

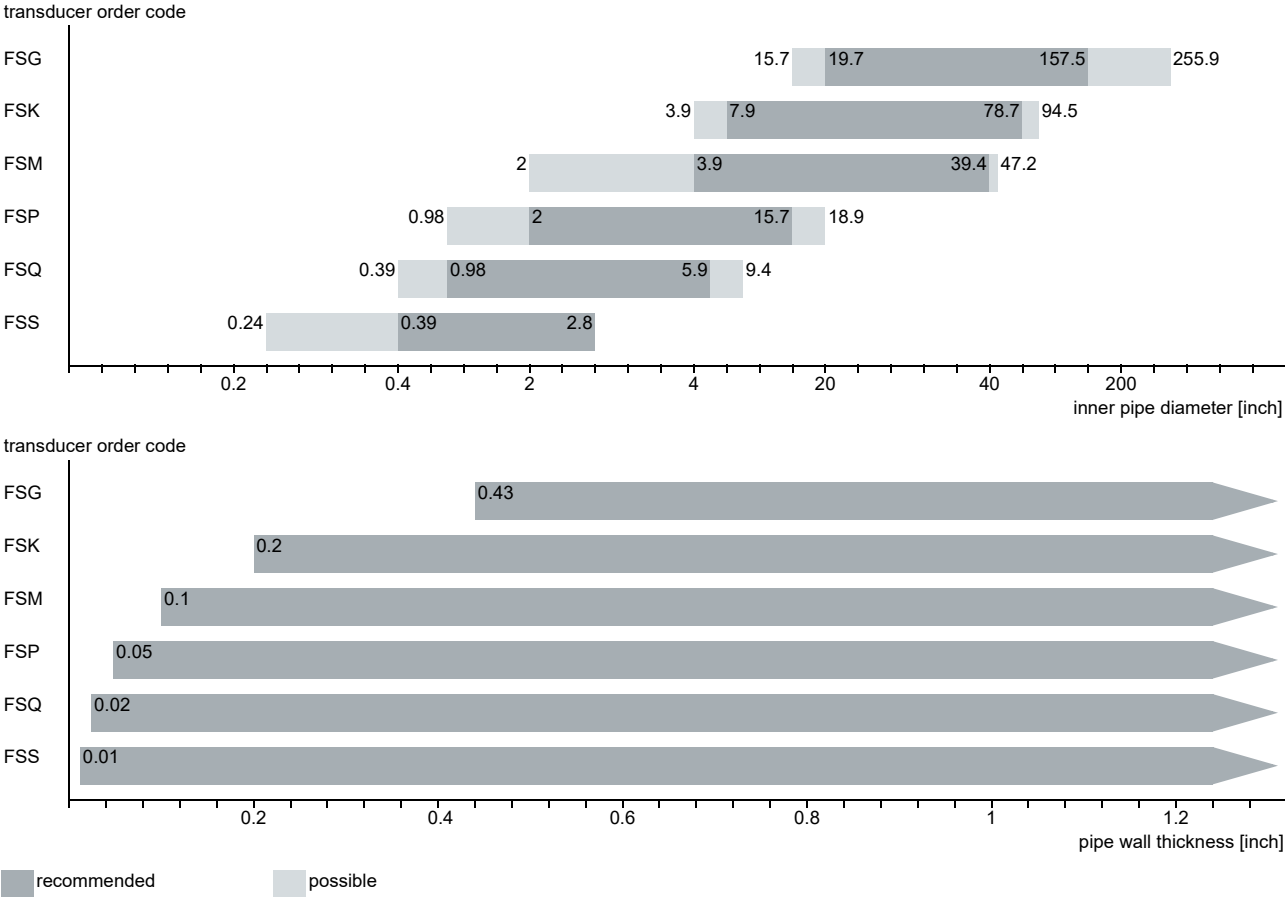
# Flexim Clamp-on Ultrasonic Transducers for FLUXUS F7\*\*, H7\*\*, PIOX S7\*\*



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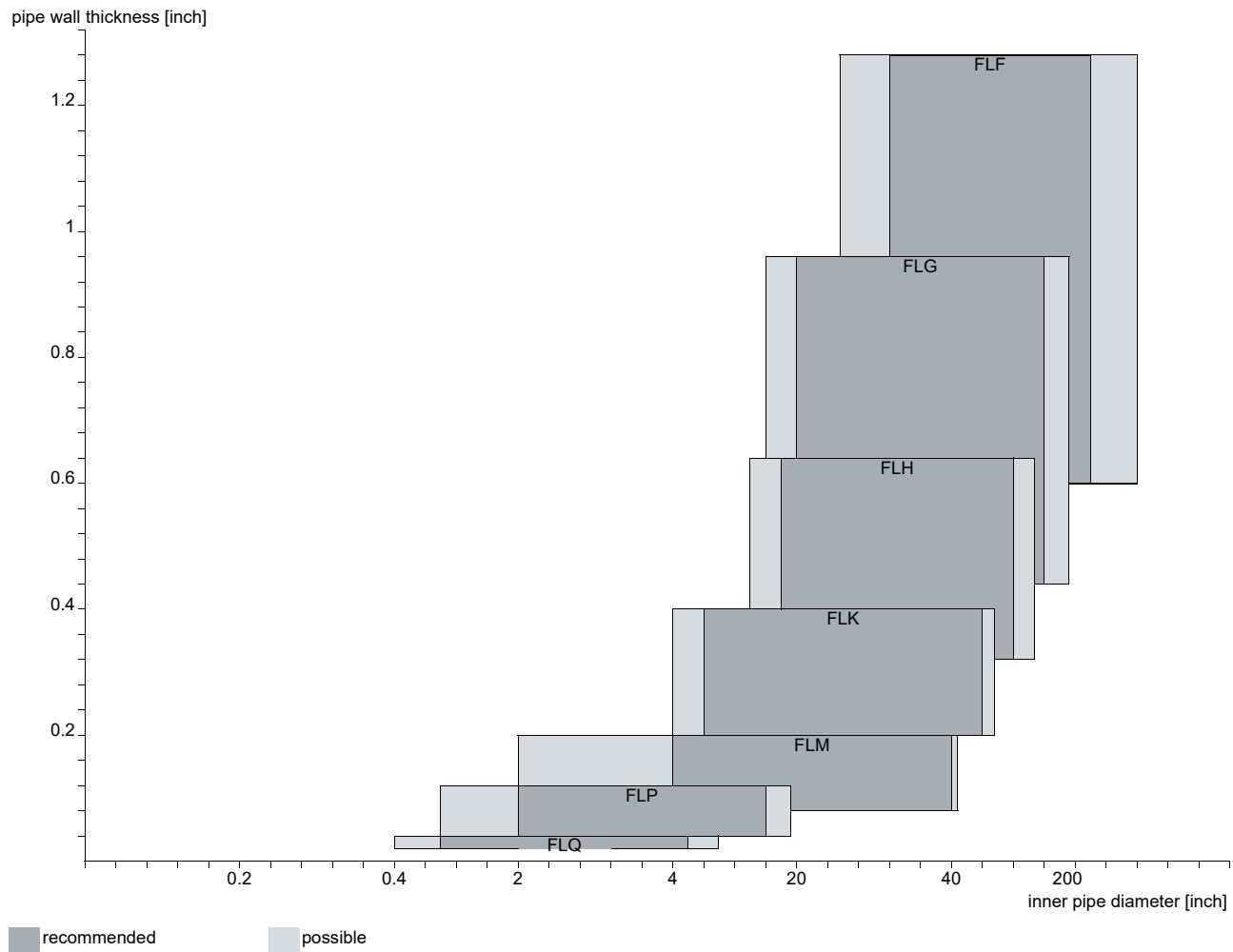
Transducer selection

Shear wave transducers



## Lamb wave transducers

If the the damping of the fluid is high or the sound velocity fluctuates strongly, Lamb wave transducers might be preferred. Please contact FLEXIM.

