Technical Specification
TS _G7xx-transducersV6-0EN_Leu

2024-11-01

Flexim Clamp-on Ultrasonic Transducers for FLUXUS G7**

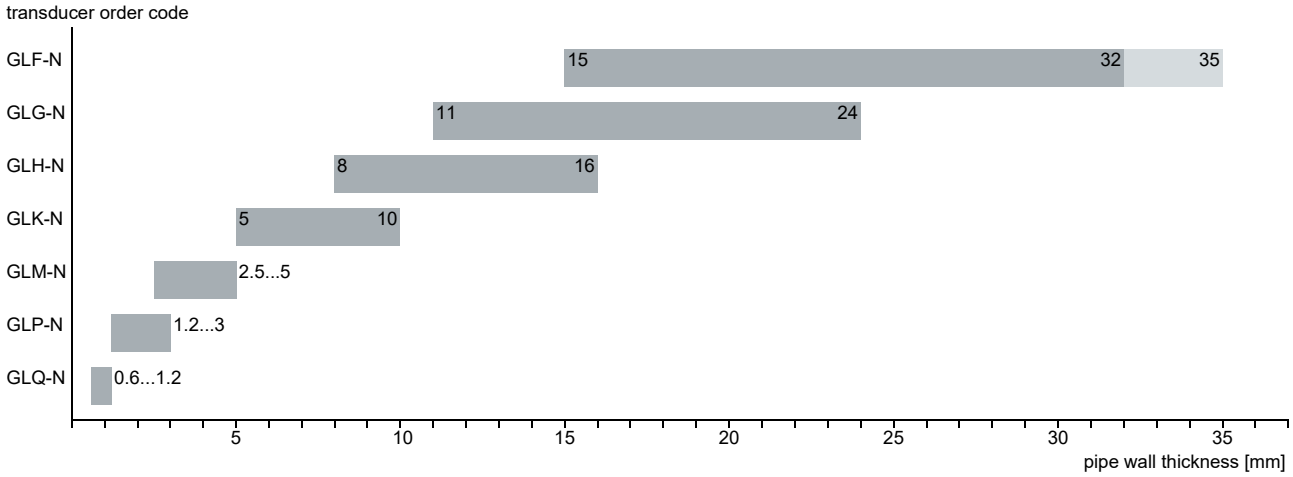
FLEXIM

EMERSON

Transducer selection

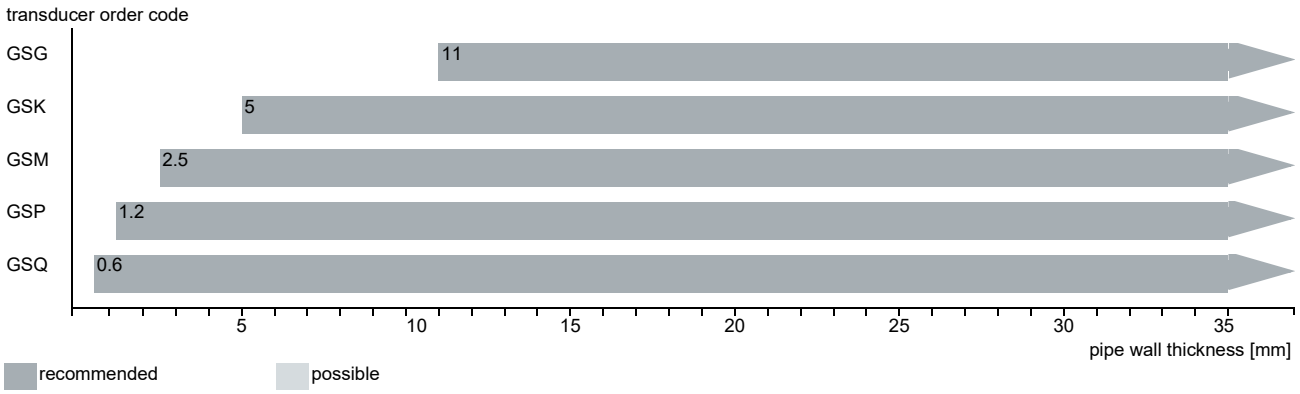
Step 1a

Select Lamb wave transducers:



Step 1b

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

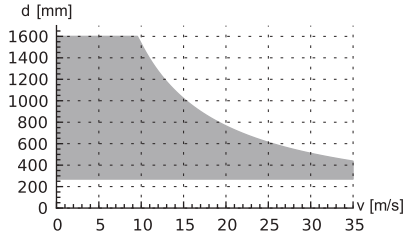
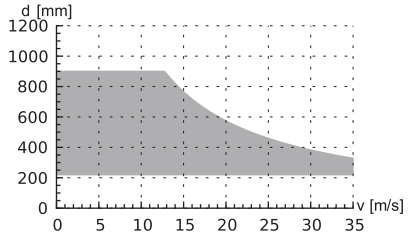
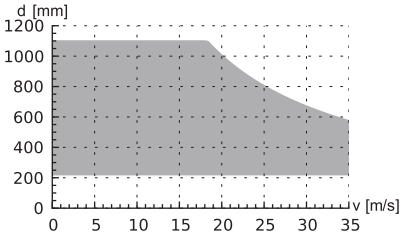
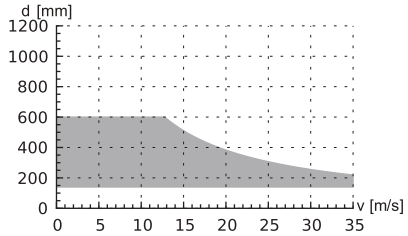
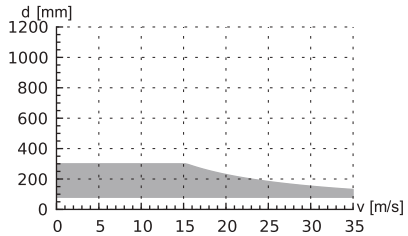
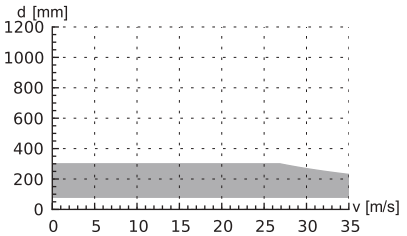
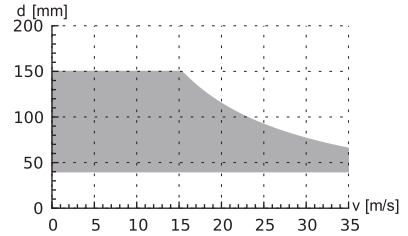
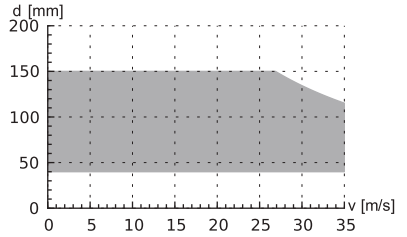
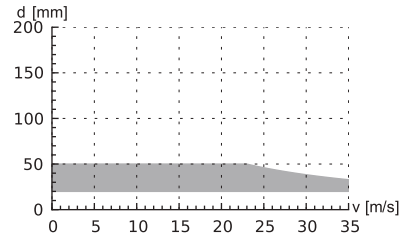
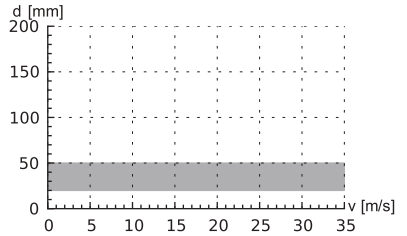
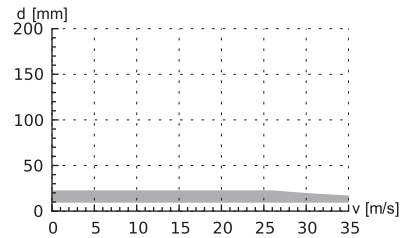
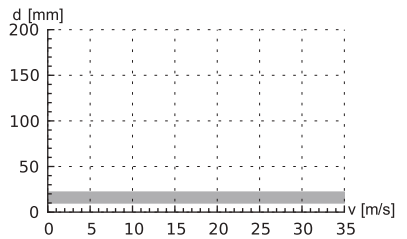


Step 2

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.

