Permanently Installed Liquid Ultrasonic Flowmeter

Designed for wall mounting or installation in 19" rack systems

Features

- Non-invasive measurement using the clamp-on technology for precise bi-directional, highly dynamic flow measurement
- ATEX, IEC, FM approved transducers for hazardous areas available
- Automatic loading of calibration data and transducer detection reduce set-up times and provide precise, long-term stable results
- Transducers available for a wide range of inner pipe diameters (6...6500 mm) and fluid temperatures (-40...+400 °C)
- Proven clamp-on technology, transducers resistant to dust and humidity
- HybridTrek automatically switches between transit time and NoiseTrek mode of measurement when high particulate flows are encountered
- User-friendly design

Applications

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

FLUXUS ADM 7407

FLUXUS ADM 7907

Measurement with transducers mounted by Variofix L

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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 one side of a pipe, reflected by the opposite pipe wall 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.

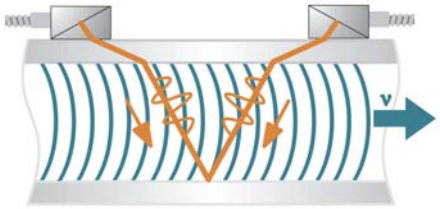
The transit time difference, Δt, is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow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

The received ultrasonic signals will be checked for their usefulness for the measurement and the plausibility of the measured values will be evaluated. The complete measuring cycle is controlled by the integrated microprocessors. Disturbance signals will be eliminated.

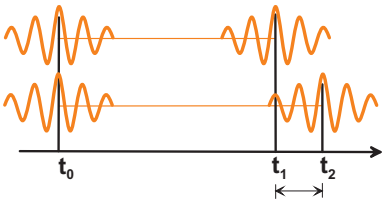
HybridTrek

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

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

where:

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

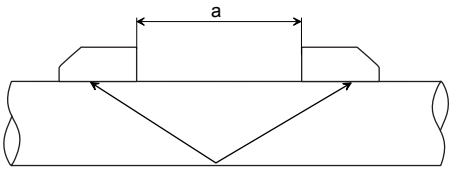
Number of Sound Paths

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 mode**
  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 mode**
  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 mode with 1 sound path will be used.

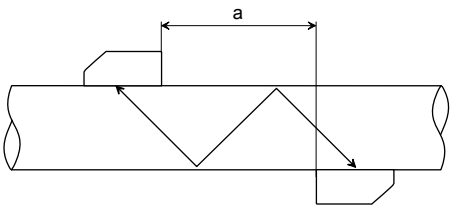
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be detemined automatically by the transmitter.

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

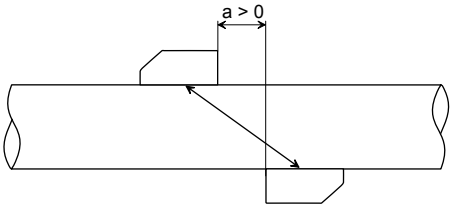


Reflection mode, number of sound paths: 2

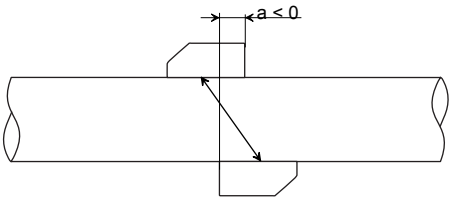
a - transducer distance



Diagonal mode, number of sound paths: 3

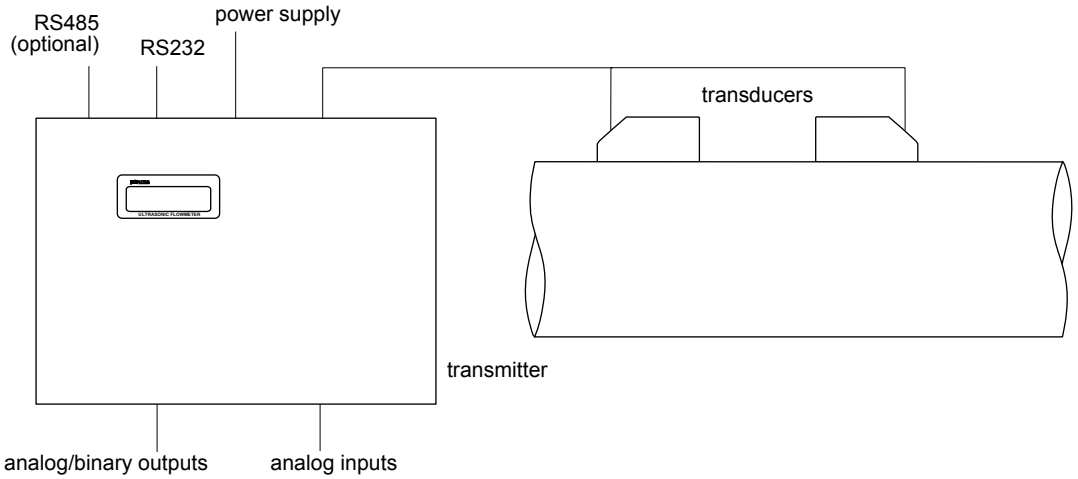


Diagonal mode , number of sound paths: 1

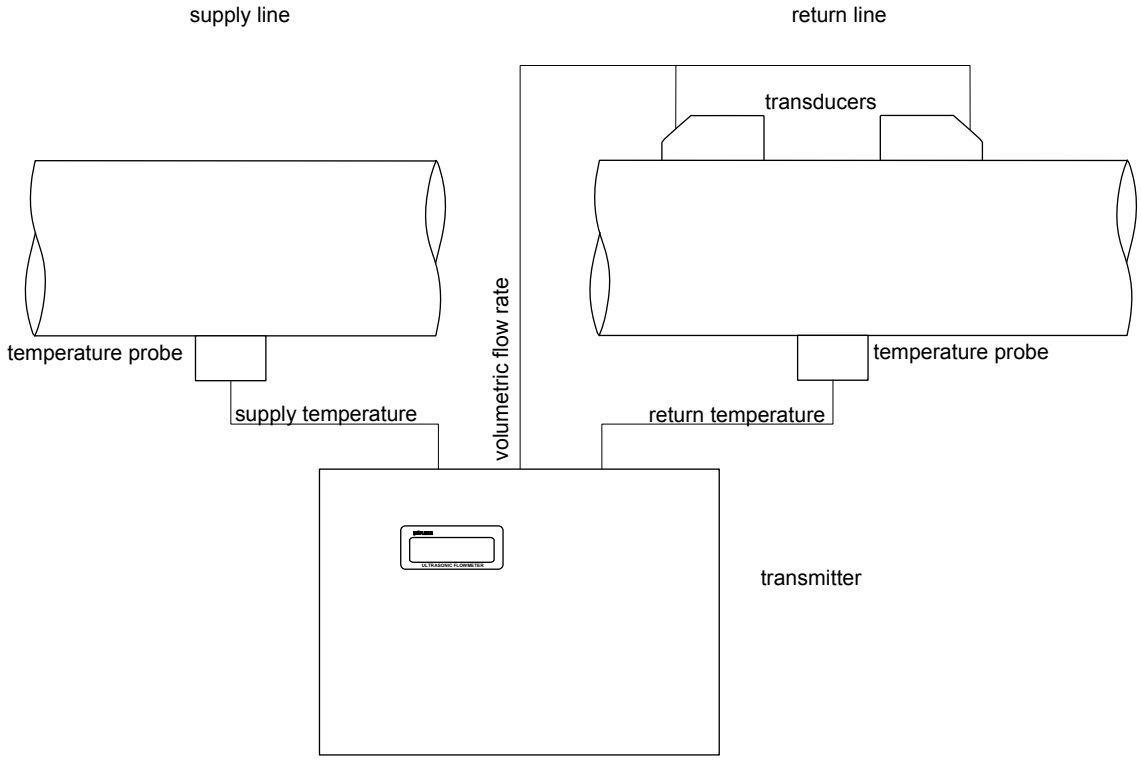


Diagonal mode , number of sound paths: 1,
negative transducer distance

Typical Measurement Setup



Example of a measurement setup in reflection mode



Example of a heat flow measurement

Flow Transmitter

Technical Data

FLUXUS	ADM 7407	ADM 7407 A2	ADM 7907
design	standard field device	field device for ATEX zone 2	19 " module
			
