

Flexim FLUXUS F722 Ultrasonic Flowmeter



Permanently Installed Ultrasonic Flowmeter for Liquids

Features




- Exact and highly reliable clamp-on volume and mass flow measurement
- High measurement accuracy even at very low as well as very high flow rates and independent of the flow direction (bidirectional)
- The measurement is zero point stable, drift free and independent of pipe material, process pressure, process temperature and process fluid

Applications

- Chemical industry, petrochemical industry, oil and gas industry, pharmaceutical industry, semiconductor industry, manufacturing industries, building technology/energy management, water and wastewater industry, mining industries

Transmitter

Technical data

	FLUXUS F722**-NNN**.*AL F722**-NNN**.*ST	FLUXUS F722**-A2N**.*AL F722**-A2N**.*ST	FLUXUS F722**-F2N**.*AL F722**-F2N**.*ST
			
design	standard field device	standard field device zone 2	standard field device FM Class I Div. 2
measurement			
measurement principle	transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content		
flow direction	bidirectional		
synchronized channel averaging	x (2 measuring channels necessary)		
flow velocity	ft/s	0.03 to 82	
repeatability	0.15 % MV ±0.02 ft/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 ±0.02 ft/s includes calibration certificate traceable to NIST		
measurement uncertainty at the measuring point ²	±1 % MV ±0.02 ft/s		
transmitter			
power supply	<ul style="list-style-type: none"> • 100 to 230 V/50 to 60 Hz or • 20 to 32 V DC or • 11 to 16 V DC 		
power consumption	W	< 15	
number of measuring channels	1, optional: 2 (1 measuring point)		
damping	s	0 to 100 (adjustable)	
measuring cycle	Hz	100 to 1000 (1 channel)	
response time	s	1 (1 channel), option: 0.02	
housing material	aluminum, powder coated or stainless steel 316L		
degree of protection	IP66		aluminum housing: IP66/NEMA 4X stainless steel housing: IP65
dimensions	inch	see dimensional drawing	
weight	lb	aluminum housing: 11.9 stainless steel housing: 11.2	
fixation	wall mounting, optional: 2" pipe mounting		
ambient temperature	°F	-40 to +140 (< -4 without operation of the display)	aluminum housing: -40 to +131/140 (< -4 without operation of the display) stainless steel housing: -4 to +131/140
display	128 x 64 pixels, backlight		
menu language	English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian, Chinese		
explosion protection			
• ATEX/IECEx			
marking	-	F722**-A20*A, F722**-A20*S: CE 0637 Ex II 3G II 2D Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db T _a -40...+60 °C	-
certification	-	IBExU11ATEX1015, IECEx IBE 11.0008	-
• FM			
marking	-	-	F722**-F20**2, F722**-F20**3:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E,F,G/ T5 F722**-F20**1:  NI/Cl. I,II,III/Div. 2/GP. A,B,C,D,E,F,G/ T4A

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 F722**-NNN**.*AL F722**-NNN**.*ST	FLUXUS F722**-A2N**.*AL F722**-A2N**.*ST	FLUXUS F722**-F2N**.*AL F722**-F2N**.*ST
measuring functions			
physical quantities	volumetric flow rate, mass flow rate, flow velocity, thermal energy rate (if temperature inputs are installed)		
totalizer	volume, mass, optional: thermal energy		
calculation functions	average, difference, sum (2 measuring channels necessary)		
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times		
communication interfaces			
service interfaces	measured value transmission, parametrization of the transmitter: <ul style="list-style-type: none"> • USB³ • LAN³ 		
process interfaces	max. 1 option: <ul style="list-style-type: none"> • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP 		
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, parametrization of the transmitter 		
data logger			
loggable values	all physical quantities, totalized physical quantities and diagnostic values		
capacity	max. 800 000 measured values		
outputs			
	The outputs are galvanically isolated from the transmitter.		
number	on request		
• switchable current output			
	All switchable current outputs are jointly switched to active or passive.		
range	mA	4 to 20 (3.2 to 22)	
accuracy		0.04 % MV ±3 µA	
active output		$R_{ext} < 250 \Omega$	
passive output		$U_{ext} = 8 \text{ to } 30 \text{ V}$, depending on R_{ext} ($R_{ext} < 1 \text{ k}\Omega$ at 30 V)	
• HART			
range	mA	4 to 20	
accuracy		0.1 % MV ±15 µA	
active output		$U_{int} = 24 \text{ V}$, $R_{ext} < 500 \Omega$	
passive output		$U_{ext} = 10 \text{ to } 24 \text{ V DC}$, depending on R_{ext} ($R_{ext} < 1 \text{ k}\Omega$ at 24 V)	
• voltage output			
range	V	0 to 1 or 0 to 10	
accuracy		0 to 1 V: 0.1 % MV ±1 mV 0 to 10 V: 0.1 % MV ±10 mV	
internal resistance		$R_{int} = 500 \Omega$	
• digital output			
functions		<ul style="list-style-type: none"> • frequency output • binary output • pulse output 	
number		3	
operating parameters		5 to 30 V / < 100 mA	
frequency output			
• range	kHz	0 to 5	
binary output			
• binary output as alarm output		limit, change of flow direction or error	
pulse output			
• functions		mainly for totalizing	
• pulse value	units	0.01 to 1000	
• pulse width	ms	0.05 to 1000	