Lamb wave transducer[1]		shear wave transducer[1]	
	GLF		
	GLG		GSG
	GLH		
	GLK		GSK
	GLM		GSM
	GLP		GSP
	GLQ		GSQ

[1] 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[1] [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[1] [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

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

d - inner pipe diameter

Example

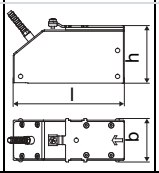
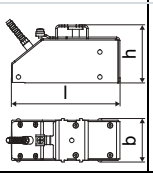
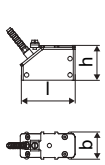
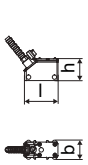
step					
1	pipe wall thickness	mm	14.3	8.6	38
	selected transducer		GLG or GLH	GLH or GLK	GS
2	inner pipe diameter	mm	581	96.8	143
	max. flow velocity	m/s	15	30	30
	selected transducer		GLG	GLK	GSK
3	min. fluid pressure	bar	20	15	40
	selected transducer		GLG	GLK	GSK

Transducer order code

1, 2	3		4	5...7		8, 9	10, 11		12...14			no. of character
transducer	**transducer frequency**	**-**	**ambient temperature**	**explosion protection**	**-**	**certification**	**connection system**	**-**	**cable length**	**/**	**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
			L									low temperature range
			N									normal temperature range
			E									extended temperature range
			S									higher temperatures
				NNN								not explosion-proof
				A2N								ATEX zone 2/IECEx zone 2
				A1N								ATEX zone 1/IECEx zone 1
				F2N								FM Class I Div. 2
						**						
							TS					with SMB connector
							T1					with stripped cable ends
									***			in m
											H68	degree of protection IP68

Technical data

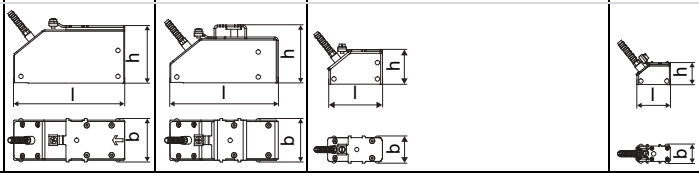
Shear wave transducers (zone 2 - FM Class I Div. 2 - nonEx, TS)

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
fluid pressure[1]						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
inner pipe diameter d[2]						
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
material						
housing		PEEK with stainless steel cover 316L (1.4404)				
contact surface		PEEK				
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699				
length	m	5		4		3
dimensions						
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
pipe surface temperature	°C	-40...+130				
ambient temperature	°C	-40...+130				
temperature compensation		x				
explosion protection						
• **ATEX/IECEx**						
order code		GSG-NA2N-**TS	GSK-NA2N-**TS	GSM-NA2N-**TS	GSP-NA2N-**TS	GSQ-NA2N-**TS
pipe surface temperature (Ex)						
• min.	°C	-55				
• max.	°C	gas: +190, dust: +180				
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T185 °C Db				
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X				
• **FM**						
order code		GSG-NF2N-**TS	GSK-NF2N-**TS	GSM-NF2N-**TS	GSP-NF2N-**TS	GSQ-NF2N-**TS
pipe surface temperature (Ex)						
• min.	°C	-40				
• max.	°C	+125		+190		
degree of protection		IP66				
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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

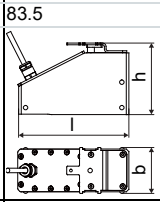
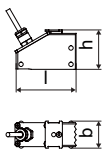
Shear wave transducers (FM Class I Div. 2, T1)

order code		GSG-N***-**T1	GSK-N***-**T1	GSM-N***-**T1	GSP-N***-**T1	GSQ-N***-**T1
technical type		G(DL)G1N53	G(DL)K1N53	G(DL)M2N53	G(DL)P2N53	G(DL)Q2N53
transducer frequency	MHz	0.2	0.5	1	2	4
fluid pressure[1]						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
inner pipe diameter d[2]						
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
material						
housing		PEEK with stainless steel cover 316L (1.4404)				
contact surface		PEEK				
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699				
length	m	5		4		3
dimensions						
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
pipe surface temperature	°C	-40...+130				
ambient temperature	°C	-40...+130				
temperature compensation		x				
explosion protection						
• **ATEX/IECEx**						
order code		GSG-NA2*-**T1	GSK-NA2*-**T1	GSM-NA2*-**T1	GSP-NA2*-**T1	GSQ-NA2*-**T1
pipe surface temperature (Ex)	°C	gas: -55...+190 dust: -55...+180				
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T185 °C Db				
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X				
• **FM**						
order code		GSG-NF2*-**T1	GSK-NF2*-**T1	GSM-NF2*-**T1	GSP-NF2*-**T1	GSQ-NF2*-**T1
pipe surface temperature (Ex)	°C	-40...+125		-40...+190		
degree of protection		IP66				
marking		FM c us APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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, T1, IP68)

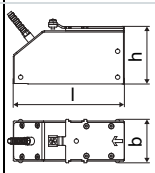
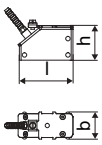
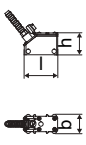
order code		GSG-L***-**T1/H68	GSK-L***-**T1/H68	GSM-L***-**T1/H68	GSP-L***-**T1/H68
technical type		GDG1LI8	GDK1LI8	GDM2LI8	GDP2LI8
transducer frequency	MHz	0.2	0.5	1	2
fluid pressure[1]					
min. extended	bar	metal pipe: 20			
min.	bar	metal pipe: 30, plastic pipe: 1			
inner pipe diameter d[2]					
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
pipe wall thickness					
min.	mm	11	5	2.5	1.2
material					
housing		PEEK with stainless steel cover 316Ti (1.4571)			
contact surface		PEEK			
degree of protection		IP68[3]			
transducer cable					
type		2550			
length	m	12			
dimensions					
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	
pipe surface temperature	°C	-40...+100			
ambient temperature	°C	-40...+100			
temperature compensation		x			
explosion protection					
• **ATEX/IECEx**					
order code		GSG-LA2N-**T1/H68	GSK-LA2N-**T1/H68	GSM-LA2N-**T1/H68	GSP-LA2N-**T1/H68
pipe surface temperature (Ex)	°C	gas: -40...+90 dust: -40...+80			
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db			
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X			

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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

