

Ultrasonic Flowmeters for Liquids for Permanent Installation in Hazardous Areas

Especially designed for the stationary use in explosive atmosphere

Features

- Instrument with one measuring channel for exact and reliable flow measurement
- Precise bi-directional and highly dynamic flow measurement with the non-intrusive clamp-on technology
- High precision at fast and slow flow rates, high temperature and zero point stability
- Transmitter housing:
 - Corrosionproof and suitable for offshore application
 - Transmitter F808**-*1 in a flameproof housing (degree of protection IP66)
 - Transmitter F808**-*1 in an explosionproof housing (NEMA 4X)
- Certifications:
 - F808**-*1: ATEX/IECEX
 - F808**-*1: FM Cl. 1, Div. 1
- The transmitters can be operated by a magnet pen without opening the housing
- Automatic loading of calibration data and transducer detection for a fast and easy set-up (less than 5 min), providing precise and long-term stable results
- User-friendly design
- Communication interfaces Modbus RTU and HART available
- Transducers available for a wide range of inner pipe diameters (10...6500 mm) and fluid temperatures (-170...+600 °C)
- Flow measurement independent of pipe wall thickness and medium pressure
- ATEX/IECEX, FM Class 1 Div. 1 approved transducers for hazardous areas available
- HybridTrek automatically switches between transit time and NoiseTrek mode of measurement when high particulate flows are encountered
- Measurement is unaffected by medium density, viscosity and solid content (max. 10 % of volume)
- Product variant FLUXUS XLF is especially suited for precise and reliable flow measurement applications with very low flow velocities (e.g. chemical injection in oil and gas extraction)



Transmitter FLUXUS F808



Measurement with transducers mounted by Variofix L



Measurement with transducers mounted by PermaFIX

Applications

Designed for industrial use in harsh environments, especially for oil extraction and processing in the petrochemical and chemical industry.

- Chemical industry
- Petrochemical industry
- Oil extraction and exploration
- Refineries

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Function

Measurement Principle

Transit Time Difference Principle

In order to measure the flow of a medium in a pipe, ultrasonic signals are used, employing the transit time difference principle. Ultrasonic signals are emitted by a transducer installed on the pipe and received by a second transducer. These signals are emitted alternately in the flow direction and against it.

As the medium in which the signals propagate is flowing, the transit time of the ultrasonic signals in the flow direction is shorter than against the flow direction.

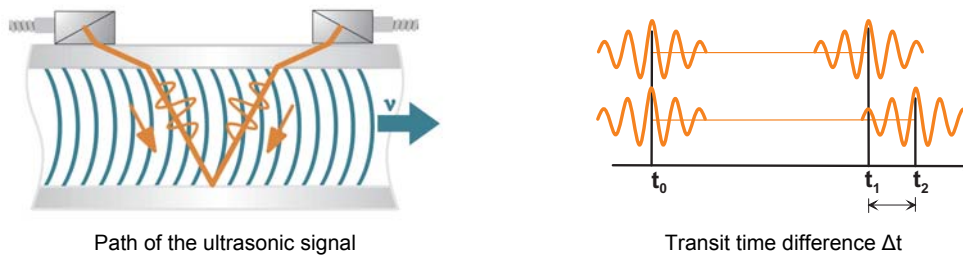
The transit time difference, Δt , is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow rate.

Two integrated microprocessors control the entire measuring process. This allows the flowmeter to remove disturbance signals, and to check each received ultrasonic wave for its validity which reduces noise.

HybridTrek

If the gaseous or solid content in the medium increases occasionally during measurement, a measurement with the transit time difference principle is no longer possible. NoiseTrek mode will then be selected by the flowmeter. This measurement method allows the flowmeter to achieve a stable measurement even with high gaseous or solid content.

The transmitter can switch automatically between transit time and NoiseTrek mode without any changes to the measurement setup.



Calculation of Volumetric Flow Rate

$$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \Delta t / (2 \cdot t_{fl})$$

where

- \dot{V} - volumetric flow rate
- k_{Re} - fluid mechanics calibration factor
- A - cross-sectional pipe area
- k_a - acoustical calibration factor
- Δt - transit time difference
- t_{fl} - transit time in the medium

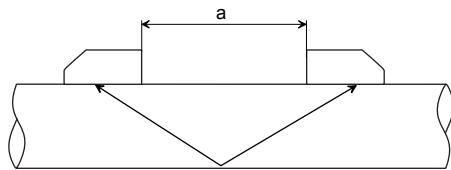
Number of Sound Paths

The number of sound paths is the number of transits of the ultrasonic signal through the medium in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflection arrangement**
The number of sound paths is even. Both of the transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easier.
- **diagonal arrangement**
The number of sound paths is odd. Both of the transducers are mounted on opposite sides of the pipe. In the case of a high signal attenuation by the medium, pipe and coatings, diagonal arrangement with 1 sound path will be used.

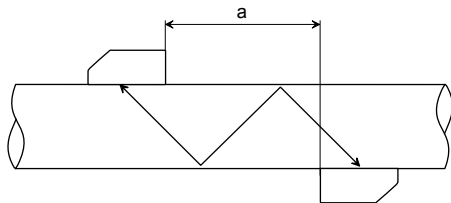
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

As the transducers can be mounted with the transducer mounting fixture in reflection arrangement or diagonal arrangement, the number of sound paths can be adjusted optimally for the application.

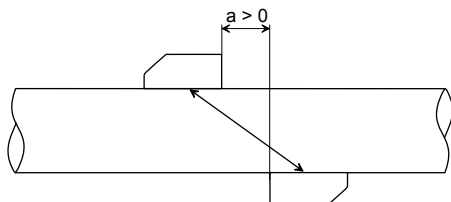


Reflection arrangement, number of sound paths: 2

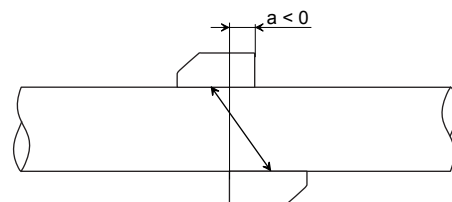
a - transducer distance



Diagonal arrangement, number of sound paths: 3

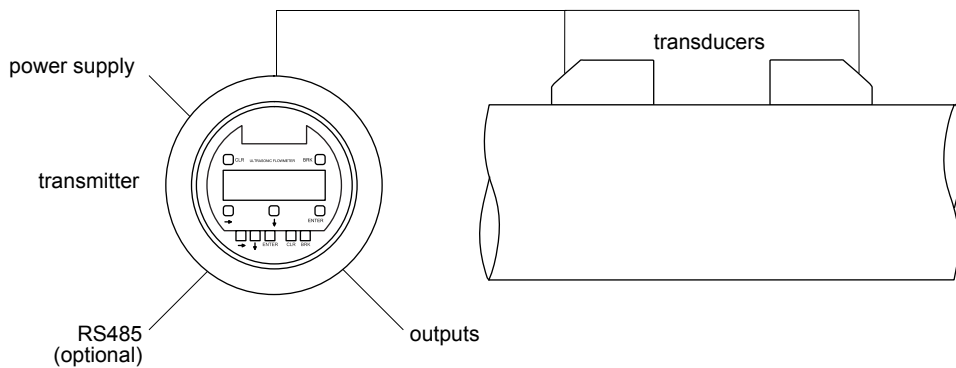


Diagonal arrangement, number of sound paths: 1



Diagonal arrangement, number of sound paths: 1, negative transducer distance


Typical Measurement Setup



Example of a measurement setup in reflection arrangement

Flow Transmitter

Technical Data

FLUXUS	F808**-A1	F808**-F1
design	explosion proof field device, 1 measuring channel	
transducers	C***81, C***LI1, C***2E85	C**1N62
		