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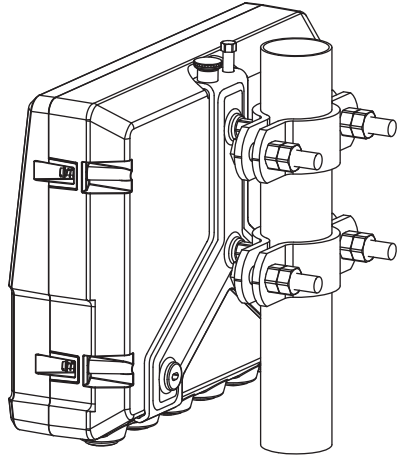
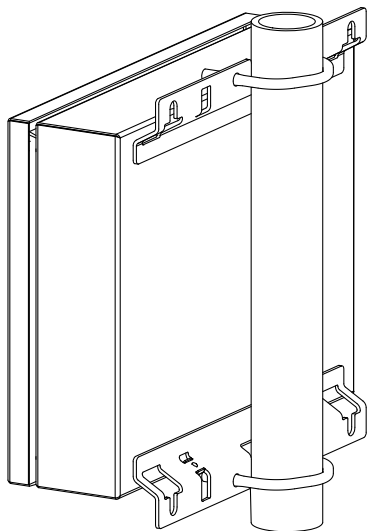
	FLUXUS F722**-NNN**.*AL F722**-NNN**.*ST	FLUXUS F722**-A2N**.*AL F722**-A2N**.*ST	FLUXUS F722**-F2N**.*AL F722**-F2N**.*ST
inputs			
	The inputs are galvanically isolated from the transmitter.		
number	max. 4, on request		
• temperature input			
type	Pt100/Pt1000		
connection	4-wire		
range	°F	-238 to +1040	
resolution	K	0.01	
accuracy	±0.01 % MV ±0.03 K		
• current input			
accuracy	0.1 % MV ±10 µA		
active input		U _{int} = 24 V, R _{int} = 50 Ω, P _{int} < 0.5 W, not short-circuit proof	
• range	mA	0 to 20	
passive input		R _{int} = 50 Ω, P _{int} < 0.3 W	
• range	mA	-20 to +20	
• voltage input			
range	V	0 to 1	
accuracy	0.1 % MV ±1 mV		
internal resistance	R _{int} = 1 MΩ		
• binary input			
switching signal	5 to 30 V, 1 mA		5 to 26 V, 1 mA
functions	<ul style="list-style-type: none"> • reset of the measured values • reset of the totalizers • stop of the totalizers • activation of the measuring mode for highly dynamic flows 		

