Liquid Ultrasonic Flowmeter for Permanent Installation

Designed for wall mounting or installation in 19" rack systems

Features

- 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
- 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
- Transducers available for a wide range of inner pipe diameters (6...6500 mm) and fluid temperatures (-170...+600 °C)
- ATEX, IECEx, FM Class 1 Div. 2 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)

Applications

- Chemical industry
- Petrochemical industry
- Oil and gas industry
- Pharmaceutical industry
- Semiconductor industry
- Mechanical engineering
- Water and wastewater industry

FLUXUS F721**-****A

FLUXUS F721**-****S

Measurement with transducers mounted by Variofix L

draft2

Table of Contents

draft2

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.

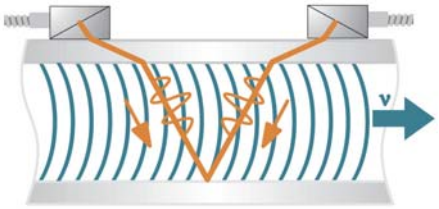
The transit time difference, Δt, is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow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

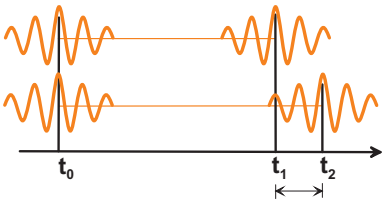
HybridTrek

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.



Path of the ultrasonic signal



Transit time difference Δt

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

draft2

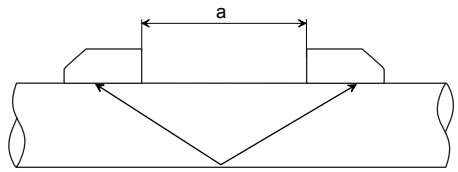
Number of Sound Paths

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.

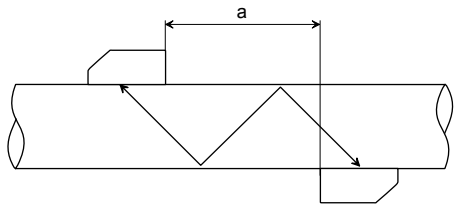
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

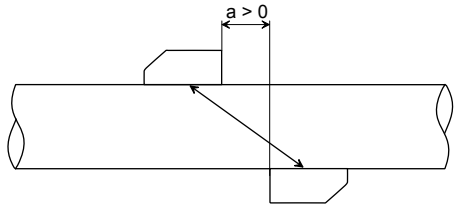


Reflection arrangement, number of sound paths: 2

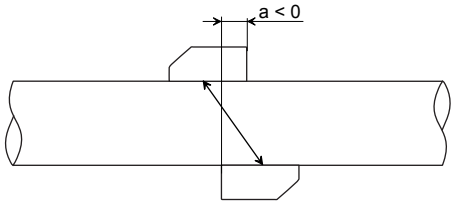
a - transducer distance



Diagonal arrangement, number of sound paths: 3



Diagonal arrangement, number of sound paths: 1



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

draft2

Flow Transmitter

Technical Data

FLUXUS	**F721**-NN0*A** **F721**-A20*A** **F721**-F20*A**	**F721**-NN0*S** **F721**-A20*S** **F721**-F20*S**
design	standard field device	field device with stainless steel housing
		
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	
accuracy[1]		
with standard calibration with advanced calibration (optional) with field calibration[2]	±1.6 % of reading ±0.01 m/s ±1.2 % of reading ±0.01 m/s ±0.5 % of reading ±0.01 m/s	
flow transmitter		
power supply	100...230 V/50...60 Hz or 20...32 V DC	
power consumption	< 15 W	
number of flow measuring channels	1, optional: 2	
damping	0...100 s, adjustable	
measuring cycle (1 channel)	100...1000 Hz	
response time	1 s (1 channel), option: 20 ms	
housing material	aluminum, powder coated	stainless steel 316L (1.4404)
degree of protection according to IEC/EN 60529	IP66	IP66
dimensions	see dimensional drawing	
weight	5.4 kg	5.1 kg
fixation	wall mounting, optional: 2 " pipe mounting	
ambient temperature	-40...+60 °C (< -20 °C without operation of the display)	
display	128 x 64 dots, backlight	
menu language	English, German, French, Dutch, Spanish, Russian	
explosion protection		
ATEX/IECEx transmitter	F721**-A20*A	F721**-A20*S
ATEX/IECEx zone	2	2
ATEX/IECEx marking	CE 0637 Ex II3G II2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T 120 °C Db T_a -40...+60 °C	CE 0637 Ex II3G II2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T 120 °C Db T_a -40...+60 °C
ATEX/IECEx certification ATEX	IBExU11ATEX1015	IBExU11ATEX1015
ATEX/IECEx certification IECEx	IECEx IBE 11.0008	IECEx IBE 11.0008
ATEX/IECEx type of protection	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
FM transmitter	F721**-F20*A	F721**-F20*S
FM model code	F701Z2***-**********AW	F703Z2***-**********AW
FM marking	F701Z2**1, F701Z2**2: NI/Cl. I,II,III/Div. 2/ GP. A,B,C,D,E,F,G/ T5 Ta = 60 °C F701Z2**9: NI/Cl. I,II,III/Div. 2/ GP. A,B,C,D,E,F,G/ T4A Ta = 55 °C	F703Z2**1, F703Z2**2: NI/Cl. I,II,III/Div. 2/ GP. A,B,C,D,E,F,G/ T5 Ta = 60 °C F703Z2**9: NI/Cl. I,II,III/Div. 2/ GP. A,B,C,D,E,F,G/ T4A Ta = 55 °C

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

[2] reference uncertainty < 0.2 %

draft2

FLUXUS	**F721**-NN0*A** **F721**-A20*A** **F721**-F20*A**	**F721**-NN0*S** **F721**-A20*S** **F721**-F20*S**
measuring functions		
physical quantities	volumetric flow rate, mass flow rate, flow velocity, heat flow (if temperature inputs are installed)	
totalizer	volume, mass, optional: heat quantity	
calculation functions	average, difference, sum (2 measuring channels necessary)	
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	max. 800 000 measured values	
communication (optional)		
process integration diagnosis[3]	measured value transmission, configuration, parametrization: HART or FF or Profibus PA or measured value transmission: RS485 (emitter) or Modbus RTU or BACnet MS/TP measured value transmission, configuration, parametrization: USB, Ethernet	
serial data kit (optional)		
software	- FluxDiag (optional): online diagnostics and report generation oder - FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™)	
cable	USB-Kabel[3]	
outputs (optional)		
	The outputs are galvanically isolated from the transmitter.	
number	on request	
	switchable current output	
 - range - accuracy - active output - passive output	All switchable current outputs are switched to active or passive mode at the same time. 4...20 mA (3.2...22 mA) 0.04 % of reading ±3 µA R_{ext} < 350 Ω U_{ext} = 8...30 V, depending on R_{ext}, R_{ext} < 1 kΩ	
	current output	
current output - range - accuracy - active output - passive output	 0/4...20 mA 0.1 % of reading ±15 µA R_{ext} < 500 Ω U_{ext} = 4...24 V, depending on R_{ext}, R_{ext} < 1 kΩ	
current output I1 in HART mode - range - passive output	 4...20 mA U_{ext} = 10...24 V	
	voltage output	
range accuracy internal resistance	0...1 V or 0...10 V 0...1 V: 0.1 % of reading ±1 mV 0...10 V: 0.1 % of reading ±10 mV R_{int} = 500 Ω	
	frequency output	
range open collector	0...5 kHz 24 V/4 mA, R_{int} = 66.5 Ω	
	binary output	
optorelay	26 V/100 mA	
binary output as alarm output - functions	 limit, change of flow direction or error	
binary output as pulse output - pulse value - pulse width	 0.01...1000 units optorelay: 1...1000 ms Reed relay, open collector: 80...1000 ms	

[3] outside of explosive atmosphere (housing cover open)

