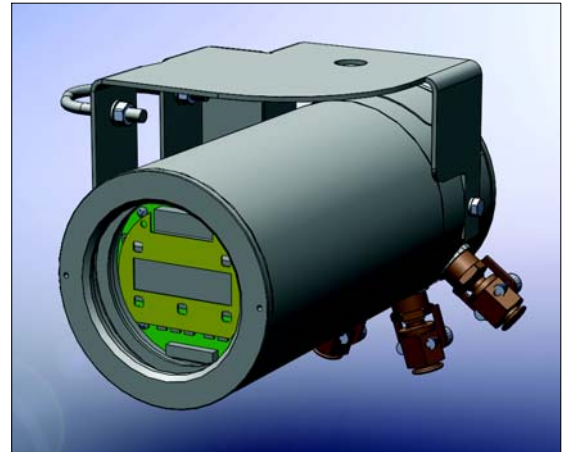


Liquid Ultrasonic Flowmeter for Permanent Installation in Hazardous Areas in the Mining Environment

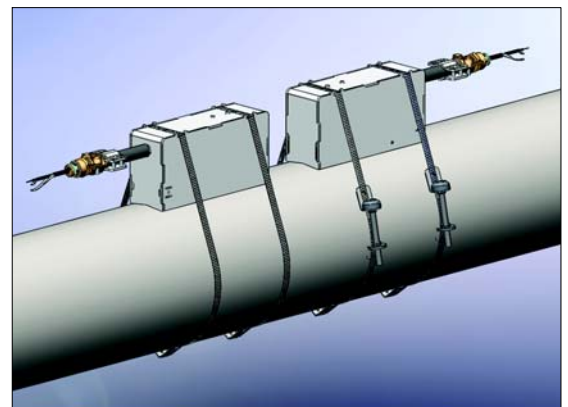
FLUXUS ADM 8127B is especially designed for the stationary use in explosive atmosphere areas in the mining environment (Equipment group I, category M2).

Features

- Non-intrusive measurement using the clamp-on technology for precise bi-directional, highly dynamic flow measurement
- Flameproof encapsulated stainless steel housing (SS316Ti) (degree of protection IP66 according to EN 60529). The flowmeter can be operated by a magnet pen without opening the housing.
- Terminals and connection compartment have type of protection Ex-e "increased safety". The power supply and the outputs are designed for the connection with intrinsically safe circuits (Ex-i).
- Automatic loading of calibration data and transducer detection, reduces set-up time and provide precise, long-term stable results.
- Transducers on request available for a wide range of inner pipe diameters (25...6500 mm) and fluid temperatures (-40...+200 °C)
- The transducers, the transducer cables and the cable glands are also fire damp proof according to ATEX 94/9/EC
- 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
- A high number of measuring cycles (up to 1000 per second) and the digital signal processing (DSP) guarantee stable and reliable measurement results even under difficult conditions
- Measuring interval of approx. 70 ms possible to record highly dynamic flows
- User-friendly design



FLUXUS ADM 8127B



Flow transducers in transducer shoe, mounted with tension strap

Applications

For use in explosive atmosphere areas in the underground mining (Equipment group I, category M2)

Table of Contents

Function	3
Measurement Principle	3
Calculation of Volumetric Flow Rate	3
Number of Sound Paths.....	4
Typical Measurement Setup	5
Flow Transmitter	6
Technical Data	6
Dimensions	7
Wall and 2 " Pipe Mounting Kit.....	7
Terminal Assignment	8
Transducers.....	9
Transducer Selection	9
Technical Data	9
Transducer Cable.....	10
Transducer Mounting Fixture	10

Function

Measurement Principle

Transit Time Difference Principle

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

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

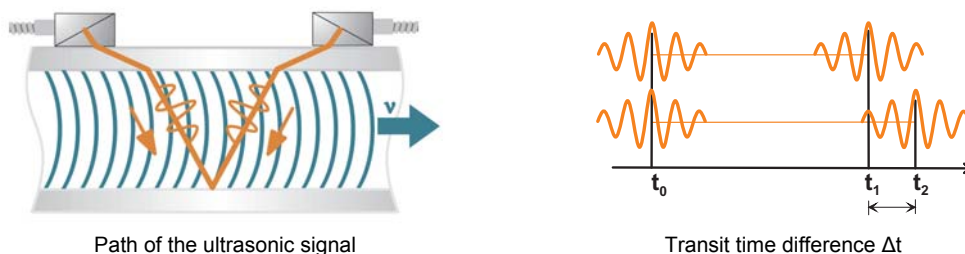
The transit time difference, Δt , is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow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