[3] 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-E***-**TS	GSK-E***-**TS	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
fluid pressure[1]						
min. extended	bar	metal pipe: 20		metal pipe: 20		
min.	bar	metal pipe: 30, plastic pipe: 1		metal pipe: 30, plastic pipe: 1		
inner pipe diameter d[2]						
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
material						
housing		PPSU with stainless steel cover 316L (1.4404)		PI with stainless steel cover 316L (1.4404)		
contact surface		PPSU		PI		
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699		6111		
length	m	5		4		3
dimensions						
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
pipe surface temperature	°C	-40...+180		-30...+240[3]		-30...+200
ambient temperature	°C	-40...+180		-30...+40 -30...+60[4] -30...+200[5]		-30...+200
temperature compensation		x		x		
explosion protection						
• ATEX/IECEx						
order code		-	-	GSM-EA2*-**TS	GSP-EA2*-**TS	GSQ-EA2*-**TS
pipe surface temperature (Ex)	°C	-	-	gas: -45...+235 dust: -45...+225		
marking		-	-	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIA T80 °C...T230 °C Db		
certification		-	-	IBExU10ATEX1163 X, IECEx IBE 12.0005X		
• FM						
order code		GSG-EF2*-**TS	GSK-EF2*-**TS	GSM-EF2*-**TS	GSP-EF2*-**TS	GSQ-EF2*-**TS
pipe surface temperature (Ex)	°C	-40...+165		-40...+235		
degree of protection		IP66				
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

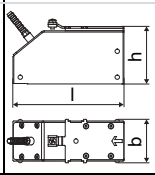
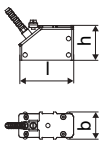
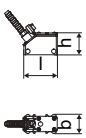
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

[3] > +200 °C:
nonEx: Variofix C without cover or Variofix L
Ex: Variofix C or Variofix L, ambient temperature max. +40 °C
observe the insulation instruction

[4] nonEx: pipe surface temperature +200...+240 °C: Variofix C without cover

[5] nonEx: pipe surface temperature max. +200 °C

Shear wave transducers (FM Class I Div. 2 - nonEx, T1, extended temperature range)

order code		GSG-E***-**T1	GSK-E***-**T1	GSM-E***-**T1	GSP-E***-**T1	GSQ-E***-**T1
technical type		G(DL)G1E53	G(DL)K1E53	G(DL)M2E53	G(DL)P2E53	G(DL)Q2E53
transducer frequency	MHz	0.2	0.5	1	2	4
fluid pressure[1]						
min. extended	bar	metal pipe: 20		metal pipe: 20		
min.	bar	metal pipe: 30, plastic pipe: 1		metal pipe: 30, plastic pipe: 1		
inner pipe diameter d[2]						
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
material						
housing		PPSU with stainless steel cover 316L (1.4404)		PI with stainless steel cover 316L (1.4404)		
contact surface		PPSU		PI		
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699		6111		
length	m	5		4		3
dimensions						
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
pipe surface temperature	°C	-40...+180		-30...+240[3]		-30...+200
ambient temperature	°C	-40...+180		-30...+40 -30...+60[4] -30...+200[5]		-30...+200
temperature compensation		x		x		
explosion protection						
• **ATEX/IECEx**						
order code		-	-	GSM-EA2*-**T1	GSP-EA2*-**T1	GSQ-EA2*-**T1
pipe surface temperature (Ex)	°C	-	-	gas: -45...+235 dust: -45...+225		
marking		-	-	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIA T80 °C...T230 °C Db		
certification		-	-	IBExU10ATEX1163 X, IECEx IBE 12.0005X		
• **FM**						
order code		GSG-EF2*-**T1	GSK-EF2*-**T1	GSM-EF2*-**T1	GSP-EF2*-**T1	GSQ-EF2*-**T1
pipe surface temperature (Ex)	°C	-40...+165		-40...+235		
degree of protection		IP66				
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

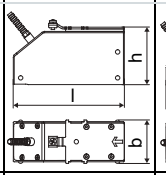
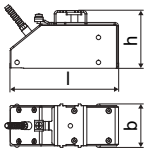
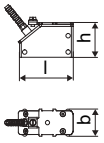
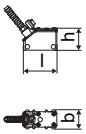
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen; pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

[3] > +200 °C:
nonEx: Variofix C without cover or Variofix L
Ex: Variofix C or Variofix L, ambient temperature max. +40 °C
observe the insulation instruction

[4] nonEx: pipe surface temperature +200...+240 °C: Variofix C without cover

[5] nonEx: pipe surface temperature max. +200 °C

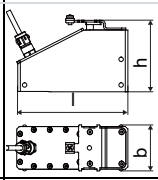
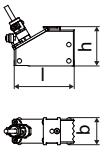
Shear wave transducers (zone 1, T1)

order code		GSG-N*1*-**T1	GSK-N*1*-**T1	GSM-N*1*-**T1	GSP-N*1*-**T1	GSQ-N*1*-**T1
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
fluid pressure[1]						
min. extended	bar	metal pipe: 20				
min.	bar	metal pipe: 30, plastic pipe: 1				
inner pipe diameter d[2]						
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
material						
housing		PEEK with stainless steel cover 316L (1.4404)				
contact surface		PEEK				
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699				
length	m	5		4		3
dimensions						
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
pipe surface temperature	°C	-40...+130				
ambient temperature	°C	-40...+130				
temperature compensation		x				
explosion protection						
• **ATEX/IECEx**						
order code		GSG-NA1*-**T1	GSK-NA1*-**T1	GSM-NA1*-**T1	GSP-NA1*-**T1	GSQ-NA1*-**T1
pipe surface temperature (Ex)	°C	-55...+180				
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T185 °C Db				
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X				

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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, T1, IP68)

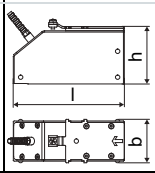
order code		GSG-L*1*-**T1/ H68	GSK-L*1*-**T1/ H68	GSM-L*1*-**T1/ H68	GSP-L*1*-**T1/ H68
technical type		GDG1LI1	GDK1LI1	GDM2LI1	GDP2LI1
transducer frequency	MHz	0.2	0.5	1	2
fluid pressure[1]					
min. extended	bar	metal pipe: 20			
min.	bar	metal pipe: 30, plastic pipe: 1			
inner pipe diameter d[2]					
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
pipe wall thickness					
min.	mm	11	5	2.5	1.2
material					
housing		PEEK with stainless steel cover 316Ti (1.4571)			
contact surface		PEEK			
degree of protection		IP68[3]			
transducer cable					
type		2550			
length	m	12			
dimensions					
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	
pipe surface temperature	°C	-40...+80			
ambient temperature	°C	-40...+80			
temperature compensation		x			
explosion protection					
• **ATEX/IECEx**					
order code		GSG-LA1*-**T1/ H68	GSK-LA1*-**T1/ H68	GSM-LA1*-**T1/ H68	GSP-LA1*-**T1/ H68
pipe surface temperature (Ex)	°C	-40...+80			
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db			
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X			

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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