measurement			
measuring 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		
accuracy[1]			
with standard calibration with extended 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		
medium	all acoustically conductive liquids with < 10 % gaseous or solid content by volume (transit time difference principle)		
temperature compensation	corresponding to the recommendations in ANSI/ASME MFC-5M-1985		
flow transmitter			
power supply	100...240 V/50...60 Hz or 20...32 V DC		
power consumption	< 15 W		
number of flow measuring channels	1, optional: 2		
signal damping	0...100 s, adjustable		
measuring cycle (1 channel)	100...1000 Hz		
response time	1 s (1 channel), optional: 70 ms		
housing material	aluminum, powder coated		aluminum
degree of protection according to EN 60529	IP 65	IP 65	IP 20
dimensions	see dimensional drawing		42HP x 3U (without back panel) see dimensional drawing
weight	2.8 kg		1.7 kg
fixation	wall mounting, optional: 2 " pipe mounting		19 " rack mounting
operating temperature	-20...+60 °C		
display	2 x 16 characters, dot matrix, backlit		
menu language	English, German, French, Dutch, Spanish		
explosion protection			
ATEX zone	-	2	-
ATEX marking	-	CE Ex II3G Ex nA II T4 T_a -20...+60 °C Ex II3D Ex tD A22 IP65 T100 °C	-

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

[2] reference uncertainty < 0.2 %

FLUXUS	ADM 7407	ADM 7407 A2	ADM 7907
measuring functions			
physical quantities	volumetric flow rate, mass flow, flow velocity, heat flow (if temperature inputs are installed)		
totalizers	volume, mass, optional: heat quantity		
calculation functions	average, difference, sum		
diagnostic functions	sound velocity, 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: RS485 (Modbus, sender) or HART - diagnosis: RS232		
serial data kit (optional)			
software (all Windows™ versions)	- FluxData: download of measured data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxKoef: creating medium data sets		
cable	RS232		
adapter	RS232 - USB		
outputs (optional)			
	The outputs are galvanically isolated from the transmitter.		
number	on request		
	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, dependent 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_i = 500 Ω		
	frequency output		
range open collector	0...1 kHz or 0...5 kHz 24 V/4 mA		
	binary output		
Reed relay open collector optorelay	- - 26 V/100 mA		48 V/0.25 A 24 V/4 mA -
binary output as alarm output - functions	 limit, change of flow direction or error		 limit, change of flow direction or error
binary output as pulse output - pulse value - pulse width	 0.01...1000 units 1...1000 ms		 0.01...1000 units 80...1000 ms

FLUXUS	ADM 7407	ADM 7407 A2	ADM 7907
inputs (optional)			
	The inputs are galvanically isolated from the transmitter.		
number	max. 4, on request		
	temperature input		
designation	Pt100/Pt1000		
connection	4-wire		
range	-150...+560 °C		
resolution	0.01 K		
accuracy	±0.01 % of reading ±0.03 K		
	current input		
range	active: 0...20 mA passive: -20...+20 mA		
accuracy	0.1 % of reading ±10 µA		
active input	U_i = 24 V, R_i = 50 Ω, P_i < 0.5 W, not short circuit proof		
passive input	R_i = 50 Ω, P_i < 0.3 W		
	voltage input		
range	0...1 V		
accuracy	0.1 % of reading ±1 mV		
internal resistance	R_i = 1 MΩ		

Dimensions

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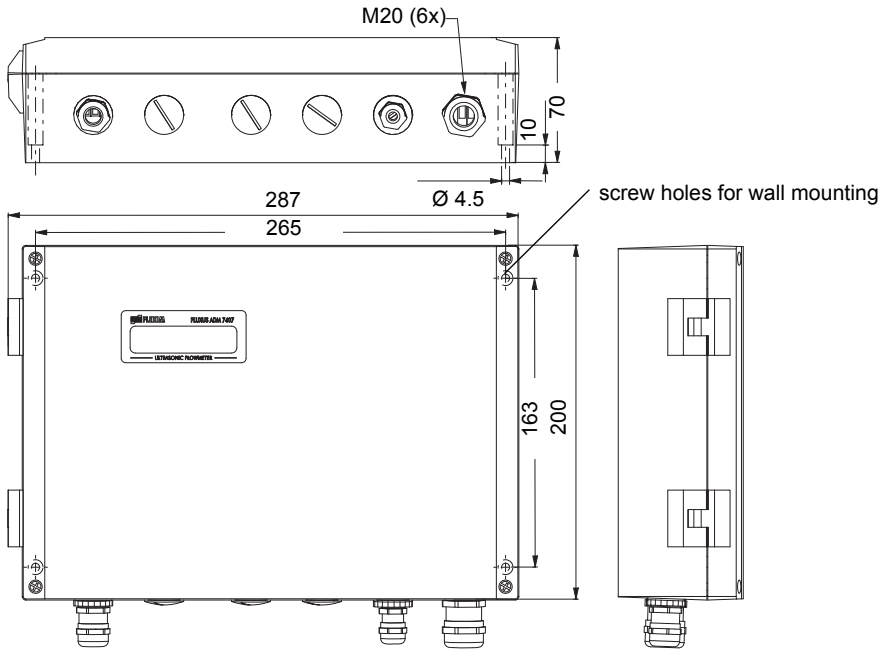
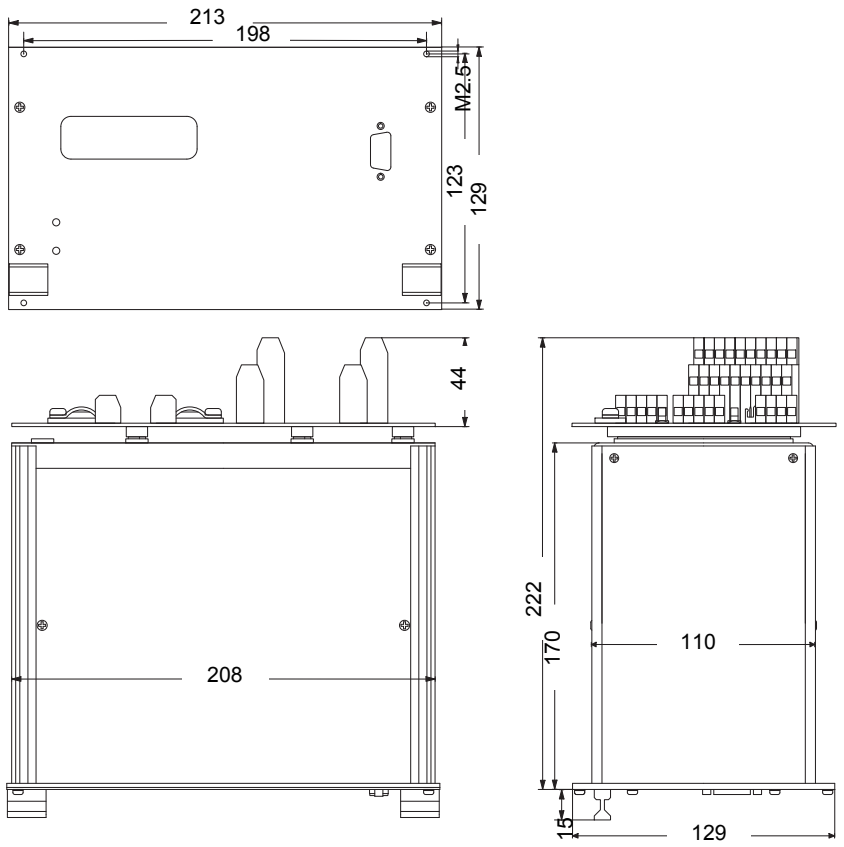


FLUXUS ADM 7907



in mm

2 " Pipe Mounting Kit (optional)