measurement		
measurement principle	transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content	
flow velocity	0.01...25 m/s	
repeatability	0.15 % of reading ±0.01 m/s	
medium	all acoustically conductive liquids with < 10 % gaseous or solid content in volume (transit time difference principle)	
temperature compensation	corresponding to the recommendations in ANSI/ASME MFC-5.1-2011	
accuracy¹		
with standard calibration	±1.6 % of reading ±0.01 m/s	
with advanced calibration (optional)	±1.2 % of reading ±0.01 m/s	
with field calibration ²	±0.5 % of reading ±0.01 m/s	
flow transmitter		
power supply	100...240 V/50...60 Hz or 20...32 V DC	
power consumption	< 8 W	
number of flow measuring channels	1	
attenuation	0...100 s, adjustable	
measuring cycle (1 channel)	100...1000 Hz	
response time	1 s, option: 70 ms	
housing material	cast aluminum, special offshore coating	
degree of protection according to IEC/EN 60529	IP66	
dimensions	see dimensional drawing	
weight	5.3 kg	
fixation	wall mounting, 2 " pipe mounting	
operating temperature	-30...+60 °C (< -20 °C without operation of the display)	
display	2 x 16 characters, dot matrix, backlight	
menu language	English, German, French, Dutch, Spanish	
explosion protection		
zone	1	
A T E X / I E C E x	marking	CE 0637 Ⓢ II2G II2D Ex db e IIC T6 Gb Ex tb IIIC T 100 °C Db Ta -40...+60 °C
	certification ATEX	IBExU11ATEX1022 X
	certification IECEx	IECEX IBE 11.0006X
	type of protection	gas: electronics compartment: flameproof enclosure, connection compartment: increased safety dust: protection by enclosure
F M	marking	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  APPROVED </div> <div> Cl. I, II, III/Div. 1/ GP. A, B, C, D, E, F, G/ For Group A, conduit seal of connection compartment is required within 18 inches. </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  APPROVED </div> <div> Cl. I, II, III/Div. 1/ GP. B, C, D, E, F, G </div> </div> <p>T5 Ta = 60 °C</p> </div>

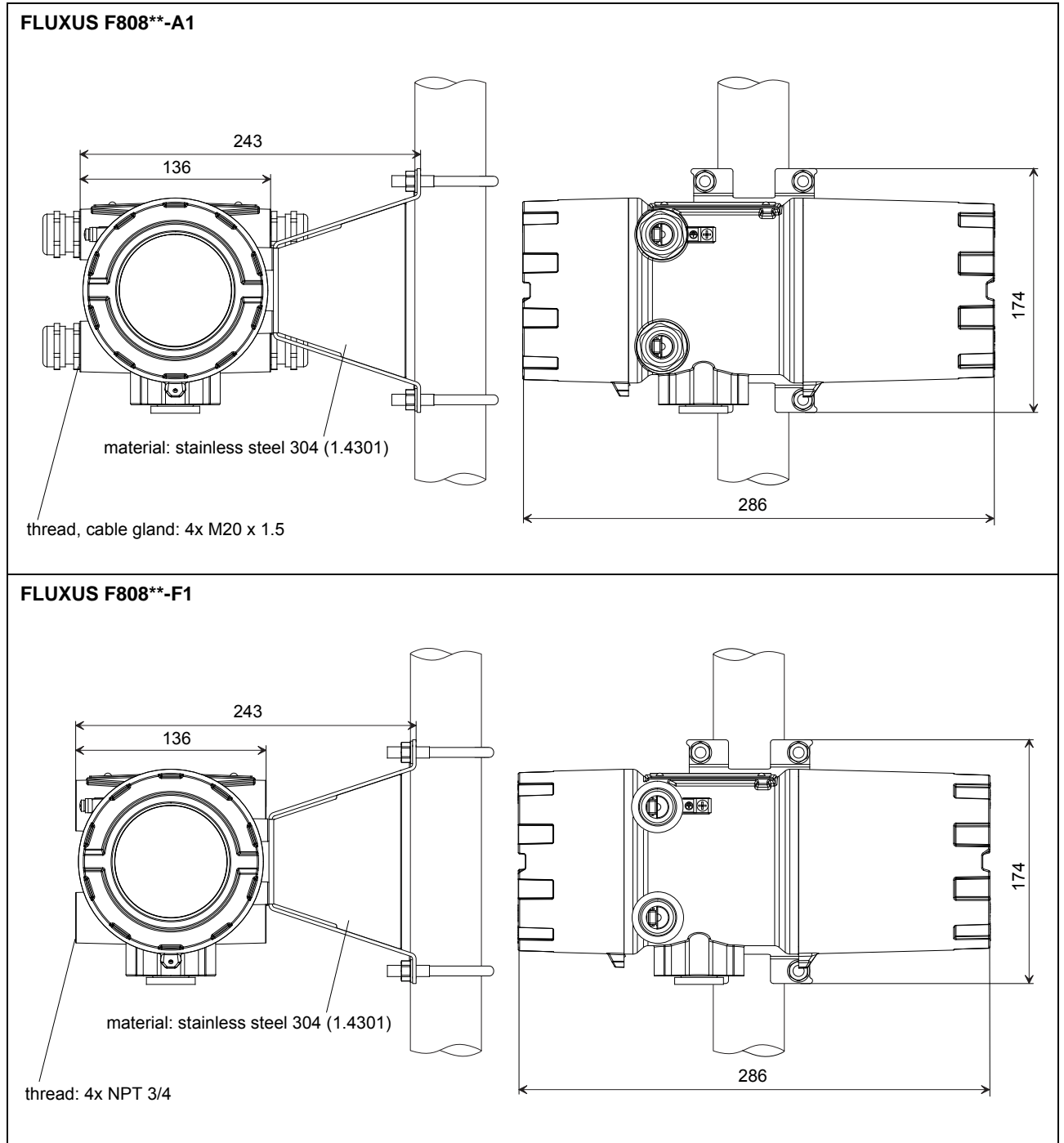
¹ for transit time difference principle, reference conditions and v > 0.15 m/s

