Technical specification

FLUXUS F736

Permanently installed ultrasonic flowmeter for liquids

Features

- 4 measuring channels to compensate highly disturbed flow profiles and to facilitate more accurate and repeatable measurements
- Best suitable for applications with limited straight runs
- High precision at fast and slow flow rates, high temperature and zero point stability

Applications

- Monitoring for large water transport lines
- Surveillance of hydro power penstocks
- Redundant check metering to custody transfer flow measurements
- Allocation flow measurement in transport systems

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TSFLUXUS_F736V1-1EN_Leu, 2023-10-01

Transmitter

Technical data

		FLUXUS F736**-NN	FLUXUS F736**-A2	FLUXUS F736**-F2
				
design		field device with 4 measuring channels in stainless steel housing		
measurement				
measurement principle		transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content		
flow direction		bidirectional		
synchronised channel averaging		x		
flow velocity	m/s	measuring range: 0.01...25		
repeatability		0.15 % MV ±0.005 m/s		
fluid		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		
measurement uncertainty (volumetric flow rate)				
measurement uncertainty of the measuring system[1]		±0.3 % MV ±0.005 m/s		
measurement uncertainty at the measuring point[2]		±1 % MV ±0.005 m/s		
transmitter				
power supply		• 90...250 V/50...60 Hz or • 11...32 V DC		
power consumption	W	< 15		
number of measuring channels		4 (1 measuring point)		
damping	s	0...100 (adjustable)		
measuring cycle	Hz	100...1000		
response time	s	1		
housing material		stainless steel 316L (1.4404)		
degree of protection		IP66		IP64
dimensions	mm	see dimensional drawing		
weight	kg	7.2		
fixation		wall mounting, optional: 2" pipe mounting		
ambient temperature	°C	-40...+60 (< -20 without operation of the display)		-20...+55
display		128 x 64 pixels, backlight		
menu language		English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian, Chinese		
explosion protection				
• ATEX				
marking		-	CE Ex II3G Ex nA ic IIC T4 Gc T_a -40...+60 °C	-
• FM				
marking		-	-	FM APPROVED NI/Cl. I, II, III / Div. 2 / GP. A, B, C, D, E, F, G / T5 -20 °C ≤ Ta ≤ 55 °C IP64
certification		-	-	FM23US0080, FM23CA0059
measuring functions				
physical quantities		volumetric flow rate, mass flow rate, flow velocity, thermal energy rate (if temperature inputs are installed)		
totaliser		volume, mass, optional: thermal energy		
diagnostic functions		sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times		
communication interfaces				
service interfaces		measured value transmission, parametrisation of the transmitter: • USB[3] • LAN[3]		
process interfaces		max. 1 option: • Modbus RTU • BACnet MS/TP • M-Bus • HART • Modbus TCP • BACnet IP • Profibus PA • FF H1	max. 1 option: • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1	max. 1 option: • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1