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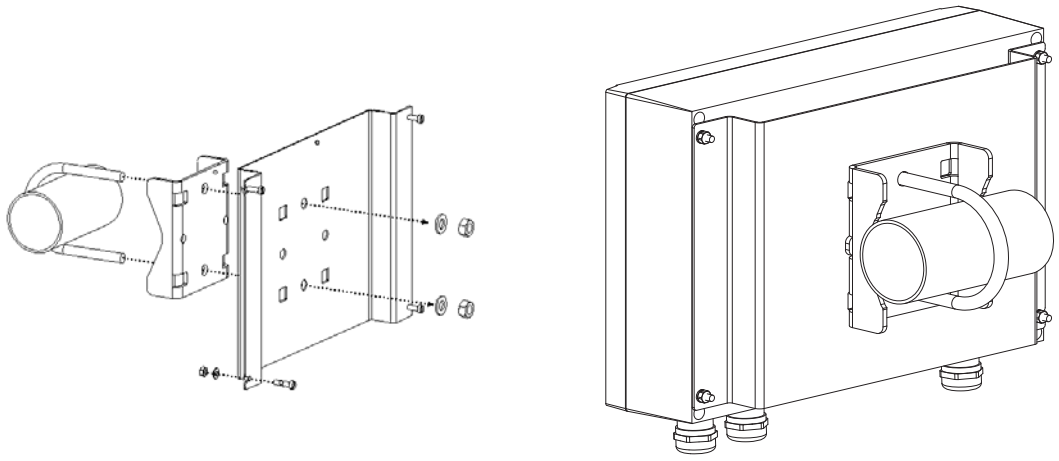

for vertical and horizontal pipes

Terminal Assignment

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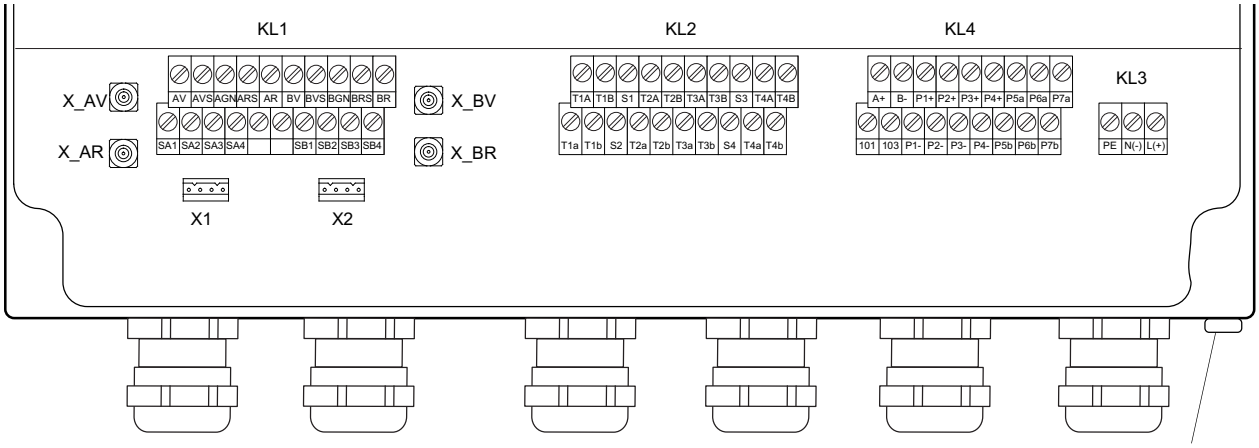

Power Supply

terminal strip KL3

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

Transducers

terminal strip KL1

extension cable for connection system TS transducer cable for connection system TS (zone 1)			
measuring channel A		measuring channel B	
terminal	connection	terminal	connection
AV	signal	BV	signal
AVS	shield	BVS	shield
ARS	shield	BRS	shield
AR	signal	BR	signal

transducer cable for connection system TS, AS (ATEX zone 2, FM or without explosion protection)		
measuring channel A	measuring channel B	
terminal		connection
X_AV	X_BV	SMB connector
X_AR	X_BR	SMB connector
X1	X2	AMP-Quick connector[1]

[1] connection system AS

Outputs[2]

terminal strip KL4

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

RS485 (optional)

terminal strip KL4

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

Inputs[2]

terminal strip KL2

	temperature probe		passive current source	active current source
terminal	connection	connection with extension cable	connection	connection
T1a...T4a	red	red	not connected	not connected
T1A...T4A	red/blue	gray	-	+
T1b...T4b	white/blue	blue	+	not connected
T1B...T4B	white	white	not connected	-
S1...S4	shield	shield	not connected	not connected

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

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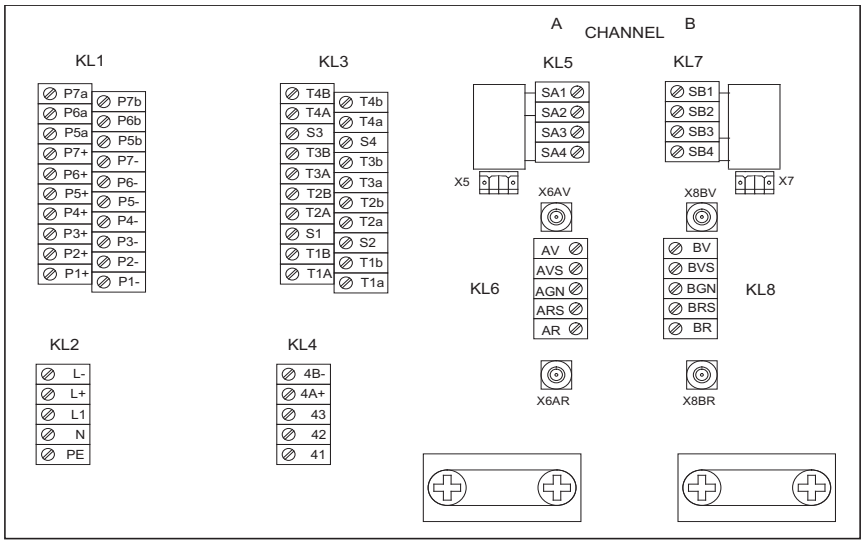


Transducers

terminal strip KL6, KL8

extension cable for connection system TS transducer cable for connection system TS (zone 1)			
measuring channel A		**measuring channel B**	
terminal	**connection**	**terminal**	**connection**
AV	signal	BV	signal
AVS	shield	BVS	shield
ARS	shield	BRS	shield
AR	signal	BR	signal

transducer cable for connection system TS, AS (ATEX zone 2, FM or without explosion protection)		
measuring channel A	**measuring channel B**	
terminal		**connection**
X6AV	X8BV	SMB connector
X6AR	X8BR	SMB connector
X5	X7	AMP-Quick connector[1]

[1] connection system AS

Power Supply

terminal strip KL2

terminal	connection AC	terminal	connection DC
PE	earth	PE	earth
N	neutral	L-	DC-
L1	phase	L+	DC+

Outputs[2]

terminal strip KL1

terminal	connection
P1+...P7+, P1-...P7-	current output, voltage output, frequency output or binary output (open collector)
P5a...P7a, P5b...P7b	binary output (Reed relay)

RS485 (optional)

terminal strip KL4

terminal	connection
4A+	signal +
4B-	signal -
43	shield

Inputs[2]

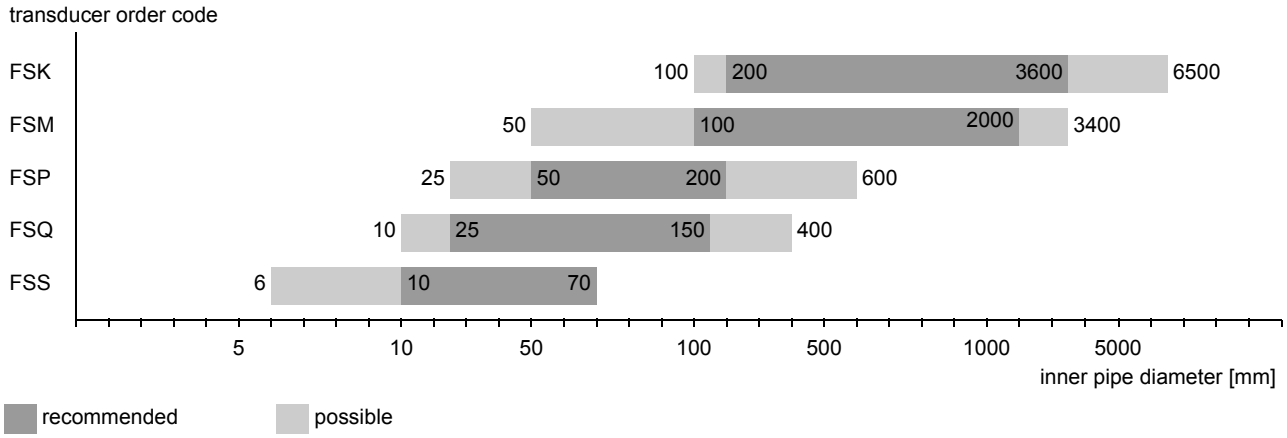
terminal strip KL3

	temperature probe		passive current source	active current source
terminal	**connection**	**connection with extension cable**	**connection**	**connection**
T1a...T4a	red	red	not connected	not connected
T1A...T4A	red/blue	gray	-	+
T1b...T4b	white/blue	blue	+	not connected
T1B...T4B	white	white	not connected	-
S1...S4	shield	shield	not connected	not connected