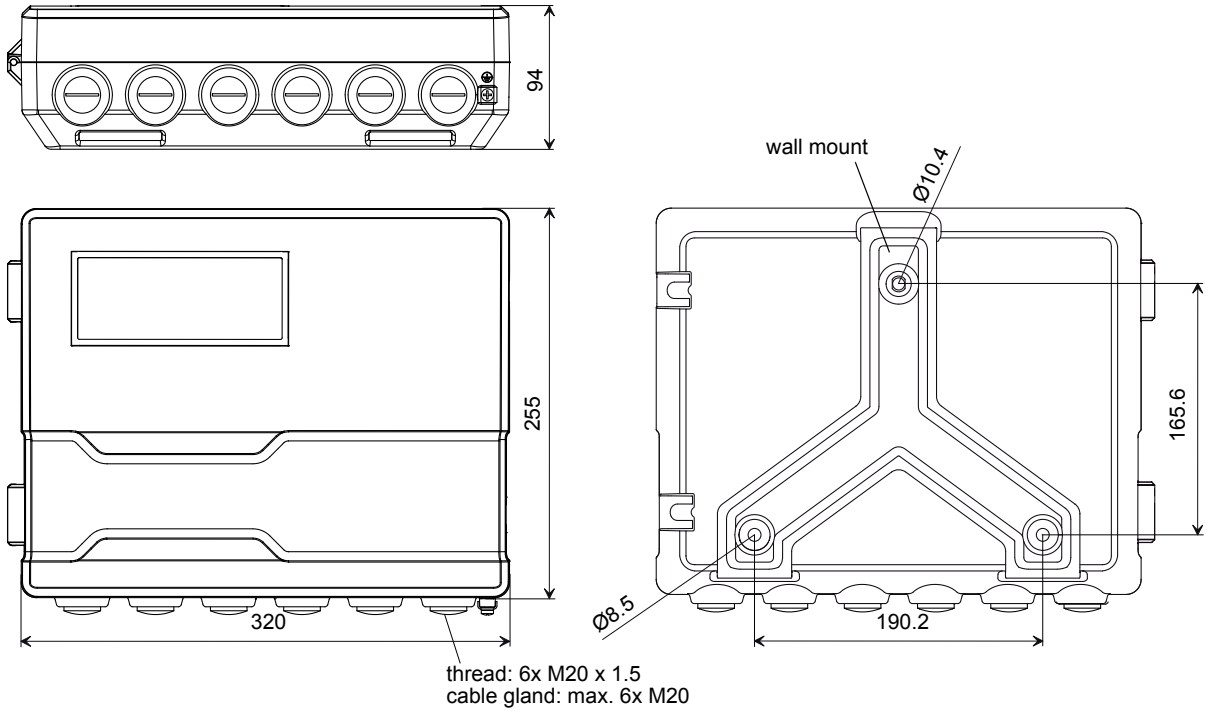
draft2

FLUXUS	**F721**-NN0*A** **F721**-A20*A** **F721**-F20*A**	**F721**-NN0*S** **F721**-A20*S** **F721**-F20*S**
inputs (optional)		
	The inputs are galvanically isolated from the transmitter.	
number	max. 4, on request	
	temperature input	
type connection range resolution accuracy	Pt100/Pt1000 4-wire -150...+560 °C 0.01 K ±0.01 % of reading ±0.03 K	
	current input	
accuracy active input - range passive input - range	0.1 % of reading ±10 µA U_{int} = 24 V, R_{int} = 50 Ω, P_{int} < 0.5 W, not short-circuit proof 0...20 mA R_{int} = 50 Ω, P_{int} < 0.3 W -20...+20 mA	
	voltage input	
range accuracy internal resistance	0...1 V 0.1 % of reading ±1 mV R_{int} = 1 MΩ	
	binary input	
switching signal functions	5...30 V, 1 mA FM class I, Div. 2: 5...26 V, 1 mA - resetting the measured values - resetting the totalizers - stopping the totalizers - activation of the measuring mode for highly dynamic flows	

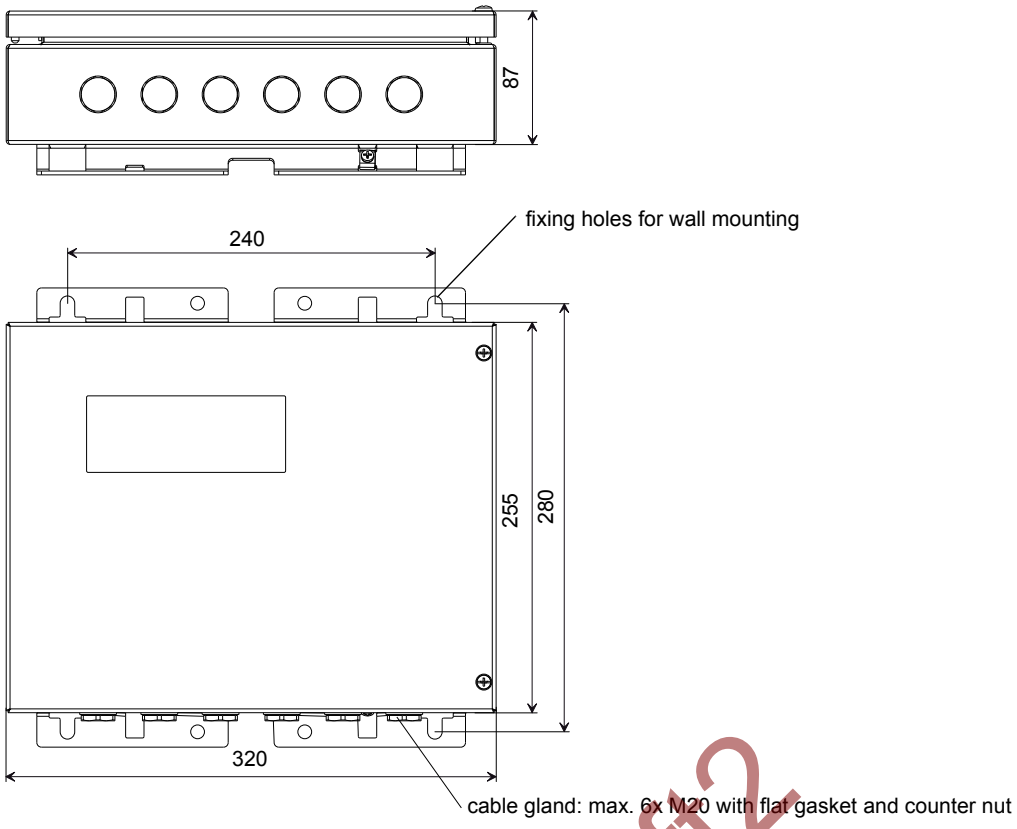
draft2

Dimensions

FLUXUS F721-****A**



FLUXUS F721-****S**

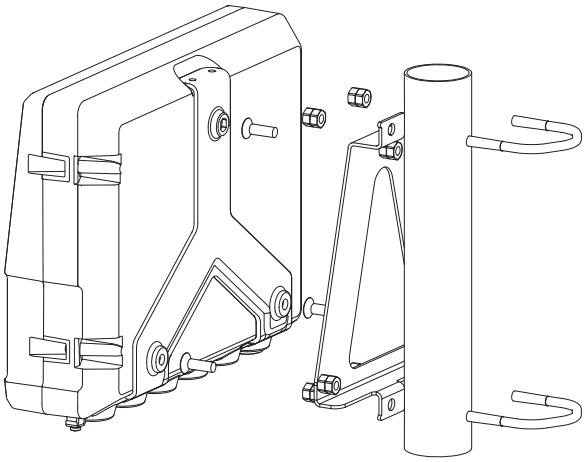


in mm

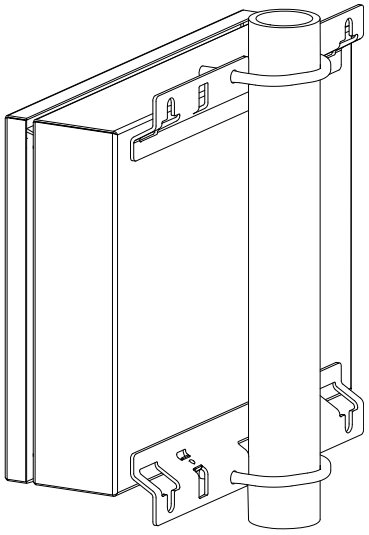
draft2

2 " Pipe Mounting Kit (optional)

