

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


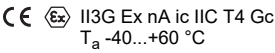
Applications

- 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



Transmitter

Technical data

FLUXUS F736** -NN, F736** -A2	
	
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	<ul style="list-style-type: none"> • 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
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)
display	128 x 64 pixels, backlight
menu language	English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian, Chinese
explosion protection	
• ATEX	
transmitter	F736** -A2
marking	
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: <ul style="list-style-type: none"> • USB³ • LAN³
process interfaces	max. 1 option: <ul style="list-style-type: none"> • Modbus RTU • BACnet MS/TP • M-Bus • HART • Modbus TCP • BACnet IP • 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)

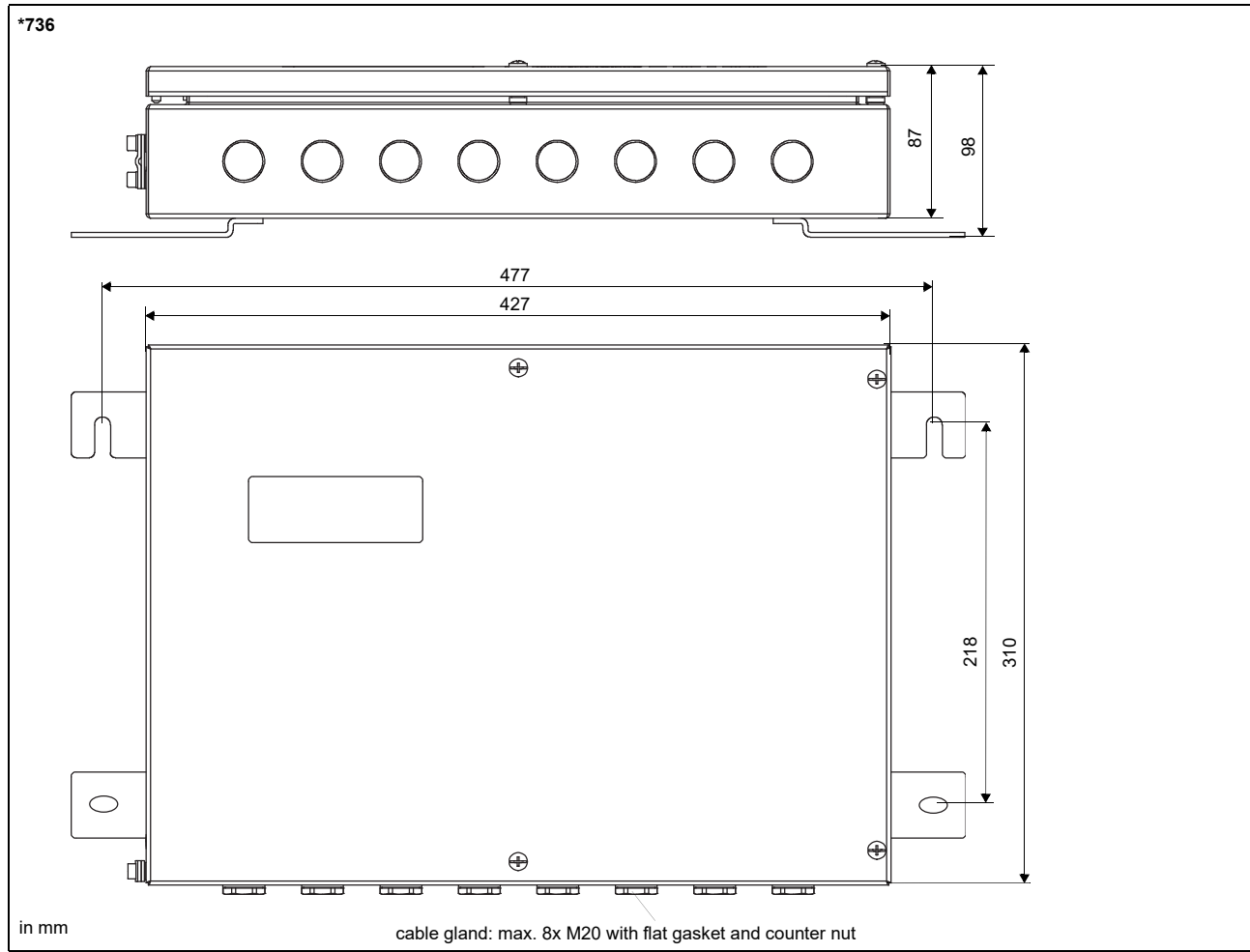
FLUXUS F736**-NN, F736**-A2	
accessories	
data transmission kit	USB cable
software	<ul style="list-style-type: none"> FluxDiagReader: reading of measured values and parameters, graphical representation FluxDiag (optional): reading of measurement data, graphical representation, report generation, parametrisation 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 NE43 All switchable current outputs are jointly switched to active or passive.
number	max. 4
range	mA 4...20 (3.2...24)
accuracy	0.04 % MV $\pm 3 \mu A$
active output	$R_{ext} < 530 \Omega$
passive output	$U_{ext} = 9...30 V$, depending on R_{ext} ($R_{ext} < 458 \Omega$ at 20 V)
current output in HART mode	option
<ul style="list-style-type: none"> range active output passive output 	mA 4...20 (3.5...22) $R_{ext} = 250...530 \Omega$ $U_{ext} = 9...30 V DC$
• digital output	
number	max. 4
functions	<ul style="list-style-type: none"> frequency output binary output pulse output
operating parameters	$U_{ext} = (8.2 \pm 0.1) V DC$
frequency output	
<ul style="list-style-type: none"> range 	kHz 0...10
binary output	
<ul style="list-style-type: none"> binary output as alarm output 	limit, change of flow direction or error
pulse output	
<ul style="list-style-type: none"> pulse value pulse width 	units 0.01...1000 ms 0.05...1000
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	$^{\circ}C$ -150...+560
resolution	K 0.01
accuracy	$\pm 0.01 \% MV \pm 0.03 K$
• switchable current input	
	All switchable current inputs are jointly switched to active or passive.
number	max. 4
accuracy	$\pm 0.1 \% MV \pm 0.01 mA$
active input	$U_{out} = \max. 28 V, R_{int} = 75 \Omega$
<ul style="list-style-type: none"> range 	mA 0...24
passive input	$R_{int} = 35 \Omega, U_{out} = 26 V, I_{max} \leq 24 mA$
<ul style="list-style-type: none"> range 	mA 0...20