[1] with aperture calibration of the transducers

[2] for transit time difference principle and reference conditions

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

		FLUXUS F736**-NN	FLUXUS F736**-A2	FLUXUS F736**-F2
accessories				
data transmission kit		USB cable		
software		• FluxDiagReader: reading of measured values and parameters, graphical representation • FluxDiag (optional): reading of measurement data, graphical representation, report generation, parametrisation of the transmitter		
data logger				
loggable values		all physical quantities, totalised physical quantities and diagnostic values		
capacity		max. 800 000 measured values		
outputs				
		The outputs are galvanically isolated from the transmitter.		
number		active current inputs and outputs: max. 4		
• switchable current output				
		configurable according to NAMUR NE 43 All switchable current outputs are jointly switched to active or passive.		
number		max. 4		
range	mA	4...20 (alarm current: 3.2...3.99, 20.01...24, hardware fault current: 3.2)		
uncertainty		0.04 % of output value ±3 µA		
active output		R_{ext} = 250...530 Ω, $U_{opencircuit}$ = 28 V DC		
passive output		U_{ext} = 9...30 V DC, depending on R_{ext} (R_{ext} < 458 Ω at 20 V)		
current output in HART mode		option		
• range	mA	4...20 (alarm current: 3.5...3.99, 20.01...22, hardware fault current: 3.2)		
• active output		R_{ext} = 250...530 Ω, $U_{opencircuit}$ = 28 V DC		
• passive output		U_{ext} = 9...30 V DC, depending on R_{ext} (R_{ext} = 250...458 Ω at 20 V)		
• digital output				
number		max. 4		
functions		• frequency output • binary output • pulse output		
type		open collector (passive)		
operating parameters		8.2 V/30 mA (NAMUR)		
max. values		8 mA at 29 V DC		
frequency output				
• range	kHz	2...10		
• damping	s	0...999.9		
• pulse-to-pause ratio		1:1		
binary output				
• binary output as alarm output		limit, change of flow direction or error		
pulse output				
• pulse value	units	0.01...1000		
• pulse width	ms	0.05...1000		
• pulse rate		max. 10 000 pulses		
inputs				
		The inputs are galvanically isolated from the transmitter.		
number		active current inputs and outputs: max. 4		
• temperature input				
number		max. 4		
type		Pt100/Pt1000		
connection		4-wire		
range	°C	-150...+560		
resolution	K	0.01		
accuracy		±0.01 % MV ±0.03 K at 18...28 °C ±0.01 % MV ±0.03 K ±0.0005 %/K at <18 °C/>28 °C		
cable resistance	Ω	max. 1000		
• switchable current input				
		All switchable current inputs are jointly switched to active or passive.		
number		max. 4		
accuracy		±0.1 % MV ±0.01 mA at 18...28 °C ±0.1 % MV ±0.01 mA ±0.005 %/K at <18 °C/>28 °C		
resolution	µA	0.1		
active input		R_{int} = 75 Ω, I_{max} ≤ 30 mA $U_{opencircuit}$ = 28 V (open circuit) U_{min} = 21.4 V at 20 mA		
• range	mA	0...20		
passive input		U_{ext} = 24 V, R_{int} = 35 Ω, I_{max} ≤ 24 mA		
• range	mA	0...20		

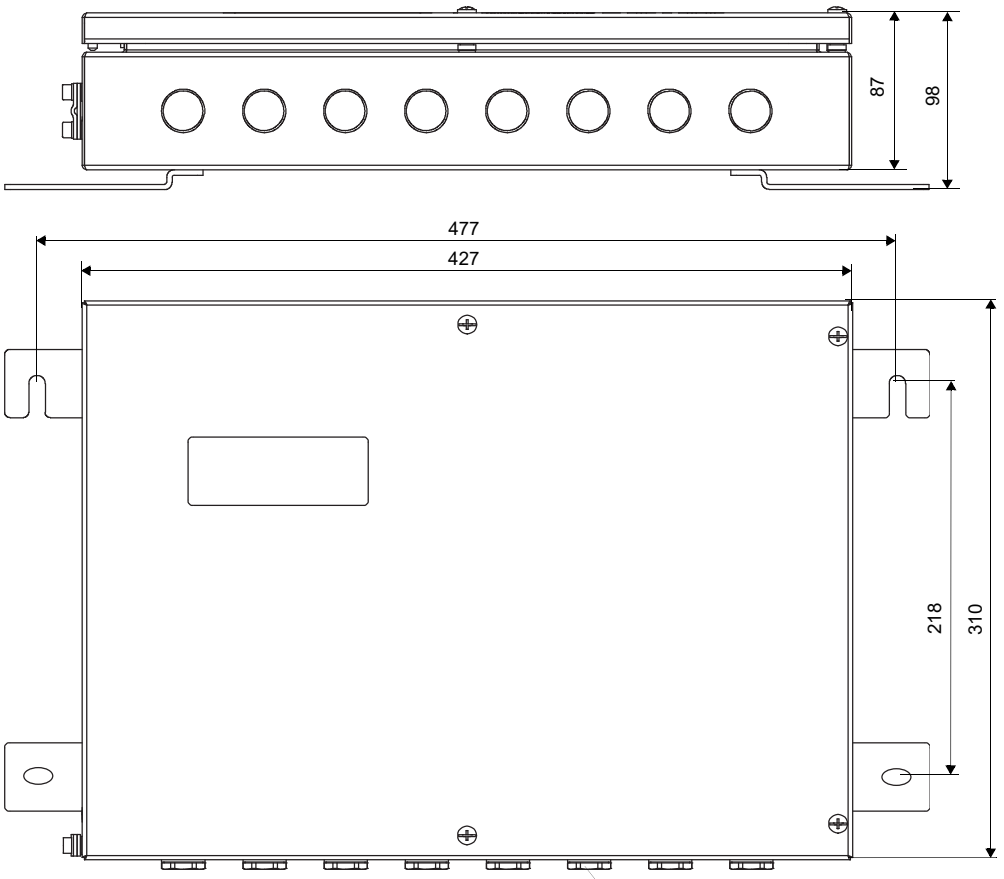
[1] with aperture calibration of the transducers

