Ultrasonic Flowmeters for Liquids for Permanent Installation in Hazardous Areas

Especially designed for the stationary use in explosive atmosphere

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
- ATEX certified FLUXUS ADM 8027 is presented in a flameproof housing (IP66) and can be operated by a magnet pen without opening the housing
- All stainless steel and seawater resistant FLUXUS ADM 8127 is ATEX certified and thus suited for offshore applications
- 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 (10...6500 mm) and fluid temperatures (-40...+400 °C)
- ATEX, IECEx approved transducers for hazardous areas available
- HybridTrek automatically switches between transit time and NoiseTrek mode of measurement when high particulate flows are encountered

Applications

- Chemical industry
- Petrochemical industry
- Oil extraction and exploration
- Natural gas extraction and processing
- Refineries

FLUXUS ADM 8027

FLUXUS ADM 8127

Measurement with transducers mounted by Variofix L

Table of Contents

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.

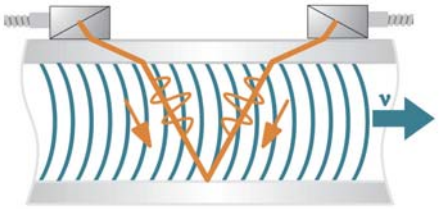
The transit time difference, Δt, is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow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

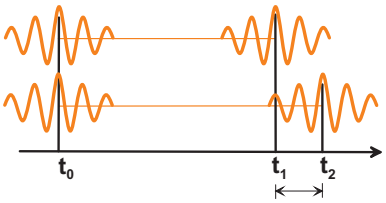
HybridTrek

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

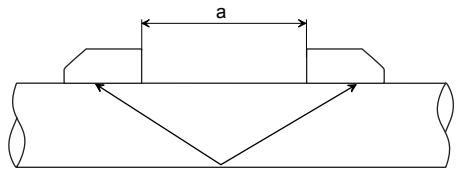
Number of Sound Paths

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.

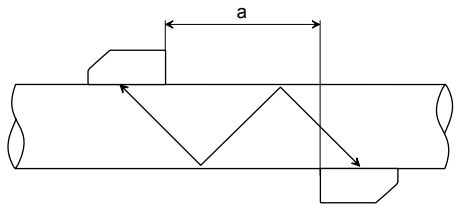
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

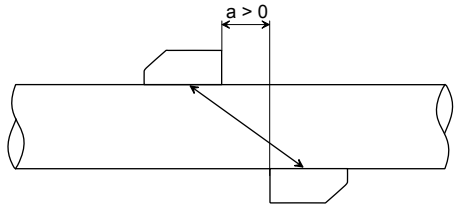


a - transducer distance

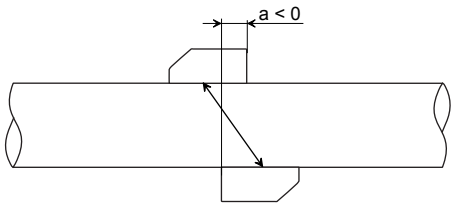
Reflection arrangement, number of sound paths: 2



Diagonal arrangement, number of sound paths: 3

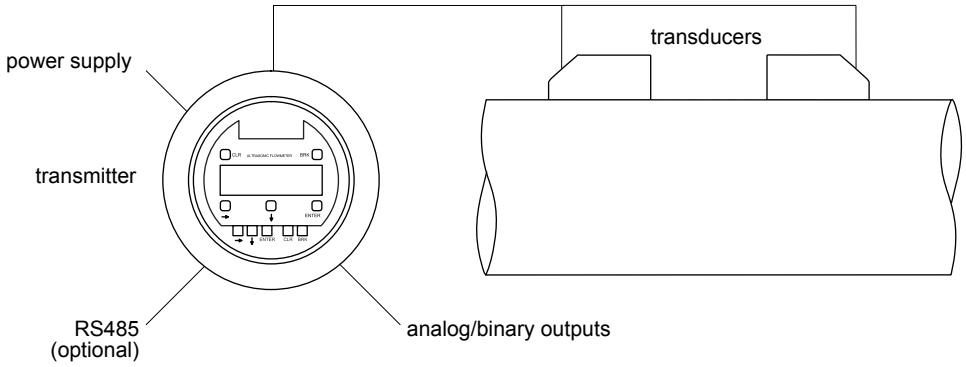


Diagonal arrangement, number of sound paths: 1



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

Typical Measurement Setup



Example of a measurement setup in reflection arrangement

Flow Transmitter

Technical Data

FLUXUS	**ADM 8027** **ADM 8027L** **ADM 8027P** **ADM 8027LP**	**ADM 8027C24** **ADM 8027LC24**	**ADM 8127** **ADM 8127P**	**ADM 8127C24**
design	explosion proof field device		explosion proof offshore device	
				
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...240 V/50...60 Hz or 20...32 V DC or on request: 11...16 V DC	24 V DC ±10 %	100...240 V/50...60 Hz or 20...32 V DC or on request: 11...16 V DC	24 V DC ±10 %
power consumption	< 10 W	< 4 W	< 10 W	< 4 W
number of flow measuring channels	1, optional: 2	1, optional: 2	1, optional: 2	1, optional: 2
signal attenuation	0...100 s, adjustable			
measuring cycle (1 channel)	100...1000 Hz			
response time	1 s (1 channel), option: 70 ms			
housing material	cast aluminum ADM 8027, ADM 8027P, ADM 8027C24: powder coated ADM 8027L, ADM 8027LP, ADM 8027LC24: special offshore coating		stainless steel 316/316L (1.4401, 1.4404, 1.4432)	
degree of protection according to IEC/EN 60529	IP66		IP66	
dimensions	see dimensional drawing			
weight	6 kg		8.5 kg	
fixation	wall mounting, 2 " pipe mounting			
ambient temperature	-20…+60 °C	-20…+50 °C	-20…+50 °C	-20…+50 °C
display	2 x 16 characters, dot matrix, backlight			
menu language	English, German, French, Dutch, Spanish			