[3] test conditions: 3 months/2 bar (20 m)/20 °C

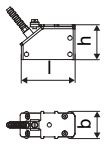
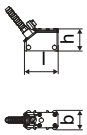
Shear wave transducers (zone 1, T1, extended temperature range)

order code		GSG-E*1*-**T1	GSK-E*1*-**T1
technical type		G(DL)G1E83	G(DL)K1E83
transducer frequency	MHz	0.2	0.5
fluid pressure[1]			
min. extended	bar	metal pipe: 20	
min.	bar	metal pipe: 30, plastic pipe: 1	
inner pipe diameter d[2]			
min. extended	mm	180	60
min. recommended	mm	220	80
max. recommended	mm	900	300
max. extended	mm	1100	360
pipe wall thickness			
min.	mm	11	5
material			
housing		PPSU with stainless steel cover 316L (1.4404)	
contact surface		PPSU	
degree of protection		IP66	
transducer cable			
type		1699	
length	m	5	
dimensions			
length l	mm	129.5	
width b	mm	51	
height h	mm	67	
dimensional drawing			
weight (without cable)	kg	0.82	
pipe surface temperature	°C	-40...+155	
ambient temperature	°C	-40...+155	
temperature compensation		x	
explosion protection			
• ATEX/IECEx			
order code		GSG-EA1*-**T1	GSK-EA1*-**T1
pipe surface temperature (Ex)	°C	-50...+155	
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db	
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X	

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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, T1, extended temperature range)

order code		GSM-E*1*-**T1	GSP-E*1*-**T1	GSQ-E*1*-**T1
technical type		G(DL)M2E85	G(DL)P2E85	G(DL)Q2E85
transducer frequency	MHz	1	2	4
fluid pressure[1]				
min. extended	bar	metal pipe: 20		
min.	bar	metal pipe: 30, plastic pipe: 1		
inner pipe diameter d[2]				
min. extended	mm	30	15	7
min. recommended	mm	40	20	10
max. recommended	mm	150	50	22
max. extended	mm	180	60	30
pipe wall thickness				
min.	mm	2.5	1.2	0.6
material				
housing		PI with stainless steel cover 316L (1.4404)		
contact surface		PI		
degree of protection		IP66/IP67		
transducer cable				
type		6111		
length	m	4		3
dimensions				
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
pipe surface temperature	°C	-30...+225[3]		-30...+200
ambient temperature	°C	-30...+40 -30...+200[4]		-30...+200
temperature compensation		x		
explosion protection				
• **ATX/IECEx**				
order code		GSM-EA1*-**T1	GSP-EA1*-**T1	GSQ-EA1*-**T1
pipe surface temperature (Ex)	°C	-45...+225		
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T2 Gb Ex tb IIIA T80 °C...T230 °C Db		
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X		

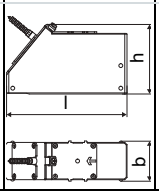
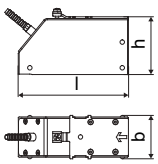
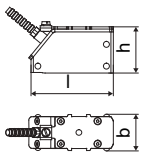
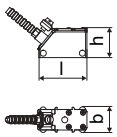
[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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

[3] > +200 °C :
Variofix L or Variofix C
observe the insulation instruction
ambient temperature max. +40 °C

[4] pipe surface temperature max. +200 °C

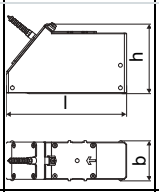
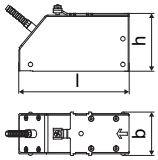
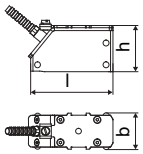
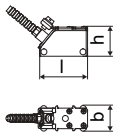
Lamb wave transducers (zone 2 - FM Class I Div. 2 - nonEx, TS)

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
fluid pressure[1]								
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
inner pipe diameter d[2]								
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								
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	-	-	-	-	-	-
material								
housing		PPSU with stainless steel cover 316Ti (1.4571)	PPSU with stainless steel cover 316L (1.4404)					
contact surface		PPSU						
degree of protection		IP66/IP67	IP66					
transducer cable								
type		1699						
length	m	5				4		3
dimensions								
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
pipe surface temperature	°C	-40...+130						
ambient temperature	°C	-40...+130						
temperature compensation		x						
explosion protection								
• **ATEX/IECEx**								
order code		GLF-NA2N-**TS	GLG-NA2N-**TS	GLH-NA2N-**TS	GLK-NA2N-**TS	GLM-NA2N-**TS	GLP-NA2N-**TS	GLQ-NA2N-**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 IIIA T80 °C...T160 °C Db	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		GLF-NF2N-**TS	GLG-NF2N-**TS	GLH-NF2N-**TS	GLK-NF2N-**TS	GLM-NF2N-**TS	GLP-NF2N-**TS	GLQ-NF2N-**TS
pipe surface temperature (Ex)	°C	-40...+165						
degree of protection		IP66						
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860						

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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)

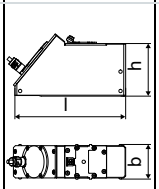
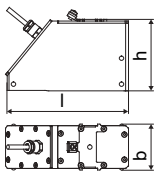
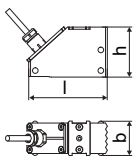
Lamb wave transducers (zone 2 - FM Class I Div. 2 - nonEx, T1)

order code		GLF-N***-**T1	GLG-N***-**T1	GLH-N***-**T1	GLK-N***-**T1	GLM-N***-**T1	GLP-N***-**T1	GLQ-N***-**T1
technical type		G(RT)F1N53	G(RT)G1N53	G(RT)H1N53	G(RT)K1N53	G(RT)M1N53	G(RT)P1N53	G(RT)Q1N53
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2	4
fluid pressure[1]								
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
inner pipe diameter d[2]								
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								
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	-	-	-	-	-	-
material								
housing		PPSU with stainless steel cover 316Ti (1.4571)	PPSU with stainless steel cover 316L (1.4404)					
contact surface		PPSU						
degree of protection		IP66/IP67	IP66					
transducer cable								
type		1699						
length	m	5				4		3
dimensions								
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
pipe surface temperature	°C	-40...+130						
ambient temperature	°C	-40...+130						
temperature compensation		x						
explosion protection								
• **ATEX/IECEx**								
order code		GLF-NA2*-**T1	GLG-NA2*-**T1	GLH-NA2*-**T1	GLK-NA2*-**T1	GLM-NA2*-**T1	GLP-NA2*-**T1	GLQ-NA2*-**T1
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 IIIA T80 °C...T160 °C Db	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		GLF-NF2*-**T1	GLG-NF2*-**T1	GLH-NF2*-**T1	GLK-NF2*-**T1	GLM-NF2*-**T1	GLP-NF2*-**T1	GLQ-NF2*-**T1
pipe surface temperature (Ex)	°C	-40...+165						
degree of protection		IP66						
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860						

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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, T1, IP68)