FLUXUS F721-****A**



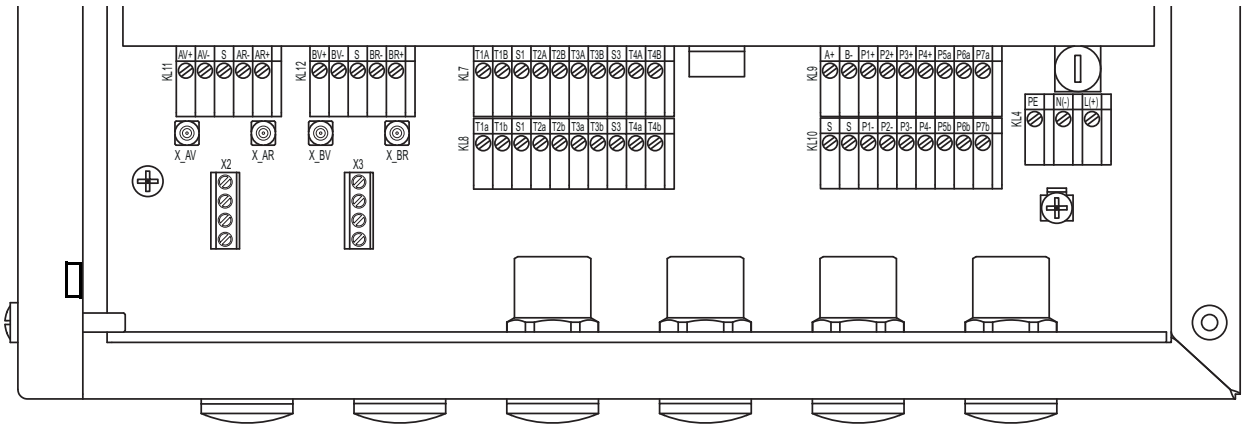
FLUXUS F721-****S**



draft2

Terminal Assignment

FLUXUS F721



power supply

terminal strip KL4

terminal	connection (AC)	connection (DC)
PE	earth	earth
N(-)	neutral	-
L(+)	phase	+

transducers

terminal strip KL11, KL12

extension cable (transducers *****8*, ****LI*, *****52) **transducer cable** (transducers *****8*, ****LI*)			
measuring channel A		**measuring channel B**	
terminal	**connection**	**terminal**	**connection**
AV+	signal	BV+	signal
AV-	shield	BV-	shield
AR-	shield	BR-	shield
AR+	signal	BR+	signal

transducer cable (transducers *****52)		
measuring channel A	**measuring channel B**	
terminal		**connection**
X_AV	X_BV	SMB connector
X_AR	X_BR	SMB connector

outputs[1]

terminal strip KL9, KL10

terminal	connection
P1+...P4+, P1-...P4-	current output, voltage output, frequency output or binary output (Reed relay, open collector)
P5a...P7a, P5b...P7b	binary output (optorelay)

RS485, Modbus, BACnet, Profibus, FF (optional)

terminal strip KL9, KL10

terminal	connection
A+	signal +
B-	signal -
S	shield

analog inputs[1]

terminal strip KL2

	temperature probe		passive current source	active current source
terminal	direct connection	connection with extension cable	connection of an active input	connection of a passive input
T1a...T4a	red	red	not connected	not connected
T1A...T4A	red/blue	grey	-	+
T1b...T4b	white/blue	blue	+	not connected
T1B...T4B	white	white	not connected	-
S1, S3	shield	shield	not connected	not connected

binary inputs[1]

terminal strip KL4

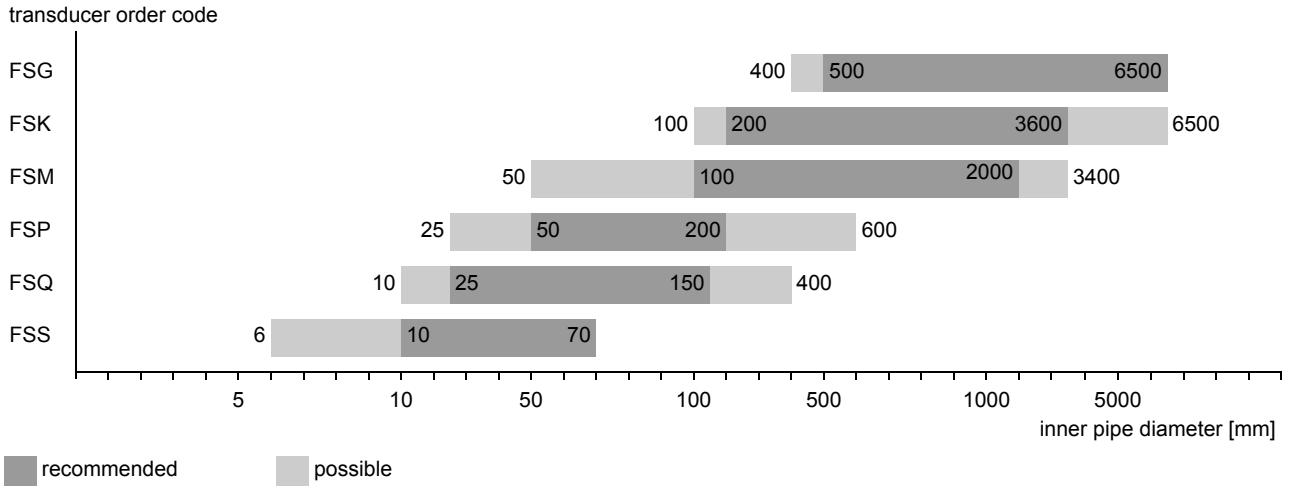
terminal
P1+...P2+, P1-...P2-

[2] The number, type and terminal assignment of the outputs and inputs will be customized.

draft2

Transducers

Transducer Selection



draft2

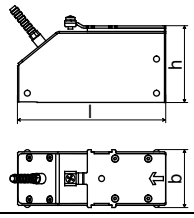
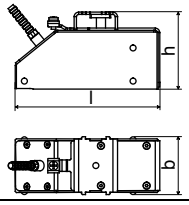
Transducer Order Code

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
	G									0.2 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 (shear wave transducers with transducer frequency M, P, Q)
				A1						ATEX zone 1/IECEx zone 1
				A2						ATEX zone 2
				F2						FM Class I Div. 2
				NN						not explosion proof
					AS					with Amphenol connector (not explosion proof transducers)
					TS					direct connection or connection via junction box
							XXX			cable length in m, for max. length of extension cable see page 25 connection system TS: 0 m: without junction box > 0 m: with junction box JB01 (zone 1), JB02 (ATEX zone 2, FM), JB03 (not explosion proof), JBP2 (transducers IP68, ATEX zone 2), JBP3 (transducers IP68, not explosion proof)
									LC	long transducer cable (only FSG, FSK)
									IP68	degree of protection IP68 with connection system TS
									OS	housing with stainless steel 316 (with connection system TS)
example										
FS	M	-	N	A1	TS	-	030			shear wave transducer 1 MHz, normal temperature range, ATEX zone 1/IECEx zone 1, connection system TS with junction box JB01 and extension cable 30 m
		-				-		/		

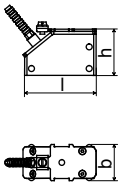
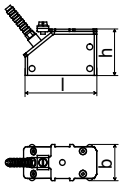
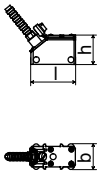
draft2

Technical Data

Shear Wave Transducers (zone 1)

