

Flexim FLUXUS H736 Ultrasonic Flowmeter



Ultrasonic Process Monitoring and Flow Measurement of Hydrocarbons

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

- Flow and density measurement in leak detection systems
- Allocation flow and density measurement in hydrocarbon transport systems
- Redundant check metering to custody transfer flow measurements

Transmitter




Technical data

		FLUXUS H736**-NNN	FLUXUS H736**-A2N	FLUXUS H736**-F2N
				
design		field device with 4 measuring channels in stainless steel housing		
measurement				
• HPI				
standard volumetric flow rate				
• measurement uncertainty	%	±1 (crude oil, refined products, liquefied gases, heavy oils)		
• standard volumetric flow rate correction		VCF = CTL · CPL = ρ/ρ _N VCF - volume correction factor CTL - correction for the effect of temperature on liquid CPL - correction for the effect of pressure on liquid ρ - operating density ρ _N - normalized density		
operating density, normalized density				
• repeatability	%	±1 (with field calibration of sound speed)		
• flow				
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		
flow velocity	ft/s	measuring range: 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		• 90 to 264 V/50 to 60 Hz or • 11 to 32 V DC		
power consumption	W	< 15		
number of measuring channels		4 (1 measuring point)		
damping	s	0 to 100 (adjustable)		
measuring cycle	Hz	100 to 1000		
response time	s	1		
housing material		stainless steel 316L		
degree of protection		IP66		
dimensions	inch	see dimensional drawing		
weight	lb	15.9		
fixation		wall mounting, optional: 2" pipe mounting		
ambient temperature	°F	-40 to +140 (< -4 without operation of the display)		
display		240 x 128 pixels, backlight		
menu language		English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian, Chinese		
certificates				
use in unclassified (ordinary) locations		optional:  FM25US0089 FM25CA0043	-	-

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 H736**-NNN	FLUXUS H736**-A2N	FLUXUS H736**-F2N
explosion protection			
• ATEX/IECEx			
marking	-	 0637  II3G Ex ec IIC T4 Gc II2D Ex tb IIIC T120 °C Db T _a -40...+60 °C	-
certification	-	FM24ATEX0022 X FM24ATEX0024 X IECEx FMG 24.0024X	-
• FM			
marking	-	-	 Cl. I, II, III / Div. 2 / GP. A, B, C, D, F, G / T5 -40 °C ≤ T _a ≤ +60 °C
certification	-	-	FM23US0080, FM23CA0059
measuring functions			
physical quantities	• operating volumetric flow rate, standard volumetric flow rate according to ASTM 1250/TP25/4311, flow velocity, mass flow rate additional output quantities • HPI: API gravity, density, normalized density • interface detection: slope of the HPI physical quantities • fluid detection: according to fluid table		
totalizer	volume, mass		
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: • USB ³ • LAN ³		
process interfaces	max. 1 option: • Modbus RTU • HART • Profibus PA • FF H1 • Modbus TCP	max. 1 option: • Modbus RTU • HART • Profibus PA • FF H1	max. 1 option: • Modbus RTU • HART • Profibus PA • FF H1 • Modbus TCP
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, parametrization of the transmitter		
data logger			
loggable values	all physical quantities, totaled 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 to 20 (alarm current: 3.2 to 3.99, 20.01 to 24, hardware fault current: 3.2)	
uncertainty		0.04 % of output value ±3 µA	
active output		R _{ext} = 250 to 530 Ω, U _{opencircuit} = 28 V DC	
passive output		U _{ext} = 9 to 30 V DC, depending on R _{ext} (R _{ext} < 458 Ω at 20 V)	
current output in HART mode		option	
• range	mA	4 to 20 (alarm current: 3.5 to 3.99, 20.01 to 22, hardware fault current: 3.2)	
• active output		R _{ext} = 250 to 530 Ω, U _{opencircuit} = 28 V DC	
• passive output		U _{ext} = 9 to 30 V DC, depending on R _{ext} (R _{ext} = 250 to 458 Ω at 20 V)	

¹ with aperture calibration of the transducers² for transit time difference principle and reference conditions³ outside the explosive atmosphere (housing cover open)