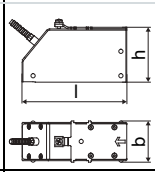
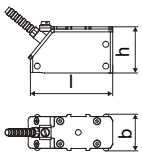
order code		GLF-L***-**T1/ H68	GLG-L***-**T1/ H68	GLH-L***-**T1/ H68	GLK-L***-**T1/ H68	GLM-L***-**T1/ H68	GLP-L***-**T1/ H68
technical type		GRF1LI8	GRG1LI8	GRH1LI8	GRK1LI8	GRM1LI8	GRP1LI8
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
fluid pressure[1]							
min. extended	bar	metal pipe: 10			metal 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
inner pipe diameter d[2]							
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
pipe wall thickness							
min.	mm	15	11	8	5	2.5	1.2
max.	mm	32	24	16	10	5	3
max. extended	mm	35	-	-	-	-	-
material							
housing		PPSU with stainless steel cover 316Ti (1.4571)					
contact surface		PPSU					
degree of protection		IP68[3]					
transducer cable							
type		2550					
length	m	12					
dimensions							
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	
pipe surface temperature	°C	-40...+100					
ambient temperature	°C	-40...+100					
temperature compensation		x					
explosion protection							
• **ATEX/IECEx**							
order code		GLF-LA2N-**T1/ H68	GLG-LA2N-**T1/ H68	GLH-LA2N-**T1/ H68	GLK-LA2N-**T1/ H68	GLM-LA2N-**T1/ H68	GLP-LA2N-**T1/ H68
pipe surface temperature (Ex)	°C	gas: -40...+90 dust: -40...+80					
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db					
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X					

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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)

[3] test conditions: 3 months/2 bar (20 m)/20 °C

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

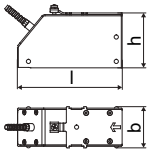
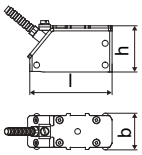
order code		GLG-S***-**TS	GLH-S***-**TS	GLK-S***-**TS	GLM-S***-**TS	GLP-SNNN-**TS
technical type		G(RT)G1S52	G(RT)H1S52	G(RT)K1S52	G(RT)M1S52	G(RT)P1S52
transducer frequency	MHz	0.2	0.3	0.5	1	2
fluid pressure[1]						
min. extended	bar	metal pipe: 10		metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal 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
inner pipe diameter d[2]						
min. extended	mm	180	110	60	30	15
min. recommended	mm	220	140	80	40	20
max. recommended	mm	900	600	300	150	50
max. extended	mm	1400	1000	360	180	60
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	°C	-40...+165				
operating temperature	°C	100…180				
warm-up time	h	3			1	
temperature compensation		x				
explosion protection						
• **ATEX/IECEx**						
order code		GLG-SA2N-**TS	GLH-SA2N-**TS	GLK-SA2N-**TS	GLM-SA2N-**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-SF2N-**TS	GLH-SF2N-**TS	GLK-SF2N-**TS	GLM-SF2N-**TS	-
pipe surface temperature (Ex)	°C	-40...+165				
degree of protection		IP66				-
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				-

completely thermically insulated transducer installation necessary

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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 - FM Class I Div. 2 - nonEx, T1, higher temperatures)

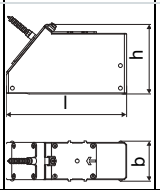
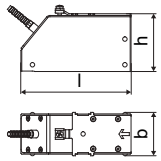
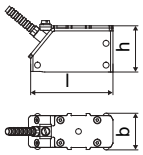
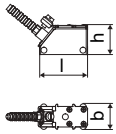
order code		GLG-S***-**T1	GLH-S***-**T1	GLK-S***-**T1	GLM-S***-**T1	GLP-S***-**T1
technical type		G(RT)G1S53	G(RT)H1S53	G(RT)K1S53	G(RT)M1S53	G(RT)P1S53
transducer frequency	MHz	0.2	0.3	0.5	1	2
fluid pressure[1]						
min. extended	bar	metal pipe: 10		metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal 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
inner pipe diameter d[2]						
min. extended	mm	180	110	60	30	15
min. recommended	mm	220	140	80	40	20
max. recommended	mm	900	600	300	150	50
max. extended	mm	1400	1000	360	180	60
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	°C	-40...+165				
operating temperature	°C	100…180				
warm-up time	h	3			1	
temperature compensation		x				
explosion protection						
• ATEX/IECEx						
order code		GLG-SA2*-**T1	GLH-SA2*-**T1	GLK-SA2*-**T1	GLM-SA2*-**T1	-
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*-**T1	GLH-SF2*-**T1	GLK-SF2*-**T1	GLM-SF2*-**T1	-
pipe surface temperature (Ex)	°C	-40…+165				
degree of protection		IP66				-
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				-

completely thermically insulated transducer installation necessary

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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)

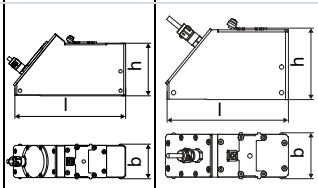
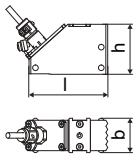
Lamb wave transducers (zone 1, T1)

order code		GLF-N*1*-**T1	GLG-N*1*-**T1	GLH-N*1*-**T1	GLK-N*1*-**T1	GLM-N*1*-**T1	GLP-N*1*-**T1	GLQ-N*1*-**T1
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
fluid pressure[1]								
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
inner pipe diameter d[2]								
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								
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	-	-	-	-	-	-
material								
housing		PPSU with stainless steel cover 316L, 316Ti (1.4404, 1.4571)				PPSU with stainless steel cover 316L (1.4404)		
contact surface		PPSU						
degree of protection		IP66/IP67	IP66					
transducer cable								
type		1699						
length	m	5				4		3
dimensions								
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
pipe surface temperature	°C	-40...+130						
ambient temperature	°C	-40...+130						
temperature compensation		x						
explosion protection								
• **ATEX/IECEx**								
order code		GLF-NA1N-**T1	GLG-NA1N-**T1	GLH-NA1N-**T1	GLK-NA1N-**T1	GLM-NA1N-**T1	GLP-NA1N-**T1	GLQ-NA1N-**T1
pipe surface temperature (Ex)	°C	-50...+155						
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIA T80 °C...T160 °C Db	CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db					
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X						

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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, T1, IP68)

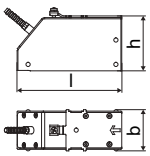
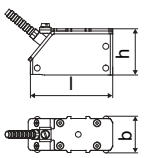
order code		GLF-L*1*-**T1/ H68	GLG-L*1*-**T1/ H68	GLH-L*1*-**T1/ H68	GLK-L*1*-**T1/ H68	GLM-L*1*-**T1/ H68	GLP-L*1*-**T1/ H68
technical type		GRF1LI3	GRG1LI3	GRH1LI3	GRK1LI3	GRM1LI3	GRP1LI3
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
fluid pressure[1]							
min. extended	bar	metal pipe: 10	metal pipe: 10		metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)
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: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1
inner pipe diameter d[2]							
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
pipe wall thickness							
min.	mm	15	11	8	5	2.5	1.2
max.	mm	32	24	16	10	5	3
max. extended	mm	35	-	-	-	-	-
material							
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[3]	IP68[3]				
transducer cable							
type		2550	2550				
length	m	12	12				
dimensions							
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	
pipe surface temperature	°C	-40...+80	-40...+80				
ambient temperature	°C	-40...+80	-40...+80				
temperature compensation		x	x				
explosion protection							
• **ATEX/IECEx**							
order code		GLF-LA1N-**T1/ H68	GLG-LA1N-**T1/ H68	GLH-LA1N-**T1/ H68	GLK-LA1N-**T1/ H68	GLM-LA1N-**T1/ H68	GLP-LA1N-**T1/ H68
pipe surface temperature (Ex)	°C	-40...+80					
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db					
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X					

[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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)

