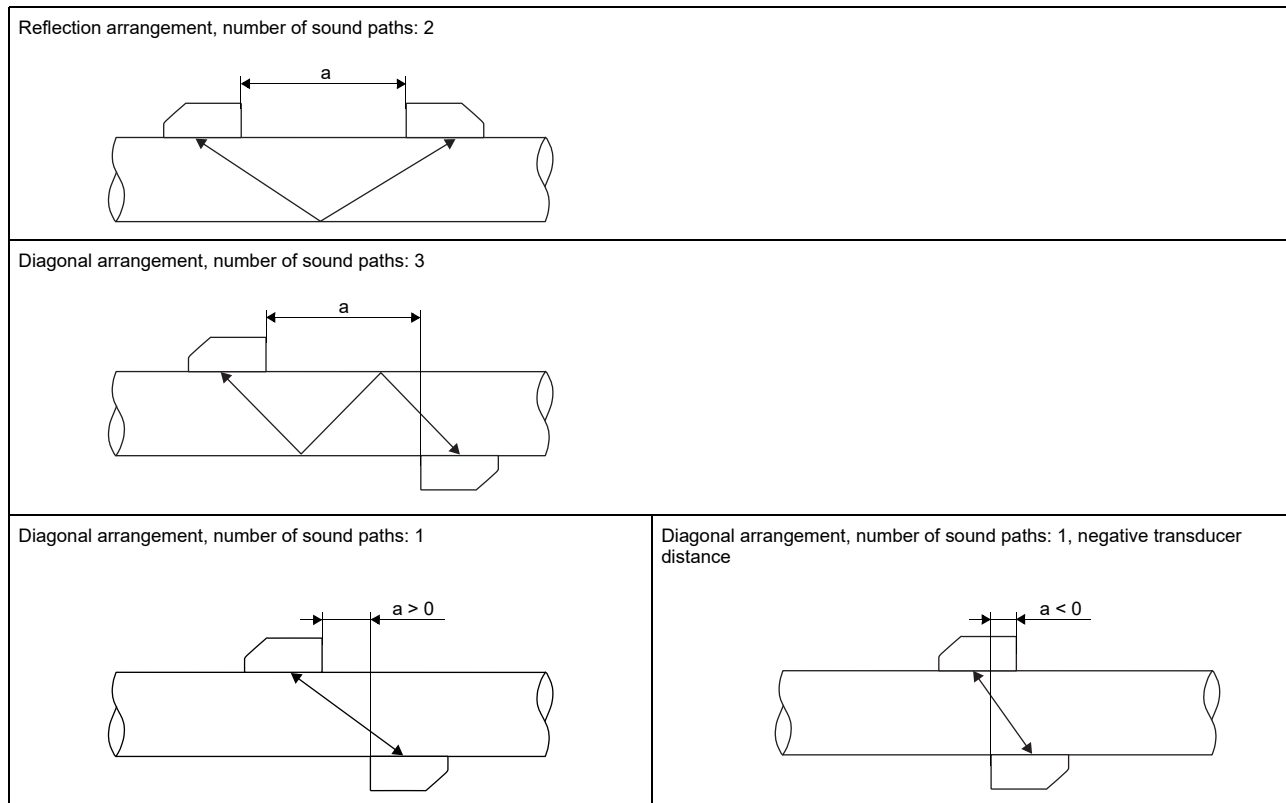
The number of sound paths is even. The transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easy.

• **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.

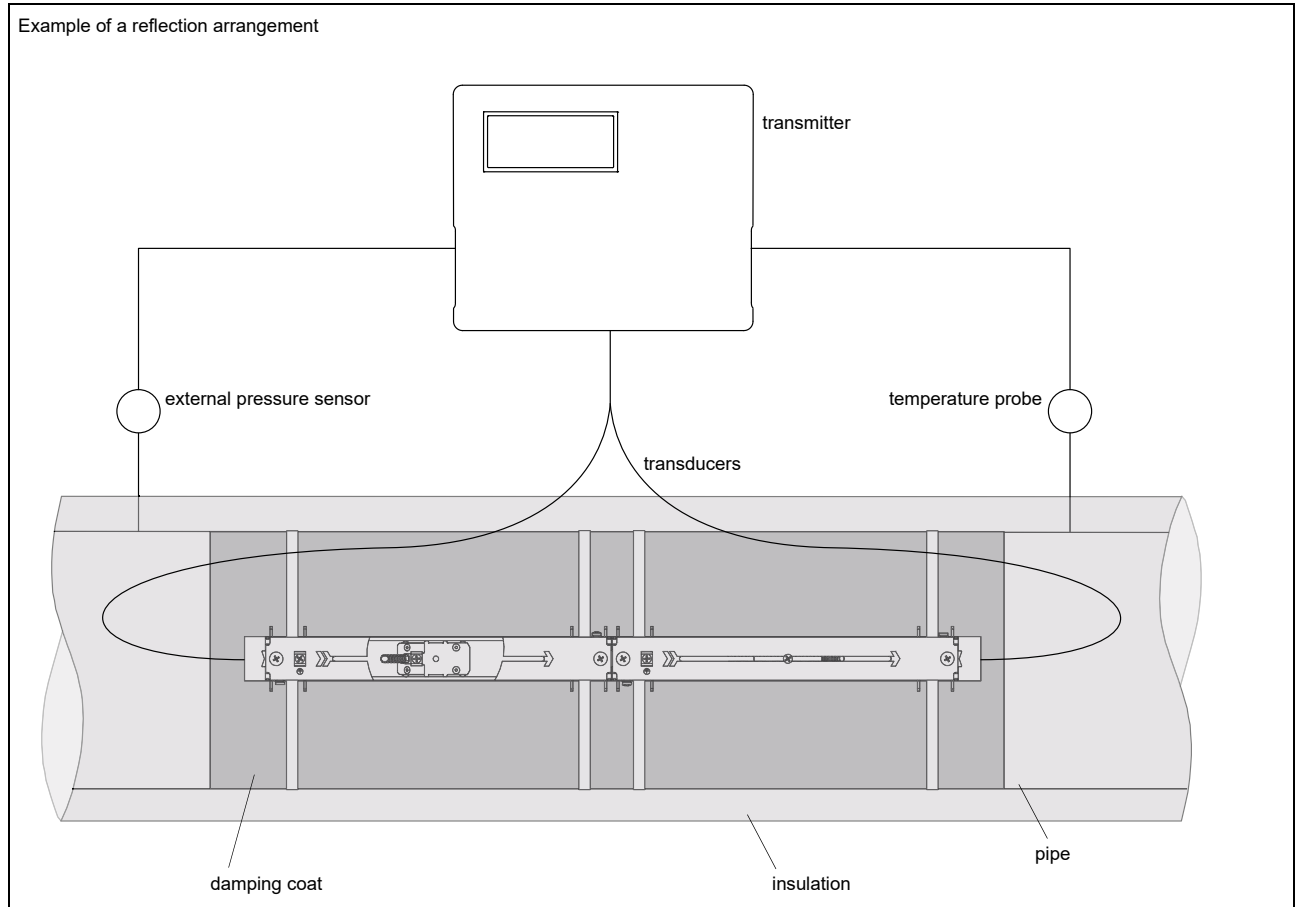
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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