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

[2] reference uncertainty < 0.2 %

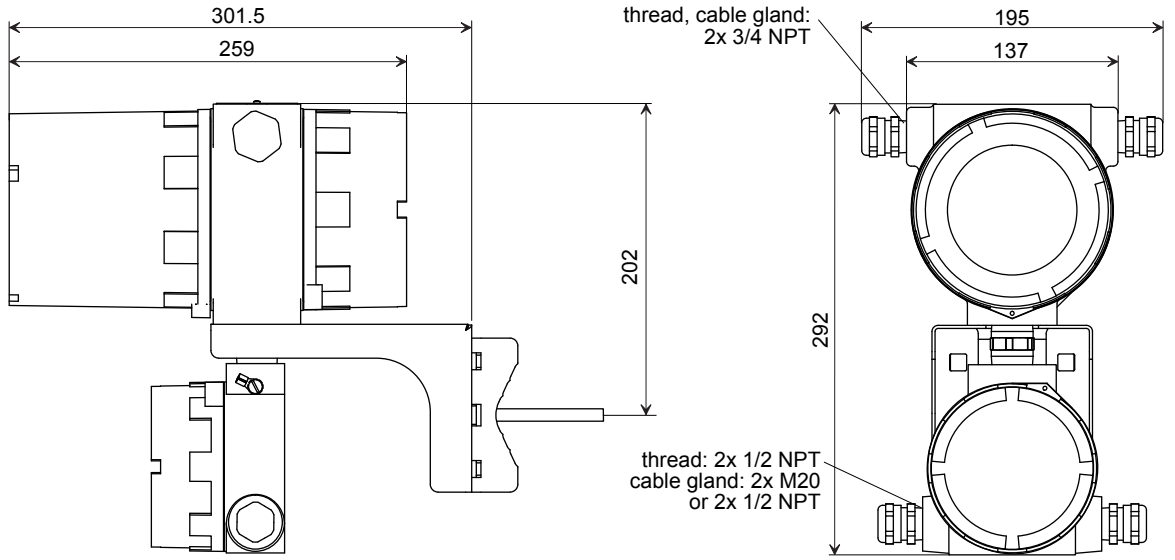
FLUXUS		ADM 8027 ADM 8027L ADM 8027P ADM 8027LP	ADM 8027C24 ADM 8027LC24	ADM 8127 ADM 8127P	ADM 8127C24
explosion protection					
ATEX	zone	1	1	1	1
	marking	**ADM 8027**: CE 0637 Ex II2G Ex d e IIC T6 T_a -20...+60 °C **ADM 8027L**: CE 0637 Ex II2G Ex d e IIB T6 T_a -20...+60 °C **ADM 8027P**: CE 0637 Ex II2G Ex d e IIC T4 T_a -20...+60 °C **ADM 8027LP**: CE 0637 Ex II2G Ex d e IIB T4 T_a -20...+60 °C	**ADM 8027C24**: CE 0637 Ex II2G Ex d e [ib] IIC T4 T_a -20...+50 °C **ADM 8027LC24**: CE 0637 Ex II2G Ex d e [ib] IIB T4 T_a -20...+50 °C	**ADM 8127**: CE 0637 Ex II2G Ex d e IIC T6 T_a -20...+50 °C **ADM 8127P**: CE 0637 Ex II2G Ex d e IIC T4 T_a -20...+50 °C	CE 0637 Ex II2G Ex d e [ib] IIC T4 T_a -20...+50 °C
	certification	IBExU01ATEX1064	IBExU01ATEX1064	IBExU05ATEX1078	IBExU05ATEX1078
	type of protection	electronics compartment: flameproof enclosure connection compartment: increased safety	electronics compartment: flameproof enclosure connection compartment: increased safety output circuits: intrinsic safety	electronics compartment: flameproof enclosure connection compartment: increased safety	electronics compartment: flameproof enclosure connection compartment: increased safety output circuits: intrinsic safety
	intrinsic safety parameters	-	U_m = 250 V AC intrinsically safe outputs: U_i = 28.2 V P_i = 0.76 W L_i, C_i negligible	-	U_m = 250 V AC intrinsically safe outputs: U_i = 28.2 V P_i = 0.76 W L_i, C_i negligible
measuring functions					
physical quantities		volumetric flow rate, mass flow rate, flow velocity			
totalizer		volume, mass			
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		> 100 000 measured values			
communication					
interface		- process integration (optional): RS485 (emitter) or Modbus/RS485 (emitter) or HART - diagnosis: RS232[3]	- diagnosis: RS232[3]	- process integration (optional): RS485 (emitter) or Modbus/RS485 (emitter) or HART - diagnosis: RS232[3]	- diagnosis: RS232[3]
serial data kit (optional)					
software (all Windows™ versions)		- FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxKoef: creating medium data sets			
cable		RS232[3]			
adapter		RS232 - USB[3]			