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

HybridTrek

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

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



Calculation of Volumetric Flow Rate

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

where:

- Q - volumetric flow rate
- k_{Re} - fluid mechanics calibration factor
- A - cross-sectional 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 mode**

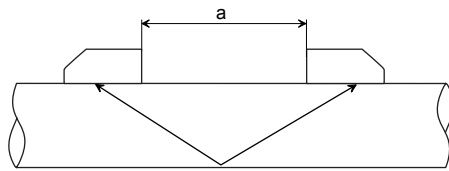
The number of sound paths is even. Both of the transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easier.

- **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.

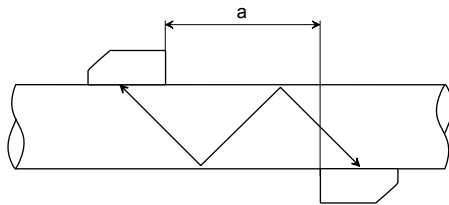
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

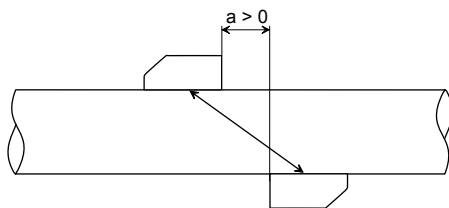


Reflection mode, number of sound paths: 2

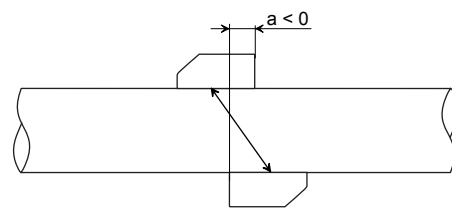
a - transducer distance



Diagonal mode, number of sound paths: 3

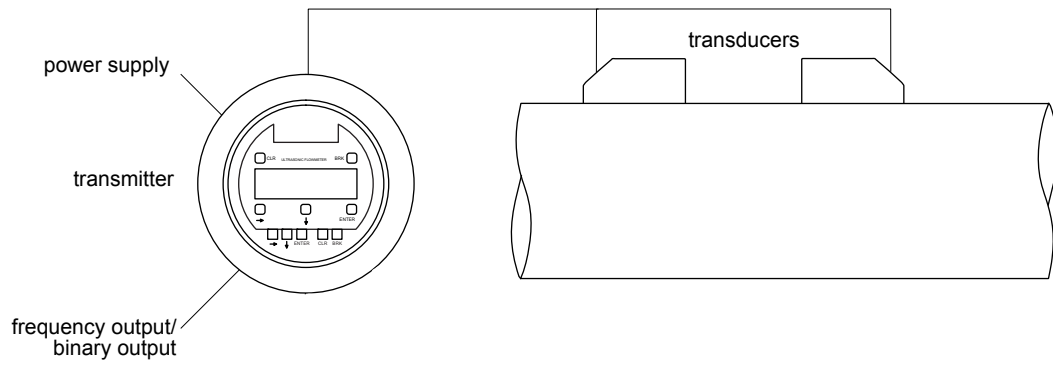


diagonal mode, number of sound paths: 1



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


Typical Measurement Setup



Example of a measurement setup in reflection mode

Flow Transmitter

Technical Data

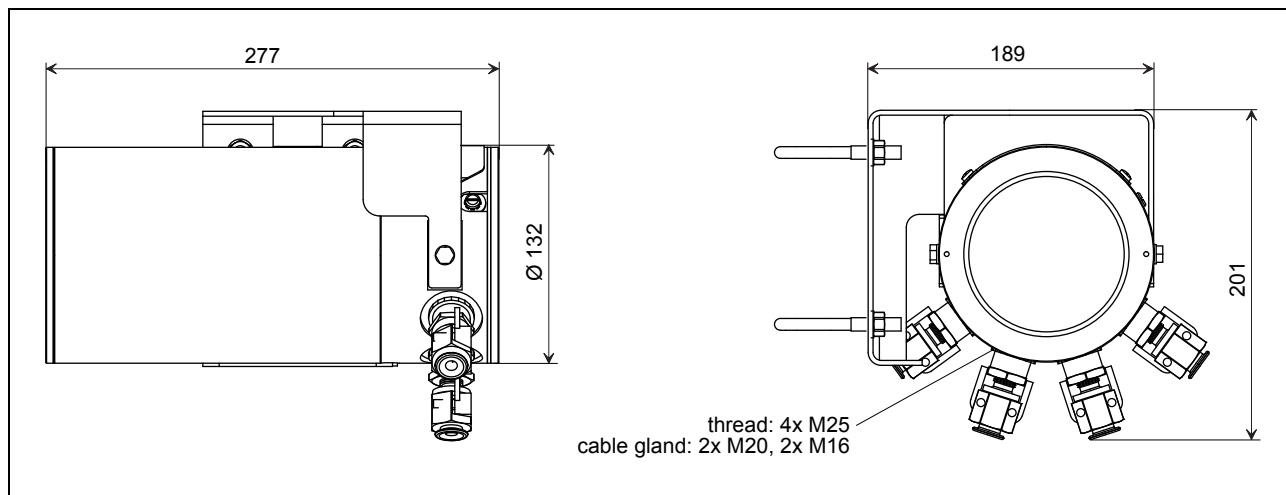
FLUXUS		ADM 8127B
design	explosion proof device for mines	
		
measurement		
measurement principle	transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content	
flow velocity	0.01...25 m/s	
repeatability	0.15 % of reading ±0.01 m/s	
medium	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-5M-1985	
accuracy¹		
with standard calibration	±1.6 % of reading ±0.01 m/s	
with extended calibration (optional)	±1.2 % of reading ±0.01 m/s	
