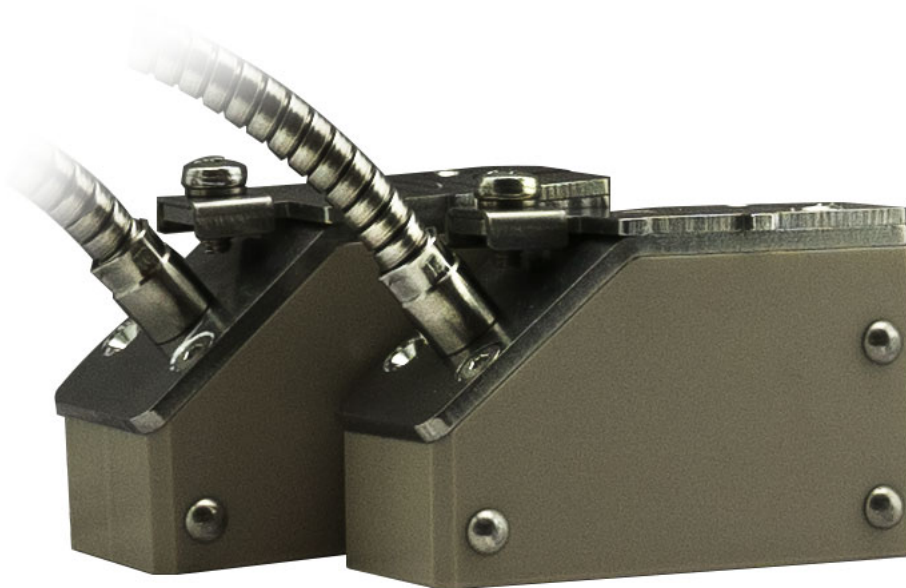


**Transducers for FLUXUS F8\*\*, H831, PIOX S831**



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TS\_F8xx-transducersV1-3US\_Lus, 2023-06-01

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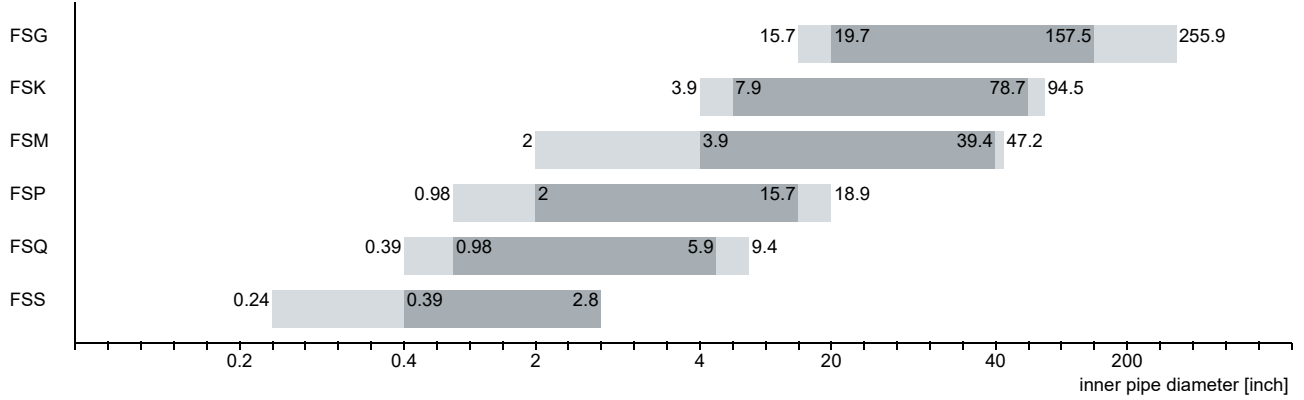
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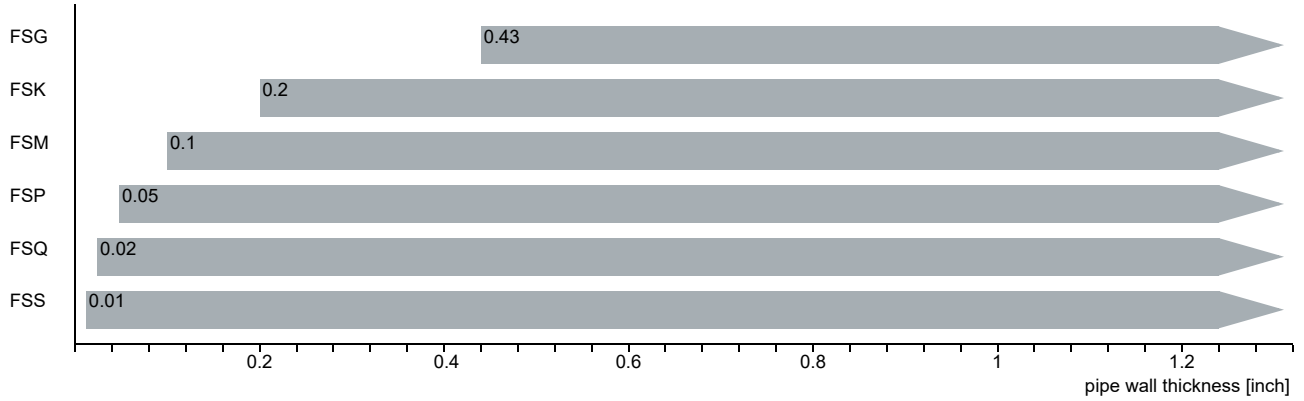
# Transducer selection