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

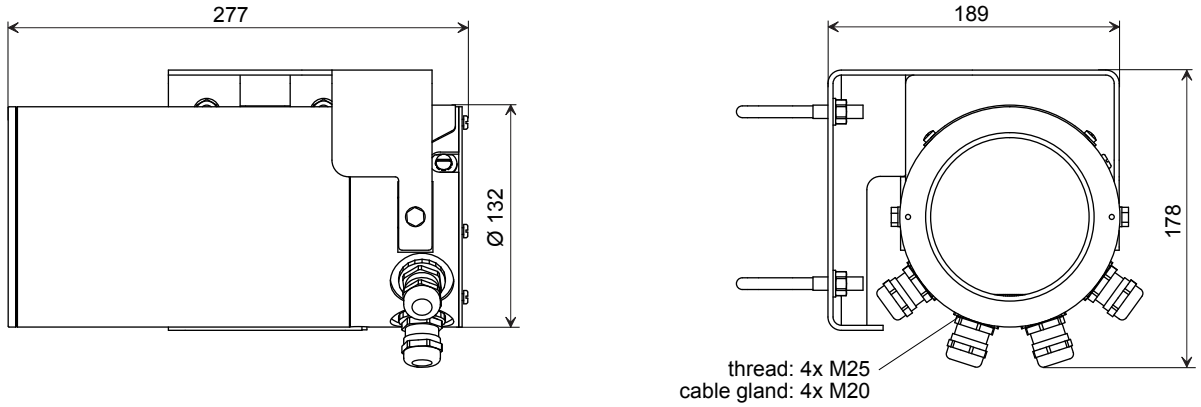
FLUXUS	**ADM 8027** **ADM 8027L** **ADM 8027P** **ADM 8027LP**	**ADM 8027C24** **ADM 8027LC24**	**ADM 8127** **ADM 8127P**	**ADM 8127C24**
outputs (optional)				
	The outputs are galvanically isolated from the transmitter.			
number	current output: 1...2 and binary output (open collector (A)): 1...4 **or** current output: 1...2 and binary output (open collector (A)): 1...2 and binary output (Reed relays): 0...2 **or** frequency output: 1 and binary output (open collector (B)): 1	current output: 1 and binary output (open collector (A)): 1	current output: 1...2 and binary output (open collector (A)): 1...4 **or** current output: 1...2 and binary output (open collector (A)): 1...2 and binary output (Reed relays): 0...2 **or** frequency output: 1 and binary output (open collector (B)): 1	current output: 1 and binary output (open collector (A)): 1
	current output			
current output I1, I2				
- range	0/4...20 mA	4...20 mA	0/4...20 mA	4...20 mA
- accuracy	0.1 % of reading ±15 µA	0.1 % of reading ±15 µA	0.1 % of reading ±15 µA	0.1 % of reading ±15 µA
- active output	**ADM 8027, ADM 8027L**: R_{ext} < 500 Ω	-	**ADM 8127**: R_{ext} < 500 Ω	-
- passive output	**ADM 8027P, ADM 8027LP**: U_{ext} = 4...26.4 V, depending on R_{ext} R_{ext} < 1 kΩ	U_{ext} = 4...28.2 V, depending on R_{ext} R_{ext} < 1 kΩ intrinsic safety	**ADM 8127P**: U_{ext} = 4...26.4 V, depending on R_{ext} R_{ext} < 1 kΩ	U_{ext} = 4...28.2 V, depending on R_{ext} R_{ext} < 1 kΩ intrinsic safety
current output I1 in HART mode				
- range	4...20 mA	-	4...20 mA	-
- passive output	U_{ext} = 10...24 V	-	U_{ext} = 10...24 V	-
	frequency output (optional) (**ADM 8027P, ADM 8127P**)			
range	0...5 kHz	-	0...5 kHz	-
open collector	30 V/100 mA optional: 8.2 V DIN EN 60947-5-6 (NAMUR)	-	30 V/100 mA optional: 8.2 V DIN EN 60947-5-6 (NAMUR)	-
	binary output			
Reed relay	48 V/0.25 A	-	48 V/0.25 A	-
open collector (A)	24 V/4 mA	24 V/4 mA intrinsic safety	24 V/4 mA	24 V/4 mA intrinsic safety
open collector (B), optional	30 V/100 mA	-	30 V/100 mA	-
binary output as alarm output				
- functions	limit, change of flow direction or error	limit, change of flow direction or error	limit, change of flow direction or error	limit, change of flow direction or error
binary output as pulse output				
- pulse value	0.01...1000 units	0.01...1000 units	0.01...1000 units	0.01...1000 units
- pulse width	1...1000 ms	1...1000 ms	1...1000 ms	1...1000 ms

