Gas ultrasonic flowmeter for permanent installation

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

Applications

- Chemical industry, petrochemical industry, oil and gas industry, manufacturing industries

Transmitter

Technical data

		FLUXUS G721**-NNN**-*A G721**-NNN**-*S	FLUXUS G721**-A2N**-*A G721**-A2N**-*S	FLUXUS G721**-F2N**-*A G721**-F2N**-*S	FLUXUS G722**-NNN**-*A G722**-NNN**-*S	FLUXUS G722**-A2N**-*A G722**-A2N**-*S	FLUXUS G722**-F2N**-*A G722**-F2N**-*S
design		standard field device	standard field device zone 2	standard field device FM Class I Div. 2	standard field device	standard field device zone 2	standard field device FM Class I Div. 2
measurement							
measurement principle		transit time difference correlation principle					
flow direction		bidirectional					
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					
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...2 % MV ±0.005 m/s, depending on the application					
transmitter							
power supply		• 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			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					
housing material		aluminum, powder coated or stainless steel 316L (1.4404)					
degree of protection		IP66		aluminum housing: IP66/NEMA 4X stainless steel housing: IP65	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	-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, Chinese					
explosion protection							
• ATEX/IECEx							
marking		-	G721**-A20*A, G721**-A20*S: CE 0637 ⟨Ex⟩ II3G II2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db T_a -40...+60 °C	-	-	G722**-A20*A, G722**-A20*S: CE 0637 ⟨Ex⟩ 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	-	-	IBExU11ATEX1015, IECEx IBE 11.0008	-

[1] with aperture calibration of the transducers

[2] outside the explosive atmosphere (housing cover open)

		FLUXUS G721**-NNN**-*A G721**-NNN**-*S	FLUXUS G721**-A2N**-*A G721**-A2N**-*S	FLUXUS G721**-F2N**-*A G721**-F2N**-*S	FLUXUS G722**-NNN**-*A G722**-NNN**-*S	FLUXUS G722**-A2N**-*A G722**-A2N**-*S	FLUXUS G722**-F2N**-*A G722**-F2N**-*S
• FM							
marking		-	-	G721**-F20**2, G721**-F20**3: ⬦FM c/us APPROVED NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T5 G721**-F20**1: ⬦FM c/us APPROVED NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T4A	-	-	G722**-F20**2, G722**-F20**3: ⬦FM c/us APPROVED NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T5 G722**-F20**1: ⬦FM c/us APPROVED NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T4A

measuring functions

physical quantities	operating volumetric flow rate, standard volumetric flow rate, mass flow rate, flow velocity, optional: gas energy flow rate (DGM)
totaliser	volume, mass, optional: gas energy (DGM)
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[2] • LAN[2]

process interfaces	max. 1 option:	max. 1 option:	max. 1 option:	max. 1 option:	max. 1 option:	max. 1 option:
	• RS485 (ASCII sender)	• RS485 (ASCII sender)	• RS485 (ASCII sender)	• RS485 (ASCII sender)	• RS485 (ASCII sender)	• RS485 (ASCII sender)
	• Modbus RTU	• Modbus RTU	• Modbus RTU	• Modbus RTU	• Modbus RTU	• Modbus RTU
	• BACnet MS/TP	• BACnet MS/TP	• BACnet MS/TP	• BACnet MS/TP	• BACnet MS/TP	• BACnet MS/TP
	• M-Bus	• HART	• HART	• M-Bus	• HART	• HART
	• HART	• Profibus PA	• Profibus PA	• HART	• Profibus PA	• Profibus PA
	• Profibus PA	• FF H1	• FF H1	• Profibus PA	• FF H1	• FF H1
	• FF H1	• Modbus TCP	• Modbus TCP	• FF H1	• Modbus TCP	• Modbus TCP
	• Modbus TCP	• BACnet IP	• BACnet IP	• Modbus TCP	• BACnet IP	• BACnet IP
	• BACnet IP			• BACnet IP		

accessories

data transmission kit	USB cable
software	• FluxDiagReader: reading of measured values and parameters, graphical representation • FluxDiag (optional): reading of measurement data, graphical representation, 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.
number		on request

• switchable current output

		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_{ext} < 250 Ω
passive output		U_{ext} = 8...30 V, depending on R_{ext} (R_{ext} < 1 kΩ at 30 V)

• HART

range	mA	4...20
accuracy		0.1 % MV ±15 µA
active output		U_{int} = 24 V, R_{ext} < 500 Ω
passive output		U_{ext} = 10...24 V DC, depending on R_{ext} (R_{ext} < 1 kΩ at 24 V)