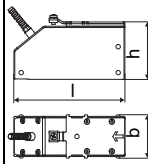
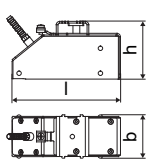
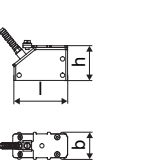
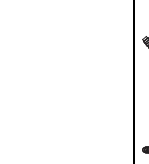



## Transducer order code

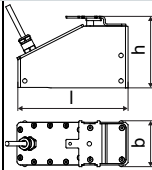
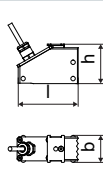

1, 2	3	4	5 to 7	8, 9	10, 11	12 to 14	no. of character
transducer	transducer frequency	-	ambient temperature	explosion protection	-	cable length	
				certification	connection system	-	
						cable length	/
							option
							description
FS							set of ultrasonic flow transducers for measurement of liquids, shear wave
FL							set of ultrasonic flow transducers for measurement of liquids, 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
	S						8 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
				**			
					T1		with stripped cable ends
						***	in m
							H68
							degree of protection IP68

## Technical data

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

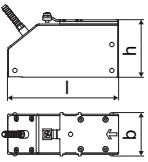
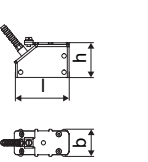
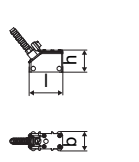

order code		FSG-N***-**T1	FSK-N***-**T1	FSM-N***-**T1	FSP-N***-**T1	FSQ-N***-**T1	FSS-N***-**T1
technical type		C(DL)G1N53	C(DL)K1N53	C(DL)M2N53	C(DL)P2N53	C(DL)Q2N53	CDS1N53
transducer frequency	MHz	0.2	0.5	1	2	4	8
inner pipe diameter d							
min. extended	inch	15.7	3.9	2	0.98	0.39	0.24
min. recommended	inch	19.7	7.9	3.9	2	0.98	0.39
max. recommended	inch	157.5	78.7	39.4	15.7	5.9	2.8
max. extended	inch	255.9	94.5	47.2	18.9	9.4	2.8
pipe wall thickness							
min.	inch	0.43	0.2	0.1	0.05	0.02	0.01
material							
housing		PEEK with stainless steel cover 316L					stainless steel 304
contact surface		PEEK					PEI
degree of protection		IP66			IP66/IP67		IP66
transducer cable							
type		1699					
length	ft	16		13		9	6
dimensions							
length l	inch	5.1	4.98	2.52		1.57	0.98
width b	inch	2.01	2.01	1.26		0.87	0.51
height h	inch	2.64	2.66	1.59		1	0.67
dimensional drawing							
weight (without cable)	lb	1	0.79	0.15		0.04	0.01
pipe surface temperature	°F	-40 to +266					-22 to +266
ambient temperature	°F	-40 to +266					-22 to +266
temperature compensation		x					-
explosion protection							
• ATEX/IECEx							
order code		FSG-NA2*-**T1	FSK-NA2*-**T1	FSM-NA2*-**T1	FSP-NA2*-**T1	FSQ-NA2*-**T1	-
pipe surface temperature (Ex)	°C	gas: -55 to +190 dust: -55 to +180					-
marking		CE0637 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		FSG-NF2*-**T1	FSK-NF2*-**T1	FSM-NF2*-**T1	FSP-NF2*-**T1	FSQ-NF2*-**T1	FSS-NF2*-**T1
pipe surface temperature (Ex)	°F	-40 to +257		-40 to +374		-40 to +257	
degree of protection		IP66					
marking		 NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860					

**Shear wave transducers (zone 2 - nonEx, T1, IP68)**

order code		FSG-L***-**T1/H68	FSK-L***-**T1/H68	FSM-L***-**T1/H68	FSP-L***-**T1/H68
technical type		CDG1LI8	CDK1LI8	CDM2LI8	CDP2LI8
transducer frequency	MHz	0.2	0.5	1	2
inner pipe diameter d					
min. extended	inch	15.7	3.9	2	0.98
min. recommended	inch	19.7	7.9	3.9	2
max. recommended	inch	157.5	78.7	39.4	15.7
max. extended	inch	255.9	94.5	47.2	18.9
pipe wall thickness					
min.	inch	0.43	0.2	0.1	0.05
material					
housing		PEEK with stainless steel cover 316Ti			
contact surface		PEEK			
degree of protection		IP68 <sup>1</sup>			
transducer cable					
type		2550			
length	ft	39			
dimensions					
length l	inch	5.12		2.76	
width b	inch	2.13		1.26	
height h	inch	3.29		1.81	
dimensional drawing					
weight (without cable)	lb	0.95		0.19	
pipe surface temperature	°F	-40 to +212			
ambient temperature	°F	-40 to +212			
temperature compensation		x			
explosion protection					
• ATEX/IECEx					
order code		FSG-LA2N-**T1/H68	FSK-LA2N-**T1/H68	FSM-LA2N-**T1/H68	FSP-LA2N-**T1/H68
pipe surface temperature (Ex)	°C	gas: -40 to +90 dust: -40 to +80			
marking		CE0637  II3G II2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db			
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X			

<sup>1</sup> test conditions: 3 months/29 psi (65 ft)/36 °F

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

order code		FSG-E***-**T1	FSK-E***-**T1	FSM-E***-**T1	FSP-E***-**T1	FSQ-E***-**T1
technical type		C(DL)G1E53	C(DL)K1E53	C(DL)M2E53	C(DL)P2E53	C(DL)Q2E53
transducer frequency	MHz	0.2	0.5	1	2	4
inner pipe diameter d						
min. extended	inch	15.7	3.9	2	0.98	0.39
min. recommended	inch	19.7	7.9	3.9	2	0.98
max. recommended	inch	157.5	78.7	39.4	15.7	5.9
max. extended	inch	255.9	94.5	47.2	18.9	9.4
pipe wall thickness						
min.	inch	0.43	0.2	0.1	0.05	0.02
material						
housing		PPSU with stainless steel cover 316L		PI with stainless steel cover 316L		
contact surface		PPSU		PI		
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699		6111		
length	ft	16		13		9
dimensions						
length l	inch	5.1		2.52		1.57
width b	inch	2.01		1.26		0.87
height h	inch	2.64		1.59		1
dimensional drawing						
weight (without cable)	lb	1.8		0.15		0.04
pipe surface temperature	°F	-40 to +356		-22 to +464 <sup>1</sup>		-22 to +392
ambient temperature	°F	-40 to +356		-22 to +104 -22 to +140 <sup>2</sup> -22 to +392 <sup>3</sup>		-22 to +392
temperature compensation		x		x		
explosion protection						
• ATEX/IECEx						
order code		-	-	FSM-EA2*-**T1	FSP-EA2*-**T1	FSQ-EA2*-**T1
pipe surface temperature (Ex)	°C	-	-	gas: -45 to +235 dust: -45 to +225		
marking		-	-	CE 0637 Ex II 3G Ex nA IIC T6...T2 Gc Ex tb IIIA T80 °C...T230 °C Db		
certification		-	-	IBExU10ATEX1163 X, IECEx IBE 12.0005X		
• FM						
order code		FSG-EF2*-**T1	FSK-EF2*-**T1	FSM-EF2*-**T1	FSP-EF2*-**T1	FSQ-EF2*-**T1
pipe surface temperature (Ex)	°F	-40 to +329		-40 to +455		
degree of protection		IP66				
marking		 NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				