## Shear wave transducers

transducer order code



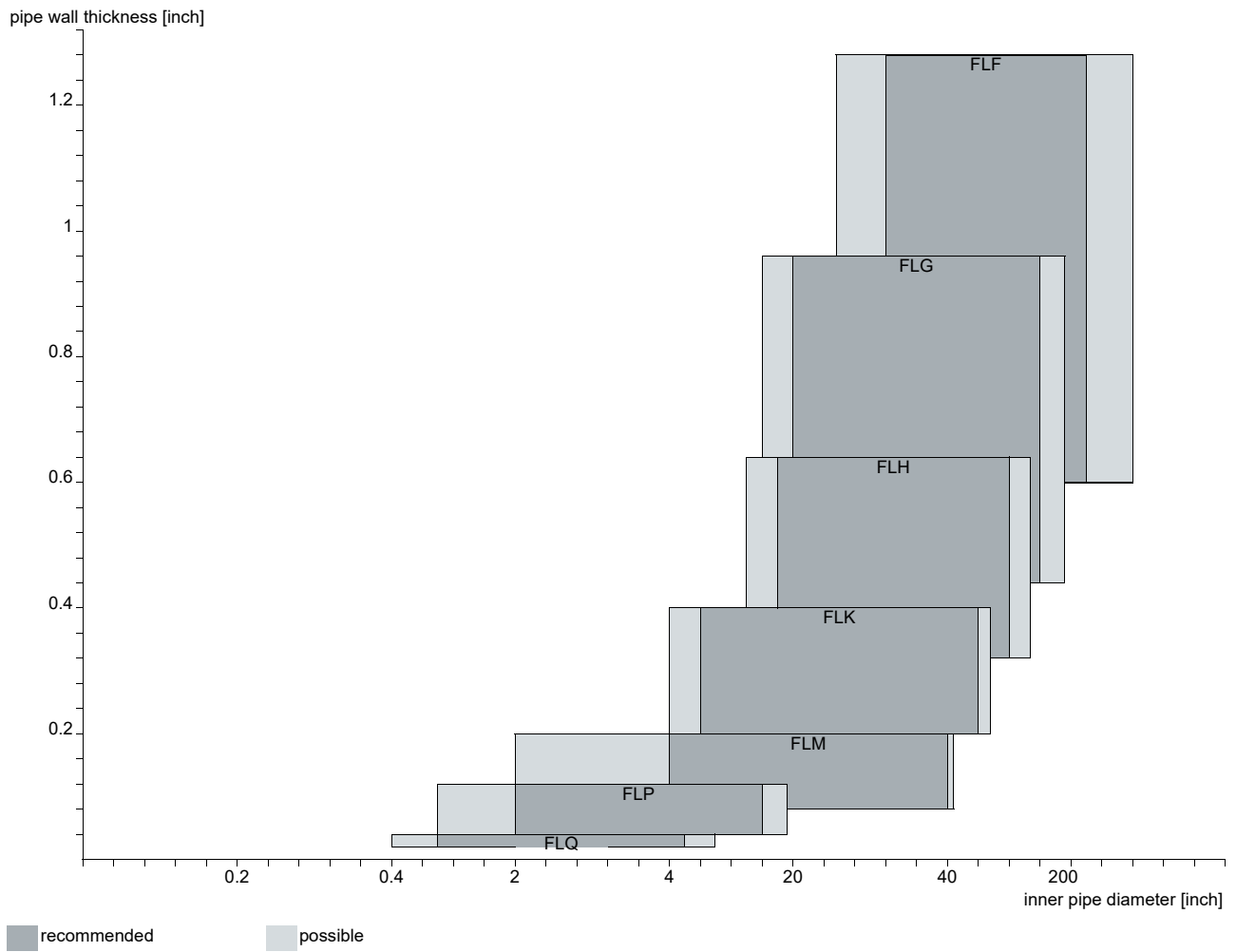
transducer order code



recommended
  possible

### 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.

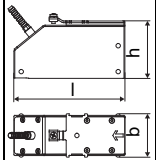
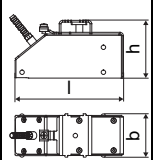
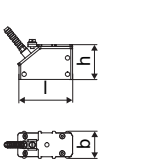



### Transducer order code

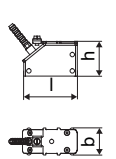
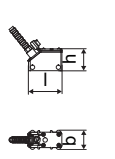

1, 2	3	4	5, 6	7, 8	9 to 11	no. of character				
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option	description
FS										set of ultrasonic flow transducers for measurement of liquids, shear wave
FL										set of ultrasonic flow 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
		N								normal temperature range
		E								extended temperature range
		S								higher temperatures
			A1							ATEX zone 1/IECEx zone 1
			F2							FM Class I Div. 2
			F1							FM Class I Div. 1
				TS						with SMB connector
				T1						with stripped cable ends
					XXX					0 m: without extension cable > 0 m: with extension cable
								LC		long transducer cable
								IP68		degree of protection IP68
								OS		housing with stainless steel 316