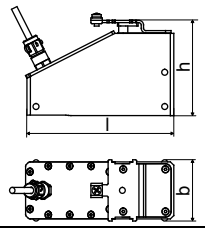
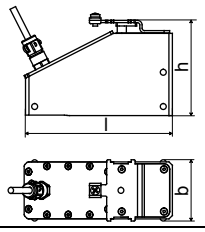
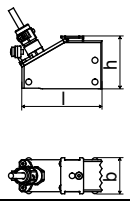
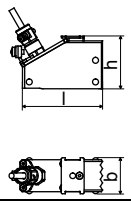
technical type		CDG1N81	CDK1N81
order code		**FSG-NA1TS** **FSG-NA1TS/OS**	**FSK-NA1TS** **FSK-NA1TS/OS**
transducer frequency	MHz	0.2	0.5
inner pipe diameter d			
min. extended min. recommended max. recommended max. extended	mm mm mm mm	400 500 6500 6500	100 200 3600 6500
pipe wall thickness			
min. max.	mm mm	- -	- -
material			
housing contact surface		PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK
degree of protection according to IEC/ EN 60529		IP65	IP65
transducer cable			
type length	 m	1699 5	1699 5
dimensions			
length l width b height h	mm mm mm	129.5 51 67	126.5 51 67.5
dimensional drawing			
ambient temperature			
min. max.	°C °C	-40 +130	-40 +130
temperature compen-sation		x	x
explosion protection			
ATEX/IECEx category zone		gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21
explosion protection temperature (pipe surface)			
min. max.	°C °C	-55 +180	-55 +180
marking		CE 0637 Ex II2G II2D Ex e q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex e q IIC T6...T3 Gb Ex tb IIIC TX Db
certification ATEX		IBExU07ATEX1168 X	IBExU07ATEX1168 X
certification IECEx		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
transducer mounting fixture necessary		x	x
remark		on request	

draft2

technical type		CDM2N81	CDP2N81	CDQ2N81
order code		**FSM-NA1TS** **FSM-NA1TS/OS**	**FSP-NA1TS** **FSP-NA1TS/OS**	**FSQ-NA1TS** **FSQ-NA1TS/OS**
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended min. recommended max. recommended max. extended	mm mm mm mm	50 100 2000 3400	25 50 200 600	10 25 150 400
pipe wall thickness				
min. max.	mm mm	- -	- -	- -
material				
housing contact surface		PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK
degree of protection according to IEC/ EN 60529		IP65	IP65	IP65
transducer cable				
type length	 m	1699 4	1699 4	1699 3
dimensions				
length l width b height h	mm mm mm	64 32 40.5	64 32 40.5	40 22 25.5
dimensional drawing				
ambient temperature				
min. max.	°C °C	-40 +130	-40 +130	-40 +130
temperature compen-sation		x	x	x
explosion protection				
ATEX / IECEx category zone		gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21
explosion protection temperature (pipe surface)				
min. max.	°C °C	-55 +180	-55 +180	-55 +180
marking		CE 0637 Ex II2G II2D Ex e q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex e q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex e 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: 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

draft2

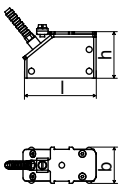
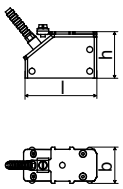
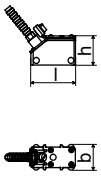
Shear Wave Transducers (zone 1, IP68)

technical type		CDG1LI1	CDK1LI1	CDM2LI1	CDP2LI1
order code		**FSG-NA1TS/IP68**	**FSK-NA1TS/IP68**	**FSM-NA1TS/IP68**	**FSP-NA1TS/IP68**
transducer frequency	MHz	0.2	0.5	1	2
inner pipe diameter d					
min. extended	mm	400	100	50	25
min. recommended	mm	500	200	100	50
max. recommended	mm	6500	3600	2000	200
max. extended	mm	6500	6500	3400	600
pipe wall thickness					
min.	mm	-	-	-	-
max.	mm	-	-	-	-
material					
housing contact surface		PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK
degree of protection according to IEC/ EN 60529		IP68 [1]	IP68 [1]	IP68 [1]	IP68 [1]
transducer cable					
type		2550	2550	2550	2550
length	m	12	12	12	12
dimensions					
length l	mm	130	130	72	72
width b	mm	54	54	32	32
height h	mm	83.5	83.5	46	46
dimensional drawing					
ambient temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+100	+100	+100	+100
temperature compen-sation		x	x	x	x
explosion protection					
ATEX/IECEx category zone		gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21	gas: 2G dust: 2D 1 21
explosion protection temperature (pipe surface)					
min.	°C	-55	-55	-55	-55
max.	°C	+180	+180	+180	+180
marking		CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex q IIC T6...T3 Gb Ex tb IIIC TX Db	CE 0637 Ex II2G II2D Ex q 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: powder filling dust: protection by enclosure	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	x
remark		on request			

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

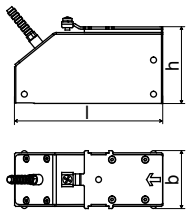
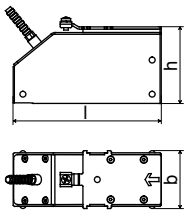
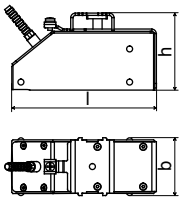
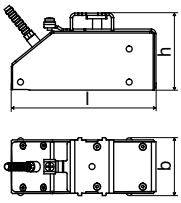
draft2

Shear Wave Transducers (zone 1, extended temperature range)

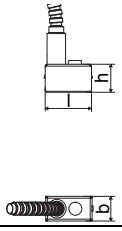
technical type		CDM2E85	CDP2E85	CDQ2E85
order code		**FSM-EA1TS** **FSM-EA1TS/OS**	**FSP-EA1TS** **FSP-EA1TS/OS**	**FSQ-EA1TS** **FSQ-EA1TS/OS**
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended min. recommended max. recommended max. extended	mm mm mm mm	50 100 2000 3400	25 50 200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

draft2

Shear Wave Transducers (ATEX zone 2, FM or not explosion proof)

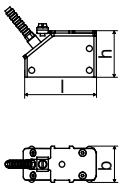
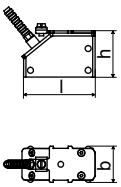
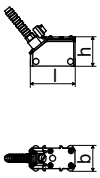
technical type		CDG1N52	CLG1N52	CDK1N52	CLK1N52
order code		**FSG-NA2TS FSG-NA2TS/OS FSG-NF2TS FSG-NF2TS/OS FSG-NNNTS FSG-NNNTS/OS**	**FSG-NA2TS/LC FSG-NA2TS/LC/OS FSG-NF2TS/LC FSG-NF2TS/LC/OS FSG-NNNTS/LC FSG-NNNTS/LC/OS**	**FSK-NA2TS FSK-NA2TS/OS FSK-NF2TS FSK-NF2TS/OS FSK-NNNTS FSK-NNNTS/OS**	**FSK-NA2TS/LC FSK-NA2TS/LC/OS FSK-NF2TS/LC FSK-NF2TS/LC/OS FSK-NNNTS/LC FSK-NNNTS/LC/OS**
transducer frequency	MHz	0.2	0.2	0.5	0.5
inner pipe diameter d					
min. extended	mm	400	400	100	100
min. recommended	mm	500	500	200	200
max. recommended	mm	6500	6500	3600	3600
max. extended	mm	6500	6500	6500	6500
pipe wall thickness					
min.	mm	-	-	-	-
max.	mm	-	-	-	-
material					
housing contact surface		PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK
degree of protection according to IEC/ EN 60529		IP67	IP67	IP67	IP67
transducer cable					
type		1699	1699	1699	1699
length	m	5	9	5	9
dimensions					
length l	mm	129.5	129.5	126.5	126.5
width b	mm	51	51	51	51
height h	mm	67	67	67.5	67.5
dimensional drawing					
ambient temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+130	+130	+130	+130
temperature compen-sation		x	x	x	x
explosion protection					
ATEX order code		FSG-NA2TS FSG-NA2TS/OS	FSG-NA2TS/LC FSG-NA2TS/LC/OS	FSK-NA2TS FSK-NA2TS/OS	FSK-NA2TS/LC FSK-NA2TS/LC/OS
category zone		gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22
explosion protection temperature (pipe surface)					
min.	°C	-55	-55	-55	-55
max.	°C	+190	+190	+190	+190
marking		CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc
certification		-	-	-	-
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
transducer mounting fixture necessary		x	x	x	x
FM order code		FSG-NF2TS FSG-NF2TS/OS	FSG-NF2TS/LC FSG-NF2TS/LC/OS	FSK-NF2TS FSK-NF2TS/OS	FSK-NF2TS/LC FSK-NF2TS/LC/OS
explosion protection temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+125	+125	+125	+125
marking		NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incendive	non incendive	non incendive	non incendive
remark		on request	on request		