Dimensions

FLUXUS ADM 8027



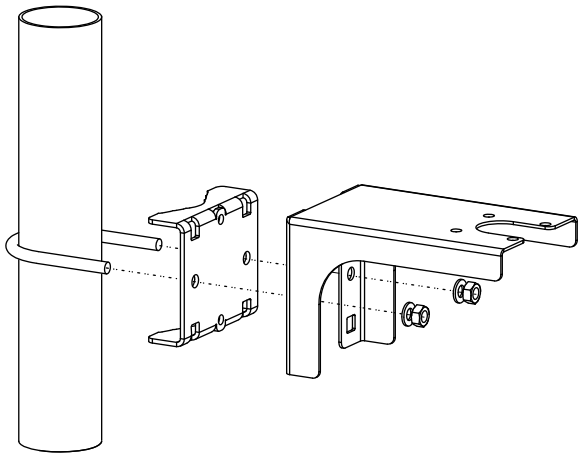
FLUXUS ADM 8127

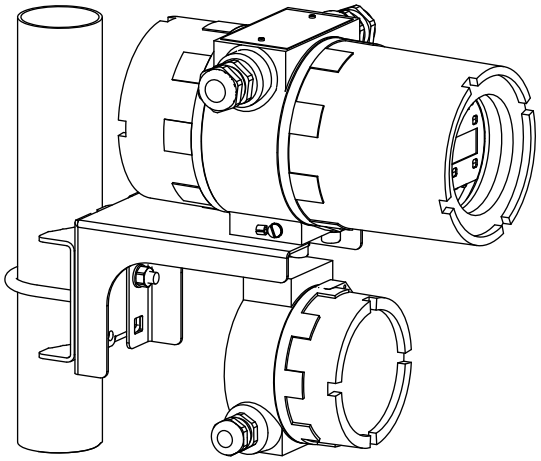


in mm

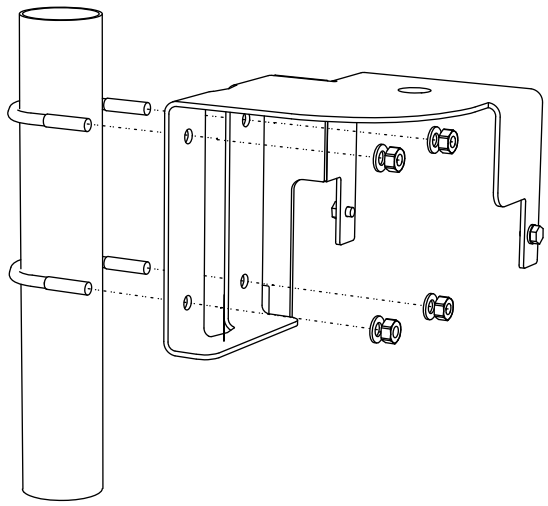
Wall and 2 " Pipe Mounting Kit

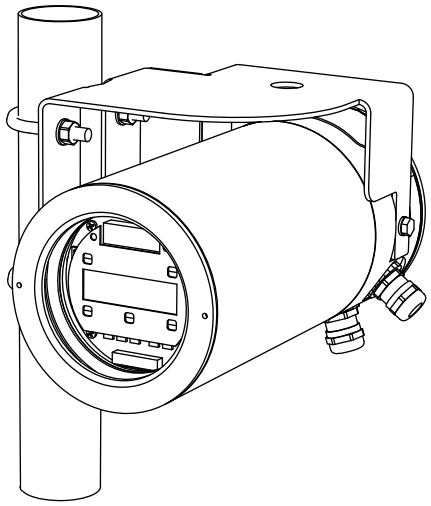
FLUXUS ADM 8027





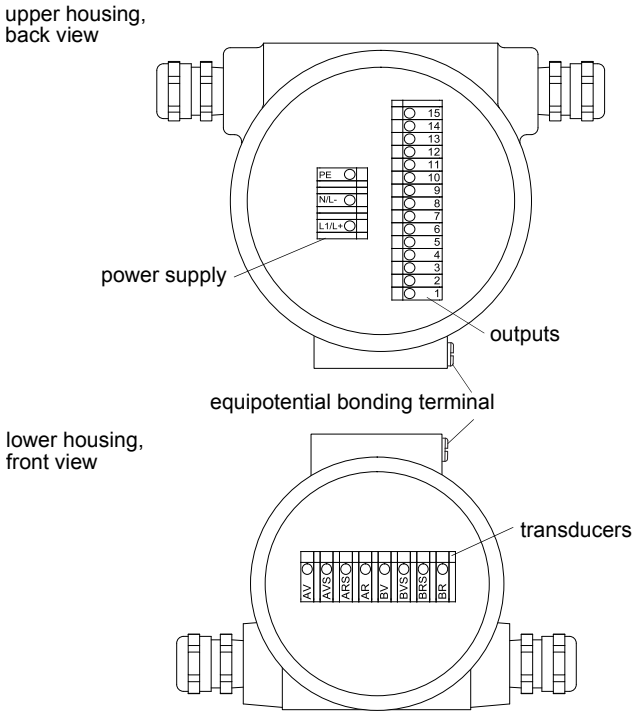
FLUXUS ADM 8127



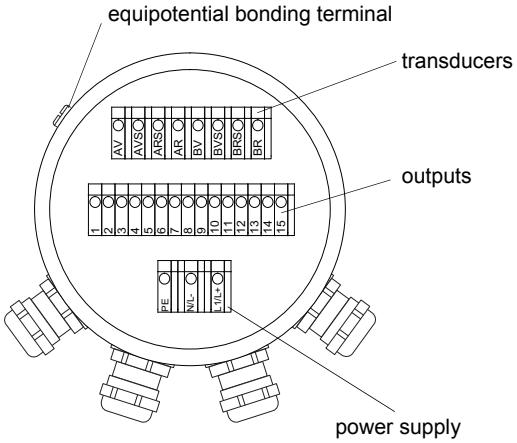


Terminal Assignment

FLUXUS ADM 8027, ADM 8027L, ADM 8027P (transmitter without frequency output), ADM 8027LP