## Technical data

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

order code		FSG-N**TS/**	FSK-N**TS/**	FSM-N**TS/**	FSP-N**TS/**	FSQ-N**TS/**	FSS-N**TS/**	
technical type		C(DL)G1N52	C(DL)K1N52	C(DL)M2N52	C(DL)P2N52	C(DL)Q2N52	CDS1N52	
transducer frequency	MHz	0.2	0.5	1	2	4	8	
<b>inner pipe diameter d</b>								
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	
<b>pipe wall thickness</b>								
min.	inch	0.43	0.2	0.1	0.05	0.02	0.01	
<b>material</b>								
housing		PEEK with stainless steel cover 304, ***-*****/OS: 316L					stainless steel 304	
contact surface		PEEK					PEI	
degree of protection		IP66			IP66/IP67		IP66	
<b>transducer cable</b>								
type		1699						
length	ft	16		13		9		
length (***-*****/LC)	ft	29						
<b>dimensions</b>								
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						
<b>explosion protection</b>								
<b>• FM</b>								
order code		FSG-NF2TS/**	FSK-NF2TS/**	FSM-NF2TS/**	FSP-NF2TS/**	FSQ-NF2TS/**	FSS-NF2TS/**	
pipe surface temperature (Ex)	°F	-40 to +257			-40 to +374		-40 to +257	
degree of protection		IP66						
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860						
remark		*80*: on request						

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

order code		FSM-EF2TS/**	FSP-EF2TS/**	FSQ-EF2TS/**
technical type		C(DL)M2E52	C(DL)P2E52	C(DL)Q2E52
transducer frequency	MHz	1	2	4
<b>inner pipe diameter d</b>				
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
<b>pipe wall thickness</b>				
min.	inch	0.1	0.05	0.02
<b>material</b>				
housing		PI with stainless steel cover 304, ***_*****/OS: 316L		
contact surface		PI		
degree of protection		IP66/IP67		
<b>transducer cable</b>				
type		6111		
length	ft	13		9
length (***_***/LC)	ft	29		
<b>dimensions</b>				
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 +464 <sup>1</sup>		-22 to +392
ambient temperature	°F	-22 to +104 -22 to +392 <sup>2</sup>		-22 to +392
temperature compensation		x		
<b>explosion protection</b>				
<b>• FM</b>				
pipe surface temperature (Ex)	°F	-40 to +455 <sup>1</sup>		
degree of protection		IP66		
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860		

<sup>1</sup> > +200 °C/+392 °F:

Variofix L

observe the insulation instruction

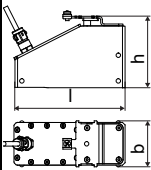
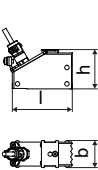
<sup>2</sup> pipe surface temperature max. +392 °F

## Shear wave transducers (zone 1, T1)

order code		FSG-N*1T1/**	FSK-N*1T1/**	FSM-N*1T1/**	FSP-N*1T1/**	FSQ-N*1T1/**
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
<b>inner pipe diameter d</b>						
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
<b>pipe wall thickness</b>						
min.	inch	0.43	0.2	0.1	0.05	0.02
<b>material</b>						
housing		PEEK with stainless steel cover 304 , ***/*****/OS: 316L				
contact surface		PEEK				
degree of protection		IP66		IP66/IP67		
<b>transducer cable</b>						
type		1699				
length	ft	16		13		9
length (***/*****/LC)	ft	29				
<b>dimensions</b>						
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				
<b>explosion protection</b>						
<b>• ATEX/IECEx</b>						
order code		FSG-NA1T1/**	FSK-NA1T1/**	FSM-NA1T1/**	FSP-NA1T1/**	FSQ-NA1T1/**
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				
remark		*80*: on request				

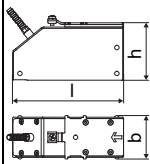


**Shear wave transducers (zone 1, T1, IP68)**

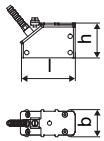
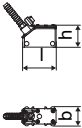
order code		FSG-N*1T1/IP68	FSK-N*1T1/IP68	FSM-N*1T1/IP68	FSP-N*1T1/IP68
technical type		CDG1L11	CDK1L11	CDM2L11	CDP2L11
transducer frequency	MHz	0.2	0.5	1	2
<b>inner pipe diameter d</b>					
min. extended	inch	15.7	3.9	2	0.98
min. recommended	inch	19.7	7.9	3.9	2
max. recommended	inch	157.5	78.7	39.4	15.7
max. extended	inch	255.9	94.5	47.2	18.9
<b>pipe wall thickness</b>					
min.	inch	0.43	0.2	0.1	0.05
<b>material</b>					
housing		PEEK with stainless steel cover 316Ti			
contact surface		PEEK			
degree of protection		IP68 <sup>1</sup>			
<b>transducer cable</b>					
type		2550			
length	ft	39			
<b>dimensions</b>					
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			
<b>explosion protection</b>					
<b>• ATEX/IECEX</b>					
order code		FSG-NA1T1/IP68	FSK-NA1T1/IP68	FSM-NA1T1/IP68	FSP-NA1T1/IP68
pipe surface temperature (Ex)	°C	-40 to +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			
remark		*80*: on request			

<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*1T1/**	FSK-E*1T1/**
technical type		CDG1E83	CDK1E83
transducer frequency	MHz	0.2	0.5
<b>inner pipe diameter d</b>			
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
<b>pipe wall thickness</b>			
min.	inch	0.43	0.2
<b>material</b>			
housing		PPSU with stainless steel cover 304, ***-*****/OS: 316L	
contact surface		PPSU	
degree of protection		IP66	
<b>transducer cable</b>			
type		1699	
length	ft	16	
length (**-*****/LC)	ft	29	
<b>dimensions</b>			
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 +356	
ambient temperature	°F	-40 to +356	
temperature compensation		x	
<b>explosion protection</b>			
• ATEX/IECEX			
order code		FSG-EA1T1/**	FSK-EA1T1/**
pipe surface temperature (Ex)	°C	-50 to +155	
marking		CE 0637 Ex II 2G II 2D Ex q IIC T6...T3 Gb Ex tb IIC T80 °C...T160 °C Db	
certification		IBExU07ATEX1168 X, IECEX IBE 08.0007X	
remark		*80*: on request	