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

Transducers

Transducer Selection

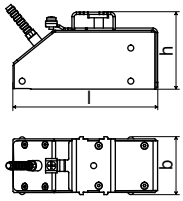
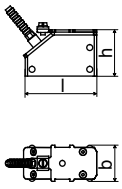
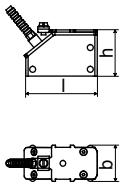
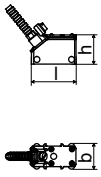


Transducer Order Codes

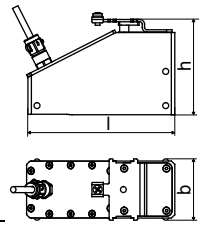
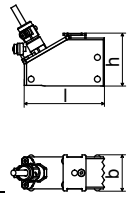
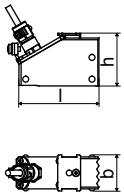
1, 2	3		4	5, 6	7, 8		9...11		12, 13	no. of character
transducer	transducer frequency	-	temperature	explosion protection	connection system	-	extension cable	/	options	description
FS										set of ultrasonic flow transducers for liquids measurement, shear wave
	K									0.5 MHz
	M									1 MHz
	P									2 MHz
	Q									4 MHz
	S									8 MHz
			N							normal temperature range
			E							extended temperature range (shear wave transducers with transducer frequency M, P, Q)
				A1						ATEX zone 1
				A2						ATEX zone 2
				F2						FM Class I Div. 2
				I1						IEC zone 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 28 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 (IP 68 transducers for ATEX zone 2), JBP3 (not explosion proof IP 68 transducers)
									LC	long transducer cable (only FSK)
									IP68	degree of protection IP 68 (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, zone 1, connection system TS with junction box JB01 and 30 m extension cable
		-				-		/		

Technical Data

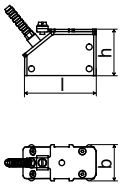
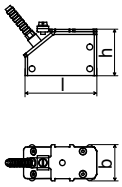
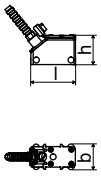
Shear Wave Transducers (zone 1)

technical type		CDK1N81	CDM2N81	CDP2N81	CDQ2N81
order code		FSK-NA1TS FSK-NA1TS/OS FSK-NI1TS FSK-NI1TS/OS	FSM-NA1TS FSM-NA1TS/OS FSM-NI1TS FSM-NI1TS/OS	FSP-NA1TS FSP-NA1TS/OS FSP-NI1TS FSP-NI1TS/OS	FSQ-NA1TS FSQ-NA1TS/OS FSQ-NI1TS FSQ-NI1TS/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 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 EN 60529		IP 65	IP 65	IP 65	IP 65
transducer cable					
type		1699	1699	1699	1699
length	m	5	4	4	3
dimensions					
length l	mm	126.5	62.5	62.5	39
width b	mm	51	32	32	22
height h	mm	67.5	40.5	40.5	25.5
dimensional drawing					
operating temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+130	+130	+130	+130
temperature compensation		x	x	x	x
explosion protection					
ATEX/IECEx transducer ATEX		FSK-NA1TS FSK-NA1TS/OS	FSM-NA1TS FSM-NA1TS/OS	FSP-NA1TS FSP-NA1TS/OS	FSQ-NA1TS FSQ-NA1TS/OS
ATEX/IECEx transducer IEC Ex		FSK-NI1TS FSK-NI1TS/OS	FSM-NI1TS FSM-NI1TS/OS	FSP-NI1TS FSP-NI1TS/OS	FSQ-NI1TS FSQ-NI1TS/OS
ATEX/IECEx zone		1	1	1	1
ATEX/IECEx explosion protection temperature					
ATEX/IECEx min.	°C	-55	-55	-55	-55
ATEX/IECEx max.	°C	+180	+180	+180	+180
ATEX/IECEx marking		CE 0044; Ex II2G II2D Ex eq II T6...T3 Ex tD A21 IP65 TX	CE 0044; Ex II2G II2D Ex eq II T6...T3 Ex tD A21 IP65 TX	CE 0044; Ex II2G II2D Ex eq II T6...T3 Ex tD A21 IP65 TX	CE 0044; Ex II2G II2D Ex eq II T6...T3 Ex tD A21 IP65 TX
ATEX/IECEx certification ATEX		IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X
ATEX/IECEx certification IEC Ex		IECEx IBE08.0007 X	IECEx IBE08.0007 X	IECEx IBE08.0007 X	IECEx IBE08.0007 X
ATEX/IECEx 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
necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C

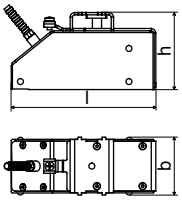
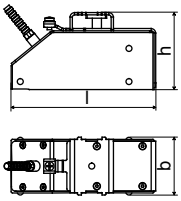
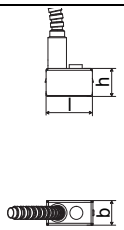
Shear Wave Transducers (zone 1, IP 68)

technical type		CDK1LI1	CDM2LI1	CDP2LI1
order code		**FSK-NA1TS/IP68** **FSK-NI1TS/IP68**	**FSM-NA1TS/IP68** **FSM-NI1TS/IP68**	**FSP-NA1TS/IP68** **FSP-NI1TS/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 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
degree of protection according to EN 60529		IP 68	IP 68	IP 68
transducer cable				
type		2550	2550	2550
length	m	12	12	12
dimensions				
length l	mm	128.5	70	70
width b	mm	54	32	32
height h	mm	83.5	46	46
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+100	+100	+100
temperature compensation		x	x	x
explosion protection				
ATEX / IEC Ex transducer ATEX		FSK-NA1TS/IP68	FSM-NA1TS/IP68	FSP-NA1TS/IP68
transducer IEC Ex		FSK-NI1TS/IP68	FSM-NI1TS/IP68	FSP-NI1TS/IP68
zone		1	1	1
explosion protection temperature				
min.	°C	-55	-55	-55
max.	°C	+180	+180	+180
marking		CE 0044; Ex II2G II2D Ex q II T6...T3 Ex tD A21 IP68 TX	CE 0044; Ex II2G II2D Ex q II T6...T3 Ex tD A21 IP68 TX	CE 0044; Ex II2G II2D Ex q II T6...T3 Ex tD A21 IP68 TX
certification ATEX		IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X
certification IEC Ex		IECEx IBE08.0007 X	IECEx IBE08.0007 X	IECEx IBE08.0007 X
type of protection		gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure
necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C