<sup>1</sup> > +200 °C/+392 °F:

nonEx: quick release clasps and tension straps or Variofix L

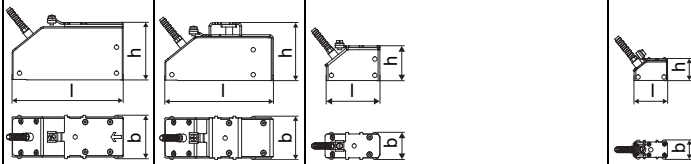

Ex: Variofix L, ambient temperature max. +40 °C/+104 °F

observe the insulation instruction

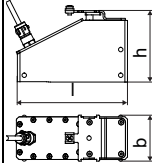
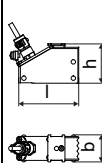

<sup>2</sup> nonEx: pipe surface temperature +200...+232 °C/+392...+450 °F: quick release clasps and tension straps<sup>3</sup> nonEx: pipe surface temperature max. +200 °C/+392 °F



**Shear wave transducers (zone 1, T1)**

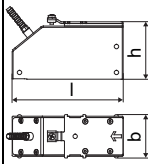
order code		FSG-N*1*-**T1	FSK-N*1*-**T1	FSM-N*1*-**T1	FSP-N*1*-**T1	FSQ-N*1*-**T1
technical type		C(DL)G1N81	C(DL)K1N81	C(DL)M2N81	C(DL)P2N81	C(DL)Q2N81
transducer frequency	MHz	0.2	0.5	1	2	4
inner pipe diameter d						
min. extended	inch	15.7	3.9	2	0.98	0.39
min. recommended	inch	19.7	7.9	3.9	2	0.98
max. recommended	inch	157.5	78.7	39.4	15.7	5.9
max. extended	inch	255.9	94.5	47.2	18.9	9.4
pipe wall thickness						
min.	inch	0.43	0.2	0.1	0.05	0.02
material						
housing		PEEK with stainless steel cover 316L				
contact surface		PEEK				
degree of protection		IP66		IP66/IP67		
transducer cable						
type		1699				
length	ft	16		13	9	
dimensions						
length l	inch	5.1	4.98	2.52	1.57	
width b	inch	2.01	2.01	1.26	0.87	
height h	inch	2.64	2.66	1.59	1	
dimensional drawing						
weight (without cable)	lb	1	0.79	0.15	0.04	
pipe surface temperature	°F	-40 to +266				
ambient temperature	°F	-40 to +266				
temperature compensation		x				
explosion protection						
• ATEX/IECEx						
order code		FSG-NA1*-**T1	FSK-NA1*-**T1	FSM-NA1*-**T1	FSP-NA1*-**T1	FSQ-NA1*-**T1
pipe surface temperature (Ex)	°C	-55 to +180				
marking		CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T185 °C Db				
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X				

## Shear wave transducers (zone 1, T1, IP68)

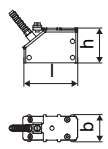
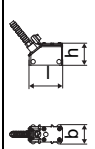
order code		FSG-L*1*-**T1/ H68	FSK-L*1*-**T1/H68	FSM-L*1*-**T1/ H68	FSP-L*1*-**T1/H68
technical type		CDG1LI1	CDK1LI1	CDM2LI1	CDP2LI1
transducer frequency	MHz	0.2	0.5	1	2
inner pipe diameter d					
min. extended	inch	15.7	3.9	2	0.98
min. recommended	inch	19.7	7.9	3.9	2
max. recommended	inch	157.5	78.7	39.4	15.7
max. extended	inch	255.9	94.5	47.2	18.9
pipe wall thickness					
min.	inch	0.43	0.2	0.1	0.05
material					
housing		PEEK with stainless steel cover 316Ti			
contact surface		PEEK			
degree of protection		IP68 <sup>1</sup>			
transducer cable					
type		2550			
length	ft	39			
dimensions					
length l	inch	5.12		2.76	
width b	inch	2.13		1.26	
height h	inch	3.29		1.81	
dimensional drawing					
weight (without cable)	lb	0.95		0.19	
pipe surface temperature	°F	-40 to +176			
ambient temperature	°F	-40 to +176			
temperature compensation		x			
explosion protection					
• ATEX/IECEx					
order code		FSG-LA1*-**T1/ H68	FSK-LA1*-**T1/ H68	FSM-LA1*-**T1/ H68	FSP-LA1*-**T1/ H68
pipe surface temperature (Ex)	°C	-40 to +80			
marking		CE0637  II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db			
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X			

<sup>1</sup> test conditions: 3 months/29 psi (65 ft)/36 °F

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

order code		FSG-E*1*-**T1	FSK-E*1*-**T1
technical type		C(DL)G1E83	C(DL)K1E83
transducer frequency	MHz	0.2	0.5
inner pipe diameter d			
min. extended	inch	15.7	3.9
min. recommended	inch	19.7	7.9
max. recommended	inch	157.5	78.7
max. extended	inch	255.9	94.5
pipe wall thickness			
min.	inch	0.43	0.2
material			
housing		PPSU with stainless steel cover 316L	
contact surface		PPSU	
degree of protection		IP66	
transducer cable			
type		1699	
length	ft	16	
dimensions			
length l	inch	5.1	
width b	inch	2.01	
height h	inch	2.64	
dimensional drawing			
weight (without cable)	lb	1.8	
pipe surface temperature	°F	-40 to +311	
ambient temperature	°F	-40 to +311	
temperature compensation		x	
explosion protection			
• ATEX/IECEx			
order code		FSG-EA1*-**T1	FSK-EA1*-**T1
pipe surface temperature (Ex)	°C	-50 to +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	