² reference uncertainty < 0.2 %

FLUXUS	F808**-A1	F808**-F1
measuring functions		
physical quantities	volumetric flow rate, mass flow rate, flow velocity	
totalizer	volume, mass	
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times	
data logger		
loggable values	all physical quantities, totalized values and diagnostic values	
capacity	> 100 000 measured values	
communication		
interface	- process integration (optional): Modbus RTU or HART - diagnosis: RS232 ³	
serial data kit (optional)		
software (all Windows™ versions)	- FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxDiag (optional): online diagnostics and report generation - FluxKoef: creating medium data sets - FluxSubstanceLoader: upload of medium data sets	
cable	RS232 ³	
adapter	RS232 - USB ³	
outputs		
	The outputs are galvanically isolated from the transmitter.	
number	current output: 1 binary output: 1 or current output: 1 Modbus or current output: 1/HART binary output: 1 current output	
current output I1, I2		
- range	0/4...20 mA	
- accuracy	0.1 % of reading ±15 µA	
- active output	$R_{ext} < 500 \Omega$	
- passive output	$U_{ext} = 4...26.4 \text{ V}$, depending on R_{ext} $R_{ext} < 1 \text{ k}\Omega$	
current output I1 in HART mode		
- range	4...20 mA	
- passive output	$U_{ext} = 7...30 \text{ V DC}$	
- active output	$U_{int} = 24 \text{ V}$	
	binary output	
open collector	24 V/4 mA optional (only in combination with HART): 30 V/100 mA or 8.2 V DIN EN 60947-5-6 (NAMUR)	
binary output as alarm output		
- functions	limit, change of flow direction or error	
binary output as pulse output		
- pulse value	0.01...1000 units	
- pulse width	80...1000 ms	

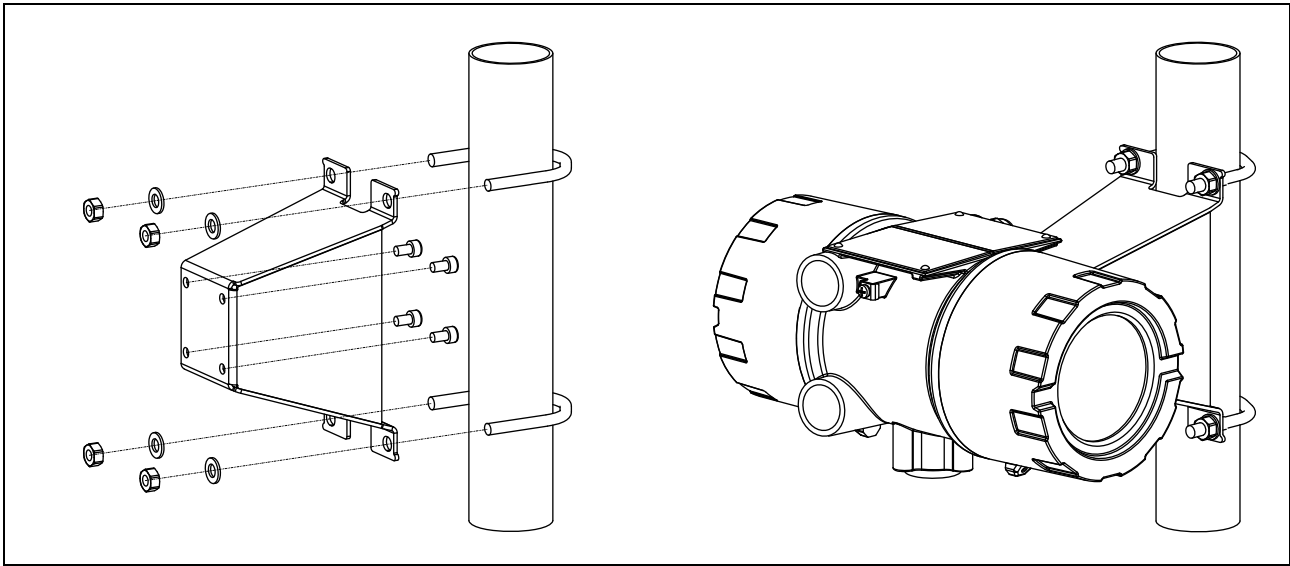
³ connection of the interface RS232 outside of explosive atmosphere (housing cover open)

Dimensions



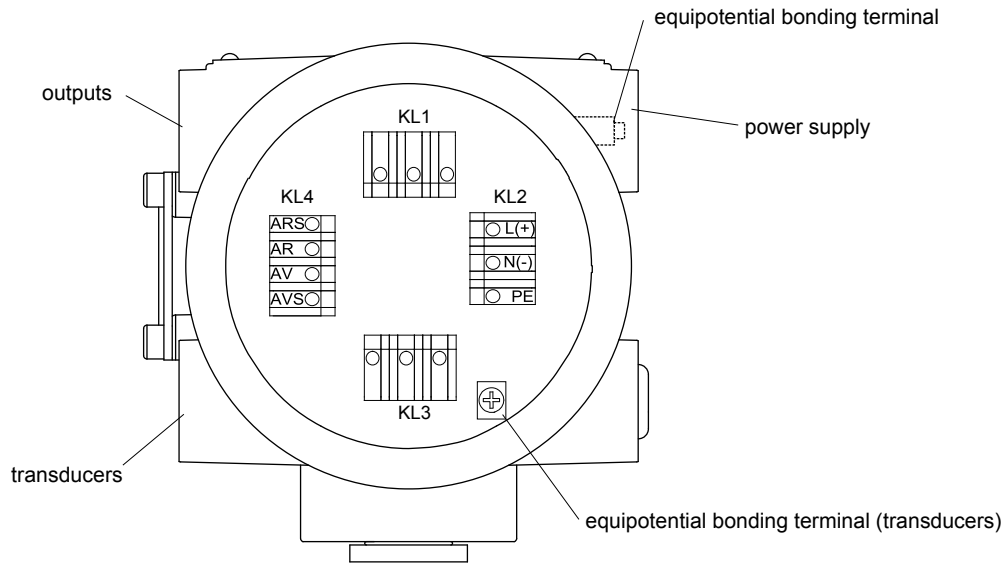
in mm

Wall and 2 " Pipe Mounting Kit



Terminal Assignment

FLUXUS F808



power supply

terminal strip	AC		DC	
	terminal	connection	terminal	connection
KL2	L	phase	L+	+
	N	neutral	L-	-
	PE	earth	PE	earth

transducers

measuring channel A		
terminal strip	terminal	connection
KL4	ARS	transducer ↘, internal shield
	AR	transducer ↘, signal
	AV	transducer ↗, signal
	AVS	transducer ↗, internal shield
cable gland or equipotential bonding terminal (transducers)		external shield

outputs (Options)

terminal strip	terminal			connection
KL1	4 GND	6 (+)	5 (-)	binary output B1
KL3	3 GND	2 (+)	1 (-)	active current output I1