[2] for transit time difference principle and reference conditions

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

Dimensions

***736**

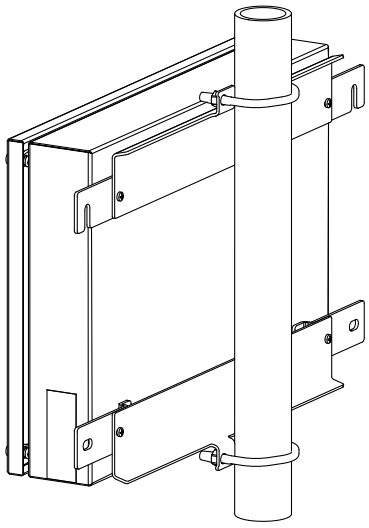


in mm

cable gland: max. 8x M20 with flat gasket and counter nut

Wall and 2" pipe mounting kit

***736**

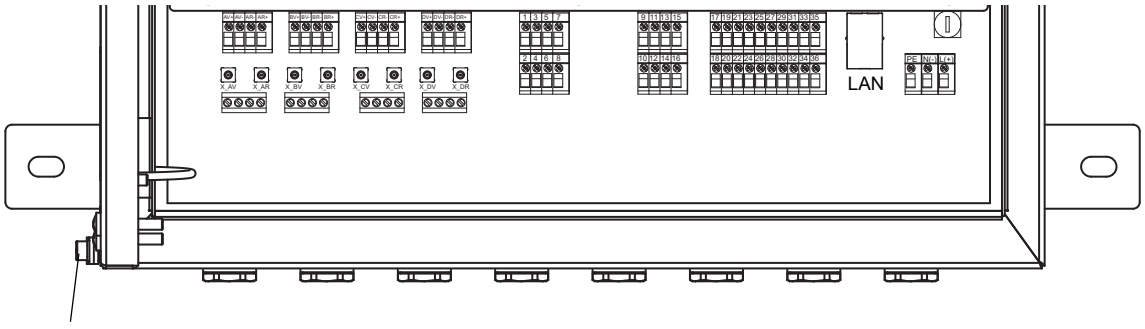


Storage

- do not store outdoors
- store within the original package
- store in a dry and dust-free place
- protect against sunlight
- keep all openings closed
- storing temperature: -20...+60 °C

Terminal assignment

***736**



power supply[1]			
AC		**DC**	
terminal	**connection**	**terminal**	**connection**
L	outer conductor	(+)	+
N	neutral conductor	(-)	-
⏚	protective conductor	⏚	protective conductor