draft2

technical type			CDS1N52
order code			**FSS-NF2TS** **FSS-NNNTS**
transducer frequency		MHz	8
inner pipe diameter d			
min. extended		mm	6
min. recommended		mm	10
max. recommended		mm	70
max. extended		mm	70
pipe wall thickness			
min.		mm	-
max.		mm	-
material			
housing contact surface			stainless steel 304 (1.4301) PEI
degree of protection according to IEC/ EN 60529			IP65
transducer cable			
type			1699
length		m	2
dimensions			
length l		mm	25
width b		mm	13
height h		mm	17
dimensional drawing			
ambient temperature			
min.		°C	-30
max.		°C	+130
temperature compen-sation			x
explosion protection			
F M	order code		FSS-NF2TS
	explosion protection temperature		
	min.	°C	-40
	max.	°C	+125
	marking		NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860

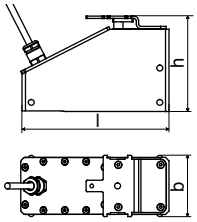
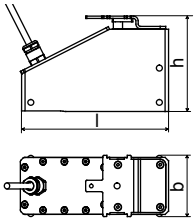
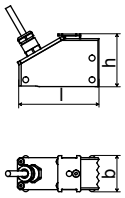
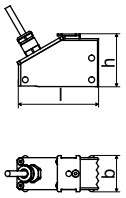
draft2

Shear Wave Transducers (ATEX zone 2, FM or not explosion proof)

technical type		CDM2N52	CDP2N52	CDQ2N52
order code		**FSM-NA2TS** **FSM-NA2TS/OS** **FSM-NF2TS** **FSM-NF2TS/OS** **FSM-NNNTS** **FSM-NNNTS/OS**	**FSP-NA2TS** **FSP-NA2TS/OS** **FSP-NF2TS** **FSP-NF2TS/OS** **FSP-NNNTS** **FSP-NNNTS/OS**	**FSQ-NA2TS** **FSQ-NA2TS/OS** **FSQ-NF2TS** **FSQ-NF2TS/OS** **FSQ-NNNTS** **FSQ-NNNTS/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 contact surface		PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK	PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PEEK
degree of protection according to IEC/ EN 60529		IP67	IP67	IP67
transducer cable				
type		1699	1699	1699
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	-40	-40	-40
max.	°C	+130	+130	+130
temperature compen-sation		x	x	x
explosion protection				
ATEX order code		FSM-NA2TS FSM-NA2TS/OS	FSP-NA2TS FSP-NA2TS/OS	FSQ-NA2TS FSQ-NA2TS/OS
category zone		gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22
explosion protection temperature (pipe surface)				
min.	°C	-55	-55	-55
max.	°C	+190	+190	+190
marking		CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T3 Gc Ta -55...+190 °C II3D Ex tc IIIC TX Dc
certification		-	-	-
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
transducer mounting fixture necessary		x	x	x
FM order code		FSM-NF2TS FSM-NF2TS/OS	FSP-NF2TS FSP-NF2TS/OS	FSQ-NF2TS FSQ-NF2TS/OS
explosion protection temperature				
min.	°C	-55	-55	-55
max.	°C	+190	+190	+190
marking		NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incendive	non incendive	non incendive

draft2

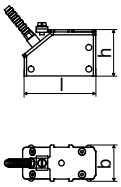
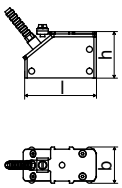
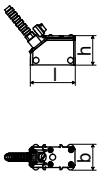
Shear Wave Transducers (ATEX zone 2 or not explosion proof, IP68)

technical type		CDG1LI8	CDK1LI8	CDM2LI8	CDP2LI8
order code		**FSG-NA2TS/IP68 FSG-NNNTS/IP68**	**FSK-NA2TS/IP68 FSK-NNNTS/IP68**	**FSM-NA2TS/IP68 FSM-NNNTS/IP68**	**FSP-NA2TS/IP68 FSP-NNNTS/IP68**
transducer frequency	MHz	0.2	0.5	1	2
inner pipe diameter d					
min. extended	mm	400	100	50	25
min. recommended	mm	500	200	100	50
max. recommended	mm	6500	3600	2000	200
max. extended	mm	6500	6500	3400	600
pipe wall thickness					
min.	mm	-	-	-	-
max.	mm	-	-	-	-
material					
housing contact surface		PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK	PEEK with stainless steel cap 316Ti (1.4571) PEEK
degree of protection according to IEC/ EN 60529		IP68[1]	IP68[1]	IP68[1]	IP68[1]
transducer cable					
type		2550	2550	2550	2550
length	m	12	12	12	12
dimensions					
length l	mm	130	130	72	72
width b	mm	54	54	32	32
height h	mm	83.5	83.5	46	46
dimensional drawing					
ambient temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+100	+100	+100	+100
temperature compen-sation		x	x	x	x
explosion protection					
ATEX order code		FSG-NA2TS/IP68	FSK-NA2TS/IP68	FSM-NA2TS/IP68	FSP-NA2TS/IP68
category zone		gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22
explosion protection temperature (pipe surface)					
min.	°C	-40	-40	-40	-40
max.	°C	+90	+90	+90	+90
marking		CE Ex II3G Ex nA IIC T6...T5 Gc Ta -40...+90 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T5 Gc Ta -40...+90 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T5 Gc Ta -40...+90 °C II3D Ex tc IIIC TX Dc	CE Ex II3G Ex nA IIC T6...T5 Gc Ta -40...+90 °C II3D Ex tc IIIC TX Dc
certification		-	-	-	-
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
transducer mounting fixture necessary		x	x	x	x
remark		on request			

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

draft2

Shear Wave Transducers (extended temperature range, ATEX zone 2, FM or not explosion proof)

technical type		CDM2E52	CDP2E52	CDQ2E52
order code		**FSM-EA2TS** **FSM-EA2TS/OS** **FSM-EF2TS** **FSM-EF2TS/OS** **FSM-ENNTS** **FSM-ENNTS/OS**	**FSP-EA2TS** **FSP-EA2TS/OS** **FSP-EF2TS** **FSP-EF2TS/OS** **FSP-ENNTS** **FSP-ENNTS/OS**	**FSQ-EA2TS** **FSQ-EA2TS/OS** **FSQ-EF2TS** **FSQ-EF2TS/OS** **FSQ-ENNTS** **FSQ-ENNTS/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 contact surface		PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PI	PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PI	PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) PI
degree of protection according to IEC/ EN 60529		IP56	IP56	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 compen-sation		x	x	x
explosion protection				
ATEX order code		FSM-EA2TS FSM-EA2TS/OS	FSP-EA2TS FSP-EA2TS/OS	FSQ-EA2TS FSQ-EA2TS/OS
category zone		gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22	gas: 3G dust: 3D 2 22
explosion protection temperature (pipe surface)				
min.	°C	-45	-45	-45
max.	°C	+235	+235	+235
marking		CE Ex II3G Ex nA IIC T6...T2 Gc Ta -45...+235 °C II3D Ex tc IIIB TX Dc	CE Ex II3G Ex nA IIC T6...T2 Gc Ta -45...+235 °C II3D Ex tc IIIB TX Dc	CE Ex II3G Ex nA IIC T6...T2 Gc Ta -45...+235 °C II3D Ex tc IIIB TX Dc
certification		-	-	-
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
transducer mounting fixture necessary		x	x	x
FM order code		FSM-EF2TS FSM-EF2TS/OS	FSP-EF2TS FSP-EF2TS/OS	FSQ-EF2TS FSQ-EF2TS/OS
explosion protection temperature				
min.	°C	-45	-45	-45
max.	°C	+235	+235	+235
marking		APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incendive	non incendive	non incendive