[3] test conditions: 3 months/2 bar (20 m)/20 °C

Lamb wave transducers (zone 1, higher temperatures, T1)

order code		GLG-S*1N-**T1	GLH-S*1N-**T1	GLK-S*1N-**T1	GLM-S*1N-**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[1]					
min. extended	bar	metal pipe: 10		metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)	metal pipe: 3 (d < 60 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
inner pipe diameter d[2]					
min. extended	mm	180	110	60	30
min. recommended	mm	220	140	80	40
max. recommended	mm	900	600	300	150
max. extended	mm	1400	1000	360	180
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**					
order code		GLG-SA1N-**T1	GLH-SA1N-**T1	GLK-SA1N-**T1	GLM-SA1N-**T1
pipe surface temperature (Ex)	°C	-50...+155			
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db			
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X			

completely thermically insulated transducer installation necessary

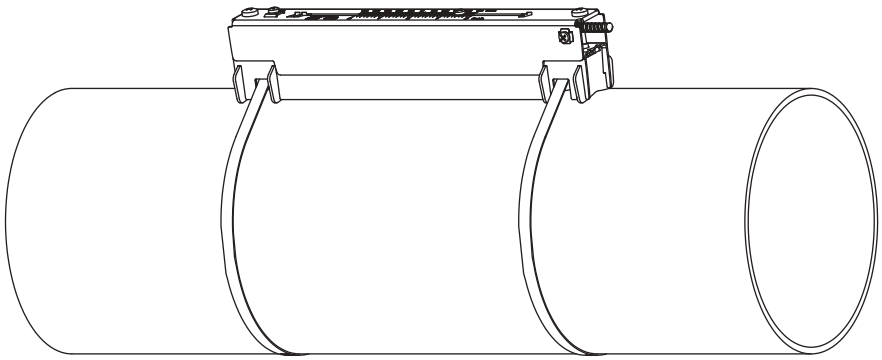
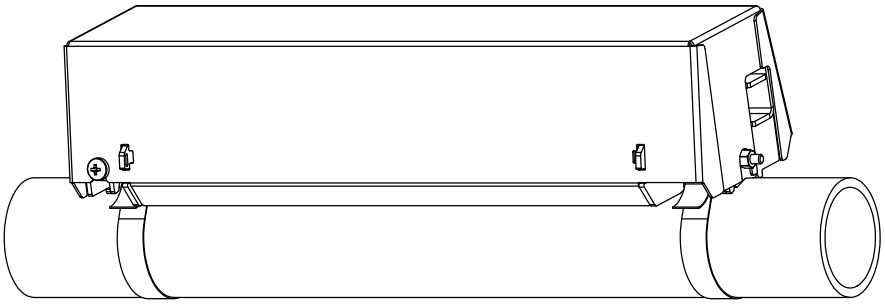
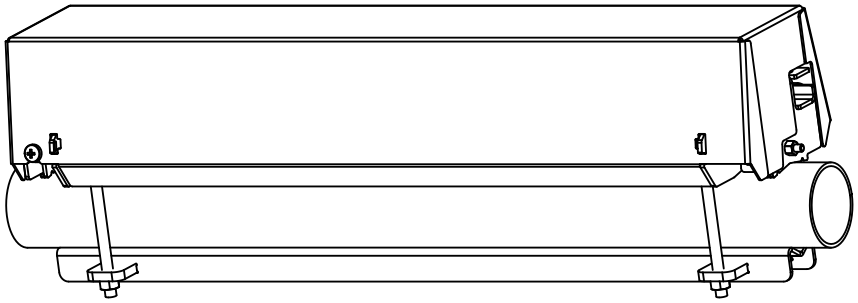
[1] depending on the application, typical absolute value for natural gas, nitrogen, compressed air

[2] 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)

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**	**description**
VL										Variofix L
VC										Variofix C
	F									transducers with transducer frequency F
	G									transducers with transducer frequency G
	H									transducers with transducer frequency H
	K									transducers with transducer frequency K
	M									transducers with transducer frequency M
	P									transducers with transducer frequency 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
							0020			10...20 mm
							0040			20...40 mm
							T360			40...360 mm
							0130			10...130 mm
							0360			130...360 mm
							0920			360...920 mm
							2000			920...2000 mm
									H68	for transducers with degree of protection IP68

Variofix L (VL) 	material: stainless steel 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568) inner length: **VL(GHK)**: 348 mm, option H68: 368 mm **VL(MP)**: 234 mm **VLQ**: 176 mm dimensions: **VL(GHK)**: 423 x 90 x 93 mm option H68: 443 x 94 x 105 mm **VL(MP)**: 309 x 57 x 63 mm **VLQ**: 247 x 43 x 47 mm
Variofix C (VC) 	material: stainless steel 316Ti (1.4571) inner length: **VC(FGHK)-*L**: 500 mm **VC(FGHK)-*S**: 350 mm **VCM**: 400 mm **VCQ**: 250 mm dimensions: **VC(FGHK)-*L**: 560 x 126 x 125 mm **VC(FGHK)-*S**: 410 x 126 x 125 mm **VC(MP)**: 460 x 96 x 82 mm **VCQ**: 310 x 85 x 71 mm
Variofix C (VC) with bolt mounting plates (VC*--B)** 	material: stainless steel 316Ti (1.4571) inner length: **VC(MP)**: 400 mm **VCQ**: 250 mm dimensions: **VC(MP)**: 460 x 96 x 82 mm **VCQ**: 310 x 85 x 71 mm outer pipe diameter: **VC(MP)**: max. 46 mm **VCQ**: max. 36 mm

Coupling materials for transducers

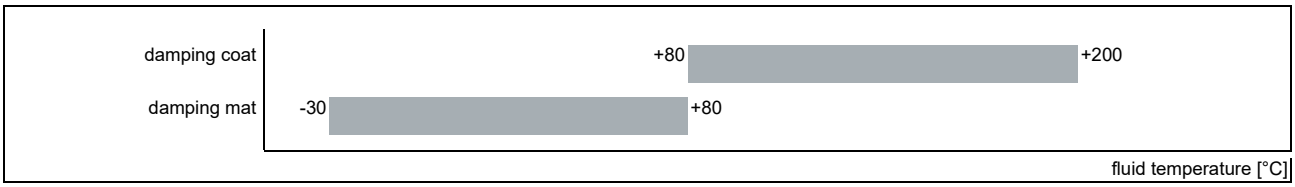
	normal temperature range (4th character of transducer order code = N)		**extended temperature range higher temperatures** (4th character of transducer order code = E, S)		
	< 100 °C	< 130 °C	< 180 °C	< 200 °C	200...240 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound type type N or E 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 H or 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

Technical data

type	**ambient temperature** °C	**remark**
coupling compound type N	-30...+130	
coupling compound type E	-30...+200	
coupling compound type H	-30...+250	
coupling foil type VT	-10...+200	fluid temperature 200 °C: min. 2 years
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.