[1] cable (by customer): e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm²

transducers, extension cable				
measuring channel A		**measuring channel B**		**transducer**
terminal	**connection**	**terminal**	**connection**	
AV	signal	BV	signal	
AVS	internal shield	BVS	internal shield	
ARS	internal shield	BRS	internal shield	
AR	signal	BR	signal	

outputs, inputs[1, 2]	
terminal	**connection**
depending on configuration	current output, digital output, current input
1, 2, 3, 4 5, 6, 7, 8 9, 10, 11, 12 13, 14, 15, 16	temperature input
33+, 34-	passive current output/HART
33-, 34+	active current output/HART
33, 34	Modbus RTU, BACnet MS/TP, M-Bus, Profibus PA, FF H1

temperature probe		
terminal	**direct connection**	**connection with extension cable**
1, 5, 9, 13	red	red
2, 6, 10, 14	white	white
3, 7, 11, 15	red/blue	grey
4, 8, 12, 16	white/blue	blue
USB	type C Hi-Speed USB 2.0 Device	service (FluxDiag/FluxDiagReader)
LAN	RJ45 10/100 Mbps Ethernet	• service (FluxDiag/FluxDiagReader) • Modbus TCP • BACnet IP

[1] cable (by customer): e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm²

[2] The number, type and terminal assignment are customised.

Transducers

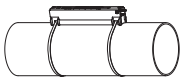
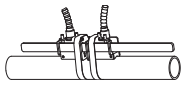
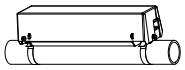
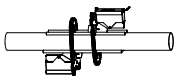
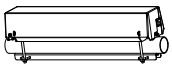
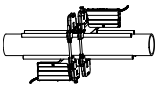
Overview

Shear wave transducers

			technical type					
			G	**K**	**M**	**P**	**Q**	**S**
zone 2 - FM Class I Div. 2 - nonEx normal temperature range			CDG1N52 CLG1N52	CDK1N52 CLK1N52	CDM2N52 CLM2N52	CDP2N52 CLP2N52	CDQ2N52 CLQ2N52	CDS2N52
zone 2 - nonEx IP68			CDG1LI8	CDK1LI8	CDM2LI8	CDP2LI8		
zone 2 - FM Class I Div. 2 - nonEx extended temperature range			CDG1E52 CLG1E52	CDK1E52 CLK1E52	CDM2E52 CLM2E52	CDP2E52 CLP2E52	CDQ2E52 CLQ2E52	
zone 1 normal temperature range			CDG1N81 CLG1N81	CDK1N81 CLK1N81	CDM2N81 CLM2N81	CDP2N81 CLP2N81	CDQ2N81 CLQ2N81	
zone 1 IP68			CDG1LI1	CDK1LI1	CDM2LI1	CDP2LI1		
zone 1 extended temperature range			CDG1E83 CLG1E83	CDK1E83 CLK1E83	CDM2E85 CLM2E85	CDP2E85 CLP2E85	CDQ2E85 CLQ2E85	
inner pipe diameter d								
min. extended	mm		400	100	50	25	10	6
min. recommended	mm		500	200	100	50	25	10
max. recommended	mm		4000	2000	1000	400	150	70
max. extended	mm		6500	2400	1200	480	240	70
pipe wall thickness								
min.	mm		11	5	2.5	1.2	0.6	0.3

for further data see Technical specification TS_F7xx-transducersVx-xXX_Leu

Transducer mounting fixture

Variofix L		**Variofix C**	**WaveInjector with chains**
	 transducer frequency S		
		Variofix C with bolt mounting plates	**WaveInjector with threaded rods**
		 outer pipe diameter: **VCM**: max. 46 mm **VCQ**: max. 36 mm	 outer pipe diameter: 35...380 mm