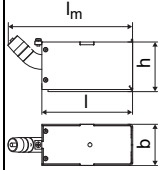
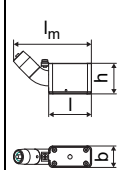

**Shear wave transducers (zone 1, T1, extended temperature range)**

order code		FSM-E*1T1/**	FSP-E*1T1/**	FSQ-E*1T1/**
technical type		C(DL)M2E85	C(DL)P2E85	C(DL)Q2E85
transducer frequency	MHz	1	2	4
<b>inner pipe diameter d</b>				
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
<b>pipe wall thickness</b>				
min.	inch	0.1	0.05	0.02
<b>material</b>				
housing		PI with stainless steel cover 304, ***-*****/OS: 316L		
contact surface		PI		
degree of protection		IP66/IP67		
<b>transducer cable</b>				
type		6111		
length	ft	13		9
length (***-*****/LC)	ft	29		
<b>dimensions</b>				
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 +450 <sup>1</sup>		-22 to +392
ambient temperature	°F	-22 to +104 -22 to +392 <sup>2</sup>		-22 to +392
temperature compensation		x		
<b>explosion protection</b>				
<b>• ATEX/IECEx</b>				
order code		FSM-EA1T1/**	FSP-EA1T1/**	FSQ-EA1T1/**
pipe surface temperature (Ex)	°C	-45 to +225 <sup>1</sup>		
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		

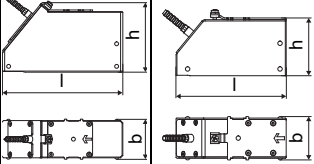
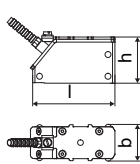
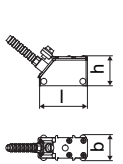

<sup>1</sup> > +200 °C/+392 °F:  
 Variofix L  
 observe the insulation instruction  
 ambient temperature max. +40 °C/+104 °F

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

## Shear wave transducers (FM Class I Div. 1, T1)

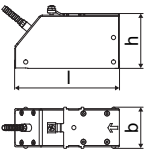
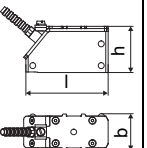

order code		FSG-NF1T1/**	FSK-NF1T1/**	FSM-NF1T1/**	FSP-NF1T1/**	FSQ-NF1T1/**
technical type		C(DL)G1N62	C(DL)K1N62	C(DL)M1N62	C(DL)P1N62	C(DL)Q1N62
transducer frequency	MHz	0.2	0.5	1	2	4
<b>inner pipe diameter d</b>						
min. extended	inch	15.7	3.9	2	0.98	0.39
min. recommended	inch	19.7	7.9	3.9	2	0.98
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
<b>pipe wall thickness</b>						
min.	inch	0.43	0.2	0.1	0.05	0.02
<b>material</b>						
housing		stainless steel 304, ***/****/OS: 316L				
contact surface		PEEK				
degree of protection		IP66				
<b>transducer cable</b>						
type		2549				
length	ft	32				
length (***/****/LC)	ft	150				
<b>dimensions</b>						
length l	inch	5.2		2.36		
width b	inch	2.36		1.18		
height h	inch	2.83		1.69		
mounting length l <sub>m</sub>	inch	7.28		4.33		
thread		1/2 NPT		1/2 NPT		
dimensional drawing						
weight (without cable)	lb	2.4		0.63		
pipe surface temperature	°F	-40 to +230				
ambient temperature	°F	-40 to +230				
temperature compensation		x				
<b>explosion protection</b>						
<b>• FM</b>						
pipe surface temperature (Ex)	°F	-40 to +257				
marking		 S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831				
remark		*80*: on request				

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

order code		FLF-N**TS/**	FLG-N**TS/**	FLH-N**TS/**	FLK-N**TS/**	FLM-N**TS/**	FLP-N**TS/**	FLQ-N**TS/**	
technical type		C(RT)F1N52	C(RT)G1N52	C(RT)H1N52	C(RT)K1N52	C(RT)M1N52	C(RT)P1N52	C(RT)Q1N52	
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2	4	
<b>inner pipe diameter d<sup>1</sup></b>									
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	
<b>pipe wall thickness</b>									
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	
<b>material</b>									
housing		PPSU with stainless steel cover 316Ti	PPSU with stainless steel cover 304, ***-*****/OS: 316L						
contact surface		PPSU							
degree of protection		IP66/IP67	IP66						
<b>transducer cable</b>									
type		1699							
length	ft	16					13		9
length (**-*****/LC)	ft	29							
<b>dimensions</b>									
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							
<b>explosion protection</b>									
<b>• FM</b>									
order code		FLF-NF2TS/**	FLG-NF2TS/**	FLH-NF2TS/**	FLK-NF2TS/**	FLM-NF2TS/**	FLP-NF2TS/**	FLQ-NF2TS/**	
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							
remark		*80*: on request	*80*: on request	*80*: on request					