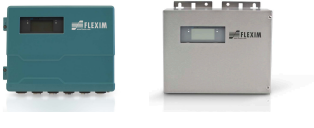




a - transducer distance

Typical measurement setup



Transmitter

Technical data

	FLUXUS G721ST-NNN**.*A G721ST-NNN**.*S	FLUXUS G721ST-A2N**.*A G721ST-A2N**.*S	FLUXUS G721ST-F2N**.*A G721ST-F2N**.*S
			
design	standard field device	standard field device zone 2	standard field device FM Class I Div. 2
application	steam measurement ²		
measurement			
measurement principle	transit time difference correlation principle		
Flussrichtung	bidirektional		
flow velocity	m/s depending on pipe diameter and transducer, see diagrams		
repeatability	0.15 % MV ±0.005 m/s		
fluid	saturated steam, superheated steam		
fluid pressure	bar (a) 3...10		
fluid temperature	°C 135...180	135...155 (see pipe surface temperature (Ex) of selected transducer)	135...165
temperature compensation	corresponding to the recommendations in ANSI/ASME MFC-5.1-2011		
measurement uncertainty (volumetric flow rate)			
measurement uncertainty of the measuring system ¹	±0.3 % MV ±0.005 m/s		
measurement uncertainty at the measuring point	±1...3 % MV ±0.005 m/s, depending on the application		
transmitter			
power supply	<ul style="list-style-type: none"> • 100...230 V/50...60 Hz or • 20...32 V DC or • 11...16 V DC 		
power consumption	W	< 15	
number of measuring channels		1, optional: 2	
damping	s	0...100 (adjustable)	
measuring cycle	Hz	100...1000 (1 channel)	
response time	s	1 (1 channel), option: 0.02	
housing material		aluminum, powder coated or stainless steel 316L (1.4404)	
degree of protection		IP66	aluminum housing: IP66/NEMA 4X stainless steel housing: 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 without operation of the display)	aluminum housing: -40...+55/60 (< -20 without operation of the display) stainless steel housing: -20...+55/60
display		128 x 64 pixels, backlight	
menu language		English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian	
explosion protection			
• ATEX/IECEx			
marking	-	G721**.*A20*A, G721**.*A20*S:  0637  II3G II2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db T _a -40...+60 °C	-
certification	-	IBEXU11ATEX1015, IECEx IBE 11.0008	-
• FM			
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

¹ with aperture calibration of the transducers

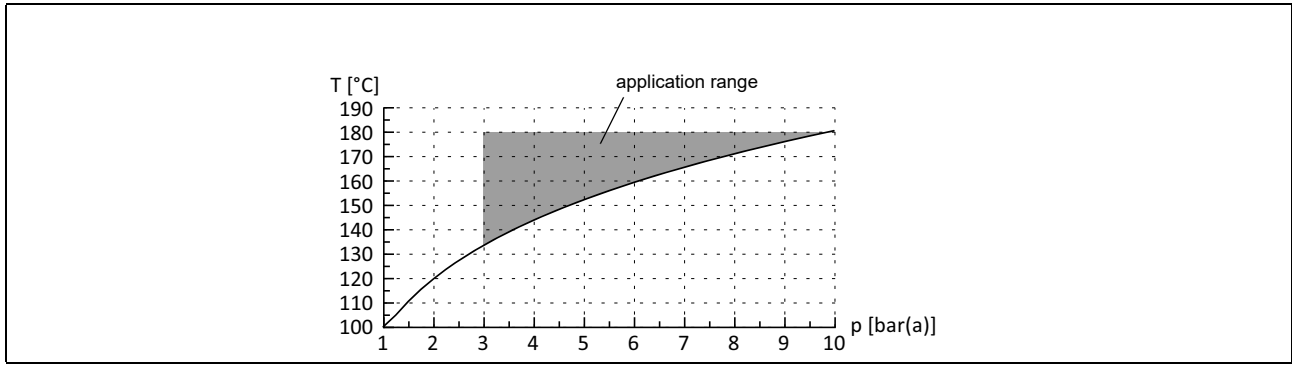
² test measurement to validate the application required in advance

	FLUXUS G721ST-NNN**-*A G721ST-NNN**-*S	FLUXUS G721ST-A2N**-*A G721ST-A2N**-*S	FLUXUS G721ST-F2N**-*A G721ST-F2N**-*S
measuring functions			
physical quantities	operating volumetric flow rate, mass flow rate, flow velocity		
totaliser	volume, mass		
calculation functions	average, difference, sum (2 measuring channels necessary)		
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times		
communication interfaces			
service interfaces	measured value transmission, parametrisation of the transmitter: • USB • LAN		
process interfaces	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • Profibus PA • FF H1 • Modbus TCP • BACnet IP		
accessories			
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		
data logger			
loggable values	all physical quantities, totalised physical quantities and diagnostic values		
capacity	max. 800 000 measured values		
outputs			
	The outputs are galvanically isolated from the transmitter.		
• switchable current output			
	All switchable current outputs are jointly switched to active or passive.		
number	2 (1 measuring channel), optional: 4 (2 measuring channels)		
range	mA	4...20 (3.2...22)	
accuracy	0.04 % MV ±3 µA		
active output	$R_{ext} < 250 \Omega$		
passive output	$U_{ext} = 8...30 \text{ V}$, depending on R_{ext} ($R_{ext} < 1 \text{ k}\Omega$ at 30 V)		
• digital output			
functions	• frequency output • binary output • pulse output		
number	3		
operating parameters	5...30 V / < 100 mA		
frequency output			
• range	kHz	0...5	
binary output			
• binary output as alarm output	limit, change of flow direction or error		
pulse output			
• functions	mainly for totalising		
• pulse value	units	0.01...1000	
• pulse width	ms	0.05...1000	
inputs			
	The inputs are galvanically isolated from the transmitter.		
• temperature input			
number	1 (1 measuring channel), optional: 2 (2 measuring channels)		
type	Pt100/Pt1000		
connection	4-wire		
range	°C	-150...+560	
resolution	K	0.01	
accuracy	±0.01 % MV ±0.03 K		
• current input			
number	1 (1 measuring channel), optional: 2 (2 measuring channels)		
accuracy	0.1 % MV ±10 µA		
active input	$U_{int} = 24 \text{ V}$, $R_{int} = 50 \Omega$, $P_{int} < 0.5 \text{ W}$, not short-circuit proof		
• range	mA	0...20	
passive input	$R_{int} = 50 \Omega$, $P_{int} < 0.3 \text{ W}$		
• range	mA	-20...+20	