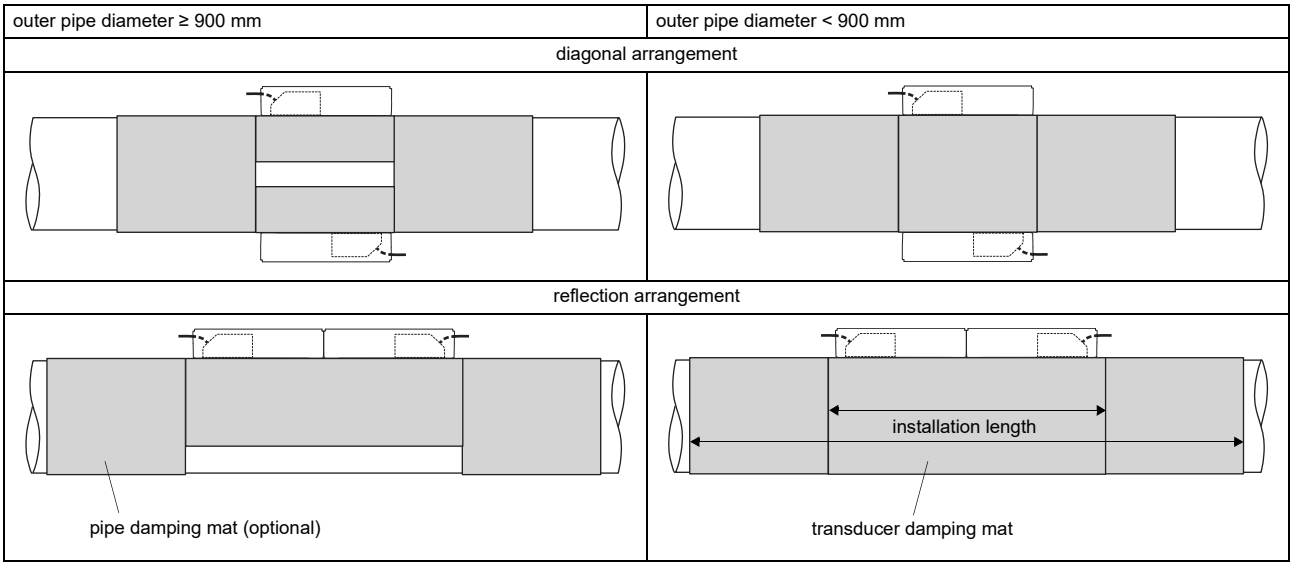
Damping mats

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
item number		992080-11	992080-10
width	mm	225	50
thickness	mm	0.7	
length (per roll)	m	10	
weight	kg/m^2	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[1]		max. installation length	number of rolls[1]	
				[mm]	standard[2]	extended[2]	[mm]	standard	extended
VarioFix L									
VLG	GLG	E30R4	3	890	4	4	1830	9	12
	GSG		3		4	4		9	10
VLH	GLH		2		2	3		4	7
VLK	GLK		1		1	1		2	2
	GSK		1		1	1		2	2
VLG-**-*****/H68	GLG	E30R4	3	930	5	5	1910	10	13
	GSG		3		5	5		10	11
VLH-**-*****/H68	GLH		2		2	3		5	7
VLK-**-*****/H68	GLK		1		1	1		2	2
	GSK		1		1	1		2	2
VLM	GLM	E30R3	1	660	1	1	1360	2	2
	GSM		1		1	1		2	2
VLP	GLP		1		1	1		1	1
	GSP		1		1	1		1	1
VLQ	GLQ	E30R3	1	540	1	1	1120	1	1
	GSQ		1		1	1		1	1
Variofix C									
VCF-*L-*****/H68	GLF	E30R4	3	1160	6	6	2360	13	15
VCG-*L VCG-*L-*****/H68	GLG	E30R4	3	1160	6	6	2360	11	14
	GSG		3		6	6		11	12
VCH-*L VCH-*L-*****/H68	GLH		2		3	4		5	8
VCK-*L VCK-*L-*****/H68	GLK		1		1	1		2	2
	GSK		1		1	1		2	2
VCF-*S-*****/H68	GLF	E30R4	3	860	4	4	1760	9	10
VCG-*S VCG-*S-*****/H68	GLG	E30R4	3	860	4	4	1760	7	9
	GSG		3		4	4		7	8
VCH-*S VCH-*S-*****/H68	GLH		2		2	3		4	5
VCK-*S VCK-*S-*****/H68	GLK		1		1	1		1	1
	GSK		1		1	1		1	1
VCM	GLM	E30R3	1	960	2	2	1960	3	3
	GSM		1		2	2		3	3
VCP	GLP		1		1	1		1	1
	GSP		1		1	1		1	1
VCQ	GLQ	E30R3	1	660	1	1	1360	1	1
	GSQ		1		1	1		1	1

[1] 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)

[2] 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

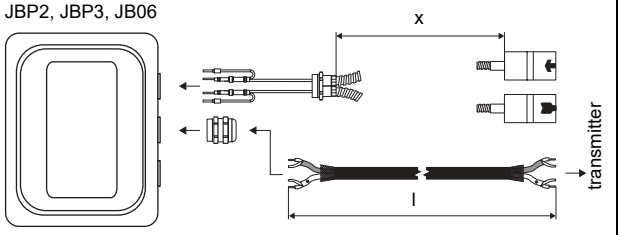
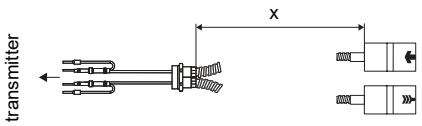
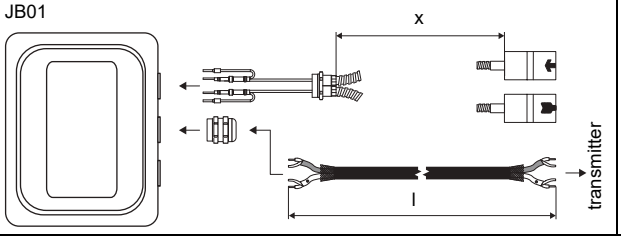
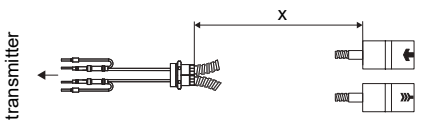
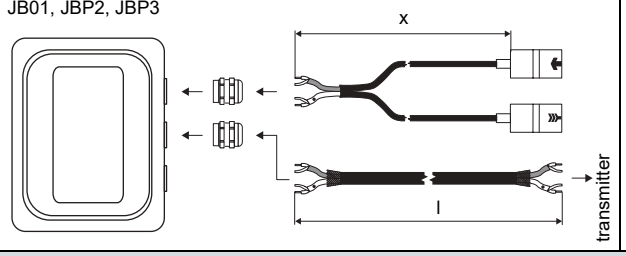
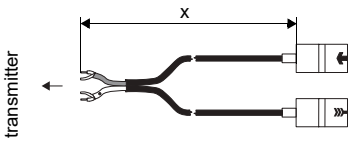
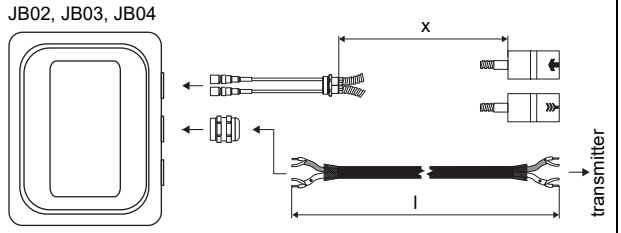
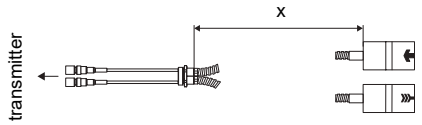
item number		992080-13
material		multipolymeric matrix/inorganic ceramic coating
packing drum	l	1
properties		heat-resistant, inert

Observe installation instructions (TI_DampingCoat).