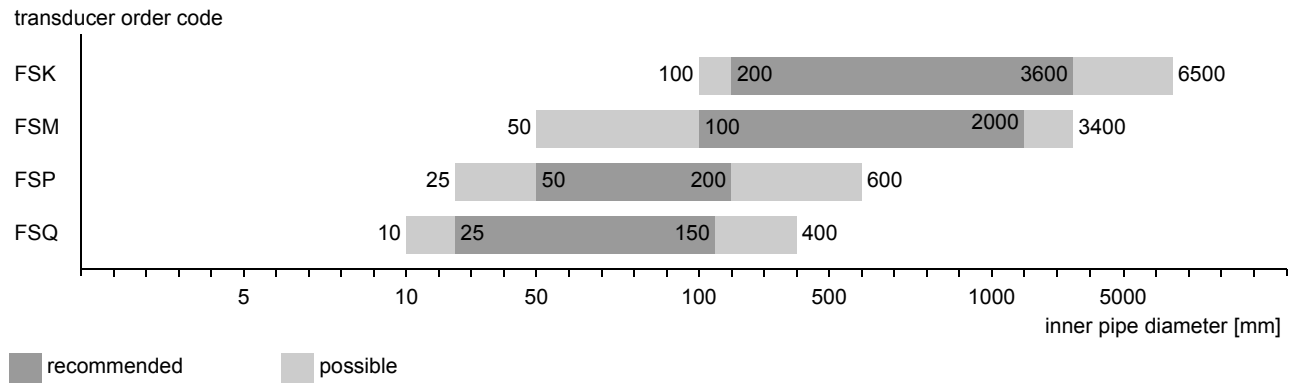
terminal strip	terminal			connection
KL1	4 GND	6 (+)	5 (-)	binary output B1
KL3	3 GND	1 (-)	2 (+)	passive current output I1

terminal strip	terminal			connection
KL1	1 (S)	2 (A+)	3 (B-)	Modbus
KL3	3 GND	2 (+)	1 (-)	active current output I1

terminal strip	terminal			connection
KL1	1 (S)	2 (A+)	3 (B-)	Modbus
KL3	3 GND	1 (-)	2 (+)	passive current output I1

Transducers

Transducer Selection

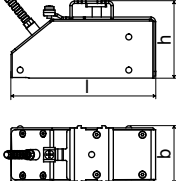
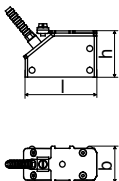
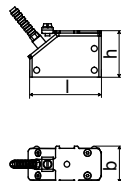
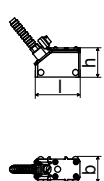


Transducer Order Code

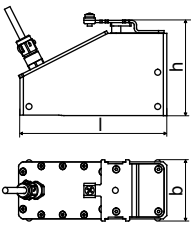
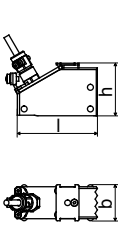
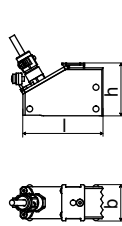



1, 2	3	4	5, 6	7, 8	9...11	12, 13	no. of character			
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option	description
FS										set of ultrasonic flow transducers for liquids measurement, shear wave
	K									0.5 MHz
	M									1 MHz
	P									2 MHz
	Q									4 MHz
			N							normal temperature range
			E							extended temperature range (shear wave transducers with transducer frequency M, P, Q)
				A1						ATEX zone 1/IECEx zone 1
				F1						FM Class I Div. 1
					TS					direct connection or connection via junction box
							XXX			0 m: without extension cable > 0 m: with extension cable, F808**-*A1: with junction box JB01
								LC		long transducer cable
								IP68		degree of protection IP68
								OS		housing with stainless steel 316
example										
FS	M	-	N	A1	TS	-	000			shear wave transducer 1 MHz, normal temperature range, ATEX zone 1/IECEx zone 1, connection system TS (direct connection)
		-				-		/		

Technical Data

Shear Wave Transducers (zone 1)

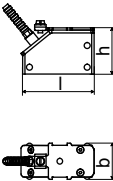
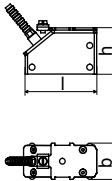
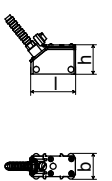



technical type		CDK1N81	CDM2N81	CDP2N81	CDQ2N81
order code		FSK-NA1TS FSK-NA1TS/OS	FSM-NA1TS FSM-NA1TS/OS	FSP-NA1TS FSP-NA1TS/OS	FSQ-NA1TS FSQ-NA1TS/OS
transducer frequency	MHz	0.5	1	2	4
inner pipe diameter d					
min. extended	mm	100	50	25	10
min. recommended	mm	200	100	50	25
max. recommended	mm	3600	2000	200	150
max. extended	mm	6500	3400	600	400
pipe wall thickness					
min.	mm	-	-	-	-
max.	mm	-	-	-	-
material					
housing		PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)
contact surface		PEEK	PEEK	PEEK	PEEK
degree of protection according to IEC/EN 60529		IP65	IP66	IP66	IP65
transducer cable					
type		1699	1699	1699	1699
length	m	5	4	4	3
dimensions					
length l	mm	126.5	64	64	40
width b	mm	51	32	32	22
height h	mm	67.5	40.5	40.5	25.5
dimensional drawing					
ambient temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+130	+130	+130	+130
temperature compensation		x	x	x	x
explosion protection					
category		gas: 2G dust: 2D	gas: 2G dust: 2D	gas: 2G dust: 2D	gas: 2G dust: 2D
zone		1 21	1 21	1 21	1 21
explosion protection temperature (pipe surface)					
min.	°C	-55	-55	-55	-55
max.	°C	+180	+180	+180	+180
ATEX / IECEx	marking	CE 0637 Ex II2G IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G IIC T6...T3 Gb Ex tb IIIC TX Db
	certification ATEX	IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X
	certification IECEx	IECEX IBE 08.0007X	IECEX IBE 08.0007X	IECEX IBE 08.0007X	IECEX IBE 08.0007X
	type of protection	gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure
	transducer mounting fixture necessary	x	x	x	x

Shear Wave Transducers (zone 1, IP68)

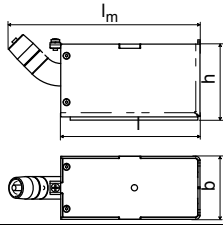

technical type		CDK1L11	CDM2L11	CDP2L11
order code		FSK-NA1TS/IP68	FSM-NA1TS/IP68	FSP-NA1TS/IP68
transducer frequency	MHz	0.5	1	2
inner pipe diameter d				
min. extended	mm	100	50	25
min. recommended	mm	200	100	50
max. recommended	mm	3600	2000	200
max. extended	mm	6500	3400	600
pipe wall thickness				
min.	mm	-	-	-
max.	mm	-	-	-
material				
housing		PEEK with stainless steel cap 316Ti (1.4571)	PEEK with stainless steel cap 316Ti (1.4571)	PEEK with stainless steel cap 316Ti (1.4571)
contact surface		PEEK	PEEK	PEEK
degree of protection according to IEC/EN 60529		IP68 ¹	IP68 ¹	IP68 ¹
transducer cable				
type		2550	2550	2550
length	m	12	12	12
dimensions				
length l	mm	130	72	72
width b	mm	54	32	32
height h	mm	83.5	46	46
dimensional drawing				
ambient temperature				
min.	°C	-40	-40	-40
max.	°C	+100	+100	+100
temperature compensation		x	x	x
explosion protection				
category		gas: 2G dust: 2D	gas: 2G dust: 2D	gas: 2G dust: 2D
zone		1 21	1 21	1 21
explosion protection temperature (pipe surface)				
min.	°C	-55	-55	-55
max.	°C	+180	+180	+180
marking		CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637  II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db
certification ATEX		IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X
certification IECEx		IECEX IBE 08.0007X	IECEX IBE 08.0007X	IECEX IBE 08.0007X
type of protection		gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure
transducer mounting fixture necessary		x	x	x