• voltage output

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_{int} = 500 Ω

• frequency output

range	kHz	0...5
optorelay		24 V/4 mA, R_{int} = 66.5 Ω

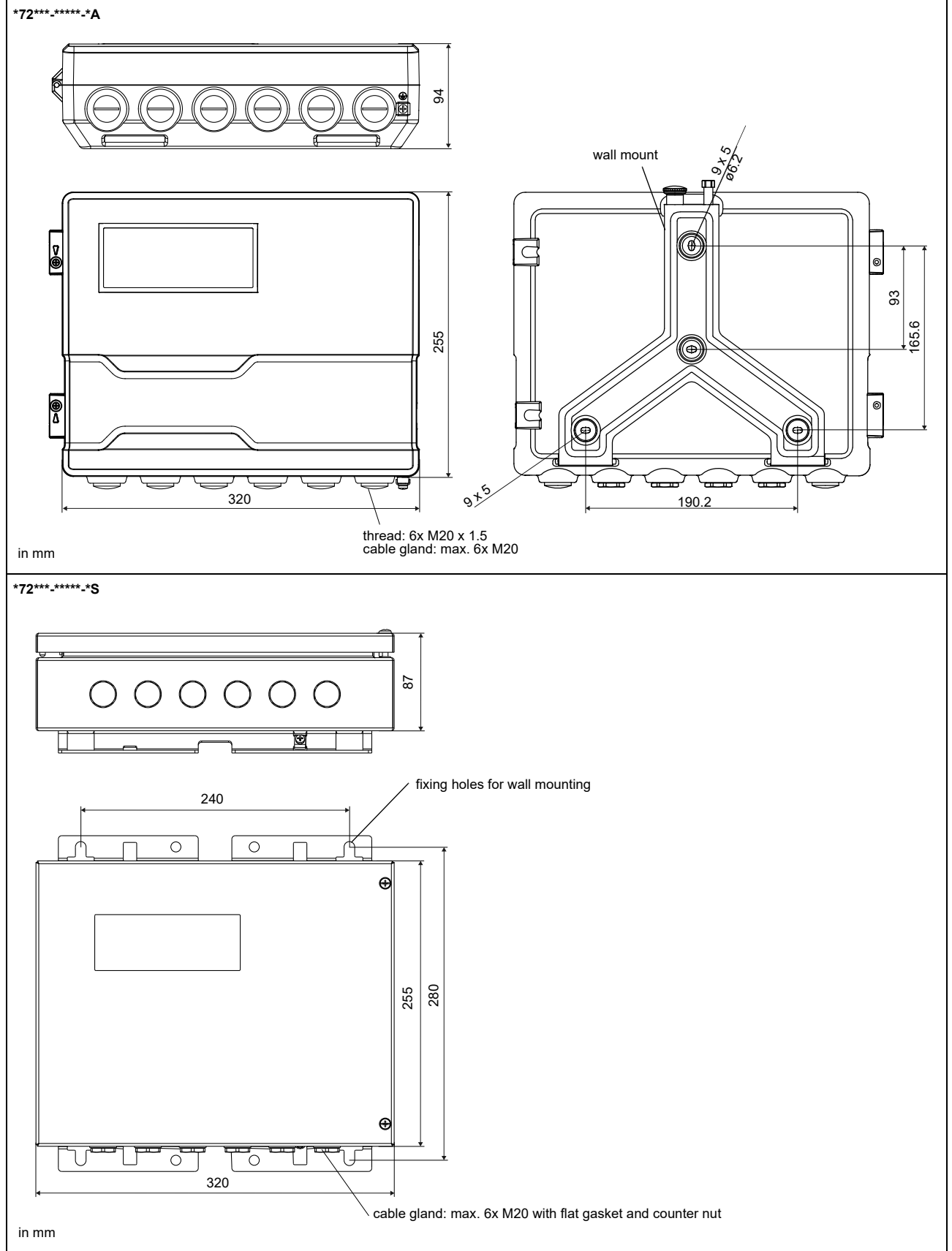[1] with aperture calibration of the transducers

[2] outside the explosive atmosphere (housing cover open)