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

order code		FSM-E*1*-**T1	FSP-E*1*-**T1	FSQ-E*1*-**T1
technical type		C(DL)M2E85	C(DL)P2E85	C(DL)Q2E85
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended	inch	2	0.98	0.39
min. recommended	inch	3.9	2	0.98
max. recommended	inch	39.4	15.7	5.9
max. extended	inch	47.2	18.9	9.4
pipe wall thickness				
min.	inch	0.1	0.05	0.02
material				
housing		PI with stainless steel cover 316L		
contact surface		PI		
degree of protection		IP66/IP67		
transducer cable				
type		6111		
length	ft	13		9
dimensions				
length l	inch	2.52		1.57
width b	inch	1.26		0.87
height h	inch	1.59		1
dimensional drawing				
weight (without cable)	lb	0.15		0.04
pipe surface temperature	°F	-22 to +437 <sup>1</sup>		-22 to +392
ambient temperature	°F	-22 to +104 -22 to +392 <sup>2</sup>		-22 to +392
temperature compensation		x		
explosion protection				
• ATEX/IECEx				
order code		FSM-EA1*-**T1	FSP-EA1*-**T1	FSQ-EA1*-**T1
pipe surface temperature (Ex)	°C	-45 to +225		
marking		CE0637 Ex II2G II2D Ex q IIC T6...T2 Gb Ex tb IIIA T80 °C...T230 °C Db		
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X		

<sup>1</sup> > +200 °C/+392 °F:

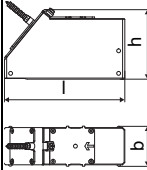
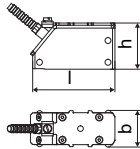
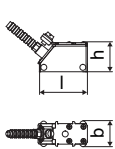
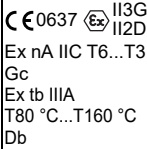
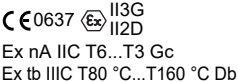

Variofix L

observe the insulation instruction

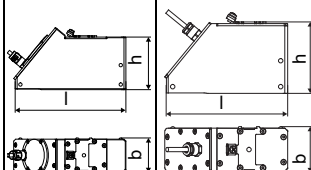
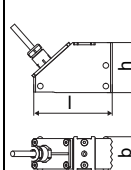
ambient temperature max. +40 °C/+104 °F

<sup>2</sup> pipe surface temperature max. +200 °C/+392 °F

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

order code		FLF-N***-**T1	FLG-N***-**T1	FLH-N***-**T1	FLK-N***-**T1	FLM-N***-**T1	FLP-N***-**T1	FLQ-N***-**T1	
technical type		C(RT)F1N53	C(RT)G1N53	C(RT)H1N53	C(RT)K1N53	C(RT)M1N53	C(RT)P1N53	C(RT)Q1N53	
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2	4	
inner pipe diameter d <sup>1</sup>									
min. extended	inch	25.2	15.7	13.8	3.9	2	0.98	0.39	
min. recommended	inch	31.5	19.7	17.7	7.9	3.9	2	0.98	
max. recommended	inch	216.5	157.5	118.1	78.7	39.4	15.7	5.9	
max. extended	inch	259.8	189	141.7	94.5	47.2	18.9	9.4	
pipe wall thickness									
min.	inch	0.59	0.43	0.31	0.2	0.1	0.05	0.02	
max.	inch	1.3	0.94	0.63	0.39	0.2	0.12	0.05	
material									
housing		PPSU with stainless steel cover 316Ti	PPSU with stainless steel cover 316L						
contact surface		PPSU							
degree of protection		IP66/IP67	IP66						
transducer cable									
type		1699							
length	ft	16				13		9	
dimensions									
length l	inch	6.42	5.06	2.91			1.65		
width b	inch	2.13	2.01	1.26			0.87		
height h	inch	3.59	2.66	1.59			1		
dimensional drawing									
weight (without cable)	lb	2.1	1	0.17			0.04		
pipe surface temperature	°F	-40 to +266							
ambient temperature	°F	-40 to +266							
temperature compensation		x							
explosion protection									
• ATEX/IECEx									
order code		FLF-NA2*-**T1	FLG-NA2*-**T1	FLH-NA2*-**T1	FLK-NA2*-**T1	FLM-NA2*-**T1	FLP-NA2*-**T1	FLQ-NA2*-**T1	
pipe surface temperature (Ex)	°C	gas: -50 to +165 dust: -50 to +155							
marking									
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X							
• FM									
order code		FLF-NF2*-**T1	FLG-NF2*-**T1	FLH-NF2*-**T1	FLK-NF2*-**T1	FLM-NF2*-**T1	FLP-NF2*-**T1	FLQ-NF2*-**T1	
pipe surface temperature (Ex)	°F	-40 to +329							
degree of protection		IP66							
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860							

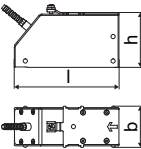
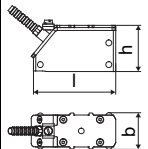

## Lamb wave transducers (zone 2 - nonEx, T1, IP68)

order code		FLF-L***-**T1/ H68	FLG-L***-**T1/ H68	FLH-L***-**T1/ H68	FLK-L***-**T1/ H68	FLM-L***-**T1/ H68	FLP-L***-**T1/ H68
technical type		CRF1LI8	CRG1LI8	CRH1LI8	CRK1LI8	CRM1LI8	CRP1LI8
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
inner pipe diameter d¹							
min. extended	inch	25.2	15.7	13.8	3.9	2	0.98
min. recommended	inch	31.5	19.7	17.7	7.9	3.9	2
max. recommended	inch	216.5	157.5	118.1	78.7	39.4	15.7
max. extended	inch	259.8	189	141.7	94.5	47.2	18.9
pipe wall thickness							
min.	inch	0.59	0.43	0.31	0.2	0.1	0.05
max.	inch	1.3	0.94	0.63	0.39	0.2	0.12
material							
housing		PPSU with stainless steel cover 316Ti					
contact surface		PPSU					
degree of protection		IP68²					
transducer cable							
type		2550					
length	ft	39					
dimensions							
length l	inch	6.81	5.65				2.87
width b	inch	2.13	2.13				1.24
height h	inch	3.6	3.29				1.81
dimensional drawing							
weight (without cable)	lb	3	1.4				0.21
pipe surface temperature	°F	-40 to +212					
ambient temperature	°F	-40 to +212					
temperature compensation		x					
explosion protection							
• ATEX/IECEx							
order code		FLF-LA2N-**T1/ H68	FLG-LA2N-**T1/ H68	FLH-LA2N-**T1/ H68	FLK-LA2N-**T1/ H68	FLM-LA2N-**T1/ H68	FLP-LA2N-**T1/ H68
pipe surface temperature (Ex)	°C	gas: -40 to +90 dust: -40 to +80					
marking		CE0637 Ex II3G II2D Ex nA IIC T6...T5 Gc Ex tb IIIC T80 °C...T85 °C Db					
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X					

<sup>1</sup> Lamb wave transducer:  
typical values for water; pipe diameters for other fluids on request  
inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)  
inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)