¹ test conditions: 3 months/2 bar (20 m)/20 °C

Shear Wave Transducers (zone 1, extended temperature range)

technical type		CDM2E85		CDP2E85		CDQ2E85		
order code		FSM-EA1TS FSM-EA1TS/OS		FSP-EA1TS FSP-EA1TS/OS		FSQ-EA1TS FSQ-EA1TS/OS		
transducer frequency		MHz	1	2	4			
inner pipe diameter d								
min. extended		mm	50	25	10			
min. recommended		mm	100	50	25			
max. recommended		mm	2000	200	150			
max. extended		mm	3400	600	400			
pipe wall thickness								
min.		mm	-	-	-			
max.		mm	-	-	-			
material								
housing		PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)		PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)		PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)		
contact surface		PI		PI		PI		
degree of protection according to IEC/EN 60529		IP66		IP66		IP56		
transducer cable								
type		6111		6111		6111		
length		m	4	4	3			
dimensions								
length l		mm	64	64	40			
width b		mm	32	32	22			
height h		mm	40.5	40.5	25.5			
dimensional drawing								
ambient temperature								
min.		°C	-30	-30	-30			
max.		°C	+200	+200	+200			
temperature compensation			x	x	x			
explosion protection								
category		gas: 2G dust: 3D		gas: 2G dust: 3D		gas: 2G dust: 3D		
zone		1 22		1 22		1 22		
explosion protection temperature (pipe surface)								
min.		°C	-45	-45	-45			
max.		°C	+225	+225	+225			
A T E X / I E C E x	marking		CE 0637  II2G II2D Ex e q IIC T6...T2 Gb Ex tb IIIA TX Db	CE 0637  II2G II2D Ex e q IIC T6...T2 Gb Ex tb IIIA TX Db	CE 0637  II2G II2D Ex e q IIC T6...T2 Gb Ex tb IIIA TX Db			
	certification ATEX		IBExU07ATEX1168 X		IBExU07ATEX1168 X		IBExU07ATEX1168 X	
	certification IECEx		IECEX IBE 08.0007X		IECEX IBE 08.0007X		IECEX IBE 08.0007X	
	type of protection		gas: increased safety, powder filling dust: protection by enclosure		gas: increased safety, powder filling dust: protection by enclosure		gas: increased safety, powder filling dust: protection by enclosure	
	transducer mounting fixture necessary		x		x		x	

Shear Wave Transducers (FM Class I, Div. 1)

technical type		CDK1N62	CLK1N62
order code		FSK-NF1TS FSK-NF1TS/OS	FSK-NF1TS/LC FSK-NF1TS/OS/LC
transducer frequency	MHz	0.5	
inner pipe diameter d			
min. extended	mm	100	
min. recommended	mm	200	
max. recommended	mm	3600	
max. extended	mm	6500	
pipe wall thickness			
min.	mm	-	
max.	mm	-	
material			
housing		stainless steel 304 (1.4301), option OS: 316L (1.4404)	
contact surface		PEEK	
transducer cable			
type		2549	2549
length	m	15	46
dimensions			
length l	mm	132	
width b	mm	60	
height h	mm	72	
mounting length l _m	mm	185	
dimensional drawing			
operating temperature			
min.	°C	-40	
max.	°C	+110	
temperature compensation		x	
explosion protection			
explosion protection temperature			
F	min.	°C	-40
	max.	°C	+125
M	marking	 S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831	

Shear Wave Transducers (FM Class I, Div. 1)

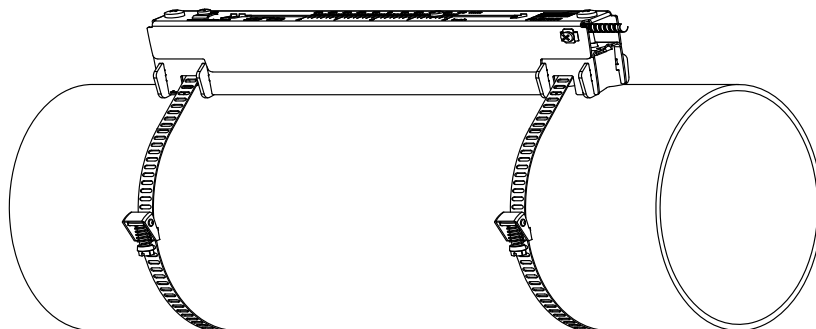
technical type		CDM1N62	CLM1N62	CDP1N62	CLP1N62	CDQ1N62	CLQ1N62	
order code		FSM-NF1TS FSM-NF1TS/ OS	FSM-NF1TS/LC FSM-NF1TS/OS/ LC	FSP-NF1TS FSP-NF1TS/ OS	FSP-NF1TS/LC FSP-NF1TS/OS/ LC	FSQ-NF1TS FSQ-NF1TS/ OS	FSQ-NF1TS/LC FSQ-NF1TS/OS/ LC	
transducer frequency	MHz	1		2		4		
inner pipe diameter d								
min. extended	mm	50		25		10		
min. recommended	mm	100		50		25		
max. recommended	mm	2000		200		150		
max. extended	mm	3400		600		400		
pipe wall thickness								
min.	mm	-		-		-		
max.	mm	-		-		-		
material								
housing		stainless steel 304 (1.4301), option OS: 316L (1.4404)		stainless steel 304 (1.4301), option OS: 316L (1.4404)		stainless steel 304 (1.4301), option OS: 316L (1.4404)		
contact surface		PEEK		PEEK		PEEK		
transducer cable								
type		2549	2549	2549	2549	2549	2549	
length	m	15	46	15	46	20	46	
dimensions								
length l	mm	60		60		60		
width b	mm	30		30		30		
height h	mm	43		43		43		
mounting length l _m	mm	110		110		110		
dimensional drawing								
operating temperature								
min.	°C	-40		-40		-40		
max.	°C	+110		+110		+110		
temperature compensation		x		x		x		
explosion protection								
explosion protection temperature								
F M	min.	°C	-40		-40		-40	
	max.	°C	+125		+125		+125	
marking		S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831		S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831		S/Cl. I, II, III / Div. 1 / GP A, B, C, D, E, F, G / Temperature Codes dwg 3831		