¹ with aperture calibration of the transducers

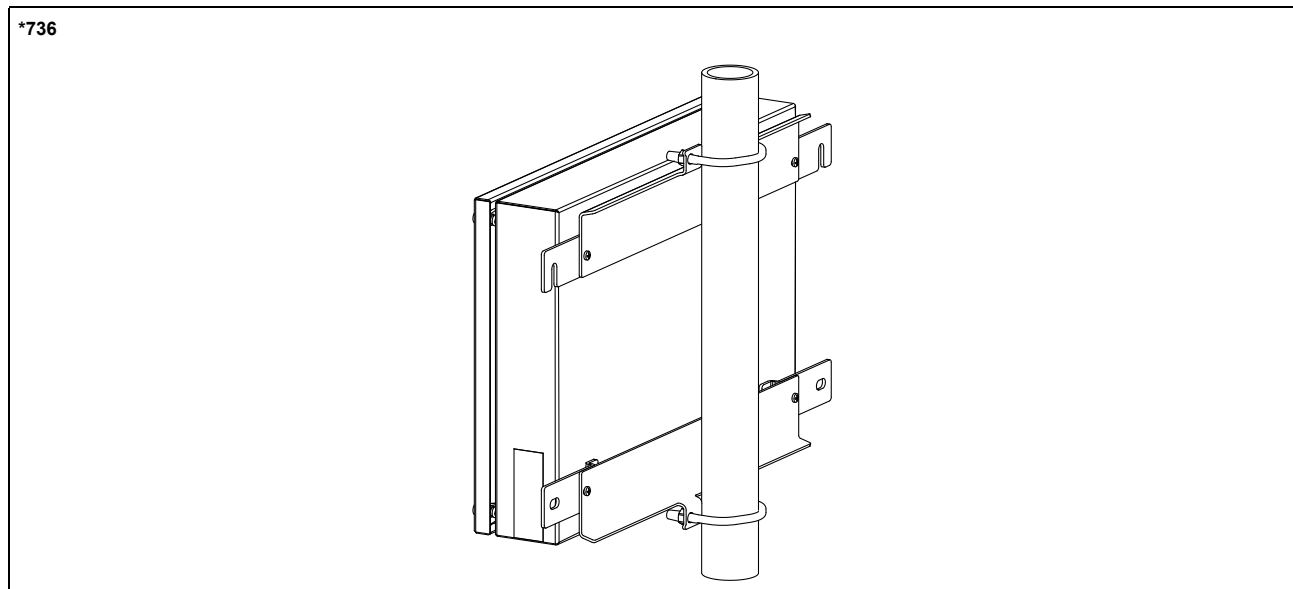
² for transit time difference principle and reference conditions

³ outside the explosive atmosphere (housing cover open)