FLUXUS ADM 8127, ADM 8127P (transmitter without frequency output)



power supply

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

transducers

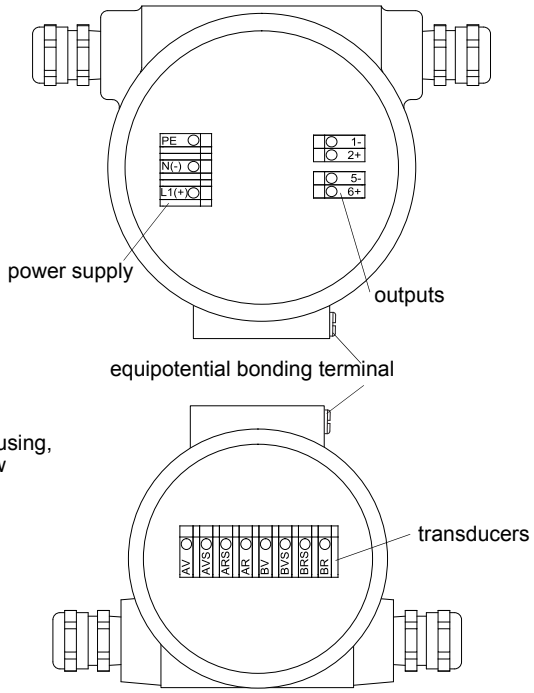
measuring channel A		measuring channel B	
terminal	**connection**	**terminal**	**connection**
AV	transducer ↑, signal	BV	transducer ↑, signal
AVS	transducer ↑, internal shield	BVS	transducer ↑, internal shield
ARS	transducer ⇈, internal shield	BRS	transducer ⇈, internal shield
AR	transducer ⇈, signal	BR	transducer ⇈, signal
cable gland	external shield	cable gland	external shield

outputs

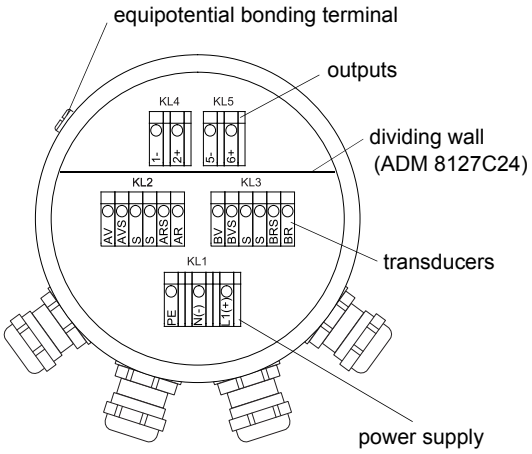
terminal	connection
1(-), 2(+)	current output I1
3(-), 4(+)	current output I2 (optional)
5(-), 6(+)	binary output B1 (open collector)
7(-), 8(+)	binary output B2 (open collector, optional)
9(a), 10(b)	binary output B3 (open collector or Reed relay, optional)
11(a), 12(b)	binary output B4 (open collector or Reed relay, optional)
13(B-), 14(A+)	RS485 (optional)

FLUXUS ADM 8027C24, ADM 8027LC24, ADM 8027P (transmitter with frequency output)

upper housing, back view



FLUXUS ADM 8127C24, ADM 8127P (transmitter with frequency output)



power supply

AC (ADM 8027P, ADM 8127P)		DC	
terminal	**connection**	**terminal**	**connection**
PE	earth	PE	earth
N	neutral	L-	-
L1	phase	L+	+

transducers

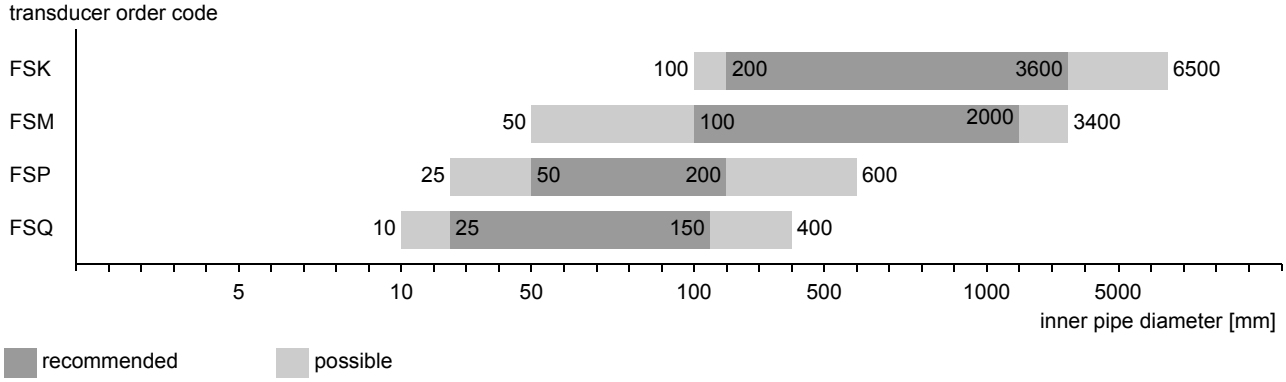
measuring channel A		measuring channel B	
terminal	**connection**	**terminal**	**connection**
AV	transducer ↑, signal	BV	transducer ↑, signal
AVS	transducer ↑, internal shield	BVS	transducer ↑, internal shield
ARS	transducer ⇑, internal shield	BRS	transducer ⇑, internal shield
AR	transducer ⇑, signal	BR	transducer ⇑, signal
S	not connected	S	not connected
cable gland	external shield	cable gland	external shield

outputs

	ADM 8027C24, ADM 8027LC24, ADM 8127C24,	ADM 8027P, ADM 8127P
color of terminals	blue (intrinsic safety)	green
terminal	**connection**	
1(-), 2(+)	current output I1	frequency output F1
5(-), 6(+)	binary output B1 (open collector)	binary output B1 (open collector)