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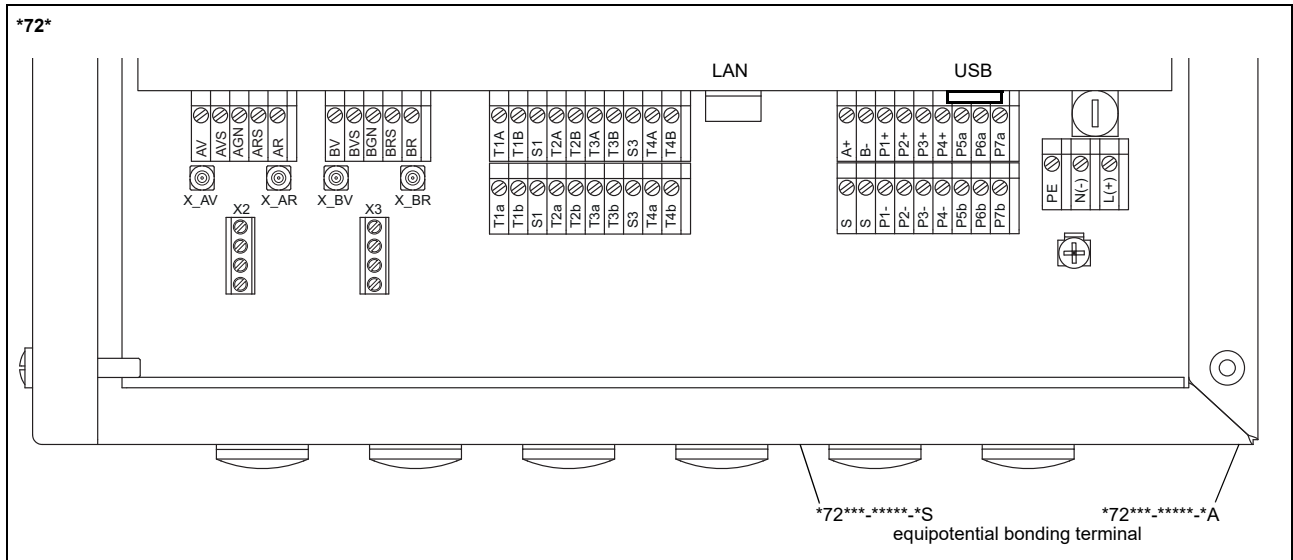
2" pipe mounting kit

<p>*72***_*****_AL</p> 	<p>item number: 721037-4</p>
<p>*72***_*****_ST</p> 	<p>item number: 721110-4</p>

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: -4...+140 °F

Terminal assignment



power supply ¹								
terminal		connection (AC)			connection (DC)			
PE		protective conductor			protective conductor			
N(-)		neutral conductor			-			
L(+)		outer conductor			+			
transducers								
transducer cable (transducers ****LI*), extension cable				transducer cable (transducers *****52)				
measuring channel A		measuring channel B		transducer	measuring channel A	measuring channel B		
terminal	connection	terminal	connection		terminal	connection		
AV	signal	BV	signal	↑	X_AV	X_BV	SMB connector	
AVS	shield	BVS	shield		X_AR	X_BR		SMB connector
ARS	shield	BRS	shield					
AR	signal	BR	signal					
outputs ^{1, 2}								
terminal	connection	terminal	connection	communication interface				
P1+ to P4+ P1- to P4-	current output, voltage output, frequency output, HART (P1)	A+	signal +	<ul style="list-style-type: none"> RS485¹ Modbus RTU¹ BACnet MS/TP¹ Profibus PA¹ FF H1¹ 				
		B-	signal -					
P5a to P7a P5b to P7b	digital output	S	shield					
		USB	type B Hi-Speed USB 2.0 Device	<ul style="list-style-type: none"> service (FluxDiag/FluxDiagReader) 				
		LAN	RJ45 10/100 Mbps Ethernet				<ul style="list-style-type: none"> service (FluxDiag/FluxDiagReader) BACnet IP Modbus TCP 	
analog inputs ^{1, 2}								
terminal	temperature probe		passive sensor		active sensor			
	direct connection	connection with extension cable	connection	connection	connection	connection		
T1a to T4a	red	red/white	not connected	not connected				
T1A to T4A	red/blue	gray/black	-	+				
T1b to T4b	white/blue	blue/red	+	not connected				
T1B to T4B	white	white/green	not connected	-				
S1, S3	shield	shield	not connected	not connected				
binary inputs ^{1, 2}								
terminal								
P1+ to P2+, P1- to P2-								

¹ cable (by customer):
 - e.g., flexible wires, with insulated wire ferrules, wire cross-section: AWG14 to 24
 - outer diameter of the cable (*72***-*****-S with ferrite nut): max. 0.3 inch

² The number, type and terminal assignment are customized.