Dimensions



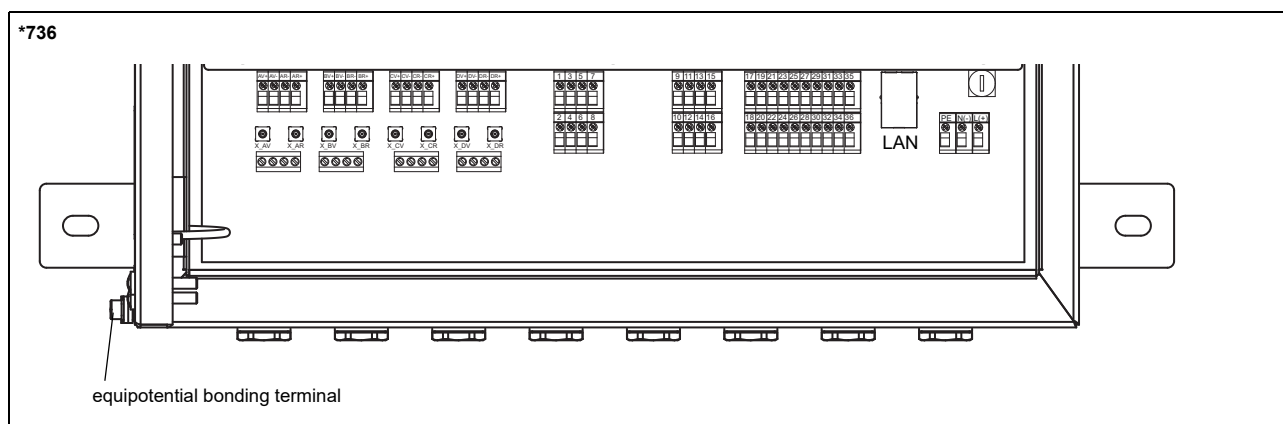
Wall and 2" pipe mounting kit



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: -40...+60 °C

Terminal assignment



power supply ¹			
AC		DC	
terminal	connection	terminal	connection
L	phase	(+)	+
N	neutral	(-)	-
PE	protective earth	PE	protective earth

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

transducers				
transducer cable (transducers *****8*, ****LI*)		transducer cable (transducers *****52)		
extension cable (transducers *****8*, ****LI*, *****52)		measuring channel A, B, C, D		
terminal	connection	transducer	terminal	connection
*V	signal	↑	X_xV	SMB connector
*VS	internal shield			
*RS	internal shield	↗	X_xR	SMB connector
*R	signal			

outputs, inputs ^{1, 2}	
terminal	connection
depending on configuration	current output, digital output, current input
1, 2, 3, 4	temperature input
5, 6, 7, 8	
9, 10, 11, 12	
13, 14, 15, 16	
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	<ul style="list-style-type: none"> • 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

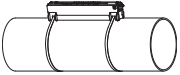
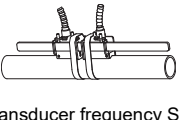
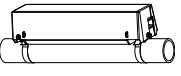
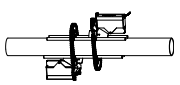
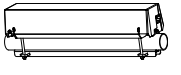
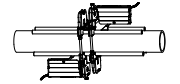
Overview

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	CDG1L18	CDK1L18	CDM2L18	CDP2L18			
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	CDG1L11	CDK1L11	CDM2L11	CDP2L11			
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		transducer box WI for Wavelnjector with chains
	 transducer frequency S			
		Variofix C with bolt mounting plates	transducer box WI for Wavelnjector with threaded rods	
		 outer pipe diameter: VCM: max. 46 mm VQC: 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			Wavelnjector	
	< 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 measurement	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type VT			


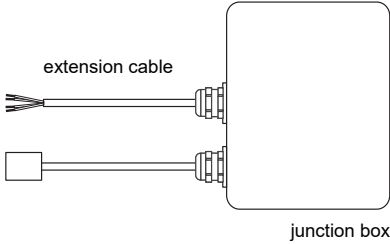
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Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
<p>JB02, JB03, JB04</p>		<p>****52</p>
connection system T1		
connection with extension cable	direct connection	transducers technical type
<p>JB01</p>		<p>****8*</p>
<p>JB01, JBP2, JBP3</p>		<p>****L*</p>

for further data see Technical specification TS_F7xx-transducersVx-xxx_Leu

Temperature probes

PT12N		PT12F
order code: • ACC-PE-****-/T312 • ACC-PE-****-/T512 (matched)	order code: • ACC-PE-****-/T322 • ACC-PE-****-/T522 (matched)	order code: • ACC-PE-****-/T112
• clamp-on	• clamp-on • ATEX	• clamp-on • response time: 8 s
-30...+250 °C	-30...+250	-45...+250 °C
direct connection		
		
connection with extension cable		
		

see Technical specification TS_PTVx-xXX

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