Transducer Mounting Fixture

Order Code

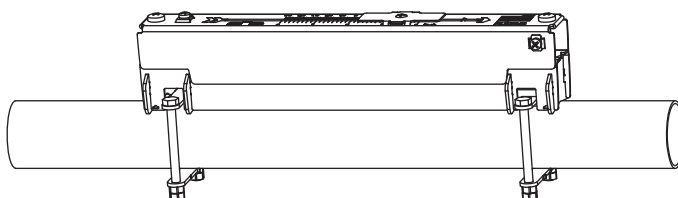
1, 2	3	4	5	6	7...9	10, 11	no. of character		
transducer mounting fixture	transducer	-	measurement arrangement	size	-	fixation	outer pipe diameter	/ option	
VL									Variofix L
VC									Variofix C
PF									PermaFiX
	K								transducers with transducer frequency K
	M								transducers with transducer frequency M, P, Q
	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
					002				10...20 mm
					004				20...40 mm
					T36				40...360 mm
					013				10...130 mm
					036				130...360 mm
					092				360...920 mm
					200				920...2000 mm
					450				2000...4500 mm
					940				4500...9400 mm
					SK1				0.5...2.5 in
					SK2				3...6 in
					SK3				8...10 in
					SK4				12...18 in
					SK5				20...36 in
					SK6				42...100 in
					SK7				100...170 in
					SB2				3...6 in
					SB3				8...10 in
					SB4				12...18 in
					SB5				20...36 in
					SB6				30...100 in
					NDR				any
								IP68	degree of protection IP68
								OS	housing with stainless steel 316
								Z	special design
example									
VL	M	-	D	S	-	S	200		Variofix L and tension straps for transducers with transducer frequency M, P
PF	M	-	D	S	-	S	200		PermaFiX and tension straps for transducers with transducer frequency M, P, Q
		-			-			/	

Variofix L (VLK, VLM, VLQ)



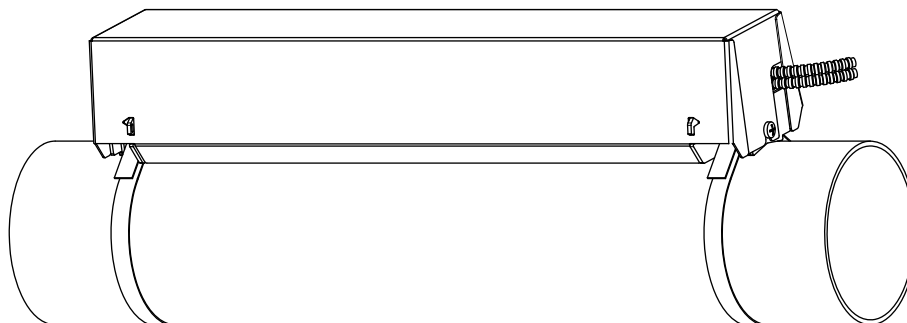
material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006)
 option OS: 316 (1.4571), 316L (1.4404), 17-7PH (1.4568)
 inner length:
VLK: 348 mm,
 option IP68: 368 mm
VLM: 234 mm
VLQ: 176 mm
 dimensions:
VLK: 423 x 90 x 93 mm,
 option IP68: 443 x 94 x 105 mm
VLM: 309 x 57 x 63 mm
VLQ: 247 x 43 x 47 mm

Variofix L with bolt mounting plate (VL*-*-B)



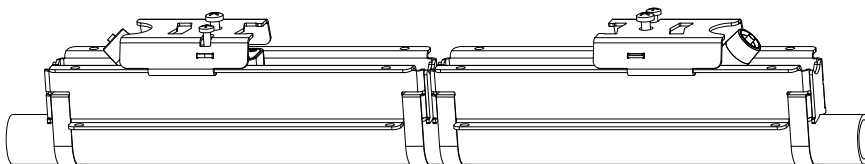
material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006)
 option OS: 316 (1.4571), 316L (1.4404), 17-7PH (1.4568)
 inner length:
VLM: 234 mm
VLQ: 176 mm
 dimensions:
VLM: 309 x 57 x 63 mm
VLQ: 247 x 43 x 47 mm
 outer pipe diameter:
 max. 48 mm

Variofix C (VC)



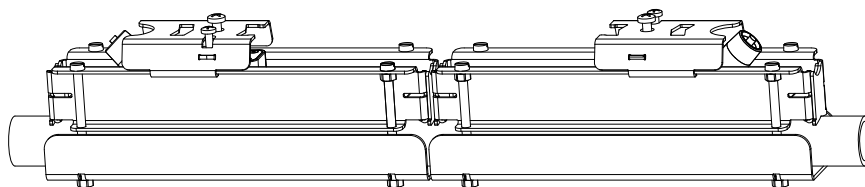
material: stainless steel 304 (1.4301), 301 (1.4310)
 option OS: 316 (1.4571)
 inner length:
VCK-*L: 500 mm
VCK-*S: 350 mm
VCM: 400 mm
VCQ: 250 mm
 dimensions:
VCK-*L: 560 x 122 x 102 mm,
 option IP68: 560 x 126 x 120 mm
VCK-*S: 410 x 122 x 102 mm,
 option IP68: 410 x 126 x 120 mm
VCM: 460 x 96 x 80 mm
VCQ: 310 x 85 x 62 mm

PermaFiX with tension straps (PF*-DS-S)



material: stainless steel 304 (1.4301), 301 (1.4310)
 option OS: 316 (1.4571)

PermaFiX with bolts (PF*-DS-B)



inner length:
PFK: 373 mm
PFM: 276 mm
 dimensions:
PFK: 410 x 90 x 73 mm
PFM: 310 x 68 x 44 mm

Coupling Materials for Transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range (4th character of transducer order code = E)	
	< 100 °C	< 170 °C	< 150 °C	< 200 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or H or coupling foil type VT
long time measurement	coupling foil type VT ¹	coupling foil type VT ²	coupling foil type VT ¹	coupling foil type VT ²