<sup>2</sup> test conditions: 3 months/29 psi (65 ft)/36 °F

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

order code		FLG-S***-**T1	FLH-S***-**T1	FLK-S***-**T1	FLM-S***-**T1	FLP-S***-**T1
technical type		C(RT)G1S53	C(RT)H1S53	C(RT)K1S53	C(RT)M1S53	C(RT)P1S53
transducer frequency	MHz	0.2	0.3	0.5	1	2
inner pipe diameter d <sup>1</sup>						
min. extended	inch	15.7	13.8	3.9	2	0.98
min. recommended	inch	19.7	17.7	7.9	3.9	2
max. recommended	inch	157.5	118.1	78.7	39.4	15.7
max. extended	inch	189	141.7	94.5	47.2	18.9
pipe wall thickness						
min.	inch	0.42	0.28	0.17	0.08	0.04
max.	inch	0.93	0.62	0.37	0.19	0.09
material						
housing		PPSU with stainless steel cover 316Ti				
contact surface		PPSU				
degree of protection		IP66				
transducer cable						
type		1699				
length	ft	16				13
dimensions						
length l	inch	5.06			2.91	
width b	inch	2.01			1.3	
height h	inch	2.66			1.59	
dimensional drawing						
weight (without cable)	lb	1.8			0.35	
storing temperature	°F	-40 to +329				
operating temperature	°F	212 to 356				
warm-up time	h	3			1	
temperature compensation		x				
explosion protection						
• ATEX/IECEx						
order code		FLG-SA2*-**T1	FLH-SA2*-**T1	FLK-SA2*-**T1	FLM-SA2*-**T1	-
pipe surface temperature (Ex)	°C	gas: -50 to +165 dust: -50 to +155				-
marking		CE 0637 Ex II 3G II 2D Ex nA IIC T6...T3 Gc Ex tb IIIC T80 °C...T160 °C Db				-
certification		IBExU10ATEX1163 X, IECEx IBE 12.0005X				-
• FM						
order code		FLG-SF2*-**T1	FLH-SF2*-**T1	FLK-SF2*-**T1	FLM-SF2*-**T1	-
pipe surface temperature (Ex)	°F	-40 to +329				-
degree of protection		IP66				-
marking		 NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860				-

completely thermally insulated transducer installation necessary

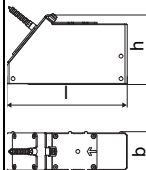
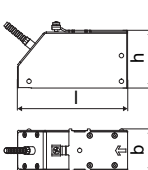
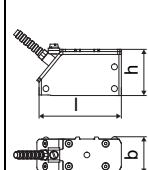
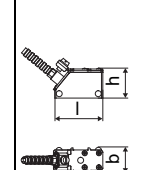
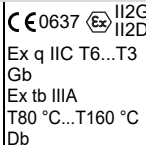
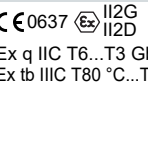
<sup>1</sup> Lamb wave transducer:

typical values for water; pipe diameters for other fluids on request

inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)

inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)

## Lamb wave transducers (zone 1, T1)

order code		FLF-N*1*-**T1	FLG-N*1*-**T1	FLH-N*1*-**T1	FLK-N*1*-**T1	FLM-N*1*-**T1	FLP-N*1*-**T1	FLQ-N*1*-**T1
technical type		C(RT)F1N83	C(RT)G1N83	C(RT)H1N83	C(RT)K1N83	C(RT)M1N83	C(RT)P1N83	C(RT)Q1N83
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2	4
inner pipe diameter d <sup>1</sup>								
min. extended	inch	25.2	15.7	13.8	3.9	2	0.98	0.39
min. recommended	inch	31.5	19.7	17.7	7.9	3.9	2	0.98
max. recommended	inch	216.5	157.5	118.1	78.7	39.4	15.7	5.9
max. extended	inch	259.8	189	141.7	94.5	47.2	18.9	9.4
pipe wall thickness								
min.	inch	0.59	0.43	0.31	0.2	0.1	0.05	0.02
max.	inch	1.3	0.94	0.63	0.39	0.2	0.12	0.05
material								
housing		PPSU with stainless steel cover 316L, 316Ti				PPSU with stainless steel cover 316L		
contact surface		PPSU						
degree of protection		IP66/IP67		IP66				
transducer cable								
type		1699						
length	ft	16				13		9
dimensions								
length l	inch	6.42	5.06				2.91	1.65
width b	inch	2.13	2.01				1.26	0.87
height h	inch	3.59	2.66				1.59	1
dimensional drawing								
weight (without cable)	lb	2.1	1				0.17	0.04
pipe surface temperature	°F	-40 to +266						
ambient temperature	°F	-40 to +266						
temperature compensation		x						
explosion protection								
• ATEX/IECEx								
order code		FLF-NA1N-**T1	FLG-NA1N-**T1	FLH-NA1N-**T1	FLK-NA1N-**T1	FLM-NA1N-**T1	FLP-NA1N-**T1	FLQ-NA1N-**T1
pipe surface temperature (Ex)	°C	-50 to +155						
marking								
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X						

<sup>1</sup> Lamb wave transducer:

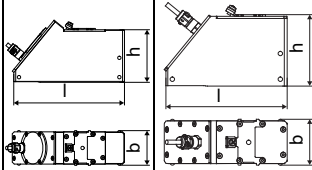
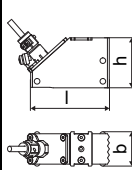
typical values for water; pipe diameters for other fluids on request

inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)

inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)



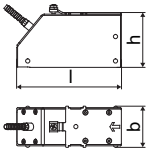
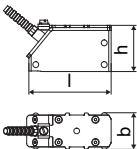
**Lamb wave transducers (zone 1, T1, IP68)**

order code		FLF-L*1*-**T1/ H68	FLG-L*1*-**T1/ H68	FLH-L*1*-**T1/ H68	FLK-L*1*-**T1/ H68	FLM-L*1*-**T1/ H68	FLP-L*1*-**T1/ H68
technical type		CRF1LI3	CRG1LI3	CRH1LI3	CRK1LI3	CRM1LI3	CRP1LI3
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
inner pipe diameter d <sup>1</sup>							
min. extended	inch	25.2	15.7	13.8	3.9	2	0.98
min. recommended	inch	31.5	19.7	17.7	7.9	3.9	2
max. recommended	inch	216.5	157.5	118.1	78.7	39.4	15.7
max. extended	inch	259.8	189	141.7	94.5	47.2	18.9
pipe wall thickness							
min.	inch	0.59	0.43	0.31	0.2	0.1	0.05
max.	inch	1.3	0.94	0.63	0.39	0.2	0.12
material							
housing		PPSU with stain- less steel cover 316Ti	PPSU with stainless steel cover 316Ti				
contact surface		PPSU	PPSU				
degree of protection		IP68 <sup>2</sup>	IP68 <sup>2</sup>				
transducer cable							
type		2550	2550				
length	ft	39	39				
dimensions							
length l	inch	6.81	5.65				2.877
width b	inch	2.13	2.13				1.24
height h	inch	3.6	3.29				1.81
dimensional drawing							
weight (without cable)	lb	3	1.4				0.21
pipe surface temperature	°F	-40 to +176	-40 to +176				
ambient temperature	°F	-40 to +176	-40 to +176				
temperature compensation		x	x				
explosion protection							
• ATEX/IECEx							
order code		FLF-LA1N-**T1/ H68	FLG-LA1N-**T1/ H68	FLH-LA1N-**T1/ H68	FLK-LA1N-**T1/ H68	FLM-LA1N-**T1/ H68	FLP-LA1N-**T1/ H68
pipe surface temperature (Ex)	°C	-40 to +80					
marking		CE0637 Ex II2G II2D Ex q IIC T6...T5 Gb Ex tb IIIC T80 °C...T85 °C Db					
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X					

<sup>1</sup> Lamb wave transducer:  
 typical values for water; pipe diameters for other fluids on request  
 inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)  
 inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)