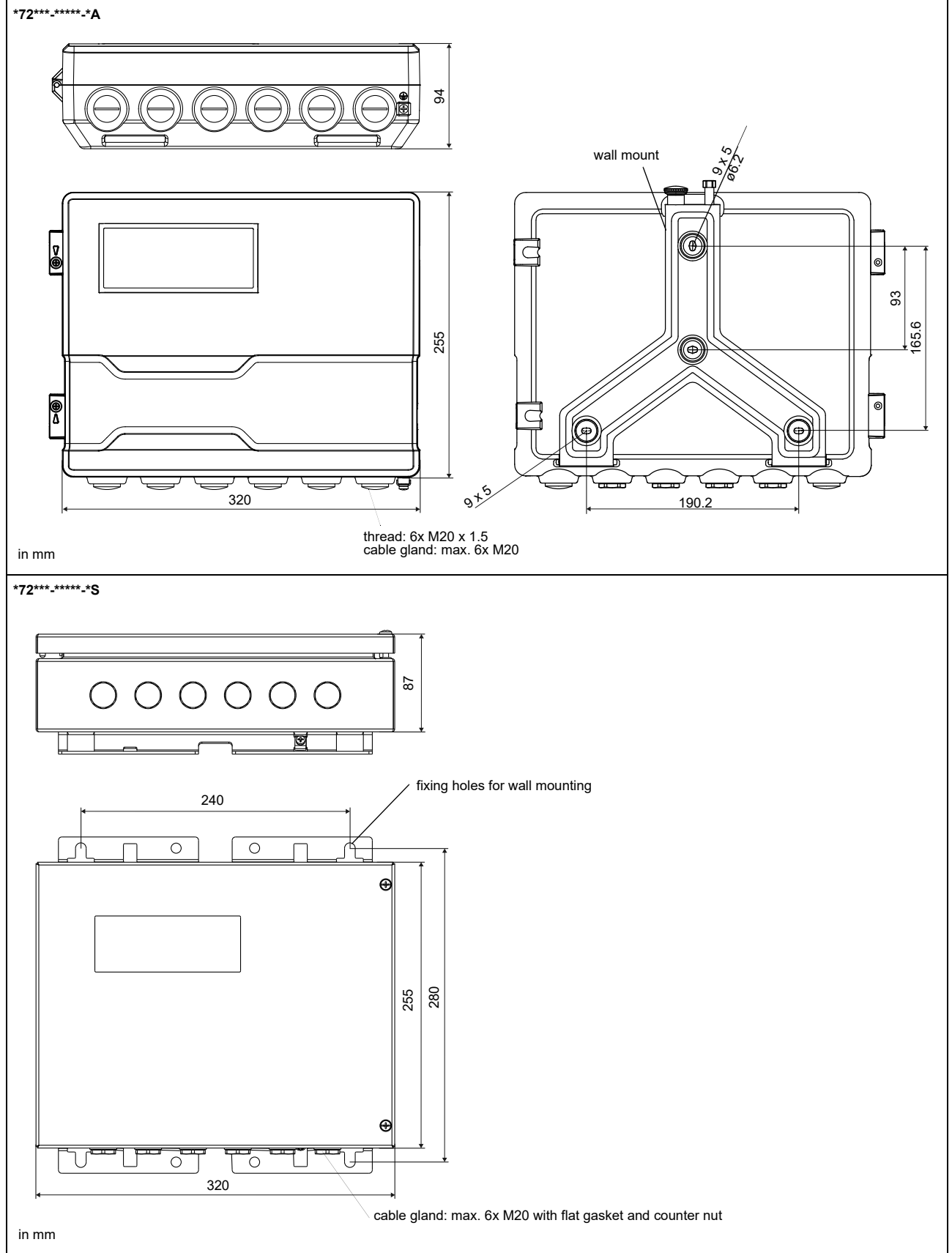
¹ with aperture calibration of the transducers