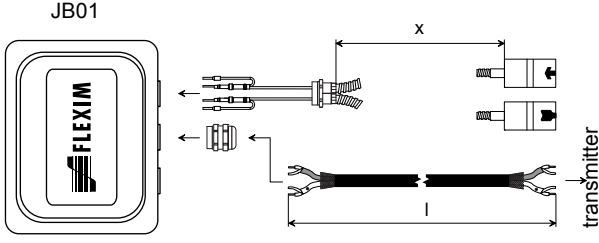
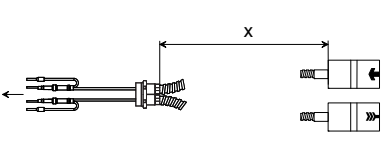
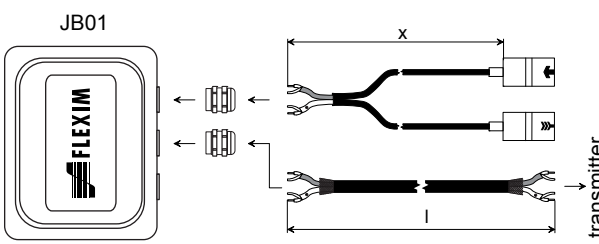
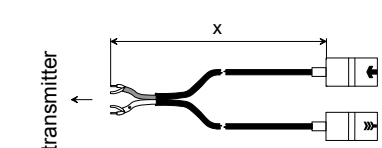
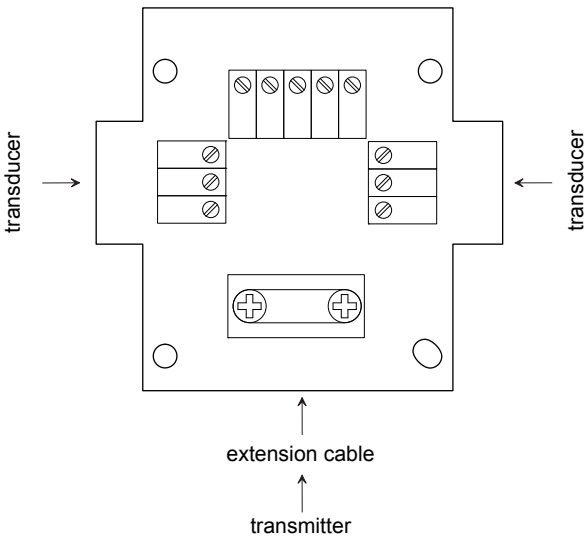
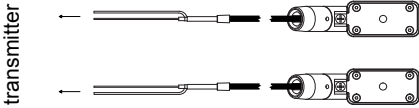
¹ < 5 years

² < 6 months

Technical Data

type	order code	ambient temperature °C	material	remark
coupling compound type N	990739-1	-30...+130	mineral grease paste	
coupling compound type E	990739-2	-30...+200	silicone paste	
coupling compound type H	990739-3	-30...+250	fluoropolymer paste	
coupling foil type VT	990739-61	-10...+200	fluoroelastomer	for transducers with transducer frequency F
	990739-0			for transducers with transducer frequency G, H, K
	990739-6			for shear wave transducers with transducer frequency M, P
	990739-14			for shear wave transducers IP68 and Lambwave transducers with transducer frequency M, P, Q
	990739-5			for transducers with transducer frequency Q

Connection Systems

connection system TS connection with extension cable	direct connection	transducers technical type
		<p>****8*</p>
		<p>****L*</p>
<p>terminal board for junction box (junction box by customer)</p> 		<p>*****62</p>

transducer frequency (3d character of transducer order code)		F, G, H, K		M, P		Q		S		
T S	cable length (F808**-A1)	m	x 5	l ≤ 300	x 4	l ≤ 300	x 3	l ≤ 90	x 2	l ≤ 40
	cable length (F808**-F1)	m	15	≤ 300	15	≤ 300	15	≤ 90	-	-
	cable length (option LC) (F808**-F1)	m	46	≤ 300	46	≤ 300	46	≤ 90	-	-
	cable length (option IP68) (F808**-A1)	m	12	≤ 300	12	≤ 300	-	-	-	-

x - transducer cable length
l - max. length of extension cable

Transducer Cable

Technical Data

transducer cable					
type		1699	2550 (option IP68)	6111	2549
transmitter					
ambient temperature	°C	-55...+200	-40...+100	-100...+225	-100...+200
properties			longitudinal water tight		
cable jacket					
material		PTFE	PUR	PFA	PTFE
outer diameter	mm	2.9	5.2 ±0.2	2.7	5.3
thickness	mm	0.3	0.9	0.5	0.5
color		brown	gray	white	black
shield		x	x	x	x
sheath					
material		stainless steel 304 (1.4301) option OS: 316L (1.4404)	-	stainless steel 304 (1.4301) option OS: 316L (1.4404)	-
outer diameter	mm	8	-	8	-

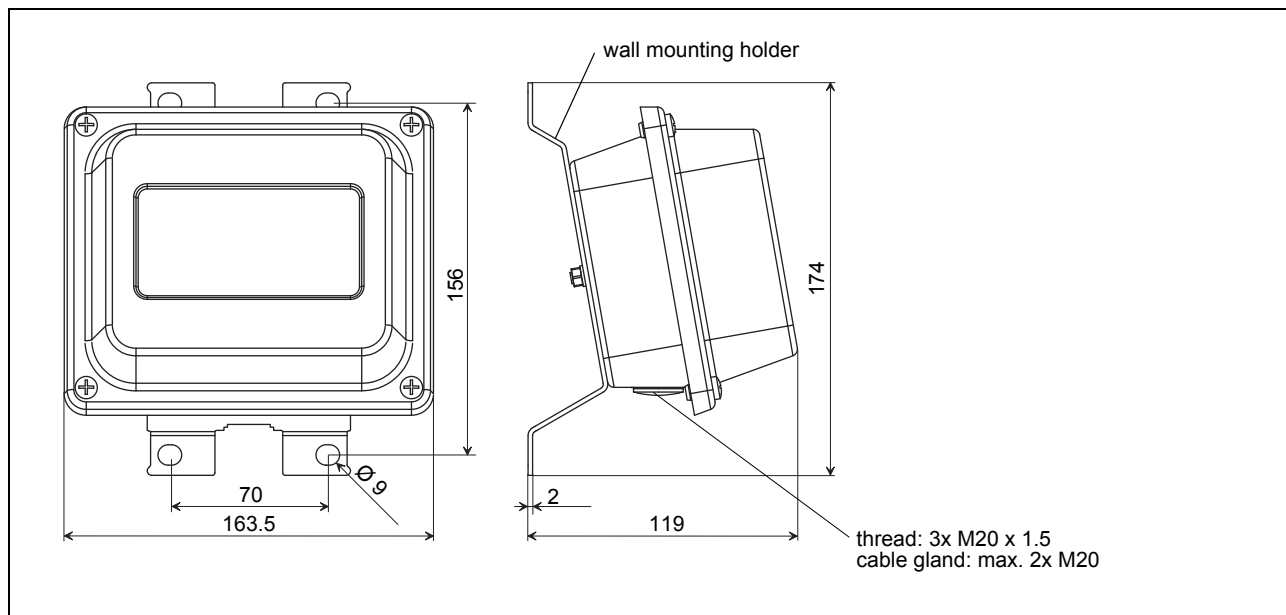
extension cable			
type		2615	5245
transmitter		F808**-F1	F808**-A1
ambient temperature	°C	-40...+70	-30...+70
properties		halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2	halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2
cable jacket			
material		PUR	PUR
outer diameter	mm	12	12
thickness	mm	2	2
color		black	black
shield		x	x
sheath			
material		-	steel wire braid with copolymer sheath
outer diameter	mm	-	15.6

Junction Box (F808**-*A1)