<sup>2</sup> test conditions: 3 months/29 psi (65 ft)/36 °F

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

order code		FLG-S*1N-**T1	FLH-S*1N-**T1	FLK-S*1N-**T1	FLM-S*1N-**T1
technical type		C(RT)G1S83	C(RT)H1S83	C(RT)K1S83	C(RT)M1S83
transducer frequency	MHz	0.2	0.3	0.5	1
inner pipe diameter d <sup>1</sup>					
min. extended	inch	15.7	13.8	3.9	2
min. recommended	inch	19.7	17.7	7.9	3.9
max. recommended	inch	157.5	118.1	78.7	39.4
max. extended	inch	189	141.7	94.5	47.2
pipe wall thickness					
min.	inch	0.42	0.28	0.17	0.08
max.	inch	0.93	0.62	0.37	0.19
material					
housing		PPSU with stainless steel cover 316Ti			
contact surface		PPSU			
degree of protection		IP66			
transducer cable					
type		1699			
length	ft	16			13
dimensions					
length l	inch	5.06			2.91
width b	inch	2.01			1.3
height h	inch	2.66			1.59
dimensional drawing					
weight (without cable)	lb	1.8			0.35
storing temperature	°F	-40 to +311			
operating temperature	°F	212 to 311			
warm-up time	h	3			1
temperature compensation		x			
explosion protection					
• ATEX/IECEx					
order code		FLG-SA1N-**T1	FLH-SA1N-**T1	FLK-SA1N-**T1	FLM-SA1N-**T1
pipe surface temperature (Ex)	°C	-50 to +155			
marking		CE0637 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 thermally insulated transducer installation necessary

<sup>1</sup> Lamb wave transducer:

typical values for water; pipe diameters for other fluids on request

inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)

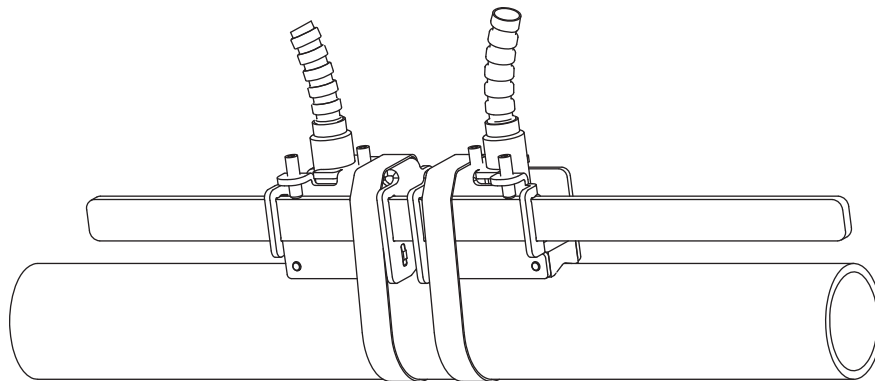
inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)

## Transducer mounting fixture

### Order code

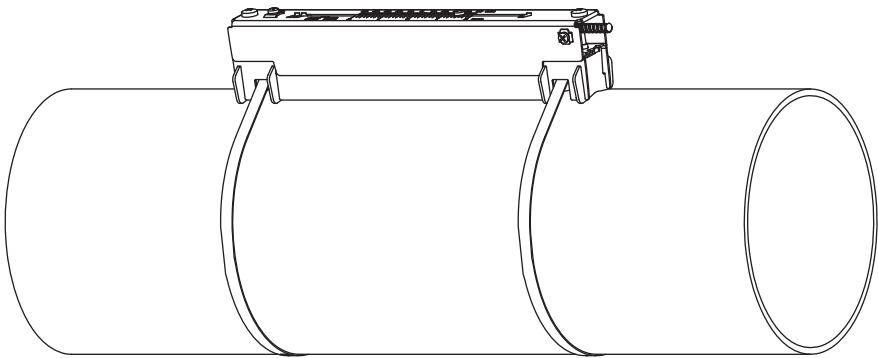
1, 2	3	4	5	6	7 to 10	no. of character
transducer mounting fixture	transducer	measurement arrangement	size	fixation	outer pipe diameter	description
VL						Variofix L
PL						PermaLok
WN						WaveInjector WI-550
WH						WaveInjector WI-630
	F					transducers with transducer frequency F
	G					transducers 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
	S					transducers with transducer frequency S
		D				reflect arrangement or diagonal arrangement/direct mode
		R				reflect arrangement
			S			small
			M			medium
			L			large
				S		tension straps
				D		solid band straps
				E		epoxy mount
				N		without fixation
					SBK1	0.5 to 2.5 inch
					SBK2	3 to 6 inch
					SBK3	8 to 10 inch
					SBK4	12 to 18 inch
					SBK5	20 to 36 inch
					SBK6	42 to 100 inch
					SSK1	0.5 to 2.5 inch
					SSK2	3 to 6 inch
					SSK3	8 to 10 inch
					SSK4	12 to 18 inch
					SSK5	20 to 36 inch
					T360	1.57 to 14.2 inch
					NODR	any
					H68	for transducers with degree of protection IP68

#### Variofix L (VLS)



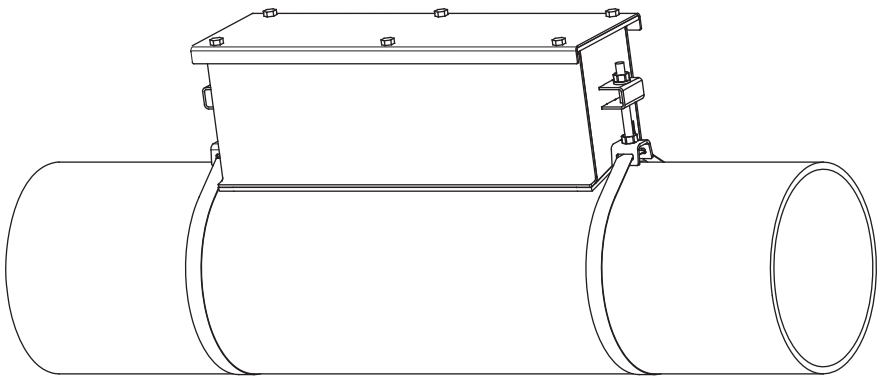
transducer frequency: S  
material: stainless steel 304, 303

Variofix L (VL)



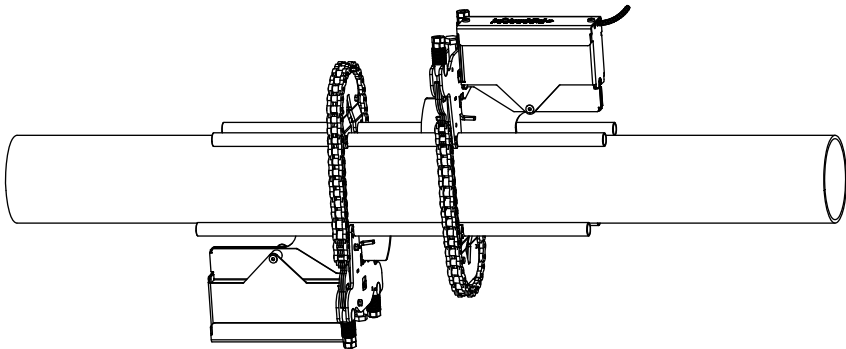
material: stainless steel 316Ti, 316L, 17-7PH  
inner length:  
**VL(GHK)**: 13.7 inch,  
option H68: 14.5 inch  
**VL(MP)**: 9.2 inch  
**VLQ**: 6.9 inch  
dimensions:  
**VL(GHK)**: 16.65 x 3.54 x 3.66 inch  
option H68: 17.44 x 3.7 x 4.13 inch  
**VL(MP)**: 12.17 x 2.24 x 2.48 inch  
**VLQ**: 9.72 x 1.69 x 1.85 inch