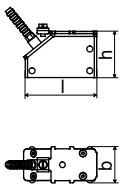
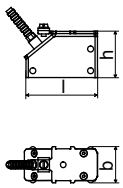
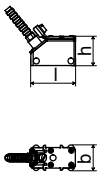
Shear Wave Transducers (zone 1, extended temperature range)

technical type		CDM2E85	CDP2E85	CDQ2E85
order code		**FSM-EA1TS** **FSM-EA1TS/OS** **FSM-EI1TS** **FSM-EI1TS/OS**	**FSP-EA1TS** **FSP-EA1TS/OS** **FSP-EI1TS** **FSP-EI1TS/OS**	**FSQ-EA1TS** **FSQ-EA1TS/OS** **FSQ-EI1TS** **FSQ-EI1TS/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 EN 60529		IP 56	IP 56	IP 56
transducer cable				
type		6111	6111	6111
length	m	4	4	3
dimensions				
length l	mm	62.5	62.5	39
width b	mm	32	32	22
height h	mm	40.5	40.5	25.5
dimensional drawing				
operating temperature				
min.	°C	-30	-30	-30
max.	°C	+200	+200	+200
temperature compensation		x	x	x
explosion protection				
ATEX / IEC Ex transducer ATEX		FSM-EA1TS FSM-EA1TS/OS	FSP-EA1TS FSP-EA1TS/OS	FSQ-EA1TS FSQ-EA1TS/OS
transducer IEC Ex		FSM-EI1TS FSM-EI1TS/OS	FSP-EI1TS FSP-EI1TS/OS	FSQ-EI1TS FSQ-EI1TS/OS
zone		1/2 (gas/dust)	1/2 (gas/dust)	1/2 (gas/dust)
explosion protection temperature				
min.	°C	-45	-45	-45
max.	°C	+225	+225	+225
marking		CE 0044; Ex II2G II3D Ex eq II T6...T2 Ex tD A22 IP56 TX	CE 0044; Ex II2G II3D Ex eq II T6...T2 Ex tD A22 IP56 TX	CE 0044; Ex II2G II3D Ex eq II T6...T2 Ex tD A22 IP56 TX
certification ATEX		IBExU07ATEX1168 X	IBExU07ATEX1168 X	IBExU07ATEX1168 X
certification IEC Ex		IECEx IBE08.0007 X	IECEx IBE08.0007 X	IECEx IBE08.0007 X
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
necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C

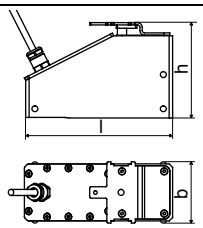
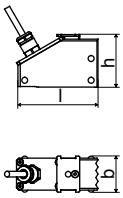
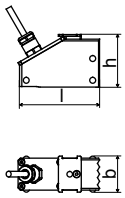
Shear Wave Transducers (ATEX zone 2, FM or without explosion protection)

technical type			CDK1N52	CLK1N52	CDS1N52
order code			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	FSS-NF2TS FSS-NNNTS
transducer frequency		MHz	0.5	0.5	8
inner pipe diameter d					
min. extended		mm	100	100	6
min. recommended		mm	200	200	10
max. recommended		mm	3600	3600	70
max. extended		mm	6500	6500	70
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)	stainless steel 304 (1.4301)
contact surface			PEEK	PEEK	PEI
degree of protection according to EN 60529			IP 67	IP 67	IP 65
transducer cable					
type			1699	1699	1699
length		m	5	9	2
dimensions					
length l		mm	126.5	126.5	25
width b		mm	51	47	13
height h		mm	67.5	55.9	17
dimensional drawing					
operating temperature					
min.		°C	-40	-40	-30
max.		°C	+130	+130	+130
temperature compensation			x	x	x
explosion protection					
ATEX	transducer		FSK-NA2TS FSK-NA2TS/OS	FSK-NA2TS/LC FSK-NA2TS/LC/OS	-
	zone		2	2	-
	explosion protection temperature				
	min.	°C	-55	-55	-
	max.	°C	+190	+190	-
	marking		CE Ex II3G Ex nA II T6...T3 Ta -55...+190 °C II3D Ex tD A22 IP67 TX	CE Ex II3G Ex nA II T6...T3 Ta -55...+190 °C II3D Ex tD A22 IP67 TX	-
	certification		-	-	-
	type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	-
	necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	-
FM	transducer		FSK-NF2TS FSK-NF2TS/OS	FSK-NF2TS/LC FSK-NF2TS/LC/OS	FSS-NF2TS
	explosion protection temperature				
	min.	°C	-40	-40	-40
	max.	°C	+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
	type of protection		non incendive	non incendive	non incendive

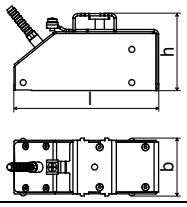
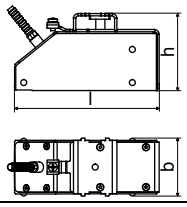
Shear Wave Transducers (ATEX zone 2, FM or without explosion protection)

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		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
degree of protection according to EN 60529		IP 67	IP 65	IP 65
transducer cable				
type		1699	1699	1699
length	m	4	4	3
dimensions				
length l	mm	62.5	62.5	39
width b	mm	32	32	22
height h	mm	40.5	40.5	25.5
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+130	+130	+130
temperature compensation		x	x	x
explosion protection				
ATEX transducer		FSM-NA2TS FSM-NA2TS/OS	FSP-NA2TS FSP-NA2TS/OS	FSQ-NA2TS FSQ-NA2TS/OS
ATEX zone		2	2	2
ATEX explosion protection temperature				
ATEX min.	°C	-55	-55	-55
ATEX max.	°C	+190	+190	+190
ATEX marking		CE Ex II3G Ex nA II T6...T3 Ta -55...+190 °C II3D Ex tD A22 IP67 TX	CE Ex II3G Ex nA II T6...T3 Ta -55...+190 °C II3D Ex tD A22 IP67 TX	CE Ex II3G Ex nA II T6...T3 Ta -55...+190 °C II3D Ex tD A22 IP67 TX
ATEX certification		-	-	-
ATEX type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure
ATEX necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C
FM transducer		FSM-NF2TS FSM-NF2TS/OS	FSP-NF2TS FSP-NF2TS/OS	FSQ-NF2TS FSQ-NF2TS/OS
FM explosion protection temperature				
FM min.	°C	-55	-55	-55
FM max.	°C	+190	+190	+190
FM 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
FM type of protection		non incendive	non incendive	non incendive

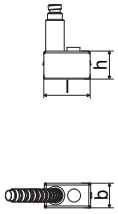
Shear Wave Transducers (ATEX zone 2 or without explosion protection, IP 68)

technical type		CDK1LI8	CDM2LI8	CDP2LI8
order code		**FSK-NA2TS/IP68** **FSK-NNNTS/IP68**	**FSM-NA2TS/IP68** **FSM-NNNTS/IP68**	**FSP-NA2TS/IP68** **FSP-NNNTS/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 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
degree of protection according to EN 60529		IP 68	IP 68	IP 68
transducer cable				
type		2550	2550	2550
length	m	12	12	12
dimensions				
length l	mm	128.5	70	70
width b	mm	54	32	32
height h	mm	83.5	46	46
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+100	+100	+100
temperature compensation		x	x	x
explosion protection				
ATEX transducer		FSK-NA2TS/IP68	FSM-NA2TS/IP68	FSP-NA2TS/IP68
zone		2	2	2
explosion protection temperature				
min.	°C	-40	-40	-40
max.	°C	+90	+90	+90
marking		CE Ex II3GEx nA II T6...T5 Ta -40...+90 °C II3D Ex tD A22 IP68 TX	CE Ex II3G Ex nA II T6...T5 Ta -40...+90 °C II3D Ex tD A22 IP68 TX	CE Ex II3G Ex nA II T6...T5 Ta -40...+90 °C II3D Ex tD A22 IP68 TX
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
necessary transducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C

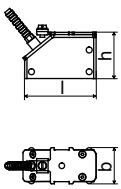
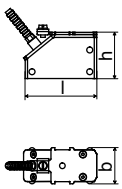
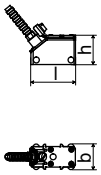
Shear Wave Transducers (connection system AS, without explosion protection)

technical type		CDK1NZ7	CLK1NZ7
order code		**FSK-NNNAS**	**FSK-NNNAS/LC**
transducer frequency	MHz	0.5	0.5
inner pipe diameter d			
min. extended	mm	100	100
min. recommended	mm	200	200
max. recommended	mm	3600	3600
max. extended	mm	6500	6500
pipe wall thickness			
min.	mm	-	-
max.	mm	-	-
material			
housing contact surface		PEEK with stainless steel cap 304 (1.4301) PEEK	PEEK with stainless steel cap 304 (1.4301) PEEK
degree of protection according to EN 60529		IP 67	IP 67
transducer cable			
type		1699	1699
length	m	5	9
dimensions			
length l	mm	126.5	126.5
width b	mm	51	51
height h	mm	67.5	67.5
dimensional drawing			
operating temperature			
min.	°C	-40	-40
max.	°C	+130	+130
temperature compensation		x	x