² test measurement to validate the application required in advance

Saturated steam pressure curve

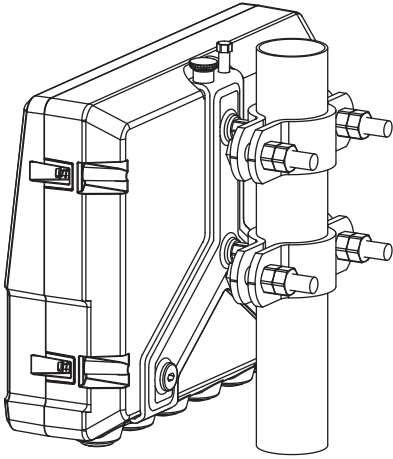


Dimensions



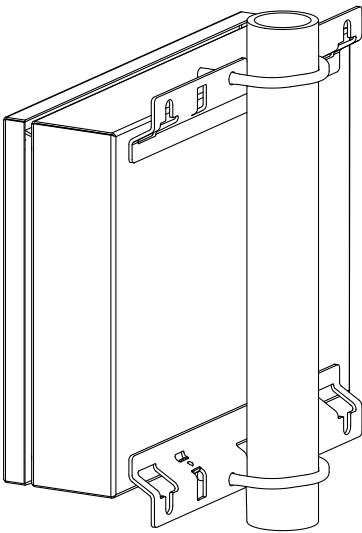
2" pipe mounting kit

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



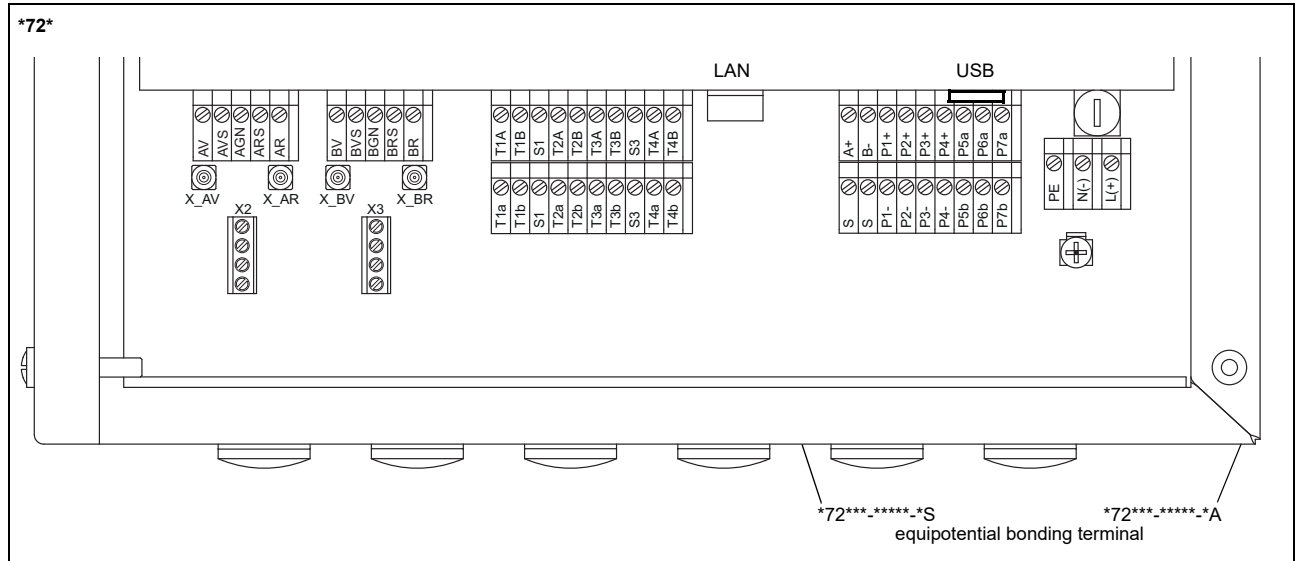
item number: 721037-4

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



item number: 721110-4

Terminal assignment



power supply ¹				
terminal		connection (AC)		connection (DC)
PE		protective earth		protective earth
N(-)		xxx		-
L(+)		outer conductor		+
transducers				
transducer cable (transducers *****8*), extension cable				transducer cable (transducers *****52)
measuring channel A		measuring channel B		
terminal	connection	terminal	connection	transducer
AV	signal	BV	signal	↑
AVS	shield	BVS	shield	
ARS	shield	BRS	shield	⌞
AR	signal	BR	signal	
				X_AV
				X_BV
				X_AR
				X_BR
				SMB connector
				SMB connector
				SMB connector
outputs ¹				
terminal	connection	terminal	connection	communication interface
P1+...P4+ P1-...P4-	current output	A+	signal +	<ul style="list-style-type: none"> • RS485¹ • Modbus RTU¹ • BACnet MS/TP¹ • Profibus PA¹ • FF H1¹
		B-	signal -	
P5a...P7a P5b...P7b	digital output	101	shield	
		USB	type B Hi-Speed USB 2.0 Device	<ul style="list-style-type: none"> • service (FluxDiag/ FluxDiagReader)
		LAN	RJ45 10/100 Mbps Ethernet	<ul style="list-style-type: none"> • service (FluxDiag/ FluxDiagReader) • BACnet IP • Modbus TCP
analog inputs ¹				
terminal	temperature probe		passive sensor	active sensor
	direct connection	connection with extension cable	connection	connection
T1a...T2a	red	red	not connected	not connected
T1A...T2A	red/blue	grey	-	+
T1b...T2b	white/blue	blue	+	not connected
T1B...T2B	white	white	not connected	-
S1, S3	shield	shield	not connected	not connected

¹ cable (by customer):
 - e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm²
 - outer diameter of the cable (*72***.*****.*S with ferrite nut): max. 7.6 mm