<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 (FM Class I Div. 2, higher temperatures, TS)**

order code		FLG-SF2TS/**	FLH-SF2TS/**	FLK-SF2TS/**	FLM-SF2TS/**
technical type		C(RT)G1S52	C(RT)H1S52	C(RT)K1S52	C(RT)M1S52
transducer frequency	MHz	0.2	0.3	0.5	1
<b>inner pipe diameter d<sup>1</sup></b>					
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
<b>pipe wall thickness</b>					
min.	inch	0.42	0.28	0.17	0.08
max.	inch	0.93	0.62	0.37	0.19
<b>material</b>					
housing		PPSU with stainless steel cover 316Ti			
contact surface		PPSU			
degree of protection		IP66			
<b>transducer cable</b>					
type		1699			
length	ft	16		13	
length (***/****/LC)	ft	29		29	
<b>dimensions</b>					
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 356 (nonEx)			
warm-up time	h	3			1
temperature compensation		x			
<b>• FM</b>					
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			
remark		*80*: on request	*80*: on request		

completely thermally insulated transducer installation necessary

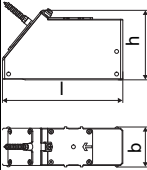
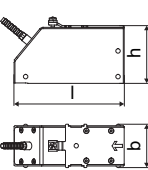
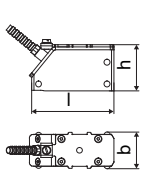
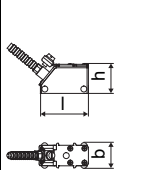


<sup>1</sup> Lamb wave transducer:

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)

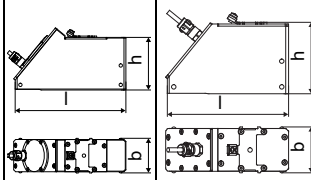
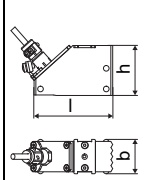

inner pipe diameter max. extended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 16 ft/s (33 ft/s)

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

order code		FLF-N*1T1/**	FLG-N*1T1/**	FLH-N*1T1/**	FLK-N*1T1/**	FLM-N*1T1/**	FLP-N*1T1/**	FLQ-N*1T1/**
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
<b>inner pipe diameter d<sup>1</sup></b>								
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
<b>pipe wall thickness</b>								
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
<b>material</b>								
housing		PPSU with stainless steel cover 304, ***-****/OS: 316L, 316Ti				PPSU with stainless steel cover 304, ***-****/OS: 316L		
contact surface		PPSU						
degree of protection		IP66/IP67		IP66				
<b>transducer cable</b>								
type		1699						
length	ft	16				13		9
length (**-****/LC)	ft	29						
<b>dimensions</b>								
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						
<b>explosion protection</b>								
<b>• ATEX/IECEx</b>								
order code		FLF-NA1T1/**	FLG-NA1T1/**	FLH-NA1T1/**	FLK-NA1T1/**	FLM-NA1T1/**	FLP-NA1T1/**	FLQ-NA1T1/**
pipe surface temperature (Ex)	°C	-50 to +155						
marking		CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIA T80 °C...T160 °C Db		CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC T80 °C...T160 °C Db				
certification		IBExU07ATEX1168 X, IECEx IBE 08.0007X						
remark		*80*: on request		*80*: on request		*80*: on request		

<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)**

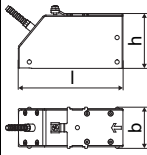
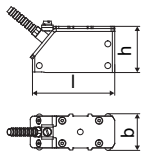
order code		FLF-N*1T1/IP68	FLG-N*1T1/IP68	FLH-N*1T1/IP68	FLK-N*1T1/IP68	FLM-N*1T1/IP68	FLP-N*1T1/IP68
technical type		CRF1LI3	CRG1LI3	CRH1LI3	CRK1LI3	CRM1LI3	CRP1LI3
transducer frequency	MHz	0.15	0.2	0.3	0.5	1	2
<b>inner pipe diameter d<sup>1</sup></b>							
min. extended	inch	25.2	15.7	13.8	3.9	2	0.98
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
<b>pipe wall thickness</b>							
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
<b>material</b>							
housing		PPSU with stainless steel cover 316Ti	PPSU with stainless steel cover 316Ti				
contact surface		PPSU	PPSU				
degree of protection		IP68 <sup>2</sup>	IP68 <sup>2</sup>				
<b>transducer cable</b>							
type		2550	2550				
length	ft	39	39				
<b>dimensions</b>							
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 +212	-40 to +212				
ambient temperature	°F	-40 to +212	-40 to +212				
temperature compensation		x	x				
<b>explosion protection</b>							
<b>• ATEX/IECEx</b>							
order code		FLF-NA1T1/IP68	FLG-NA1T1/IP68	FLH-NA1T1/IP68	FLK-NA1T1/IP68	FLM-NA1T1/IP68	FLP-NA1T1/IP68
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					
remark		*80*: on request	*80*: on request	*80*: on request			