with field calibration ²	±0.5 % of reading ±0.01 m/s	
flow transmitter		
power supply	12 V DC ± 10 %, U _i = 13.2 V, internal fuse: 0.315 A	
power consumption	< 5 W	
number of flow measuring channels	1	
signal attenuation	0...100 s, adjustable	
measuring cycle	100...1000 Hz	
response time	1 s, optional: 70 ms	
housing material	stainless steel 316Ti (1.4571)	
degree of protection according to EN 60529	IP66	
dimensions	see dimensional drawing	
weight	8.5 kg	
fixation	wall mounting, optional: 2 " pipe mounting	
operating temperature	-20...+50 °C	
display	2 x 16 characters, dot matrix, backlight	
menu language	English, German	
explosion protection		
A T E X	category	M2
	marking	☑ 0637 ☑ I M2 Ex de [ib] I Ta -20...+50 °C
	certification	IBExU05ATEX1078
	type of protection	electronics compartment: flameproof enclosure connection compartment: increased safety power supply circuit, output circuits: intrinsic safety
measuring functions		
physical quantities	volumetric flow rate, mass flow rate, flow velocity	
totalizer	volume, mass	
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times	

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

² reference uncertainty < 0.2 %

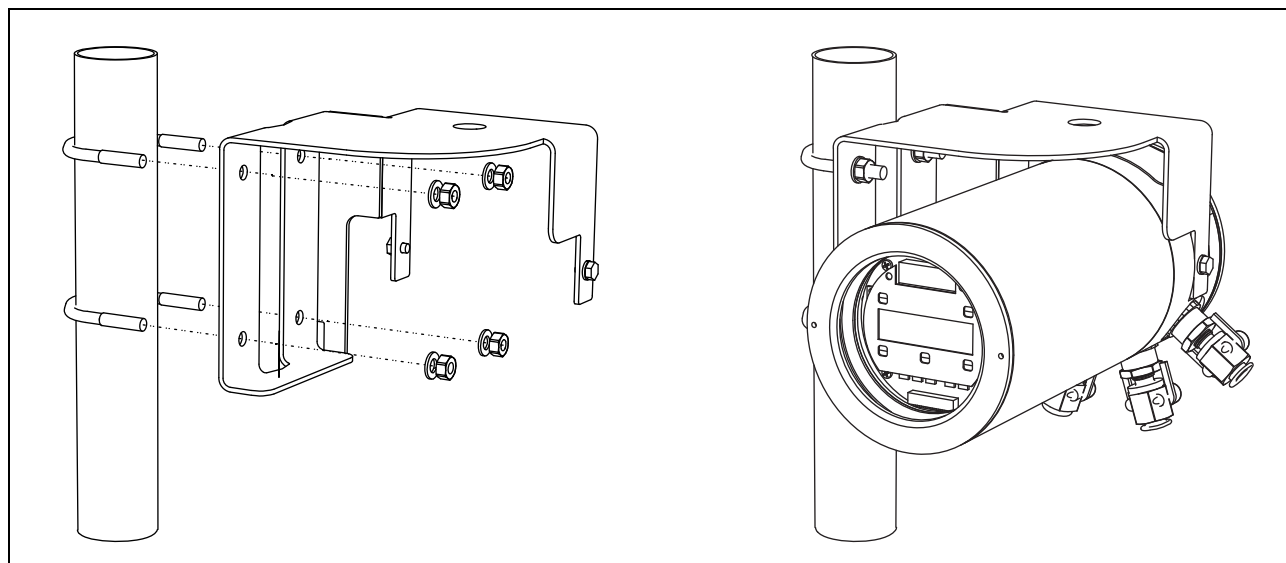
FLUXUS	ADM 8127B
outputs	
	The outputs are galvanically isolated from the transmitter.
frequency output	
number	1
range	5...15 Hz
open collector	12 V, $U_i = 13.2$ V
binary output	
number	1
open collector	12 V, $U_i = 13.2$ V
binary output as alarm output - functions	limit, change of flow direction or error
binary output as pulse output - pulse value - pulse width	0.01...1000 units 1...1000 ms