Transducers

Transducer Selection

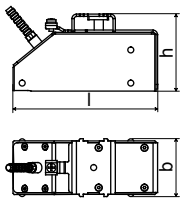
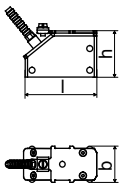
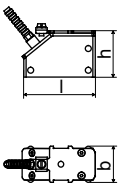
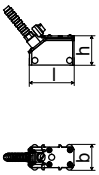


Transducer Order Code

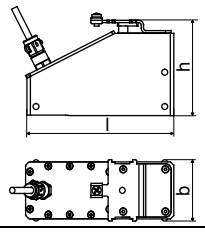
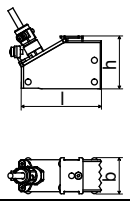
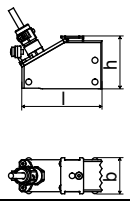
1, 2	3		4	5, 6	7, 8		9...11		12, 13	no. of character
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option	description
FS										set of ultrasonic flow transducers for liquids measurement, shear wave
	K									0.5 MHz
	M									1 MHz
	P									2 MHz
	Q									4 MHz
			N							normal temperature range
			E							extended temperature range (shear wave transducers with transducer frequency M, P, Q)
				A1						ATEX zone 1/IECEx zone 1
					TS					direct connection or connection via junction box
							XXX			cable length in m, for max. length of extension cable see page 20 connection system TS: 0 m: without junction box > 0 m: with junction box JB01
									IP68	degree of protection IP68
									OS	housing with stainless steel 316
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
		-				-		/		

Technical Data

Shear Wave Transducers (zone 1)

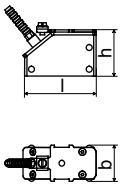
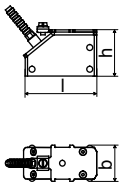
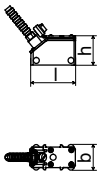
technical type		CDK1N81	CDM2N81	CDP2N81	CDQ2N81
order code		**FSK-NA1TS** **FSK-NA1TS/OS**	**FSM-NA1TS** **FSM-NA1TS/OS**	**FSP-NA1TS** **FSP-NA1TS/OS**	**FSQ-NA1TS** **FSQ-NA1TS/OS**
transducer frequency	MHz	0.5	1	2	4
inner pipe diameter d					
min. extended	mm	100	50	25	10
min. recommended	mm	200	100	50	25
max. recommended	mm	3600	2000	200	150
max. extended	mm	6500	3400	600	400
pipe wall thickness					
min.	mm	-	-	-	-
max.	mm	-	-	-	-
material					
housing 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		IP65	IP65	IP65	IP65
transducer cable					
type		1699	1699	1699	1699
length	m	5	4	4	3
dimensions					
length l	mm	126.5	64	64	40
width b	mm	51	32	32	22
height h	mm	67.5	40.5	40.5	25.5
dimensional drawing					
ambient temperature					
min.	°C	-40	-40	-40	-40
max.	°C	+130	+130	+130	+130
temperature compensation		x	x	x	x
explosion protection					
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 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	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	IBExU07ATEX1168 X
certification IECEx		IECEx IBE 08.0007X	IECEx IBE 08.0007X	IECEx IBE 08.0007X	IECEx IBE 08.0007X
type of protection		gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure	gas: increased safety, powder filling dust: protection by enclosure
transducer mounting fixture necessary		x	x	x	x

Shear Wave Transducers (zone 1, IP68)

technical type		CDK1LI1	CDM2LI1	CDP2LI1
order code		**FSK-NA1TS/IP68**	**FSM-NA1TS/IP68**	**FSP-NA1TS/IP68**
transducer frequency	MHz	0.5	1	2
inner pipe diameter d				
min. extended	mm	100	50	25
min. recommended	mm	200	100	50
max. recommended	mm	3600	2000	200
max. extended	mm	6500	3400	600
pipe wall thickness				
min.	mm	-	-	-
max.	mm	-	-	-
material				
housing 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 IEC/ EN 60529		IP68[1]	IP68[1]	IP68[1]
transducer cable				
type		2550	2550	2550
length	m	12	12	12
dimensions				
length l	mm	130	72	72
width b	mm	54	32	32
height h	mm	83.5	46	46
dimensional drawing				
ambient temperature				
min.	°C	-40	-40	-40
max.	°C	+100	+100	+100
temperature compensation		x	x	x
explosion protection				
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 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
certification IECEx		IECEx IBE 08.0007X	IECEx IBE 08.0007X	IECEx IBE 08.0007X
type of protection		gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure	gas: powder filling dust: protection by enclosure
transducer mounting fixture necessary		x	x	x

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

Shear Wave Transducers (zone 1, extended temperature range)