<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-SA1T1/**	FLH-SA1T1/**	FLK-SA1T1/**	FLM-SA1T1/**
technical type		C(RT)G1S83	C(RT)H1S83	C(RT)K1S83	C(RT)M1S83
transducer frequency	MHz	0.2	0.3	0.5	1
<b>inner pipe diameter d<sup>1</sup></b>					
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
<b>pipe wall thickness</b>					
min.	inch	0.42	0.28	0.17	0.08
max.	inch	0.93	0.62	0.37	0.19
<b>material</b>					
housing		PPSU with stainless steel cover 316Ti			
contact surface		PPSU			
degree of protection		IP66			
<b>transducer cable</b>					
type		1699			
length	ft	16			13
length (**-****/LC)	ft	29			29
<b>dimensions</b>					
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			
<b>explosion protection</b>					
<b>• ATEX/IECEx</b>					
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			
remark		*80*: on request	*80*: on request		

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 (FM Class I Div. 1, T1)**

order code		FLG-NF1T1/**	FLH-NF1T1/**	FLK-NF1T1/**	FLM-NF1T1/**	FLP-NF1T1/**	FLQ-NF1T1/**
technical type		C(RT)G1N62	C(RT)H1N62	C(RT)K1N62	C(RT)M1N62	C(RT)P1N62	C(RT)Q1N62
transducer frequency	MHz	0.2	0.3	0.5	1	2	4
<b>inner pipe diameter d<sup>1</sup></b>							
min. extended	inch	15.7	13.8	3.9	2	0.98	0.39
min. recommended	inch	19.7	17.7	7.9	3.9	2	0.98
max. recommended	inch	157.5	118.1	78.7	39.4	15.7	5.9
max. extended	inch	189	141.7	94.5	47.2	18.9	9.4
<b>pipe wall thickness</b>							
min.	inch	0.43	0.31	0.2	0.1	0.05	0.02
max.	inch	0.94	0.63	0.39	0.2	0.12	0.05
<b>material</b>							
housing		stainless steel 304, **-* ***/OS: 316L					
contact surface		PPSU					
degree of protection		IP66					
<b>transducer cable</b>							
type		2549					
length	ft	32					
length (**-* ***/LC)	ft	150					
<b>dimensions</b>							
length l	inch	5.2			3.15		
width b	inch	2.36			1.5		
height h	inch	2.83			1.73		
mounting length l <sub>m</sub>	inch	7.28			5.31		
thread		1/2 NPT			1/2 NPT		
dimensional drawing							
weight (without cable)	lb	0.67			1.04	1.05	1.06
pipe surface temperature	°F	-40 to +230					
ambient temperature	°F	-40 to +230					
temperature compensation		x					
<b>explosion protection</b>							
<b>• FM</b>							
pipe surface temperature (Ex)	°F	-40 to +257					
marking		S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831					
remark		*80*: on request		*80*: on request			

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

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

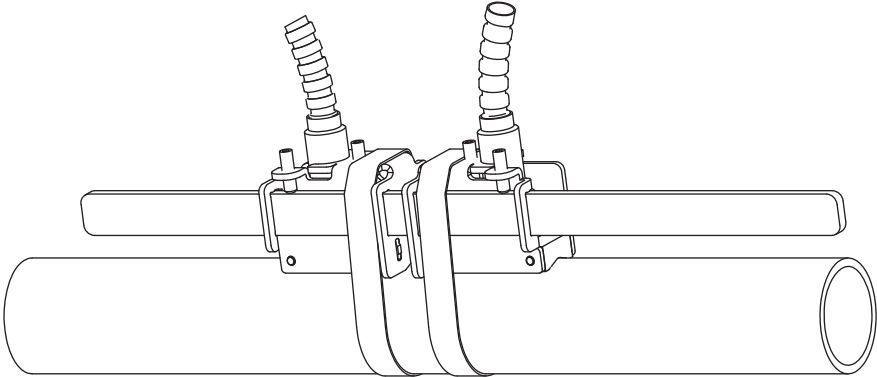
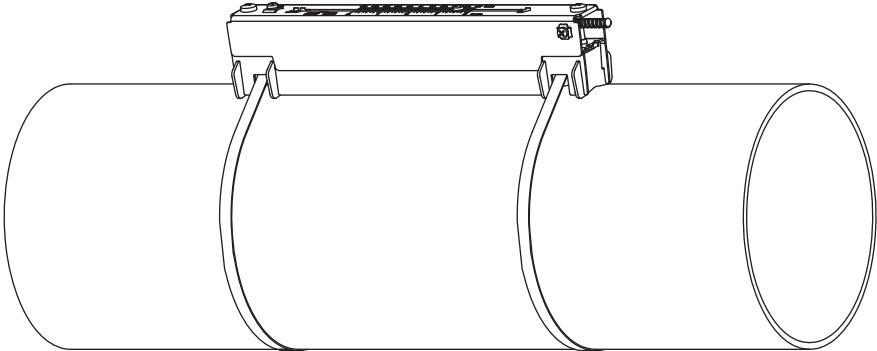
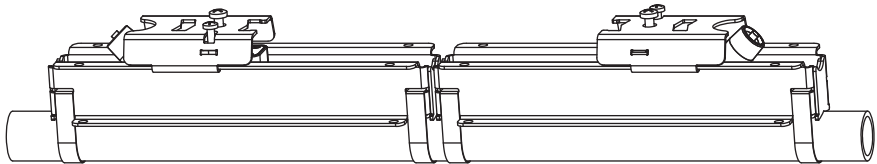
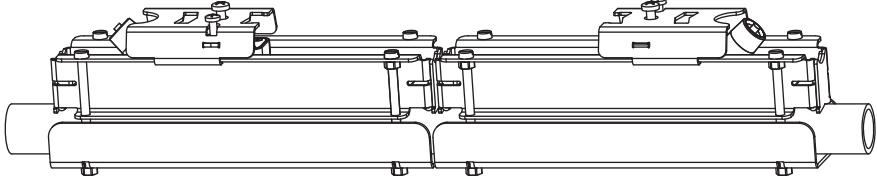
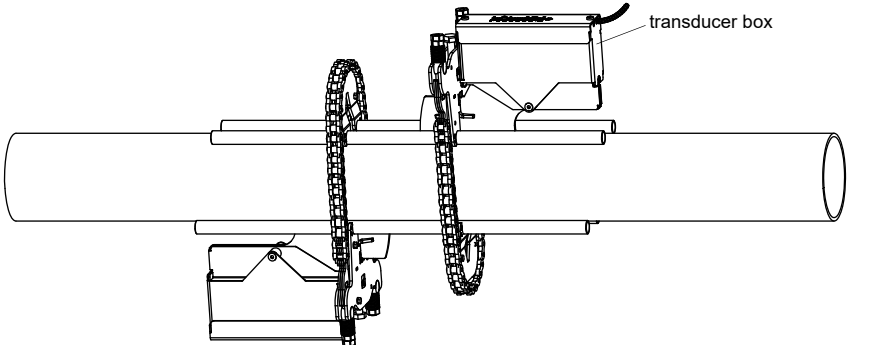
inner pipe diameter max. recommended: in reflect arrangement (diagonal arrangement) and for a flow velocity of 23 ft/s (46 ft/s)