Transducers


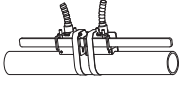
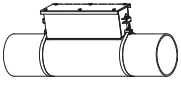
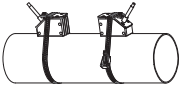
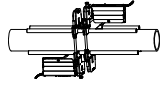
Overview

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	inch	15.7	3.9	2	0.98	0.39	0.24
min. recommended	inch	19.7	7.9	3.9	2	0.98	0.39
max. recommended	inch	157.5	78.7	39.4	15.7	5.9	2.8
max. extended	inch	255.9	94.5	47.2	18.9	9.4	2.8
pipe wall thickness							
min.	inch	0.43	0.2	0.1	0.05	0.02	0.01

for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Transducer mounting fixture

PermaRail	PermaLok	quick release clasps and tension straps	Wavelnjector with chains
	 transducer frequency S		 transducer frequency M, P, Q
			Wavelnjector with threaded rods
			 outer pipe diameter: 1.4 to 15 inch

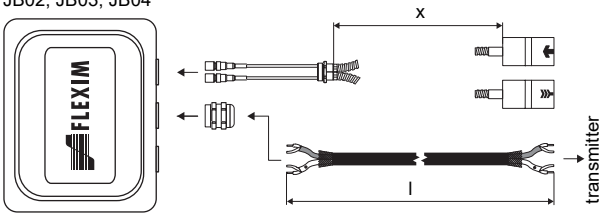
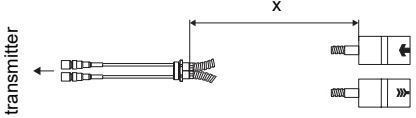
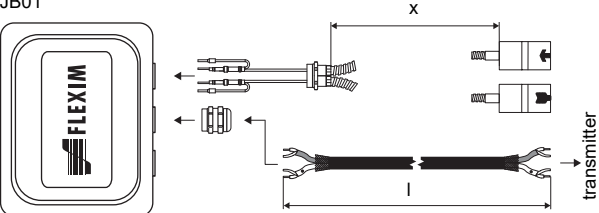
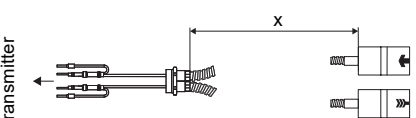
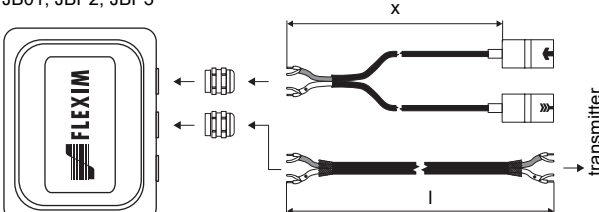
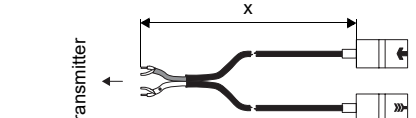
for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Coupling materials for transducers

	normal temperature range		extended temperature range			Wavelnjector	
	< 212 °F	< 338 °F	< 302 °F	< 392 °F	392 to 464 °F	< 536 °F	536 to 1166 °F
< 24 h	coupling compound type N or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type E or H or coupling pad type VT	coupling pad type TF	coupling pad type A and coupling pad type VT	coupling pad type B and coupling pad type VT
long time measurement	coupling pad type VT	coupling pad type VT	coupling pad type VT	coupling pad type VT			

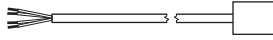
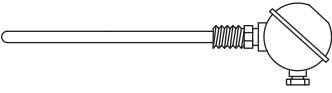
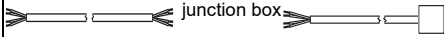
for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Connection systems

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

for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Temperature probes

PT13N	PT13F	A2179
<ul style="list-style-type: none"> • Pt1000 • clamp-on • -40 to +392 °F 	<ul style="list-style-type: none"> • Pt1000 • clamp-on • response time: 8 s • -49 to +482 °F 	<ul style="list-style-type: none"> • Pt1000 • inline • -58 to +500 °F
<p>direct connection</p> 		
<p>connection with extension cable</p> <p>extension cable</p> 		

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		77 °F ±9 °F
ambient temperature		77 °F ±9 °F
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

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