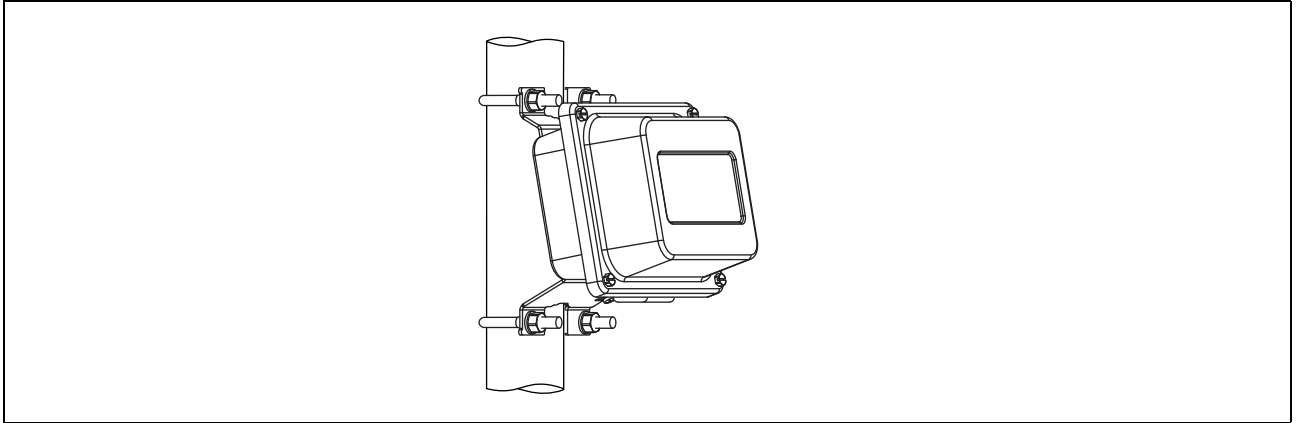
Technical Data

technical type	JB01S4E3M	
dimensions	see dimensional drawing	
fixation	wall mounting, optional: 2 " pipe mounting	
material		
housing	stainless steel 316L (1.4404)	
gasket	silicone	
degree of protection according to IEC/ EN 60529	IP67	
ambient temperature		
min.	°C	-40
max.	°C	+80
explosion protection		
A T E X / I E C E X	zone	1
	marking	CE 0637 Ex II2G II2D Ex e mb IIC (T6)...T4 Gb Ex tb IIIC T 100 °C Db Ta -40...(70)80 °C
	certification ATEX	IBExU06ATEX1161
	certification IECEx	IECEX IBE 08.0006
	type of protection	gas: • increased safety • decoupled network: encapsulation dust: protection by enclosure

Dimensions

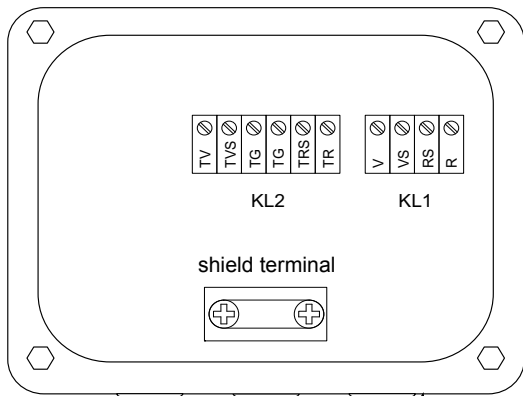


2 " Pipe Mounting Kit (optional)



Terminal Assignment





JB01



equipotential bonding terminal
(at wall mounting holder)

transducers

terminal strip KL1

terminal	connection
V	transducer  , signal
VS	transducer  , internal shield
RS	transducer  , internal shield
R	transducer  , signal
cable gland	external shield

extension cable

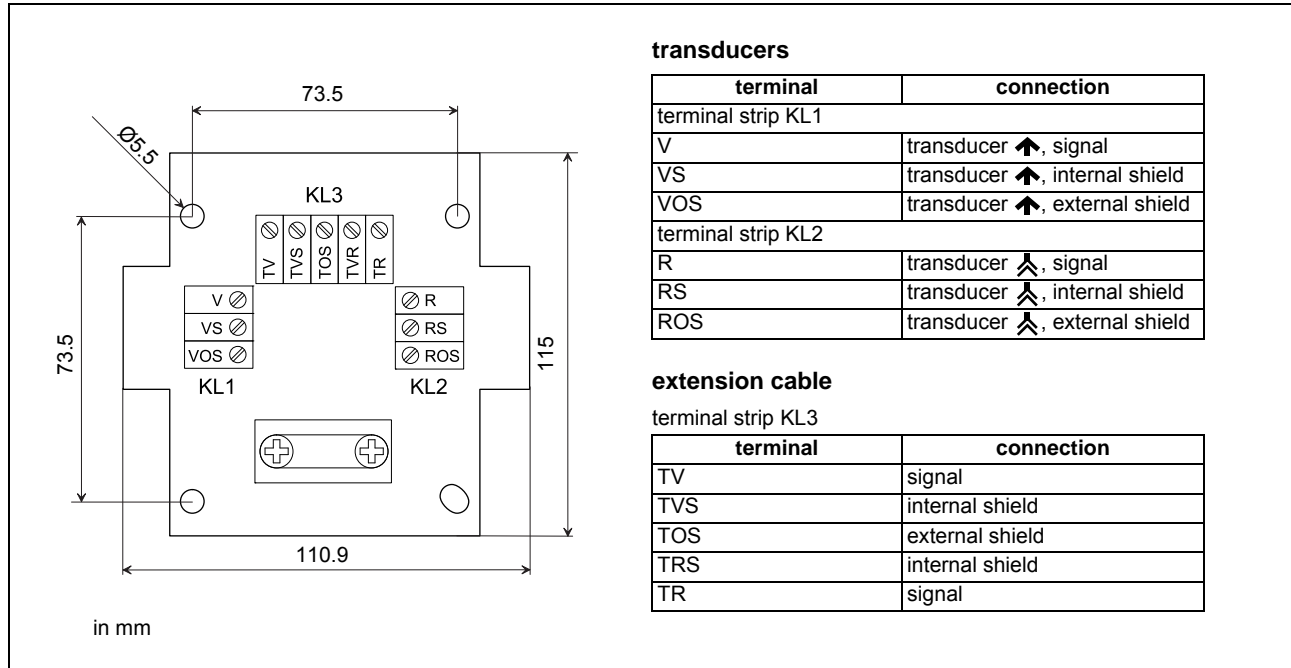
terminal strip KL2

terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

Extension Cable (F808**-F1)

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

Terminal Assignment for Terminal Board KFM1



transducers

terminal	connection
terminal strip KL1	
V	transducer ↗, signal
VS	transducer ↗, internal shield
VOS	transducer ↗, external shield
terminal strip KL2	
R	transducer ↘, signal
RS	transducer ↘, internal shield
ROS	transducer ↘, external shield

extension cable

terminal	connection
terminal strip KL3	
TV	signal
TVS	internal shield
TOS	external shield
TRS	internal shield
TR	signal



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