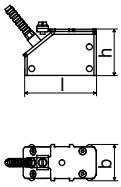
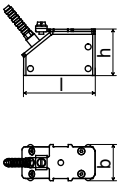
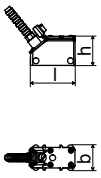
Shear Wave Transducers (connection system AS, without explosion protection)

technical type		CDS1NZ7
order code		**FSS-NNNAS**
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 EN 60529		IP 65
transducer cable		
type		1699
length	m	2
dimensions		
length l	mm	25
width b	mm	13
height h	mm	17
dimensional drawing		
operating temperature		
min.	°C	-30
max.	°C	+130
temperature compensation		x

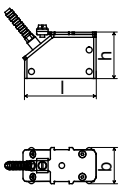
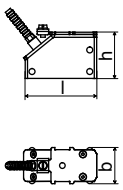
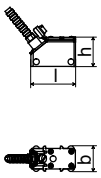
Shear Wave Transducers (connection system AS, without explosion protection)

technical type		CDM2NZ7	CDP2NZ7	CDQ2NZ7
order code		F**SM-NNNAS**	F**SP-NNNAS**	F**SQ-NNNAS**
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) PEEK	PEEK with stainless steel cap 304 (1.4301) PEEK	PEEK with stainless steel cap 304 (1.4301) PEEK
degree of protection according to EN 60529		IP 67	IP 67	IP 67
transducer cable				
type		1699	1699	1699
length	m	4	4	3
dimensions				
length l	mm	62.5	62.5	39
width b	mm	32	32	22
height h	mm	40.5	40.5	25.5
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+130	+130	+130
temperature compensation		x	x	x

Shear Wave Transducers (extended temperature range, ATEX zone 2, FM or without explosion protection)

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			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 EN 60529			IP 56	IP 56	IP 56
transducer cable					
type			6111	6111	6111
length		m	4	4	3
dimensions					
length l		mm	62.5	62.5	39
width b		mm	32	32	22
height h		mm	40.5	40.5	25.5
dimensional drawing					
operating temperature					
min.		°C	-30	-30	-30
max.		°C	+200	+200	+200
temperature compensation			x	x	x
explosion protection					
ATEX	transducer		FSM-EA2TS FSM-EA2TS/OS	FSP-EA2TS FSP-EA2TS/OS	FSQ-EA2TS FSQ-EA2TS/OS
	zone		2	2	2
	explosion protection temperature				
	min.	°C	-45	-45	-45
	max.	°C	+235	+235	+235
	marking		CE Ex II3G Ex nA II T6...T2 Ta -45...+235 °C II3D Ex tD A22 IP56 TX	CE Ex II3G Ex nA II T6...T2 Ta -45...+235 °C II3D Ex tD A22 IP56 TX	CE Ex II3G Ex nA II T6...T2 Ta -45...+235 °C II3D Ex tD A22 IP56 TX
	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
	necessary trans-ducer mounting fixture		Variofix L or Variofix C	Variofix L or Variofix C	Variofix L or Variofix C
FM	transducer		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		FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	FM 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

Shear Wave Transducers (extended temperature range, without explosion protection, connection system AS)

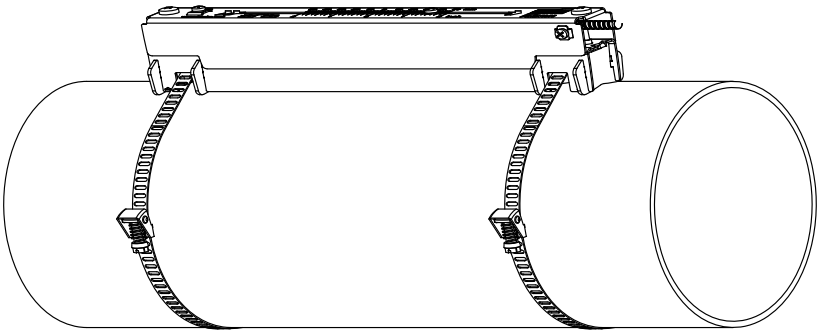
technical type		CDM2EZ7	CDP2EZ7	CDQ2EZ7
order code		**FSM-ENNAS**	**FSP-ENNAS**	**FSQ-ENNAS**
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended	mm	50	25	10
min. recommended	mm	100	50	25
max. recommended	mm	2000	200	150
max. extended	mm	3400	600	400
pipe wall thickness				
min.	mm	-	-	-
max.	mm	-	-	-
material				
housing contact surface		PI with stainless steel cap 304 (1.4301) PI	PI with stainless steel cap 304 (1.4301) PI	PI with stainless steel cap 304 (1.4301) PI
degree of protection according to EN 60529		IP 65	IP 65	IP 65
transducer cable				
type		6111	6111	6111
length	m	4	4	3
dimensions				
length l	mm	62.5	62.5	39
width b	mm	32	32	22
height h	mm	40.5	40.5	25.5
dimensional drawing				
operating temperature				
min.	°C	-30	-30	-30
max.	°C	+200	+200	+200
temperature compensation		x	x	x

Transducer Mounting Fixtures

Order Codes

1, 2	3		4	5		6	7...9		10, 11	no. of character
transducer mounting fixture	transducer	-	measuring mode	size	-	fixation	outer pipe diameter	/	option	description
VL										Variofix L
VC										Variofix C
WI										transducer clamping fixture for WaveInjector
	K									transducers with transducer frequency K
	M									transducers with transducer frequency M, P
	Q									transducers with transducer frequency Q
	S									transducers with transducer frequency S
			D							reflection mode or diagonal mode
			R							reflection mode
				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 IP 68
									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
		-			-			/		

Variofix L (VL)



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

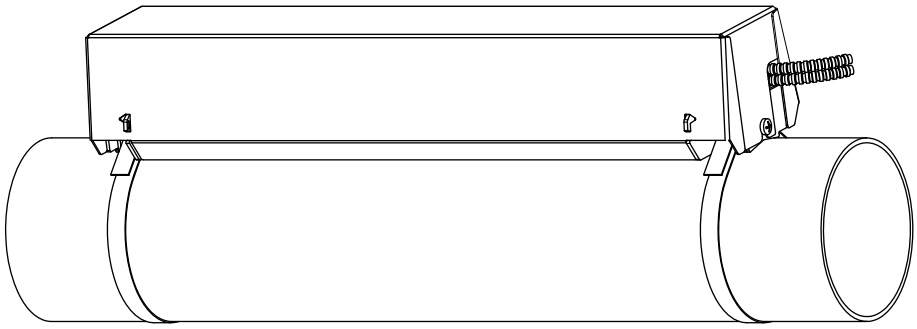
inner length:

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)

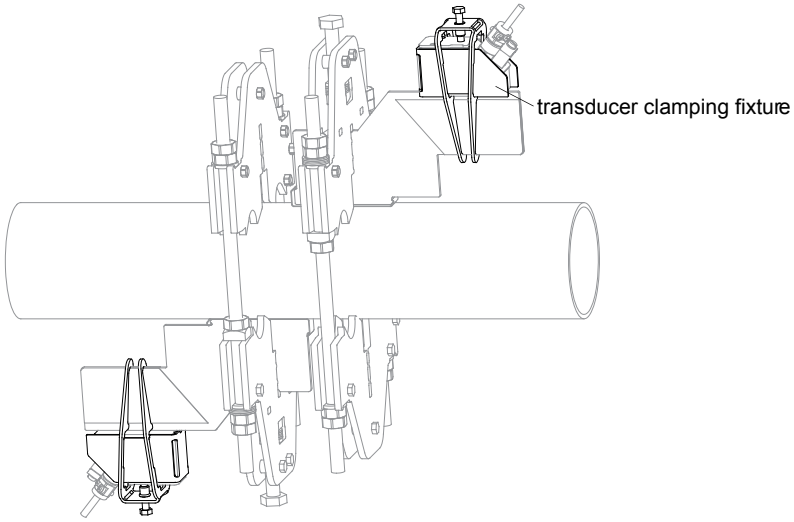
inner length:

VCK-xL: 500 mm,
VCK-xS: 350 mm,
VCM: 400 mm
VCQ: 250 mm

dimensions:

VCK-xL: 560 x 122 x 102 mm,
option IP68: 560 x 126 x 120 mm
VCK-xS: 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 Clamping Fixture for WaveInjector WI



see Technical Specification TSWaveInjectorVx-x

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	100...170 °C	< 150 °C	150...200 °C	< 280 °C	280...400 °C
< 2 h		coupling compound type N	coupling compound type E	coupling compound type E	coupling compound type E or H	coupling foil type A	coupling foil type B
< 24 h		coupling compound type N	coupling compound type E	coupling compound type E	coupling foil type VT	coupling foil type A	coupling foil type B
long time measurement	indoor	coupling compound type N	coupling compound type E	coupling foil type VT[1]	coupling foil type VT[2]	coupling foil type A	coupling foil type B
	outdoor	coupling foil type VT	coupling foil type VT	coupling foil type VT[1]	coupling foil type VT[2]	coupling foil type A	coupling foil type B

[1] < 5 years

[2] < 6 months

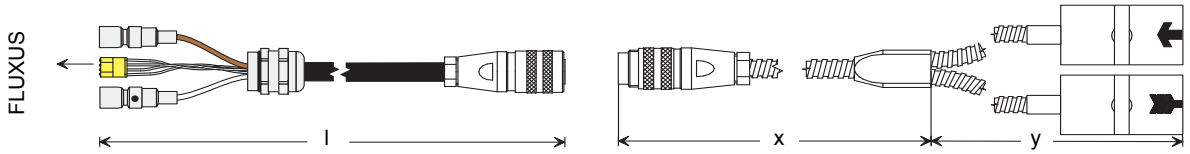
Technical Data

type	**order code**	**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	Pb	
coupling foil type B	990739-8	> 280...400	Ag	
coupling foil type VT	990739-0	-10...+150, peak max. 200	fluoroelastomer	for transducers with transducer frequency G, H, K
	990739-6			for shear wave transducers with transducer frequency M, P
	990739-14			for IP 68 shear wave transducers and Lambwave transducers with transducer frequency M, P
	990739-15			for shear wave transducers with transducer frequency Q
	990739-5			for Lambwave transducers with transducer frequency Q

Connection Systems

Connection System AS (not explosion proof transducers)

transducer frequency (3rd character of transducer order code)		G, H, K			M, P			Q			S		
		x	y	l	x	y	l	x	y	l	x	y	l
cable length	m	2	3	≤ 100	2	2	≤ 100	2	1	≤ 50	1	1	≤ 20



Connection System TS

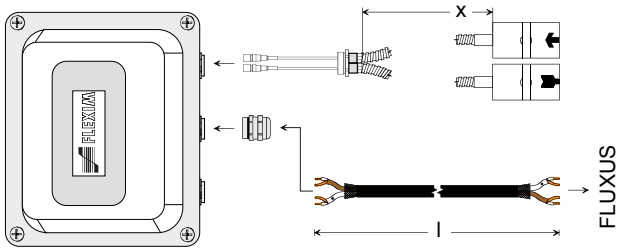
transducer frequency (3rd character of transducer order code)		G, H, K		M, P		Q		S	
		x	l	x	l	x	l	x	l
cable length	m	5	≤ 300	4	≤ 300	3	≤ 90	2	≤ 40

connection via junction box

direct connection
(only ADM 7407, ADM 7407 A2)

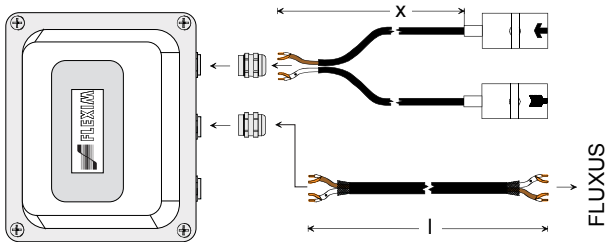
ATEX zone 2, FM, without explosion protection

JB02, JB03



zone 1 , ATEX zone 2 (transducers IP 68), without explosion protection (transducers IP 68)

JB01, JBP2, JBP3



x, y - transducer cable length

l - max. length of extension cable

Transducer Cables

Technical Data

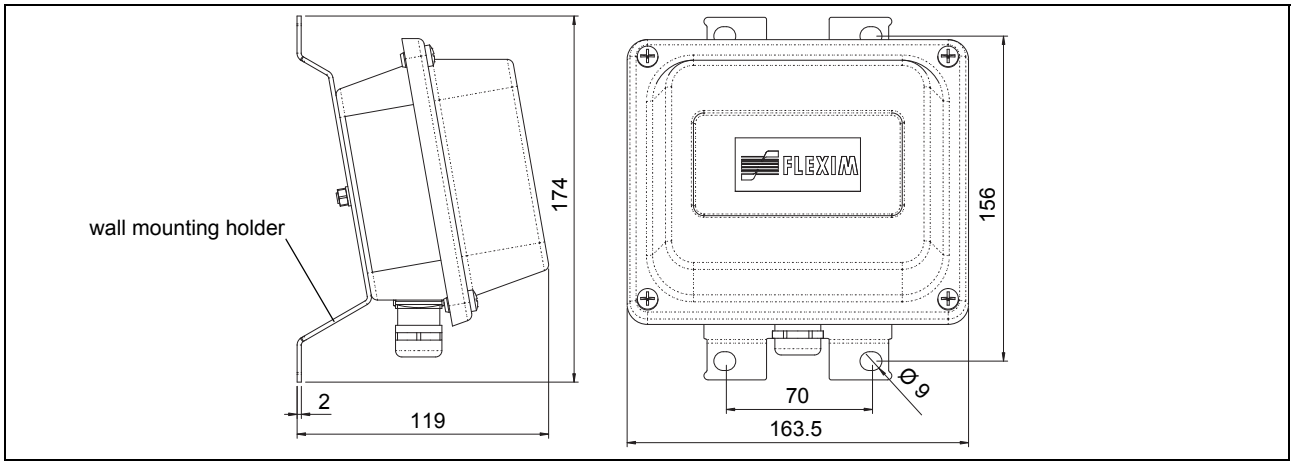
		transducer cable			extension cable	
item number		1699	2550	6111	2551	2615
connection system					AS	TS
standard length	m	see table above	12	see table above	1 10	-
max. length	m	-	-	-	see table above	see table above
temperature	°C	-55...+200	-40...+100	-100...+225	-25...+80	-40...+70
properties			longitudinal 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
color		brown	gray	white	black	black
shield		x	x	x	x	x

Junction Box

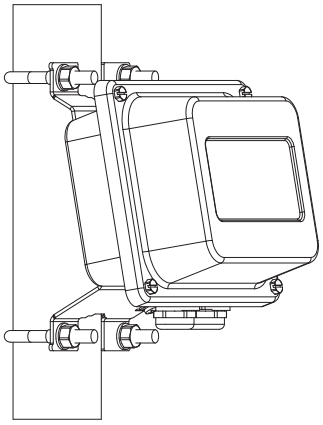
Technical Data

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		stainless steel 316L (1.4404)	stainless steel 304 (1.4301) option OS: 316L (1.4404)	stainless steel 304 (1.4301) option OS: 316L (1.4404)	stainless steel 316L (1.4404)	stainless steel 316L (1.4404)
gasket		silicone	silicone	silicone	silicone	silicone
degree of protection according to EN 60529		IP 67	IP 67	IP 67	IP 67	IP 67
cable gland		M20	M20	M20	M20	M20
operating temperature						
min.	°C	-40	-40	-40	-40	-40
max.	°C	+80	+80	+80	+80	+80
explosion protection						
ATEX zone		1	2	-	2	-
ATEX marking		CE 0044 Ex II2G Ex e mb II (T6)...T4 T_a -40...+(70) 80 °C Ex II2D Ex tD A21 IP67 T 100 °C	CE Ex II3G Ex nA II T6...T4 T_a -40...+80 °C Ex II3D Ex tD A22 IP67 T 100 °C	-	CE Ex II3G Ex nA II T6...T4 T_a -40...+80 °C Ex II3D Ex tD A22 IP67 T 100 °C	-
ATEX certification		IBExU06ATEX1161	-	-	-	-
ATEX type of protection		junction box: increased safety decoupled network: encapsulation	non sparking, protection by enclosure	-	non sparking, protection by enclosure	-