draft2

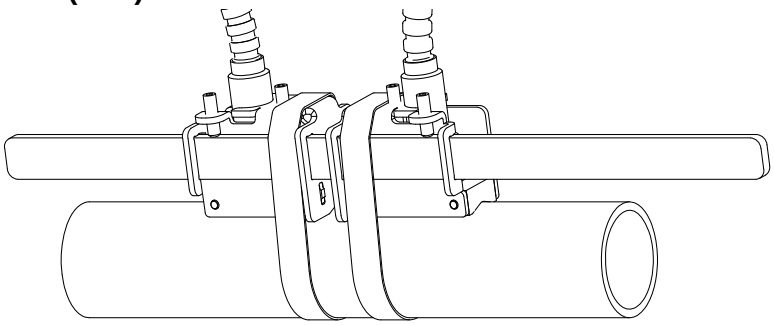
Transducer Mounting Fixture

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	description
VL										Variofix L
VC										Variofix C
WI										transducer box for WaveInjector
	K									transducers with transducer frequency G, K
	M									transducers with transducer frequency M, P
	Q									transducers with transducer frequency Q
	S									transducers with transducer frequency S
			D							reflection arrangement or diagonal arrangement
			R							reflection arrangement
				S						small
				M						medium
				L						large
						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
							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
		-			-			/		

draft2

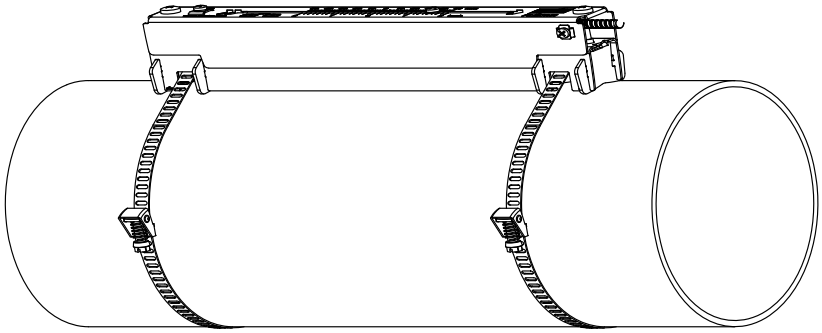
Variofix L (VLS)



transducers:
CDS1N52, CDS1NZ7

material: stainless steel 304 (1.4301), 303 (1.4305)

Variofix L (VLK, VLM, VLQ)

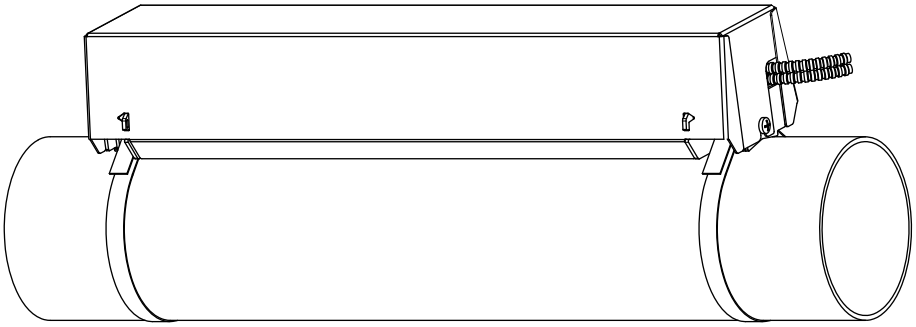


material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006)
option OS: 316 (1.4571), 316L (1.4404), 17-7PH (1.4568)

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 C (VC)

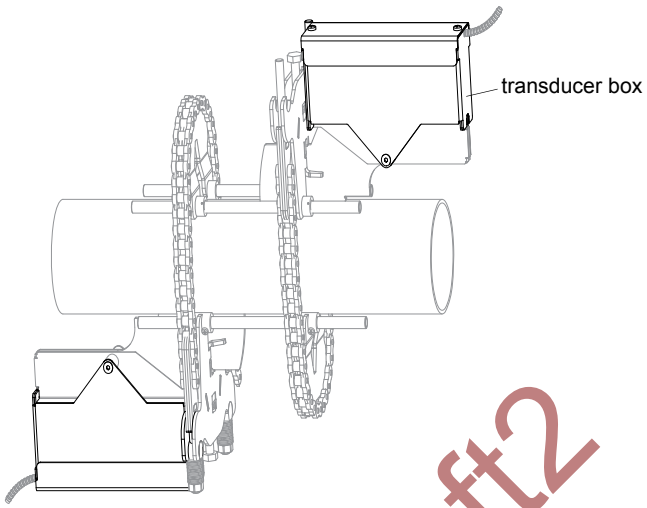


material: stainless steel 304 (1.4301), 301 (1.4310)
option OS: 316 (1.4571)

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

transducer box WI for WaveInjector



see Technical Specification
TSWaveInjectorVx-x

draft2

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 WI-400	
	< 100 °C	< 170 °C	< 150 °C	< 200 °C	< 280 °C	280...400 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or H or coupling foil type VT	coupling foil type A and coupling foil type VT	coupling foil type B and 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]	coupling foil type A and coupling foil type VT	coupling foil type B and coupling foil type VT

[1] < 5 years
[2] < 6 months

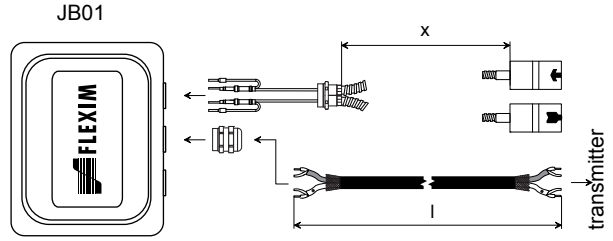
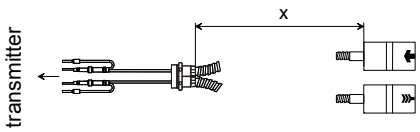
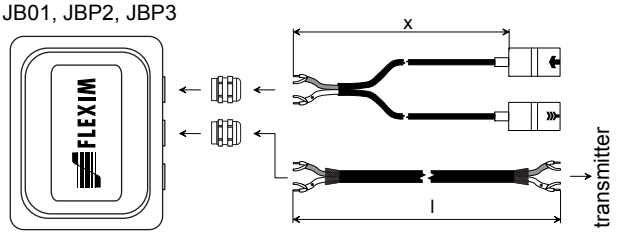
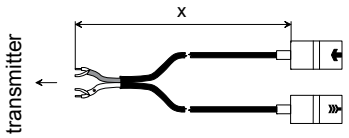
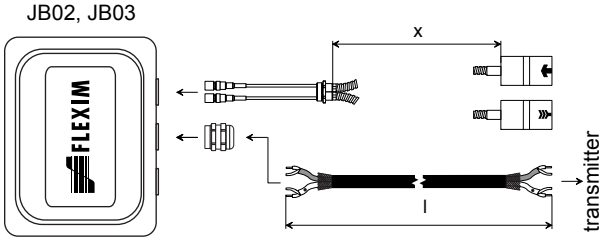
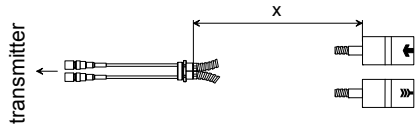
Technical Data

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 A	990739-7	max. 280	lead	
coupling foil type B	990739-8	> 280...400	silver	
coupling foil type VT	990739-0	-10...+200	fluoroelastomer	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
	990739-5			for transducers with transducer frequency Q

draft2

Connection Systems

connection system TS

connection with extension cable	direct connection	transducers technical type
JB01 		*****8*
JB01, JBP2, JBP3 		****LI*
JB02, JB03 		*****52

transducer frequency (3d character of transducer order code)			G, H, K		M, P		Q		S	
			x	**l**	**x**	**l**	**x**	**l**	**x**	**l**
T S	cable length	m	5	≤ 300	4	≤ 300	3	≤ 90	2	≤ 40
	cable length (option LC)	m	9	≤ 300	-	-	-	-	-	-
	cable length (option IP68)	m	12	≤ 300	12	≤ 300	-	-	-	-