Dimensions



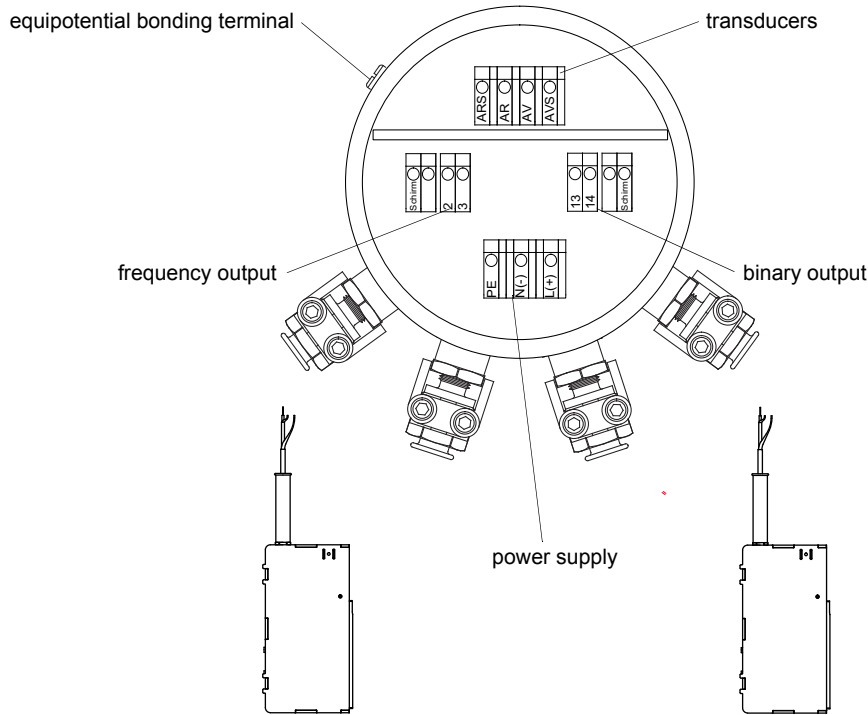
in mm

Wall and 2 " Pipe Mounting Kit



Terminal Assignment

FLUXUS ADM 8127B



power supply

terminal	connection
PE	earth
L-	-
L+	+

transducers

terminal	connection
AV	transducer ↑, signal
AVS	transducer ↑, internal shield
ARS	transducer ↗, internal shield
AR	transducer ↗, signal
Schirm	transducer ↑ and ↗, external shield

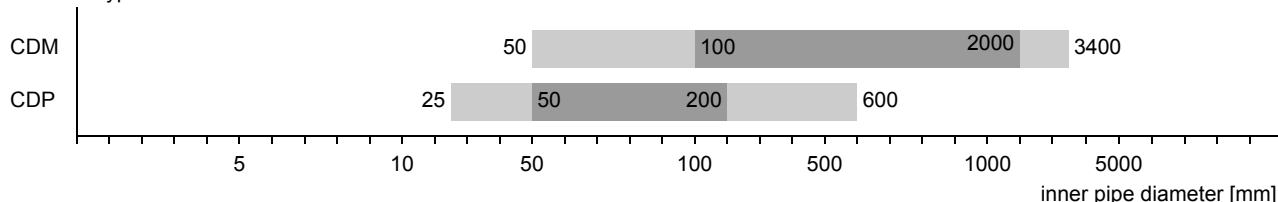
outputs

terminal	connection
2(-), 3(+)	frequency output F1
13(-), 14(+)	binary output B1 (open collector)