PermaLok (PL)



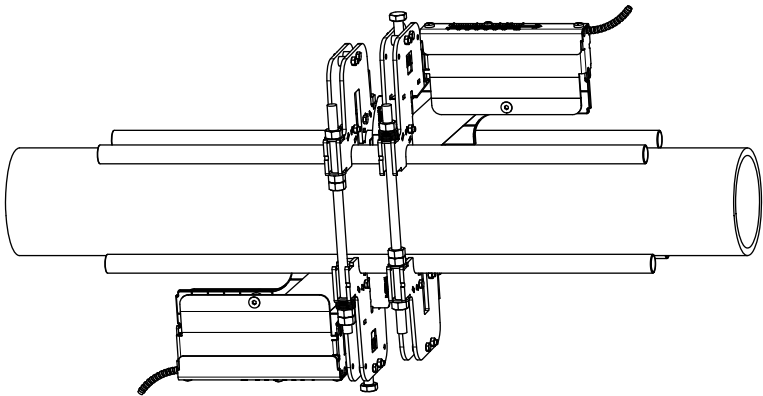
material: stainless steel 316  
dimensions:  
**PL(GHK)-RL**:  
19.25 x 3.9 x 3.95 inch  
**PL(GHK)-DS**:  
13.25 x 3.85 x 3.95 inch  
**PL(MP)**: 25.25 x 3.08 x 3.15 inch  
**PLQ**: 13.37 x 2.68 x 2.4 inch  
weight:  
**PL(GHK)-RL**: 6 lb  
**PL(GHK)-DS**: 4.2 lb  
**PL(MP)**: 6.6 lb  
**PLQ**: 2.8 lb

WaveInjector with chains



see Technical specification  
TSWaveInjectorVx-x

WaveInjector with threaded rods



outer pipe diameter:  
1.4 to 15 inch  
see Technical specification  
TSWaveInjectorVx-x

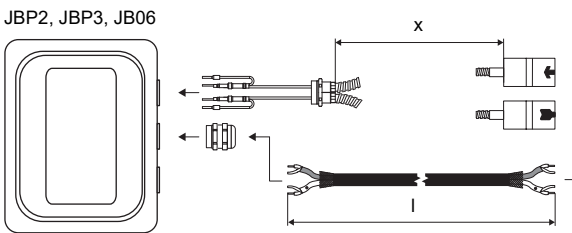
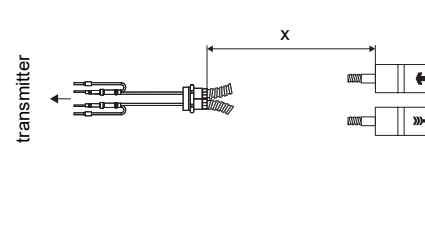
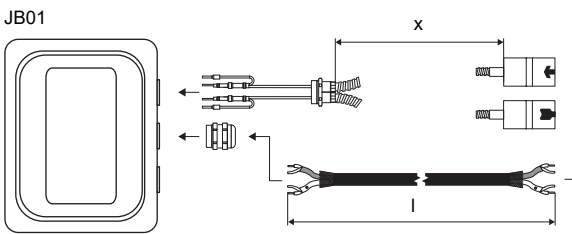
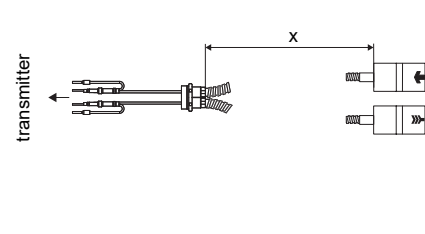
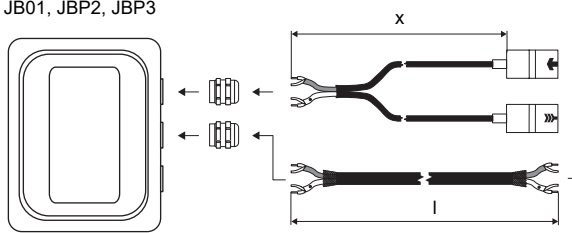
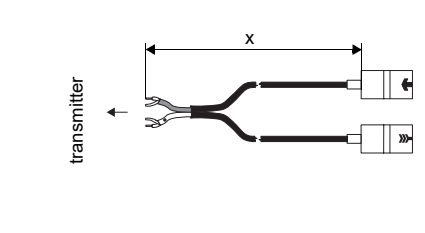
## Coupling materials for transducers

	<b>normal temperature range</b> (4th character of transducer order code = N)		<b>extended temperature range higher temperatures</b> (4th character of transducer order code = E, S)			<b>WaveInjector</b>	
	< 212 °F	< 266 °F	< 356 °F	< 392 °F	392 to 464 °F	< 536 °F	536 to 1166 °F
< 24 h	coupling compound type N or coupling pad type VT	coupling compound type N or E or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type H or coupling pad type TF	coupling pad type A and coupling pad type VT	coupling pad type B and coupling pad type VT
long time measurement	coupling pad type VT	coupling pad type VT	coupling pad type VT	coupling pad type VT	coupling pad type TF	coupling pad type A and coupling pad type VT	coupling pad type B and coupling pad type VT

### Technical data

type	ambient temperature °F	remark
coupling compound type N	-22 to +266	
coupling compound type E	-22 to +392	
coupling compound type H	-22 to +482	
coupling pad type A	max. 536	
coupling pad type B	536 to 1166	
coupling pad type VT	14 to +392	fluid temperature 392 °F: min. 2 years
coupling pad type TF	392 to 464	

## Connection systems

connection system T1		
connection with extension cable	direct connection	transducers technical type
<p>JBP2, JBP3, JB06</p> 		****53
<p>JB01</p> 		****8*
<p>JB01, JBP2, JBP3</p> 		****L1*

## Cable

transducer cable				
type		1699	2550	6111
weight	lb/ft	0.06	0.02	0.06
ambient temperature	°F	-67 to +392	-40 to +212	-148 to +437
properties			longitudinal watertight	
cable jacket				
material		PTFE	PUR	PFA
outer diameter	inch	0.11	0.2 ±0.01	0.11
thickness	inch	0.01	0.04	0.02
color		brown	gray	white
shield		x	x	x
sheath				
material		stainless steel 304 option OS: 316Ti	-	stainless steel 304 option OS: 316Ti
outer diameter	inch	0.31	-	0.31

extension cable			
type		2615	5245
weight	lb/ft	0.12	0.26
ambient temperature	°F	-22 to +158	-22 to +158
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	inch	max. 0.47	max. 0.47
thickness	inch	0.08	0.08
color		black	black
shield		x	x
sheath			
material		-	steel wire braid with copolymer sheath
outer diameter	inch	-	max. 0.61