Dimensioning

transducer frequency	**number of packing drums**		
	outer pipe diameter		
	≤300	≤500	≤700
	mm		
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 T1		
connection with extension cable	direct connection	transducers technical type
JBP2, JBP3, JB06 		*****53
JB01 		*****8*
JB01, JBP2, JBP3 		****LI*
connection system TS		
connection with extension cable	direct connection	transducers technical type
JB02, JB03, JB04 		*****52

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 316Ti (1.4571)	-	stainless steel 316Ti (1.4571)
outer diameter	mm	8	-	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		**F, G, H, K**		**M, P**		**Q**		**S**	
transducers technical type		x	l	x	l	x	l	x	l
*(DR)***5*	m	5	≤ 300	4	≤ 300	3	≤ 90	2	≤ 40
*(LT)***5*	m	9	≤ 300	9	≤ 300	9	≤ 90	-	-
transducers technical type		x	l	x	l	x	l	x	l
*(DR)***8*	m	5	≤ 300	4	≤ 300	3	≤ 90	-	-
*(LT)***8*	m	9	≤ 300	9	≤ 300	9	≤ 90	-	-
option H68: ****LI*	m	12	≤ 300	12	≤ 300	-	-	-	-

x - transducer cable length

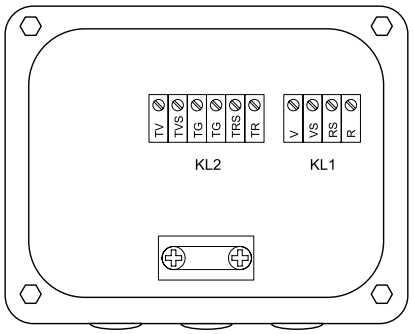
l - max. length of extension cable (depending on the application)

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		IP66/IP67
ambient temperature	°C	-40...+80
explosion protection		
• ATEX/IECEx		
marking		CE 0637 Ex II2G II2D Ex eb mb IIC T6...T4 Gb Ex tb IIIC T100 °C Db Ta -40...+70/80 °C
certification		IBExU06ATEX1161 IECEx IBE 08.0006
type of protection		gas: increased safety decoupling network: encapsulation dust: protection by enclosure

Connection



Transducers

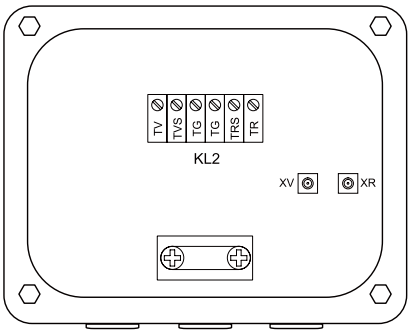
terminal strip	terminal	connection	transducer
KL1	V	signal	
	VS	internal shield	
	RS	internal shield	
	R	signal	

Extension cable

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		JB02, JB03: IP66/IP67 JB04: Type 4X, IP66
ambient temperature	°C	-40...+80
explosion protection		
• ATEX/UKCA		
junction box		JB02
marking		CE UK CA Ex II3G Ex nA IIC T6...T4 Gc II3D Ex tc IIIC T 100 °C Dc -40 ≤ Ta ≤ +70 °C/+80 °C
• FM		
junction box		JB04
certification type		JBC24
marking		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C

Connection



Transducers

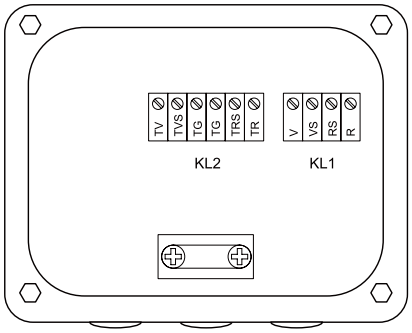
	terminal	connection	transducer
	XV	SMB connector	
	XR	SMB connector	

Extension cable

terminal strip	terminal	connection
KL2	TV	signal
	TVS	internal shield
	TRS	internal shield
	TR	signal

JBP2, JBP3, JB06		
weight	kg	1.2 kg
fixation		wall mounting optional: 2" pipe mounting
material		
housing		stainless steel 316L (1.4404)
gasket		silicone
degree of protection		JBP2, JBP3: IP66/IP67 JB06: Type 4X, IP66
ambient temperature	°C	-40...+80
explosion protection		
• ATEX/UKCA		
junction box		JBP2
marking		II3G Ex nA IIC T6...T4 Gc II3D Ex tc IIIC T 100 °C Dc -40 ≤ Ta ≤ +70 °C/+80 °C
• FM		
junction box		JB06
certification type		JBC23
marking		NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C

Connection



Transducers

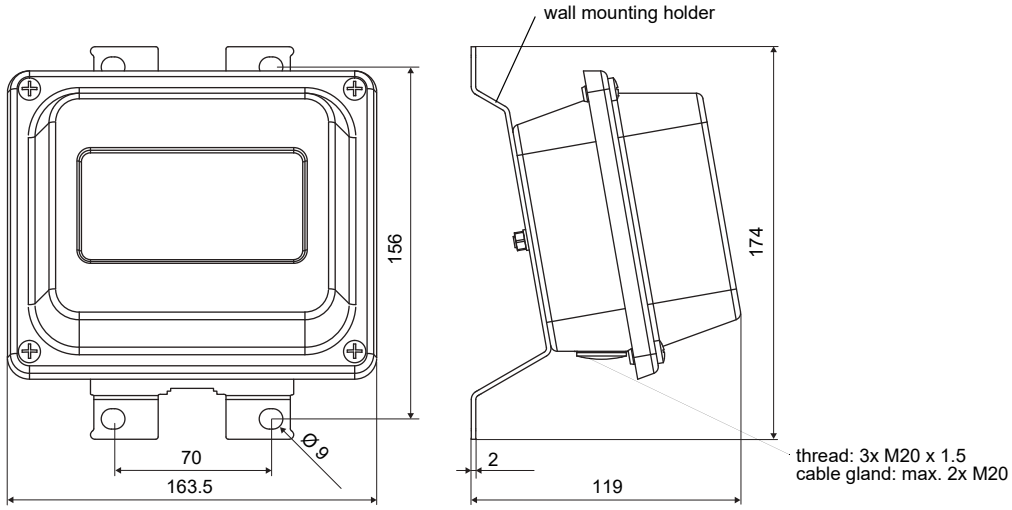
terminal strip	terminal	connection	transducer
KL1	V	signal	
	VS	internal shield	
	RS	internal shield	
	R	signal	

Extension cable

terminal strip	terminal	connection
KL2	TV	signal
	TVS	internal shield
	TRS	internal shield
	TR	signal

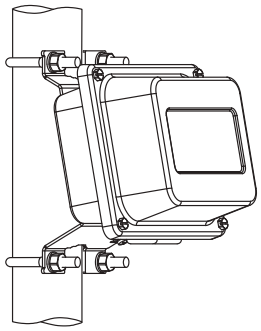
Dimensions

JB0*, JBP*



in mm

2" pipe mounting kit

JB** 	item number: 751035-2

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