Dimensions

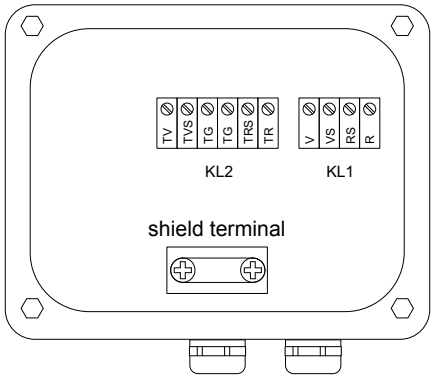


2 " Pipe Mounting Kit (optional)



Terminal Assignment

JB01



Transducers

terminal strip KL1

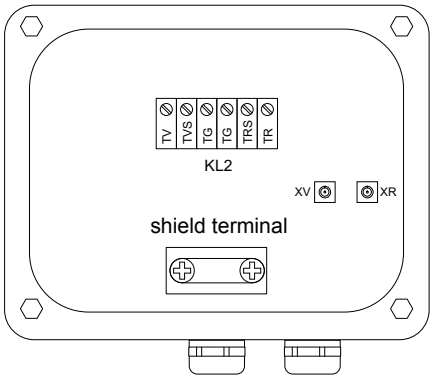
terminal	connection
V	transducer ↑, signal
VS	transducer ↑, internal shield
RS	transducer ⇈, internal shield
R	transducer ⇈, signal
cable gland	external shield

Extension Cable

terminal strip KL2

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

JB02, JB03



Transducers

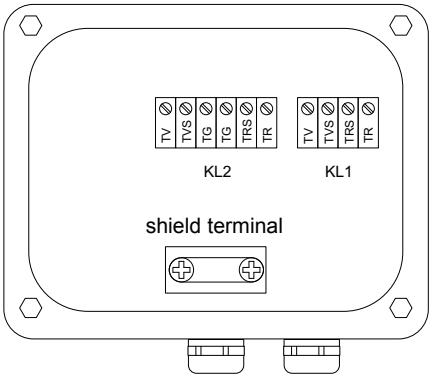
terminal	connection
XV	transducer ↑, SMB connector
XR	transducer ⇈, SMB connector
cable gland	external shield

Extension Cable

terminal strip KL2

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

JBP2, JBP3



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

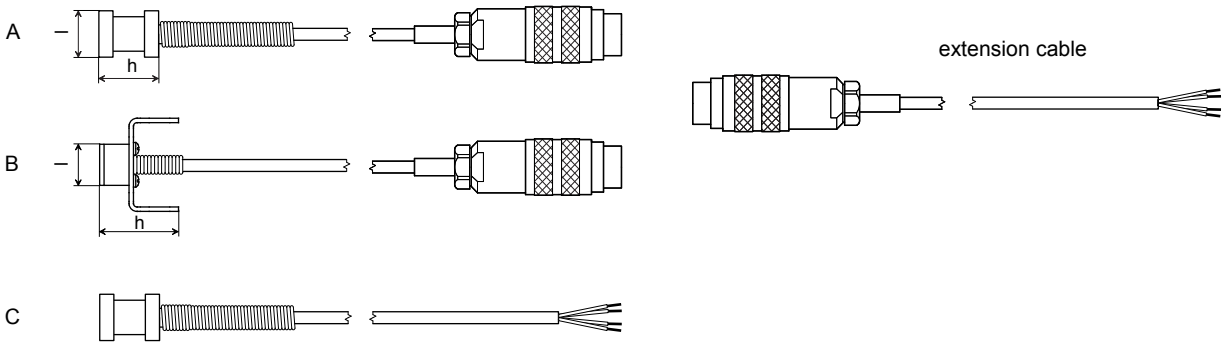
terminal strip KL2

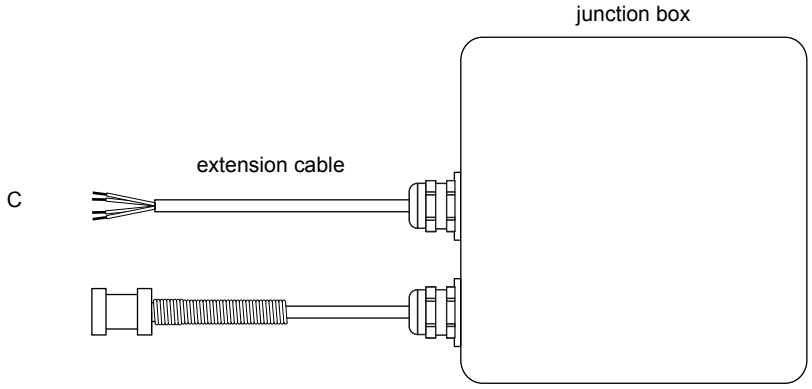
terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

Temperature Probes (optional)

Technical Data

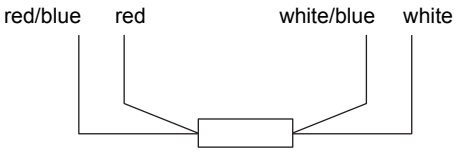
order code		**670415-1 770415-1**	**670414-1 770414-1**	**770415-1A2**	**770414-1A2**	**670415-2**	**670414-2**
type		Pt100	Pt100 matched according to DIN 1434-1	Pt100	Pt100 matched according to DIN 1434-1	Pt100	Pt100 matched according to DIN 1434-1
design		4-wire		4-wire		4-wire	
measuring range	°C	-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 (3K < ΔT < 6 K), more corresponding to EN 1434-1	-	≤ 0.1 K (3K < ΔT < 6 K), more corresponding to EN 1434-1	-	≤ 0.1 K (3K < ΔT < 6 K), more corresponding to EN 1434-1
response time	s	50		50		8	
housing		aluminum		aluminum		PEEK, stainless steel 304 (1.4301), Cu	
degree of protection according to EN 60529		IP 66		IP 66		IP 66	
weight (without connector)	kg	0.25	0.5	0.25	0.5	0.32	0.64
fixation		clamp-on		clamp-on		clamp-on	
accessories		-		-		plastic protection plate, isolation foam	
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.		-		-30		-	
ATEX max.		-		+250		-	
ATEX marking		-		CE Ex II3G Ex nA II T6...T2 Ta -30...+250 °C		-	





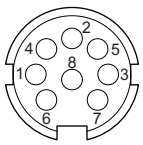
Connection

Temperature Probe



Connector

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



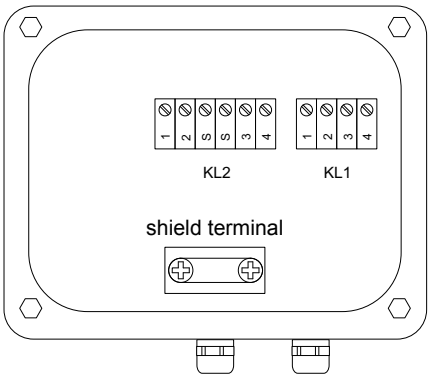
Cables

		cable of temperature probe	extension cable
type		4 x 0.25 mm^2 black or white	LIYCY 8 x 0.14 mm^2 gray
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		stainless steel 316L (1.4404)	stainless steel 316L (1.4404)
gasket		silicone	silicone
degree of protection according to EN 60529		IP 67	IP 67
cable gland		M12	M12
operating temperature			
min.	°C	-40	-40
max.	°C	+80	+80
explosion protection			
ATEX zone		2	-
ATEX marking		CE Ex II3G Ex nA II T6...T4 T_a -40...+80 °C Ex II3D Ex tD A22 IP67 T 100 °C	-
ATEX certification		-	-
ATEX type of protection		non sparking, protection by enclosure	-

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	gray
3	white
4	blue

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