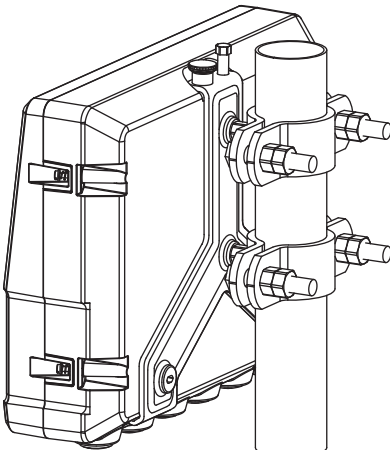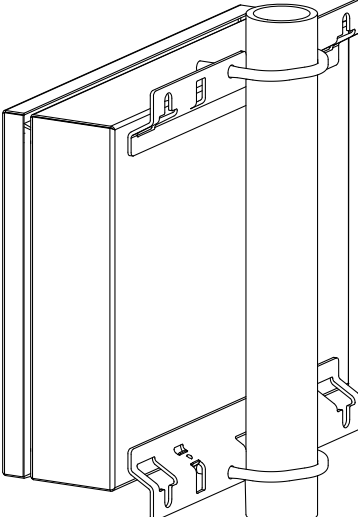|		FLUXUS G721**-NNN**-*A G721**-NNN**-*S	FLUXUS G721**-A2N**-*A G721**-A2N**-*S	FLUXUS G721**-F2N**-*A G721**-F2N**-*S	FLUXUS G722**-NNN**-*A G722**-NNN**-*S	FLUXUS G722**-A2N**-*A G722**-A2N**-*S	FLUXUS G722**-F2N**-*A G722**-F2N**-*S
• digital output							
functions		• frequency output • binary output • 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.					
number		max. 4, on request					
• temperature input							
type		Pt100/Pt1000					
connection		4-wire					
range	°C	-150...+560					
resolution	K	0.01					
accuracy		±0.01 % MV ±0.03 K					
• current input							
accuracy		0.1 % MV ±10 µA					
active input		U_{int} = 24 V, R_{int} = 50 Ω, P_{int} < 0.5 W, not short-circuit proof					
• range	mA	0...20					
passive input		R_{int} = 50 Ω, P_{int} < 0.3 W					
• range	mA	-20...+20					
• voltage input							
range	V	0...1					
accuracy		0.1 % MV ±1 mV					
internal resistance		R_{int} = 1 MΩ					
• binary input							
switching signal		5...30 V, 1 mA		5...26 V, 1 mA	5...30 V, 1 mA		5...26 V, 1 mA
functions		• reset of the measured values • reset of the totalisers • stop of the totalisers • activation of the measuring mode for highly dynamic flows					

[1] with aperture calibration of the transducers

[2] outside the explosive atmosphere (housing cover open)

Dimensions

*72***-*****-*A

wall mount

9 x 5
ø6.2

94

255

93

165.6

320

9 x 5

190.2

in mm

thread: 6x M20 x 1.5
cable gland: max. 6x M20

*72***-*****-*S

87

fixing holes for wall mounting

240

255

280

320

cable gland: max. 6x M20 with flat gasket and counter nut

in mm

2" pipe mounting kit

*72***-*****-*A	item number: 721037-4
*72***-*****-*S	item number: 721110-4

Storage

• do not store outdoors

• store within the original package

• store in a dry and dust-free place

• protect against sunlight

• keep all openings closed

• storing temperature: -20...+60 °C

Terminal assignment


```
*72*
```

LAN   USB

*72***-*****-*S

*72***-*****-*A

equipotential bonding terminal

power supply[1]

terminal	connection (AC)	connection (DC)
PE	protective conductor	protective conductor
N(-)	neutral conductor	-
L(+)	outer conductor	+

transducers

transducer cable (transducers *****8*, ****LI*), extension cable					transducer cable (transducers *****52)		
measuring channel A		**measuring channel B**			**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[1, 2]

terminal	connection	terminal	connection	communication interface
P1+...P4+ P1-...P4-	current output, voltage output, frequency output, HART (P1)	A+	signal +	• RS485[1] • Modbus RTU[1] • BACnet MS/TP[1] • M-Bus[1] • Profibus PA[1] • FF H1[1]
		B-	signal -	
P5a...P7a P5b...P7b	digital output	S	shield	
		USB	type B Hi-Speed USB 2.0 Device	• service (FluxDiag/ FluxDiagReader)
		LAN	RJ45 10/100 Mbps Ethernet	• service (FluxDiag/ FluxDiagReader) • BACnet IP • Modbus TCP

analog inputs[1, 2]

	temperature probe		passive sensor	active sensor
terminal	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[1, 2]

terminal
P1+...P2+, P1-...P2-

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

[2] The number, type and terminal assignment are customised.