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 9	no. of character	
transducer mounting fixture	transducer	measurement arrangement	size	fixation	outer pipe diameter	option	
VL							PermaRail
PF							PermaFix
WI							transducer box for WaveInjector
	F						transducers with transducer frequency F
	K						transducers with transducer frequency G, H, K
	M						transducers with transducer frequency M, P *****62: M, P, Q
	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
				W			welding
				N			without fixation
					002		0.39 to 0.79 inch
					004		0.79 to 1.6 inch
					T36		1.6 to 14.2 inch
					013		0.39 to 5.1 inch
					036		5.1 to 14.2 inch
					092		14.2 to 36.2 inch
					200		36.2 to 78.7 inch
					450		78.7 to 177.2 inch
					940		177.2 to 370.1 inch
					SK1		0.5 to 2.5 inch
					SK2		3 to 6 inch
					SK3		8 to 10 inch
					SK4		12 to 18 inch
					SK5		20 to 36 inch
					SK6		42 to 100 inch
					SK7		100 to 170 inch
					SB2		3 to 6 inch
					SB3		8 to 10 inch
					SB4		12 to 18 inch
					SB5		20 to 36 inch
					SB6		30 to 100 inch
					NDR		any
						IP68	for transducers with degree of protection IP68
						OS	housing with stainless steel 316
						Z	special design

<p><b>PermaRail (VLS)</b></p> 	<p>transducer frequency: S material: stainless steel 304, 303</p>
<p><b>PermaRail (VLK, VLM, VLQ)</b></p> 	<p>material: stainless steel 304, 301, 410 option OS: 316Ti, 316L, 17-7PH inner length: <b>VLK:</b> 13.7 inch, option IP68: 14.5 inch <b>VLM:</b> 9.2 inch <b>VLQ:</b> 6.9 inch dimensions: <b>VLK:</b> 16.65 x 3.54 x 3.66 inch option IP68: 17.44 x 3.7 x 4.13 inch <b>VLM:</b> 12.17 x 2.24 x 2.48 inch <b>VLQ:</b> 9.72 x 1.69 x 1.85 inch</p>
<p><b>PermaFix</b></p> <ul style="list-style-type: none"> <li>with tension straps (PF*-DS-S)</li> </ul> 	<p>material: stainless steel 304, 301 option OS: 316Ti inner length: <b>PFK:</b> 14.69 inch <b>PFM:</b> 10.87 inch dimensions: <b>PFK:</b> 16.14 x 3.54 x 2.87 inch <b>PFM:</b> 12.2 x 2.68 x 1.73 inch</p>
<ul style="list-style-type: none"> <li>with bolts (PF*-DS-B)</li> </ul> 	
<p><b>transducer box WI for WaveInjector</b></p> 	<p>see Technical specification TSWaveInjectorVx-x</p>

## Coupling materials for transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range (4th character of transducer order code = E)			WaveInjector	
	< 212 °F	< 338 °F	< 302 °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 E or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type E or H or 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
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>JB01</p>		<p>****8*</p>
<p>JB01</p>		<p>****L1*</p>
<p>terminal board for junction box (junction box by customer)</p>		<p>****62</p>
connection system TS		
connection with extension cable	direct connection	transducers technical type
<p>JB04</p>		<p>****52</p>