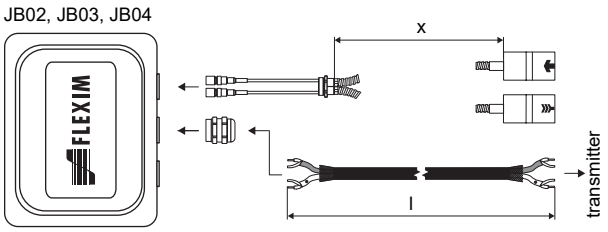
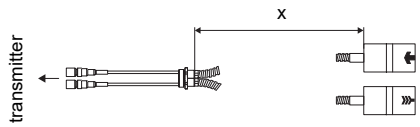
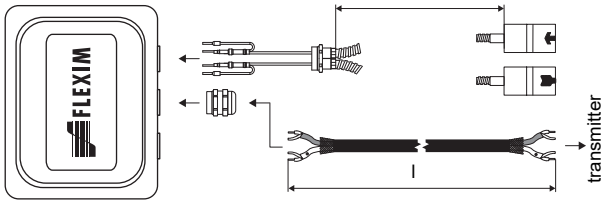
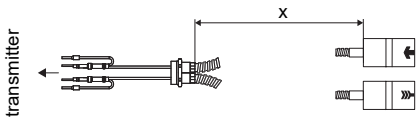
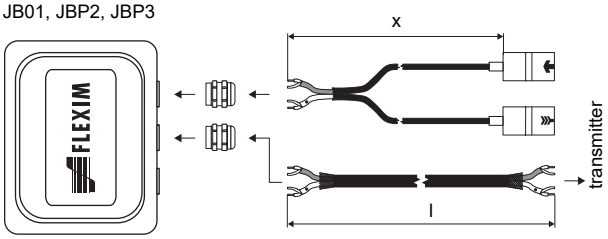
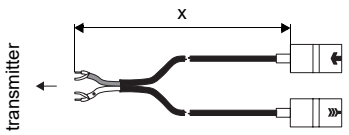
for further data see Technical specification TS_F7xx-transducersVx-xXX_Leu

Coupling materials for transducers

	normal temperature range		**extended temperature range**			**WaveInjector**	
	< 100 °C	< 170 °C	< 150 °C	< 200 °C	200...240 °C	< 280 °C	280...630 °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 TF	coupling foil type A and coupling foil type VT	coupling foil type B and coupling foil type VT
long time measure-ment	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type VT			

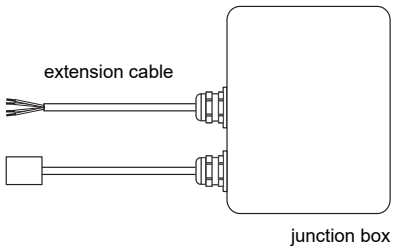
for further data see Technical specification TS_F7xx-transducersVx-xXX_Leu

Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
JB02, JB03, JB04 		*****52
connection system T1		
connection with extension cable	direct connection	transducers technical type
JB01 		*****8*
JB01, JBP2, JBP3 		****LI*

for further data see Technical specification TS_F7xx-transducersVx-xXX_Leu

Temperature probes

PT12N		PT12F
item number: • 770415-1 • 770414-2 (matched)	item number: • 770415-1A2 • 770414-1A2 (matched)	item number: • 770415-2
• Pt100 • clamp-on • -30...+250 °C	• Pt100 • clamp-on • -30...+250 °C • ATEX/UKCA	• Pt100 • clamp-on • -45...+250 °C • response time: 8 s
direct connection 		
connection with extension cable  		

see Technical specification TS_PTVx-xXX_Leu

Annex

Reference conditions

as available at e.g. the test facilities of Physikalisch-Technische Bundesanstalt

measurement principle		transit time difference correlation principle
all uncertainties	%	95
fluid temperature		25 °C ±5 K
ambient temperature		25 °C ±5 K
warm-up time	min	10
flow profile at the measuring point		fully developed, rotationally symmetric
installation		installation according to specifications using the recommended transducers
Reynolds number		> 10 000
pipe diameter uncertainty	%	0.2
pipe wall thickness uncertainty	%	1
circularity tolerance		0.08 % of inner pipe diameter
SCNR	dB	> 48
SNR	dB	> 12