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

draft2

Transducer Cable

Technical Data

		transducer cable			extension cable	
type		1699	2550 (option IP68)	6111	2551	2615
connection system					AS	TS
standard length	m	see table above			1 10	-
max. length	m	-			see table above	
ambient temperature	°C	-55...+200	-40...+100	-100...+225	-25...+80	-40...+70
properties			longitudinal water tight			halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2
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	-	-
cable jacket						
material		PTFE	PUR	PFA	TPE-O	PUR
outer diameter	mm	2.9	5.2 ±0.2	2.7	8	12
thickness	mm	0.3	0.9	0.5		2
colour		brown	grey	white	black	black
shield		x	x	x	x	x

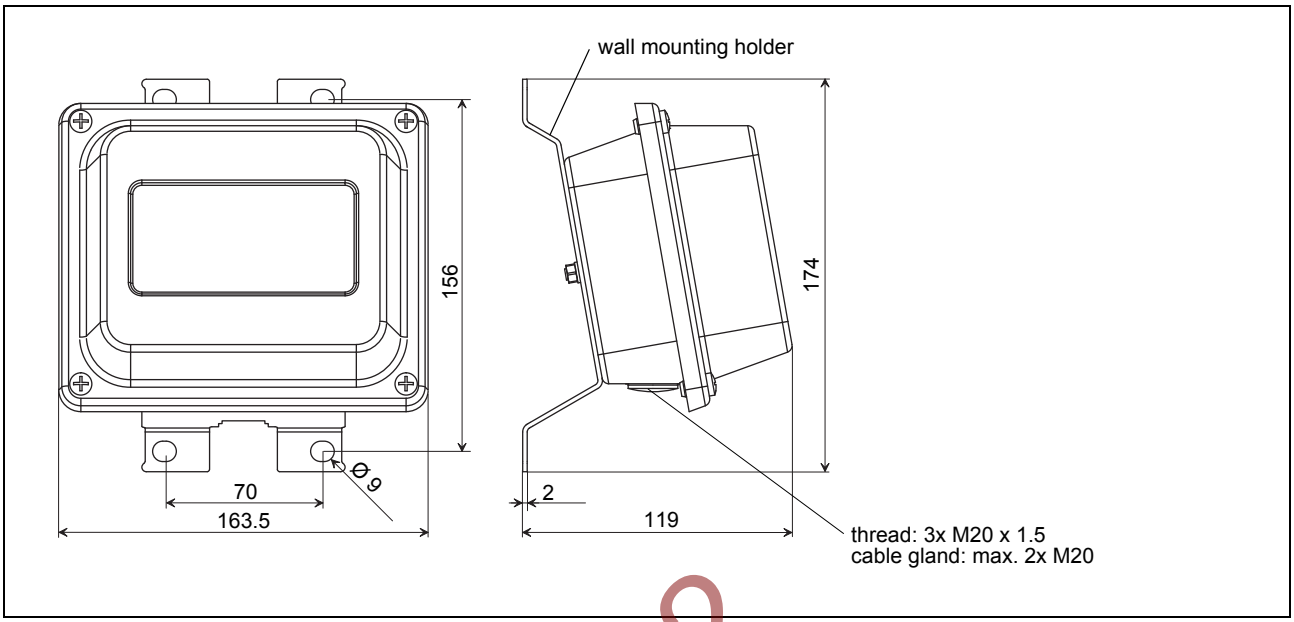
draft2

Junction Box

Technical Data

technical type		JB01S4E3M	JB02	JB03	JBP2	JBP3
dimensions		see dimensional drawing	see dimensional drawing	see dimensional drawing	see dimensional drawing	see dimensional drawing
fixation		wall mounting, optional: 2 " pipe mounting	wall mounting, optional: 2 " pipe mounting	wall mounting, optional: 2 " pipe mounting	wall mounting, optional: 2 " pipe mounting	wall mounting, optional: 2 " pipe mounting
material						
housing gasket		stainless steel 316L (1.4404) silicone	stainless steel 304 (1.4301) option OS: 316L (1.4404) silicone	stainless steel 304 (1.4301) option OS: 316L (1.4404) silicone	stainless steel 316L (1.4404) silicone	stainless steel 316L (1.4404) silicone
degree of protection according to IEC/ EN 60529		IP67	IP67	IP67	IP67	IP67
ambient temperature						
min. max.	°C °C	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80
explosion protection						
ATEX / IECEx zone		1	2	-	2	-
ATEX / IECEx 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	CE Ex II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIIC T 100 °C Dc Ta -40...+(70)80 °C	-	CE Ex II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIIC T 100 °C Dc Ta -40...+(70)80 °C	-
ATEX / IECEx certification ATEX		IBExU06ATEX1161	-	-	-	-
ATEX / IECEx certification IECEx		IECEx IBE 08.0006	-	-	-	-
ATEX / IECEx type of protection		gas: • increased safety • decoupled net-work: encapsula-tion dust: protection by enclosure	gas: non sparking dust: protection by enclosure	-	gas: non sparking dust: protection by enclosure	-

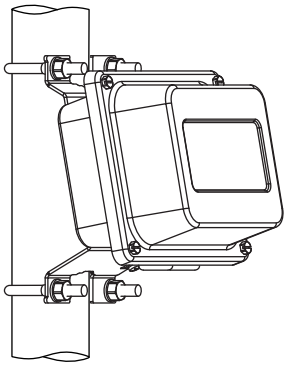
Dimensions



in mm

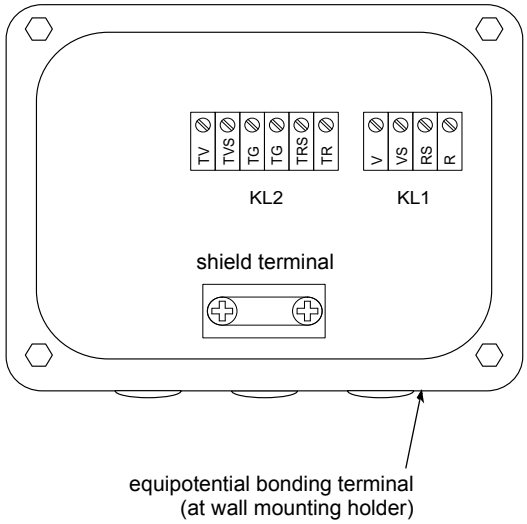
draft2

2 " Pipe Mounting Kit (optional)



Terminal Assignment

JB01



transducers

terminal strip KL1

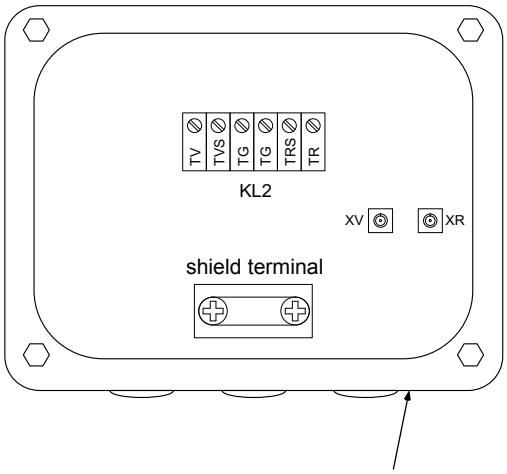
terminal	connection
V	transducer ↑, signal
VS	transducer ↑, internal shield
RS	transducer ⇈, internal shield
R	transducer ⇈, signal
cable gland	external shield

extension cable

terminal strip KL2

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

JB02, JB03



transducers

terminal	connection
XV	transducer ↑, SMB connector
XR	transducer ⇈, SMB connector
cable gland	external shield