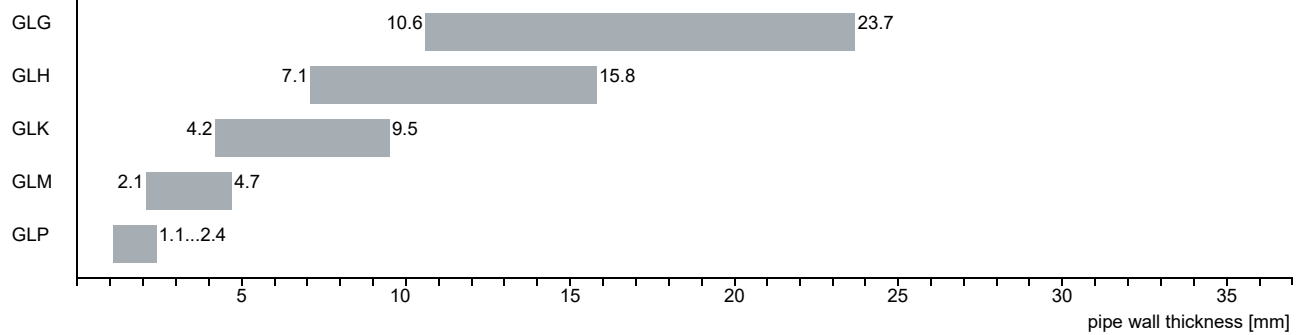
Transducers

Transducer selection

Step 1

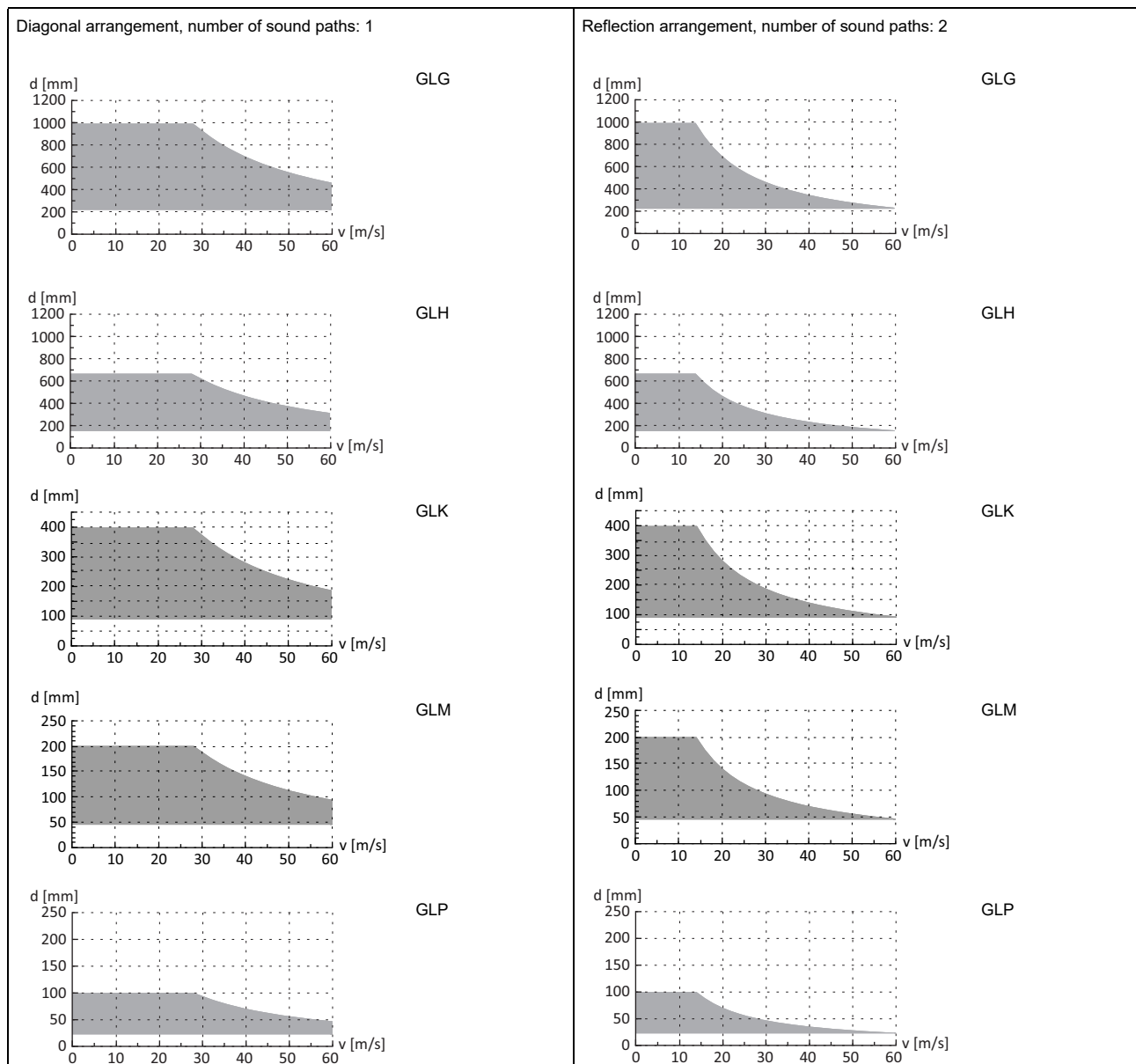
pipe wall thickness

transducer order code



Step 2

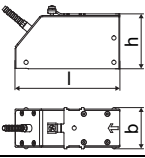
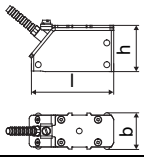

inner pipe diameter d dependent on the flow velocity v of the fluid in the pipe



inner pipe diameter and max. flow velocity for a steam application

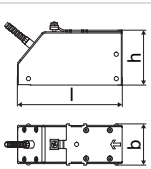
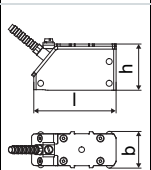

Technical data

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

order code		GLG-S***-**TS	GLH-S***-**TS	GLK-S***-**TS	GLM-S***-**TS	GLP-SNNN-**TS
technical type		G(RT)G1S52	G(RT)H1S52	G(RT)K1S52	G(RT)M1S52	G(RT)P1S52
transducer frequency	MHz	0.2	0.3	0.5	1	2
fluid pressure		see saturated steam pressure curve				
inner pipe diameter d						
min.	mm	225	150	90	45	23
max.	mm	1000	667	400	200	100
pipe wall thickness						
min.	mm	10.6	7.1	4.2	2.1	1.1
max.	mm	23.7	15.8	9.5	4.7	2.4
material						
housing		PPSU with stainless steel cover 316Ti (1.4571)				
contact surface		PPSU				
degree of protection		IP66				
transducer cable						
type		1699				
length	m	5				4
dimensions						
length l	mm	128.5			74	
width b	mm	51			32	
height h	mm	67.5			40.5	
dimensional drawing						
weight (without cable)	kg	0.8			0.16	
storing temperature						
storing temperature	°C	-40...+155				
operating temperature	°C	100...180 (nonEx)				
warm-up time	h	3				1
temperature compensation		x				
explosion protection						
• ATEX/IECEx						
order code		GLG-SA2*-**TS	GLH-SA2*-**TS	GLK-SA2*-**TS	GLM-SA2*-**TS	-
pipe surface temperature (Ex)	°C	gas: -50...+165 dust: -50...+155				-
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T160 °C Db				-
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X				-
• FM						
order code		GLG-SF2*-**TS	GLH-SF2*-**TS	GLK-SF2*-**TS	GLM-SF2*-**TS	-
pipe surface temperature (Ex)	°C	-40...+165				-
degree of protection		IP66				-
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				-

completely thermally insulated transducer installation necessary

Lamb wave transducers (zone 1, steam measurement, T1)

order code		GLG-SA1*-**T1	GLH-SA1*-**T1	GLK-SA1*-**T1	GLM-SA1*-**T1
technical type		G(RT)G1S83	G(RT)H1S83	G(RT)K1S83	G(RT)M1S83
transducer frequency	MHz	0.2	0.3	0.5	1
fluid pressure		see saturated steam pressure curve			
inner pipe diameter d					
min.	mm	225	150	90	45
max.	mm	1000	667	400	200
pipe wall thickness					
min.	mm	10.6	7.1	4.2	2.1
max.	mm	23.7	15.8	9.5	4.7
material					
housing		PPSU with stainless steel cover 316Ti (1.4571)			
contact surface		PPSU			
degree of protection		IP66			
transducer cable					
type		1699			
length	m	5			4
dimensions					
length l	mm	128.5			74
width b	mm	51			32
height h	mm	67.5			40.5
dimensional drawing					
weight (without cable)	kg	0.8			0.16
storing temperature	°C	-40...+155			
operating temperature	°C	100...155			
warm-up time	h	3			1
temperature compensation		x			
explosion protection					
• ATEX/IECEX					
pipe surface temperature (Ex)	°C	-50...+155			
marking		CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db			
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X			