Transducers

Transducer Selection

technical type



Technical Data

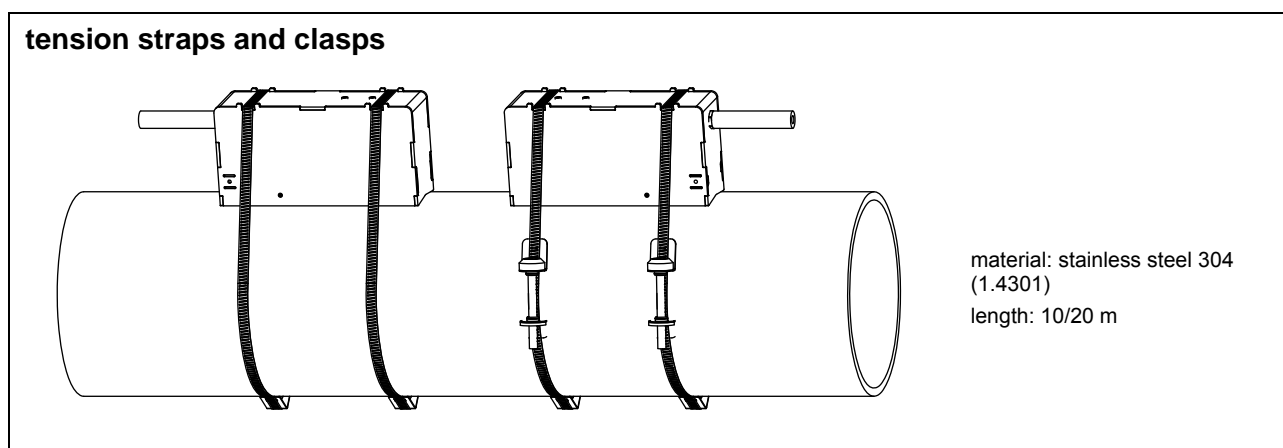
Shear Wave Transducers

technical type		CDM2NB1		CDP2NB1	
transducer frequency	MHz	1		2	
inner pipe diameter d					
min. extended	mm	50		25	
min. recommended	mm	100		50	
max. recommended	mm	2000		200	
max. extended	mm	3400		600	
material					
housing		PEEK with stainless steel cap and transducer shoe 304 (1.4301)		PEEK with stainless steel cap and transducer shoe 304 (1.4301)	
contact surface		PEEK		PEEK	
degree of protection according to EN 60529		IP65		IP65	
transducer cable					
type	m	2549		2549	
length	m	5/10		5/10	
dimensions					
length l	mm	146		146	
width b	mm	42.5		42.5	
height h	mm	76		76	
dimensional drawing					
operating temperature					
min.	°C	-40		-40	
max.	°C	+130		+130	
temperature compensation		x		x	
explosion protection					
category/EPL		M2/Mb		M2/Mb	
explosion protection temperature (pipe surface)					
min.	°C	-55		-55	
max.	°C	+180		+180	
marking		CE 0637 Ex q I Mb		CE 0637 Ex q I Mb	
certification ATEX		IBExU10ATEX1098 X		IBExU10ATEX1098 X	
certification IEC		IECEx IBE10.0014 X		IECEx IBE10.0014 X	
type of protection		powder filling		powder filling	
necessary transducer mounting fixture		-		-	

Transducer Cable

type		2549
operating temperature	°C	-100...+200
cable jacket		
material		PTFE
outer diameter	mm	5.3
thickness	mm	0.5
color		black
shield		x
sheath (protection hose for mining)		
material		CR
outer diameter	mm	11.5
thickness	mm	3.5
operating temperature	°C	-35...+80
marking		CONTITECH 8754 S DN8 PN10/16 DIN 20018 * **

Transducer Mounting Fixture





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

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

Subject to change without notification. Errors excepted.
FLUXUS® is a registered trademark of FLEXIM GmbH.
TSFLUXUS_F8127BV1-4-1EN_Leu, 2011-03-16