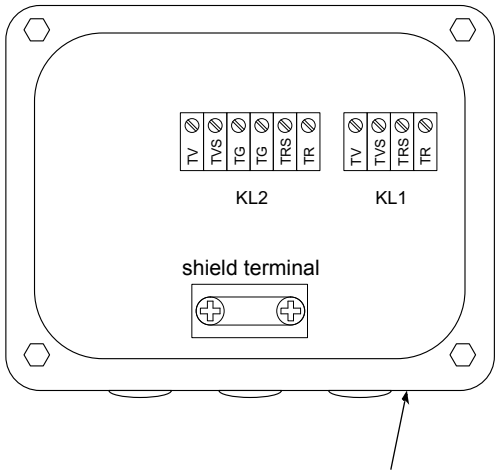
extension cable

terminal strip KL2

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

draft2

JBP2, JBP3



JBP2: equipotential bonding terminal
(at wall mounting holder)

transducers

terminal strip KL1

terminal	connection
TV	transducer ↑, signal
TVS	transducer ↑, internal shield
TRS	transducer ⅄, internal shield
TR	transducer ⅄, signal
cable gland	external shield

extension cable

terminal strip KL2

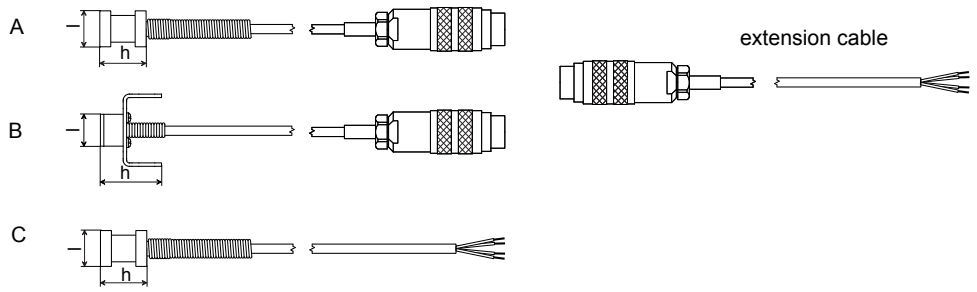
terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

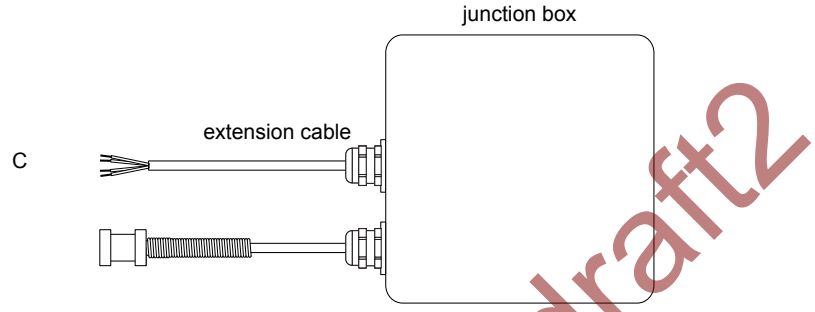
draft2

Clamp-on Temperature Probe (optional)

Technical Data

technical type		**PT12N**	**PT12N**	**PT12N**	**PT12N**	**PT12F**	**PT12F**
order code		**670415-1 770415-1**	**670414-1 770414-1**	**770415-1A2**	**770414-1A2**	**670415-2**	**670414-2**
design				ATEX zone 2		short response time	
type		Pt100	2x Pt100 matched according to EN 1434-1	Pt100	2x Pt100 matched according to EN 1434-1	Pt100	2x Pt100 matched according to EN 1434-1
connection		4-wire		4-wire		4-wire	
measuring range	°C	-30...+250		-30...+250		-50...+250	
accuracy T		±(0.15 °C + 2 · 10^{-3} · |T [°C]|) class A		±(0.15 °C + 2 · 10^{-3} · |T [°C]|) class A		±(0.15 °C + 2 · 10^{-3} · |T [°C]|) class A	
accuracy ΔT		-	≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1	-	≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1	-	≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1
response time	s	50		50		8	
housing		aluminum		aluminum		PEEK, stainless steel 304 (1.4301), copper	
degree of protection according to IEC/ EN 60529		IP66		IP66		IP66	
weight (without connector)	kg	0.25	0.5	0.25	0.5	0.32	0.64
fixation		clamp-on		clamp-on		clamp-on	
accessories							
thermal conductivity paste 200 °C		670415-1: x 770415-1: -	670414-1: x 770414-1: -	-		x	
thermal conductivity foil 250 °C		x	x	x		x	
plastic protection plate, insulation foam		-	-	-		x	
dimensions							
length l	mm	15		15		14	
width b	mm	15		15		30	
height h	mm	20		20		27	
dimensional drawing		670415-1: A 770415-1: C	670414-1: A 770414-1: C	C		B	
explosion protection							
ATEX zone		-		2		-	
explosion protection temperature							
ATEX min.	°C	-		-30		-	
ATEX max.	°C	-		+250		-	
ATEX marking		-		CE Ex II3G Ex nA IIC T6...T2 Gc Ta -30...+250 °C		-	

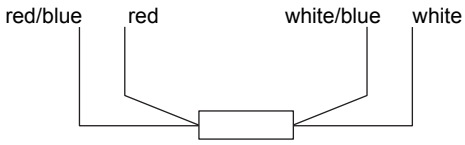




draft2

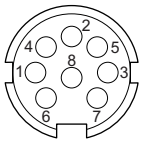
Connection

Temperature Probe



Connector

pin	cable of temperature probe	extension cable
1	white/blue	blue
2	red/blue	grey
3, 4, 5	not connected	
6	red	red
7	white	white
8	not connected	



Cable

		cable of temperature probe	extension cable
type		4 x 0.25 mm² black or white	LIYCY 8 x 0.14 mm² grey
standard length	m	3	5/10/25
max. length	m	-	200
cable jacket		PTFE	PVC

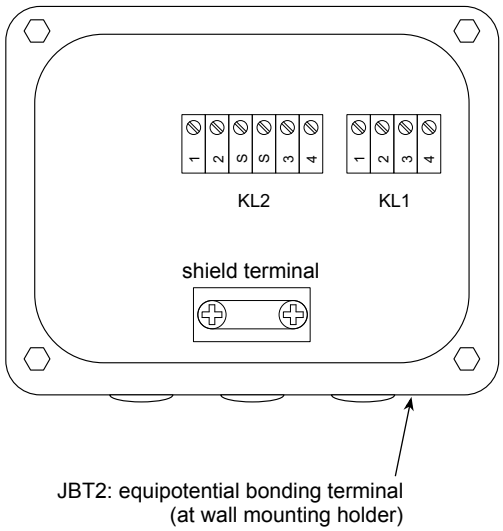
Junction Box

technical type		JBT2	JBT3
dimensions		see dimensional drawing	see dimensional drawing
fixation		wall mounting optional: 2 " pipe mounting	wall mounting optional: 2 " pipe mounting
material			
housing gasket		stainless steel 304 (1.4301) silicone	stainless steel 304 (1.4301) silicone
degree of protection according to IEC/ EN 60529		IP67	IP67
cable gland		max. 2x M12	max. 2x M12
ambient temperature			
min. max.	°C °C	-40 +80	-40 +80
explosion protection			
ATEX zone		2	-
ATEX marking		CE Ex II3G Ex nA IIC (T6)...T4 Gc II3D Ex tc IIIC T 100 °C Dc Ta -40...+(70)80 °C	-
ATEX certification		-	-
ATEX type of protection		gas: non sparking, dust: protection by enclosure	-

draft2

Terminal Assignment

JBT2, JBT3



temperature probe

terminal strip KL1

terminal	connection
1	red
2	red/blue
3	white
4	white/blue

extension cable

terminal strip KL2

terminal	connection
1	red
2	grey
3	white
4	blue

draft2

FLEXIM GmbH
Wolfener Str. 36
12681 Berlin
Germany
Tel.: +49 (30) 93 66 76 60
Fax: +49 (30) 93 66 76 80

internet: www.flexim.com
e-mail: info@flexim.com

draft2

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