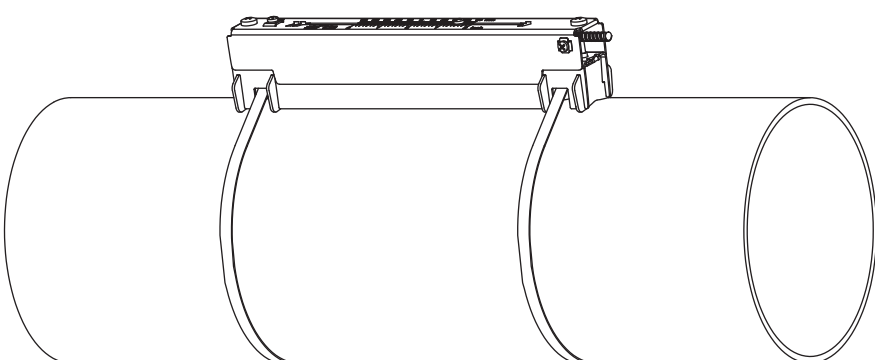
completely thermally insulated transducer installation necessary

Transducer mounting fixture

Order code

1, 2	3	4	5	6	7...10	no. of character
transducer mounting fixture	transducer	measurement arrangement	size	fixation	outer pipe diameter	option
VL						
						Variofix L
	K					transducers with transducer frequency G, H, K
	M					transducers with transducer frequency M, P
		D				reflection arrangement or diagonal arrangement
		R				reflection arrangement
			S			small
				S		tension straps
				W		welding
					T360	40...360 mm
					0130	10...130 mm
					0360	130...360 mm
					0920	360...920 mm
					2000	920...2000 mm
					4500	2000...4500 mm
						OS housing with stainless steel 316
						Z special design

Variofix L (VLK, VLM)



material: stainless steel 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568)

inner length:
VLK: 348 mm,
VLM: 234 mm

dimensions:
VLK: 423 x 90 x 93 mm
VLM: 309 x 57 x 63 mm

Coupling materials for transducers

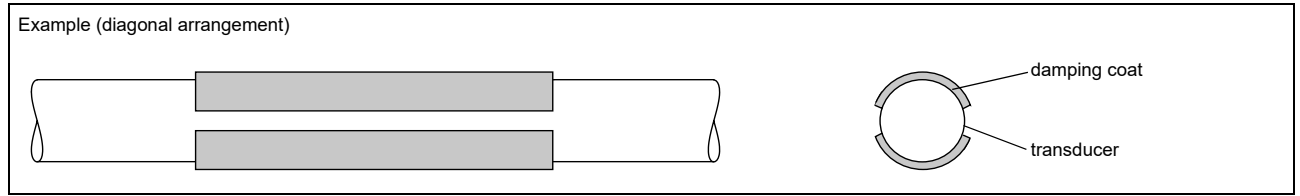
type	ambient temperature °C
coupling foil type VT ¹	-10...+200
coupling compound type E ²	-30...+200

¹ fluid temperature 200 °C: min. 2 years

² in combination with type VT only

Damping coat

The damping coat will be used to reduce acoustic noise influences on the measurement.



Technical data

item number		992080-13
material		multipolymeric matrix/inorganic ceramic coating
packing drum	I	1
properties		heat resistant, inert
fluid temperature when applying	°C	10...200
drying time (example)		approx. 3 h at 20 °C approx. 15 min at 150 °C
temperature resistance in dry state	°C	max. 650
durability of the packing drum (unopened)		2 years

Observe installation instructions (TI_DampingCoat).

Dimensioning

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

Connection systems

connection system T1		
connection with extension cable	direct connection	transducers technical type
		****G*
connection system TS		
		****52

Cable

transducer cable		
type		1699
weight	kg/m	0.094
ambient temperature	°C	-55...+200
cable jacket		
material		PTFE
outer diameter	mm	2.9
thickness	mm	0.3
colour		brown
shield		x
sheath		
material		stainless steel 316Ti (1.4571)
outer diameter	mm	8

extension cable			
type		2615	5245
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

Cable length


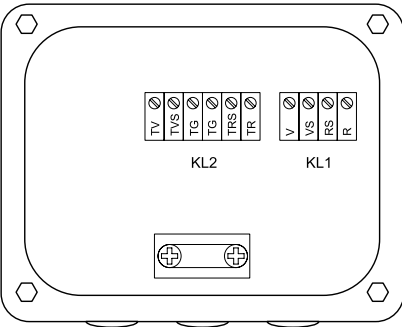
transducer frequency		G, H, K		M, P	
transducers technical type		x	l	x	l
*R***8*		5	≤ 300	4	≤ 300
*T***0*		9	≤ 300	9	≤ 300
*R***5*	m	5	≤ 300	4	≤ 300
*T***0*	m	9	≤ 300	9	≤ 300