**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*	ft	16	≤ 984	13	≤ 984	9	≤ 295	6	≤ 131
*(LT)***5*	ft	29	≤ 984	29	≤ 984	29	≤ 295	-	-
transducers technical type		x	l	x	l	x	l	x	l
*(DR)***8*	ft	16	≤ 984	13	≤ 984	9	≤ 295	-	-
*(LT)***8*	ft	29	≤ 984	29	≤ 984	29	≤ 295	-	-
option H68: ****LJ*	ft	39	≤ 984	39	≤ 984	-	-	-	-

x = transducer cable length

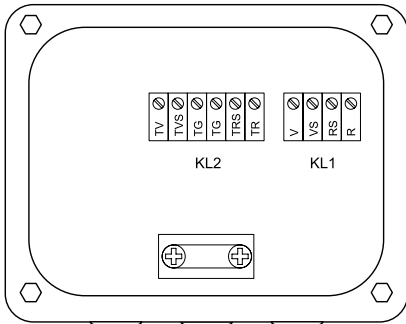
l = max. length of extension cable (depending on the application)

## Junction box

### Technical data

JB01S4E3M		
weight	lb	2.6 lb
fixation		wall mounting optional: 2" pipe mounting
material		
housing		stainless steel 316L
gasket		silicone
degree of protection		IP66/IP67
ambient temperature °F		-40 to +176
explosion protection		
• ATEX/IECEX		
marking		CE0637 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

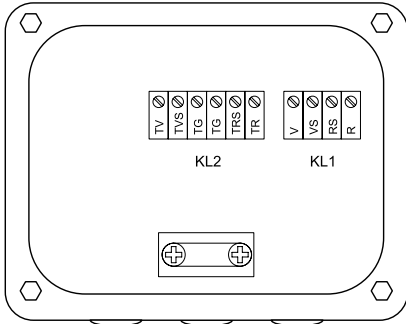
terminal strip	terminal	connection	transducer
KL1	V	signal	↑
	VS	internal shield	
	RS	internal shield	⌋
	R	signal	

Extension cable

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

JBP2, JBP3, JB06		
weight	lb	2.6 lb
fixation		wall mounting optional: 2" pipe mounting
material		
housing		stainless steel 316L
gasket		silicone
degree of protection		JBP2, JBP3: IP66/IP67 JB06: Type 4X, IP66
ambient temperature °F		-40 to +176
explosion protection		
• ATEX/UKCA		
junction box		JBP2
marking		CE UKCA 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		JB06
certification type		JBC23
marking		F1/1 APPROVED NI/CI. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C

Connection



Transducers

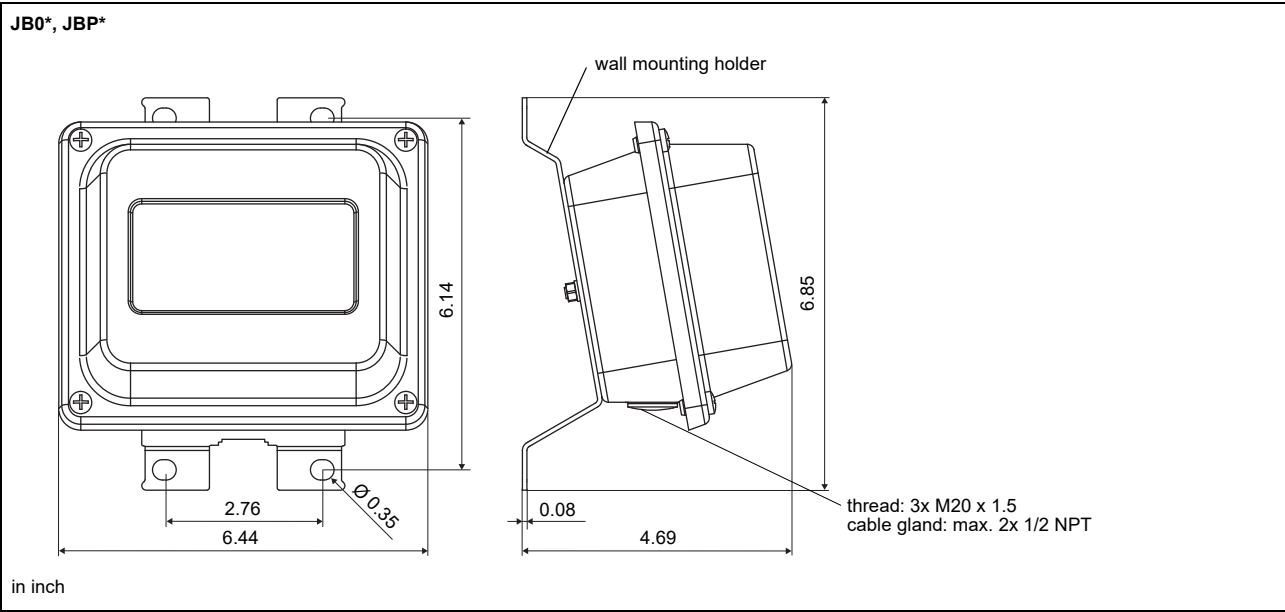
terminal strip	terminal	connection	transducer
KL1	V	signal	↑
	VS	internal shield	
	RS	internal shield	⌋
	R	signal	

Extension cable

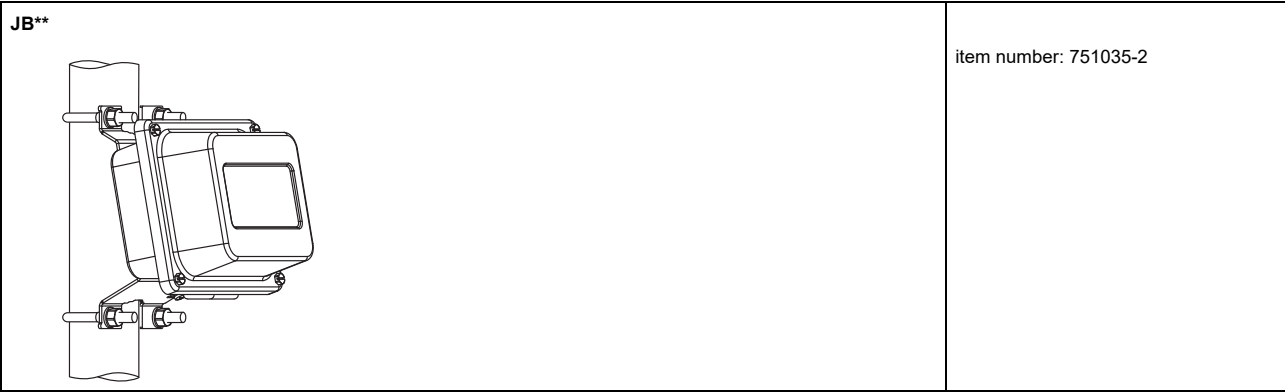
terminal strip	terminal	connection
KL2	TV	signal
	TVS	internal shield
	TRS	internal shield
	TR	signal



Dimensions



2" pipe mounting kit



For more information: **Emerson.com**

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