**Cable**

transducer cable					
type		1699	2550	6111	2549
weight	lb/ft	0.06	0.02	0.06	0.04
ambient temperature	°F	-67 to +392	-40 to +212	-148 to +437	-148...+392
properties			longitudinal watertight		
cable jacket					
material		PTFE	PUR	PFA	PTFE
outer diameter	inch	0.11	0.2 ±0.01	0.11	0.21
thickness	inch	0.01	0.04	0.02	0.02
color		brown	gray	white	black
shield		x	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
connection system TS								
transducers technical type		x		x		x		x
*(DR)***5*	ft	16	≤ 984	13	≤ 984	9	≤ 295	≤ 131
option LC: *(LT)***5*	ft	29	≤ 984	29	≤ 984	29	≤ 295	-
connection system T1								
transducers technical type		x		x		x		x
*(DR)***8*	ft	16	≤ 984	13	≤ 984	9	≤ 295	-
option LC: *(LT)***8*	ft	29	≤ 984	29	≤ 984	29	≤ 295	-
*(DR)***62	ft	32	≤ 984	32	≤ 984	32	≤ 295	-
option LC: *(LT)***62	ft	150	≤ 984	150	≤ 984	150	≤ 295	-
option IP68: ****LI*	ft	39	≤ 984	39	≤ 984	-	-	-

x = transducer cable length

| = max. length of extension cable

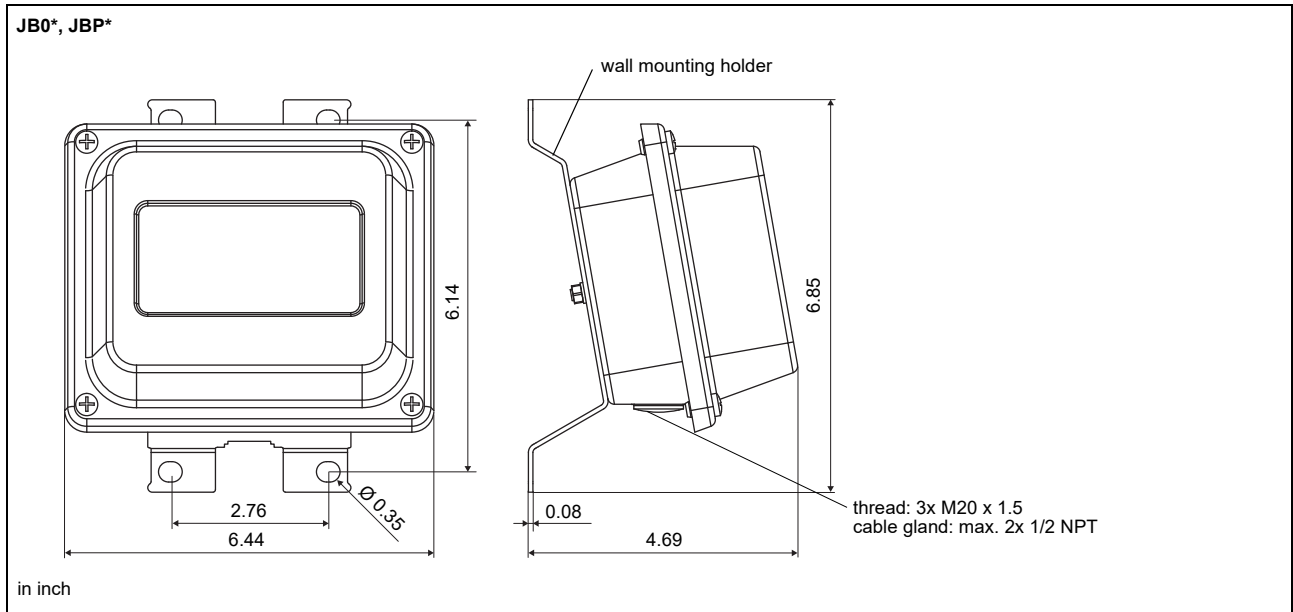
# Junction box

## Technical data

JB01S4E3M			
weight	lb	2.6 lb	
fixation		wall mounting optional: 2" pipe mounting	
<b>material</b>			
housing		stainless steel 316L	
gasket		silicone	
degree of protection		IP66/IP67	
ambient temperature °F		-40 to +176	
<b>explosion protection</b>			
• ATEX/IECEx			
marking		CE 0637 II2G II2D Ex eb mb IIC T6...T4 Gb Ex tb IIIC T100 °C Db Ta -40...+70/80 °C	
certification		IBEXU06ATEX1161 IECEx IBE 08.0006	
type of protection		gas: increased safety decoupling network: encapsulation dust: protection by enclosure	
<b>Connection</b>			
<b>Transducers</b>			
<b>terminal strip</b>	<b>terminal</b>	<b>connection</b>	<b>transducer</b>
KL1	V	signal	↑
	VS	internal shield	
	RS	internal shield	⤴
	R	signal	
<b>Extension cable</b>			
<b>terminal strip</b>	<b>terminal</b>	<b>connection</b>	
KL2	TV	signal	
	TVS	internal shield	
	TRS	internal shield	
	TR	signal	
JB04			
weight	lb	2.6 lb	
transmitter		F808**-F2	
fixation		wall mounting optional: 2" pipe mounting	
<b>material</b>			
housing		stainless steel 316L	
gasket		silicone	
degree of protection		Type 4X, IP66	
ambient temperature °F		-40 to +176	
• FM			
marking		NI/CI, I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ T6 Ta = -40...+60 °C	
<b>Connection</b>			
<b>Transducers</b>			
	<b>terminal</b>	<b>connection</b>	<b>transducer</b>
	XV	SMB connector	↑
	XR	SMB connector	⤴
<b>Extension cable</b>			
<b>terminal strip</b>	<b>terminal</b>	<b>connection</b>	
KL2	TV	signal	
	TVS	internal shield	
	TRS	internal shield	
	TR	signal	



### Dimensions



### 2" pipe mounting kit



## Extension cable

The extension cable and the transducers are connected via terminal board KFM1. The terminal board has to be installed into a junction box (to be provided by the customer) approved for hazardous areas.

### Terminal assignment KFM1