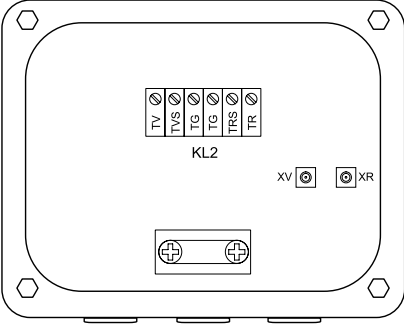
x - transducer cable length

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

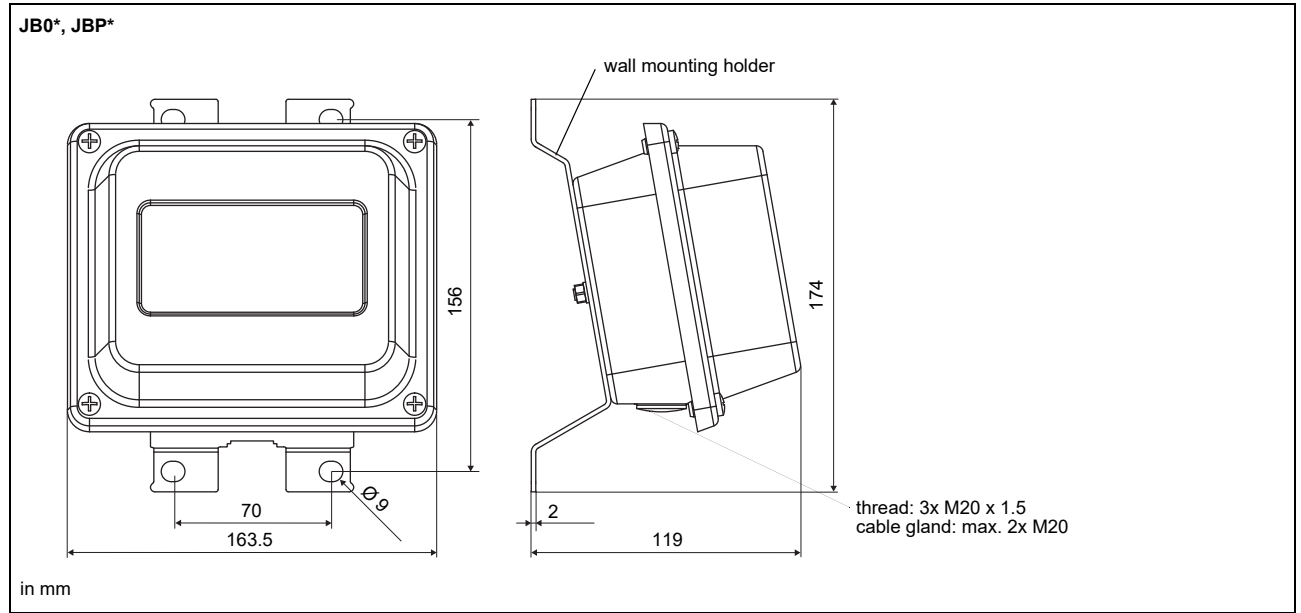
Junction box

Technical data

JB01S4E3M																		
weight	kg 1.2 kg																	
fixation	wall mounting optional: 2" pipe mounting																	
material																		
housing	stainless steel 316L (1.4404)																	
gasket	silicone																	
degree of protection	IP67																	
ambient temperature																		
min.	°C -40																	
max.	°C +80																	
explosion protection																		
• ATEX/IECEX																		
marking	CE 0637  II2G II2D Ex eb mb IIC T6...T4 Gb Ex tb IIIC 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																	
Connection 																		
Transducers <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> <th>transducer</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL1</td> <td>V</td> <td>signal</td> <td>↑</td> </tr> <tr> <td>VS</td> <td>internal shield</td> <td></td> </tr> <tr> <td>RS</td> <td>internal shield</td> <td>⌋</td> </tr> <tr> <td>R</td> <td>signal</td> <td></td> </tr> </tbody> </table>		terminal strip	terminal	connection	transducer	KL1	V	signal	↑	VS	internal shield		RS	internal shield	⌋	R	signal	
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Extension cable <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>TV</td> <td>signal</td> </tr> <tr> <td>TVS</td> <td>internal shield</td> </tr> <tr> <td>TRS</td> <td>internal shield</td> </tr> <tr> <td>TR</td> <td>signal</td> </tr> </tbody> </table>		terminal strip	terminal	connection	KL2	TV	signal	TVS	internal shield	TRS	internal shield	TR	signal					
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												
material													
housing	stainless steel 316L (1.4404)												
gasket	silicone												
degree of protection	IP67												
ambient temperature													
min.	°C -40												
max.	°C +80												
explosion protection													
• ATEX													
junction box	JB02												
marking	CE  II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIIC T 100 °C Dc Ta -40...+(70)80 °C												
• FM													
junction box	JB04												
marking	 NI/CI, I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C												
Connection 													
Transducers <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> <th>transducer</th> </tr> </thead> <tbody> <tr> <td rowspan="2"></td> <td>XV</td> <td>SMB connector</td> <td>↑</td> </tr> <tr> <td>XR</td> <td>SMB connector</td> <td>⌋</td> </tr> </tbody> </table>		terminal strip	terminal	connection	transducer		XV	SMB connector	↑	XR	SMB connector	⌋	
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terminal strip	terminal	connection											
KL2	TV	signal											
	TVS	internal shield											
	TRS	internal shield											
	TR	signal											

Dimensions

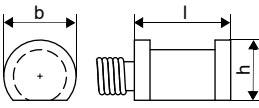
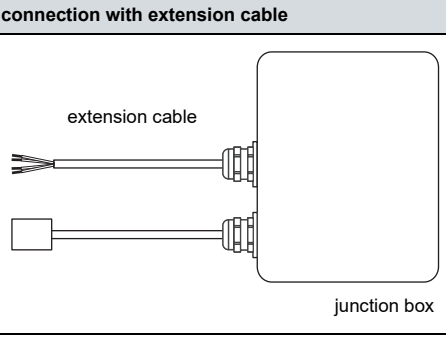
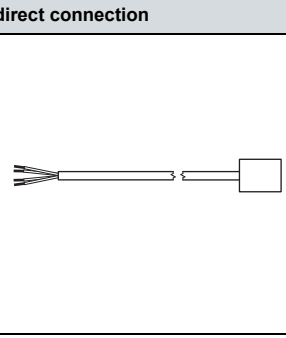
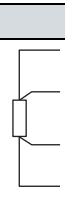


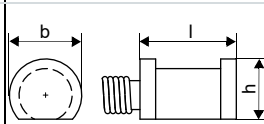

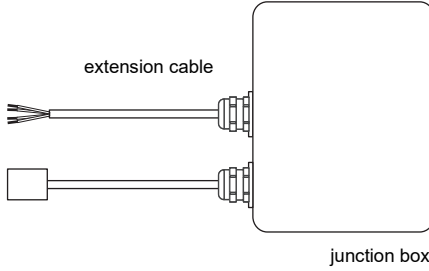
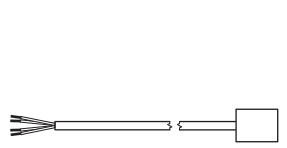
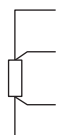
2" pipe mounting kit



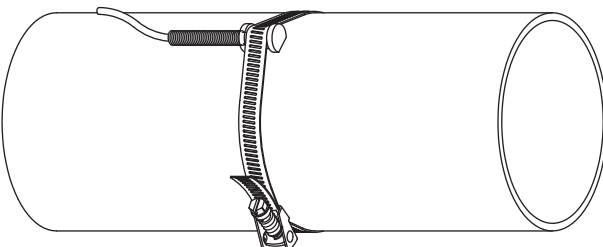
Clamp-on temperature probe (optional)