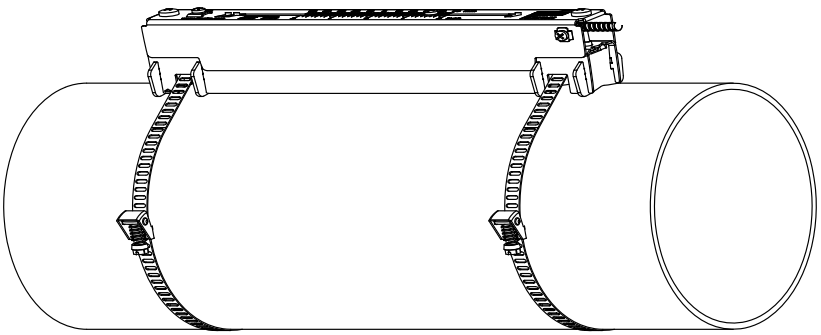
technical type		CDM2E85	CDP2E85	CDQ2E85
order code		**FSM-EA1TS** **FSM-EA1TS/OS**	**FSP-EA1TS** **FSP-EA1TS/OS**	**FSQ-EA1TS** **FSQ-EA1TS/OS**
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended	mm	50	25	10
min. recommended	mm	100	50	25
max. recommended	mm	2000	200	150
max. extended	mm	3400	600	400
pipe wall thickness				
min.	mm	-	-	-
max.	mm	-	-	-
material				
housing 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 compensation		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.	°C	-45	-45	-45
max.	°C	+225	+225	+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

Transducer Mounting Fixture

Order Code

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
			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
		-			-			/		

Variofix L (VLK, VLM, VLQ)

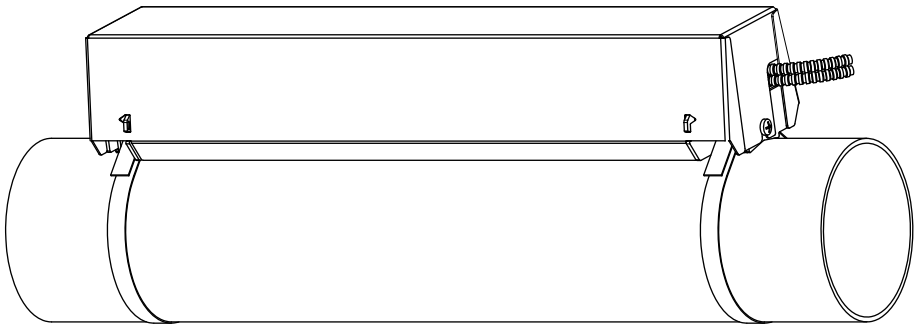


material: stainless steel 304 (1.4301), 301 (1.4310), 410 (1.4006), 410 (1.4006)
option OS: 316 (1.4571), 316L (1.4404), 17-7PH (1.4568)

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)

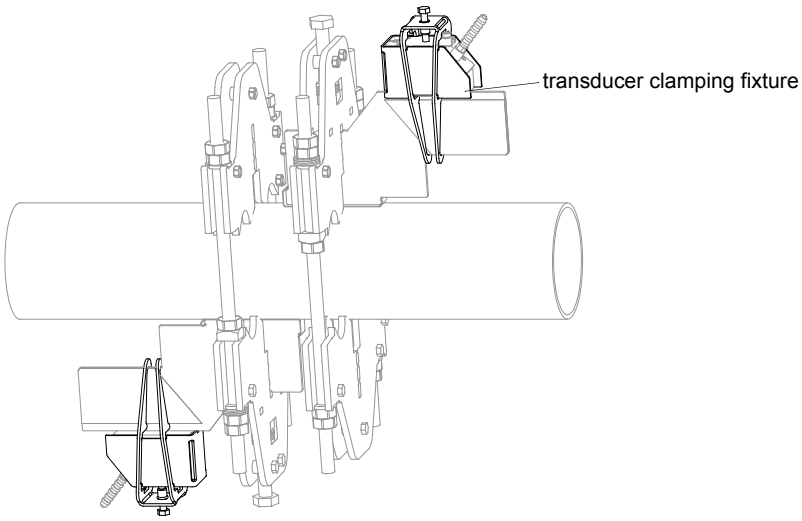


material: stainless steel 304 (1.4301), 301 (1.4310)
option OS: 316 (1.4571)

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 clamping fixture for WaveInjector WI



see Technical Specification TSWaveInjectorVx-x

Coupling Materials for Transducers

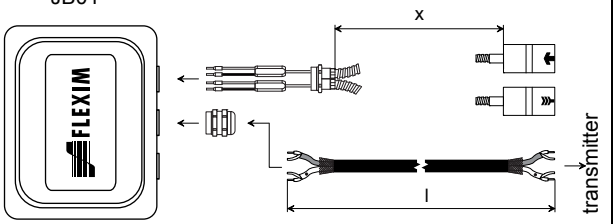
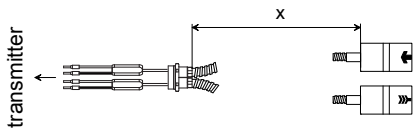
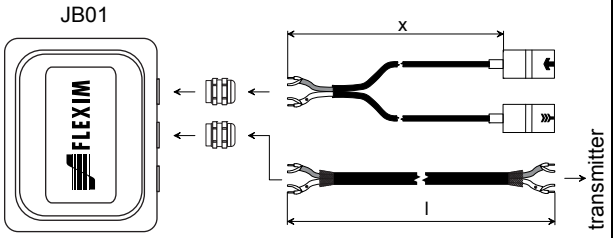
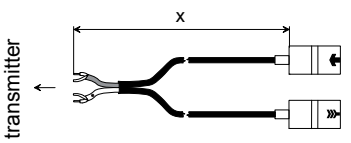
	normal temperature range (4th character of transducer order code = N)		**extended temperature range (4th character of transducer order code = E)**		**WaveInjector WI-400**	
	< 100 °C	< 170 °C	< 150 °C	< 200 °C	< 280 °C	280...400 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound 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	plomb	
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