Transducers

Overview

Shear wave transducers

		technical type				
		G	K	M	P	Q
zone 2 - FM Class I Div. 2 - nonEx normal temperature range		GDG1N52 GLG1N52	GDK1N52 GLK1N52	GDM2N52 GLM2N52	GDP2N52 GLP2N52	GDQ2N52 GLQ2N52
zone 2 - nonEx IP68		GDG1LI8	GDK1LI8	GDM2LI8	GDP2LI8	
zone 2 - FM Class I Div. 2 - nonEx extended temperature range		GDG1E52 GLG1E52	GDK1E52 GLK1E52	GDM2E52 GLM2E52	GDP2E52 GLP2E52	GDQ2E52 GLQ2E52
zone 1 normal temperature range		GDG1N81 GLG1N81	GDK1N81 GLK1N81	GDM2N81 GLM2N81	GDP2N81 GLP2N81	GDQ2N81 GLQ2N81
zone 1 IP68		GDG1LI1	GDK1LI1	GDM2LI1	GDP2LI1	
zone 1 extended temperature range		GDG1E83 GLG1E83	GDK1E83 GLK1E83	GDM2E85 GLM2E85	GDP2E85 GLP2E85	GDQ2E85 GLQ2E85
inner pipe diameter d						
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
pipe wall thickness						
min.	mm	11	5	2.5	1.2	0.6
fluid pressure						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
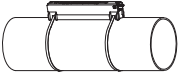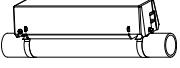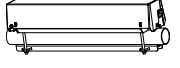
for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Lamb wave transducers

		technical type						
		F	G	H	K	M	P	Q
zone 2 - FM Class I Div. 2 - nonEx normal temperature range		GRF1N52 GTF1N52	GRG1N52 GTG1N52	GRH1N52 GTH1N52	GRK1N52 GTK1N52	GRM1N52 GTM1N52	GRP1N52 GTP1N52	GRQ1N52 GTQ1N52
zone 2 - nonEx IP68		GRF1LI8 GTF1LI8	GRG1LI8 GTG1LI8	GRH1LI8 GTH1LI8	GRK1LI8 GTK1LI8	GRM1LI8 GTM1LI8	GRP1LI8 GTP1LI8	
zone 2 - FM Class I Div. 2 - nonEx higher temperatures			GRG1S52 GTG1S52	GRH1S52 GTH1S52	GRK1S52 GTK1S52	GRM1S52 GTM1S52	GRP1S52 GTP1S52	
zone 1 normal temperature range		GRF1N83 GTF1N83	GRG1N83 GTG1N83	GRH1N83 GTH1N83	GRK1N83 GTK1N83	GRM1N83 GTM1N83	GRP1N83 GTP1N83	GRQ1N83 GTQ1N83
zone 1 IP68		GRF1LI3	GRG1LI3	GRH1LI3	GRK1LI3	GRM1LI3	GRP1LI3	
zone 1 higher temperatures			GRG1S83 GTG1S83	GRH1S83 GTH1S83	GRK1S83 GTK1S83	GRM1S83 GTM1S83		
fluid pressure								
min. extended	bar	metal pipe: 10	metal pipe: 10	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 plastic pipe: 1	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
inner pipe diameter d								
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
pipe wall thickness ****N**, ****L**								
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	-	-	-	-	-	-
pipe wall thickness ****S**								
min.	mm		10.6	7.1	4.2	2.1		
max.	mm		23.7	15.8	9.5	4.7		

for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Transducer mounting fixture

Variofix L	Variofix C
	Variofix C with bolt mounting plates
	  outer pipe diameter: **VCM**: max. 46 mm **VCQ**: max. 36 mm

for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Coupling materials for transducers

	normal temperature range		extended temperature range		
	< 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 measure-ment	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type VT	

for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Damping material

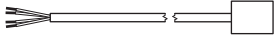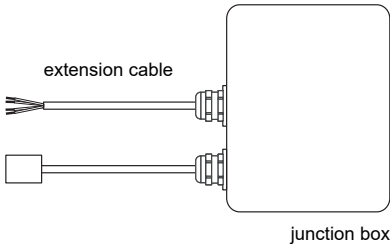|	damping mat		damping coat
item number	992080-11	992080-10	992080-13
type	E30R4	E30R3	

for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
JB02, JB03, JB04 		*****52

connection system T1		
connection with extension cable	direct connection	transducers technical type
JB01 		*****8*
JB01, JBP2, JBP3 		****Ll*

for further data see Technical specification TS_G7xx-transducersVx-xXX_Leu

Temperature probes

PT12N		PT12F
item number: • 770415-1 • 770414-2 (matched)	item number: • 770415-1A2 • 770414-1A2 (matched)	item number: • 770415-2
• Pt100 • clamp-on • -30...+250 °C	• Pt100 • clamp-on • -30...+250 °C • ATEX	• Pt100 • clamp-on • -45...+250 °C • response time: 8 s
direct connection 		
connection with extension cable extension cable junction box		

see Technical specification TS_PTVx-xXX_Leu