Technical data

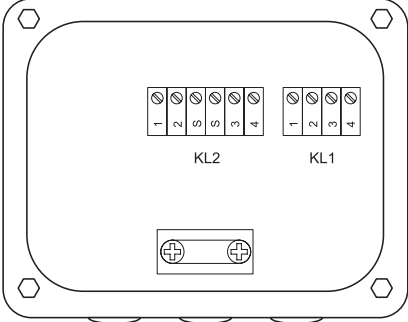
PT12N, PT12N-LC											
item number	PT12N: • 770415-1 • 770414-1 (matched) PT12N-LC: • 770415-4 • 770414-4 (matched)										
design	clamp-on option: with long cable										
type	Pt100										
connection	4-wire										
measuring range	°C -30...+250										
accuracy T	$\pm(0.15 \text{ °C} + 2 \cdot 10^{-3} \cdot T \text{ [°C] })$ class A										
accuracy ΔT (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										
housing material	aluminum										
degree of protection	IP54										
dimensions											
length l	mm 20										
width b	mm 15										
height h	mm 13										
dimensional drawing											
weight	kg 0.25										
accessories											
thermal conductivity foil 250 °C	x										
Connection system											
connection with extension cable	direct connection										
											
Connection											
	<table border="1"> <thead> <tr> <th colspan="2">temperature probe</th> </tr> </thead> <tbody> <tr> <td></td> <td>red</td> </tr> <tr> <td></td> <td>red/blue</td> </tr> <tr> <td></td> <td>white/blue</td> </tr> <tr> <td></td> <td>white</td> </tr> </tbody> </table>	temperature probe			red		red/blue		white/blue		white
temperature probe											
	red										
	red/blue										
	white/blue										
	white										
Cable											
	PT12N	PT12N-LC	extension cable								
type	4 x 0.22 mm ²		LIYCY 8 x 0.14 mm ² grey								
standard length	m 3	15	5/10/25								
max. length	m -		200								
ambient temperature	°C -30...+250		-25...+80								
min. bend radius	mm 27		68								
cable jacket											
material	PFA		PVC								
outer diameter	mm 3.8 ±0.15		4.8 ±2								
colour	black		grey								

PT12N		
item number		<ul style="list-style-type: none"> • 770415-1A2 • 770414-1A2 (matched)
design		clamp-on ATEX
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 ΔT (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
housing material		aluminum
degree of protection		IP67
dimensions		
length l	mm	20
width b	mm	15
height h	mm	13
dimensional drawing		
weight	kg	0.25
accessories		
thermal conductivity foil 250 °C		x
explosion protection		
• ATEX		
marking		 II 3G Ex nA IIC T6...T2 Gc Ta -30...+250 °C
Connection system		
connection with extension cable		direct connection
		
Connection		
	temperature probe	
	red	
	red/blue	
	white	
	white/blue	
Cable		
	temperature probe	extension cable
type	4 x 0.25 mm ²	LIYCY 8 x 0.14 mm ²
standard length	m	3
max. length	m	-
ambient temperature	°C	-30...+250
min. bend radius	mm	19
cable jacket		
material	PTFE	PVC
outer diameter	mm	3.8
colour	black	grey

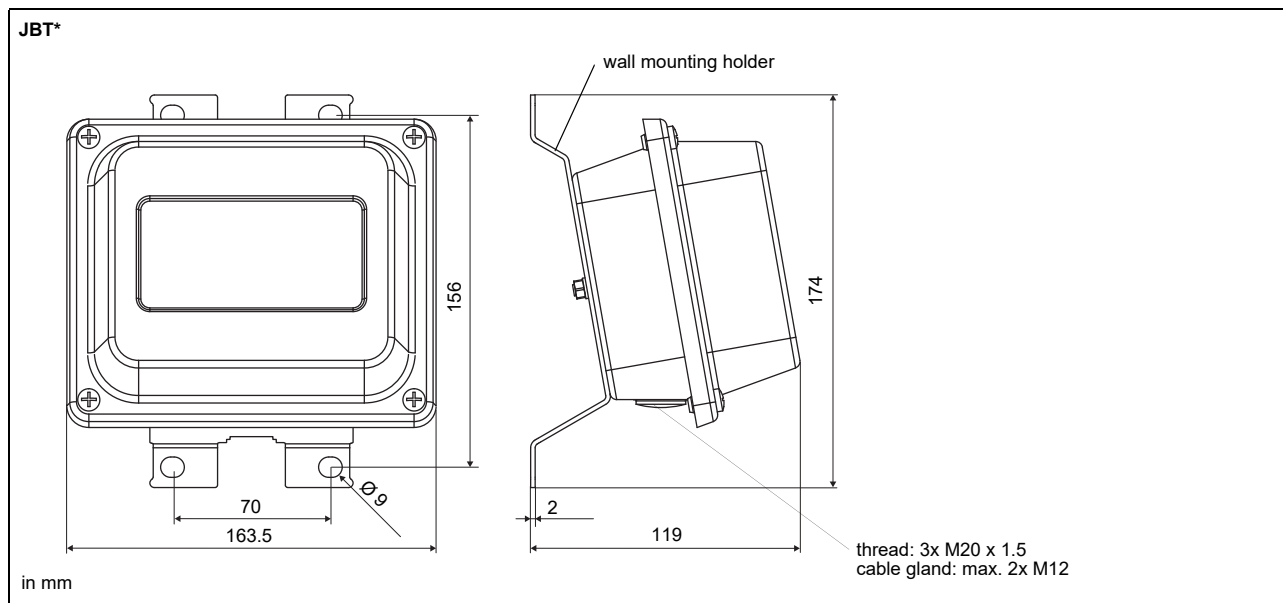
Fixation

tension strap PT12N	
	material: stainless steel 301 (1.4310), 410 (1.4006) thermal insulation necessary

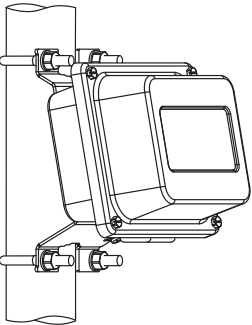
Junction box

JBT2, JBT3																									
item number	<ul style="list-style-type: none"> JBT2:770428-5A2 JBT3: 751040-36 																								
weight	kg 1.2 kg																								
fixation	wall mounting optional: 2" pipe mounting																								
material																									
housing	stainless steel 316L (1.4404)																								
gasket	silicone																								
degree of protection	IP67																								
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• ATEX																									
junction box marking	JBT2																								
marking	CE Ex II3G Ex nA IIC T6...T4 Gc II3D Ex tc IIIC T 100 °C Dc Ta -40...+70/80 °C																								
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Connection</p>  </div> <div style="width: 45%;"> <p>Temperature probe</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>Extension cable</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
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																							

Dimensions



2" pipe mounting kit

<p>JB**</p> 	<p>item number: 751035-2</p>
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