Connection Systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
JB01 		*****8*
JB01 		****LI*

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

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

Transducer Cable

Technical Data

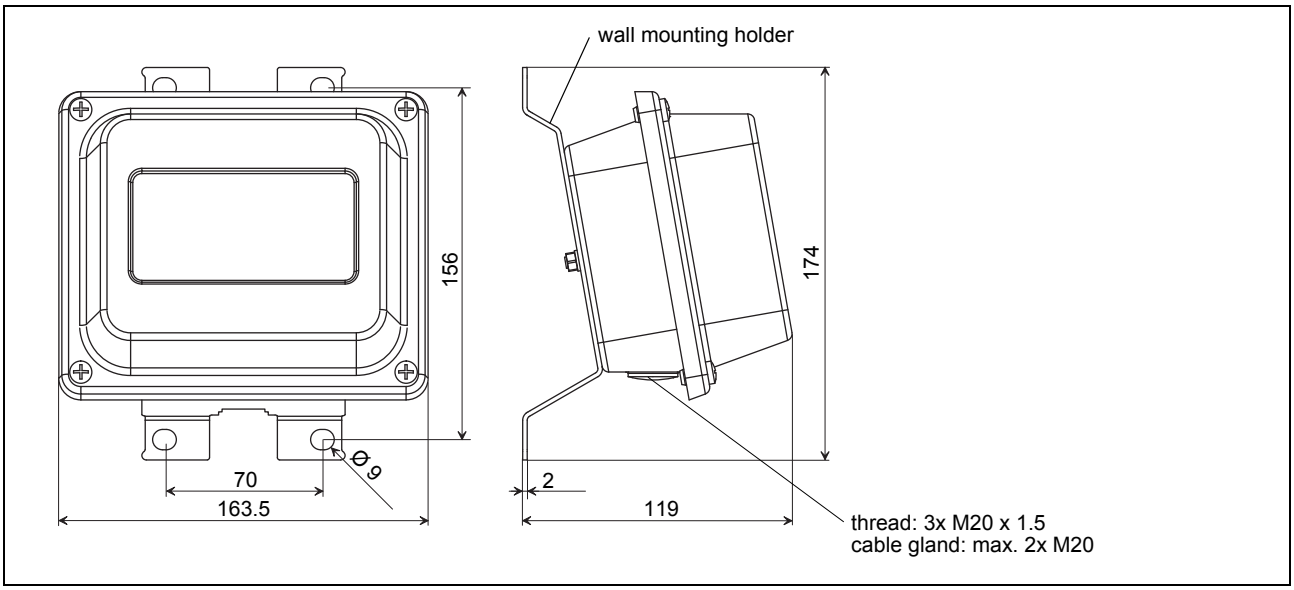
		transducer cable			extension cable
type		1699	2550 (option IP68)	6111	2615
standard length	m	see table above			-
max. length	m	-			see table above
ambient temperature	°C	-55...+200	-40...+100	-100...+225	-40...+70
properties			longitudinal water tight		halogen free fire propagation test according to 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	PUR
outer diameter	mm	2.9	5.2 ±0.2	2.7	12
thickness	mm	0.3	0.9	0.5	2
color		brown	gray	white	black
shield		x	x	x	x

Junction Box

Technical Data

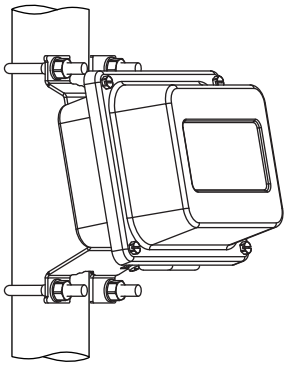
technical type			**JB01S4E3M**
dimensions			see dimensional drawing
fixation			wall mounting, optional: 2 " pipe mounting
material			
housing gasket			stainless steel 316L (1.4404) silicone
degree of protection according to IEC/ EN 60529			IP67
ambient temperature			
min. max.		°C °C	-40 +80
explosion protection			
ATEX / IECEx	zone		1
	marking		CE 0637 Ex II2G II2D Ex e mb II (T6)...T4 Ta -40...+(70)80 °C Ex tD A21 IP67 T 100 °C
	certification ATEX		IBExU06ATEX1161
	certification IECEx		IECEx IBE 08.0006
	type of protection		gas: • increased safety • decoupled network: encapsulation dust: protection by enclosure

Dimensions



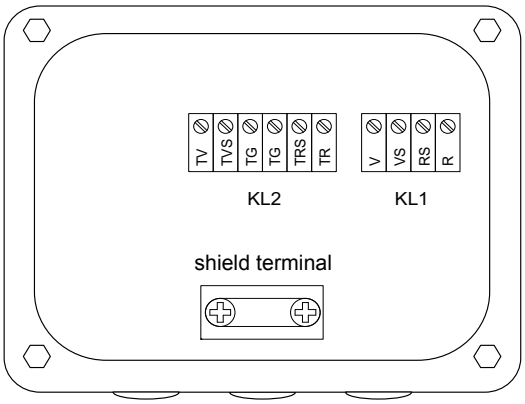
in mm

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

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