		FLUXUS H736**-NNN	FLUXUS H736**-A2N	FLUXUS H736**-F2N
• digital output				
number		max. 4		
functions		<ul style="list-style-type: none">• frequency output• binary output• pulse output		
type		open collector (passive)		
operating parameters		OC30V (IEC 60947-5-6) 5 to 30 V, I _{max} = 20 mA, R _{int} = 1020 Ω Low: U < 2 V at I _{loop} = 2 mA (R _{ext} = 11 kΩ at U _{ext} = 24 V) High: U > 15 V (R _{ext} = 11 kΩ at U _{ext} = 24 V) or OC30V/100mA 5 to 30 V, I _{max} = 100 mA, R _{int} = 20 Ω Low: U < 2 V at I _{loop} = 2 mA (R _{ext} = 12 kΩ at U _{ext} = 24 V) High: U > 15 V (R _{ext} = 12 kΩ at U _{ext} = 24 V)		OC30V (IEC 60947-5-6) 5 to 30 V, I _{max} = 20 mA, R _{int} = 1020 Ω Low: U < 2 V at I _{loop} = 2 mA (R _{ext} = 11 kΩ at U _{ext} = 24 V) High: U > 15 V (R _{ext} = 11 kΩ at U _{ext} = 24 V)
frequency output				
• range	kHz	0.002 to 10		
• damping	s	0 to 999.9 (adjustable)		
• 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 to 1000		
• pulse width	ms	0.05 to 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	°F	-238 to +1040		
resolution	K	0.01		
accuracy		±0.01 % MV ±0.03 K at 64 to 82 °F ±0.01 % MV ±0.03 K ±0.0005 %/K at <64 °F/>82 °F		
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 64 to 82 °F ±0.1 % MV ±0.01 mA ±0.005 %/K at <64 °F/>82 °F		
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 to 20		
passive input		U _{ext} = 24 V, R _{int} = 35 Ω, I _{max} ≤ 24 mA		
• range	mA	0 to 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)

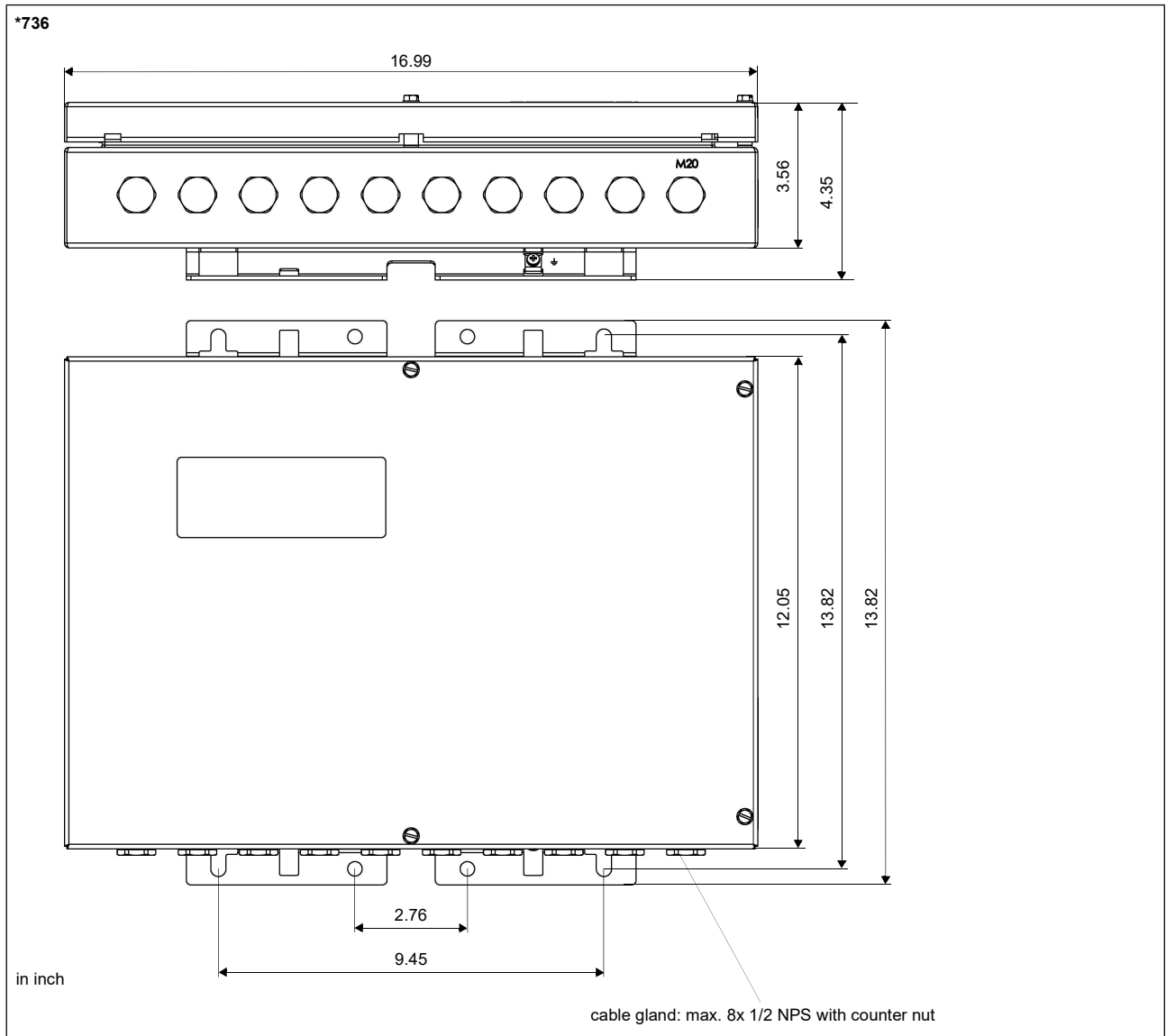
Fluid data sets

The transmitter contains fluid data sets for the HPI measuring mode.

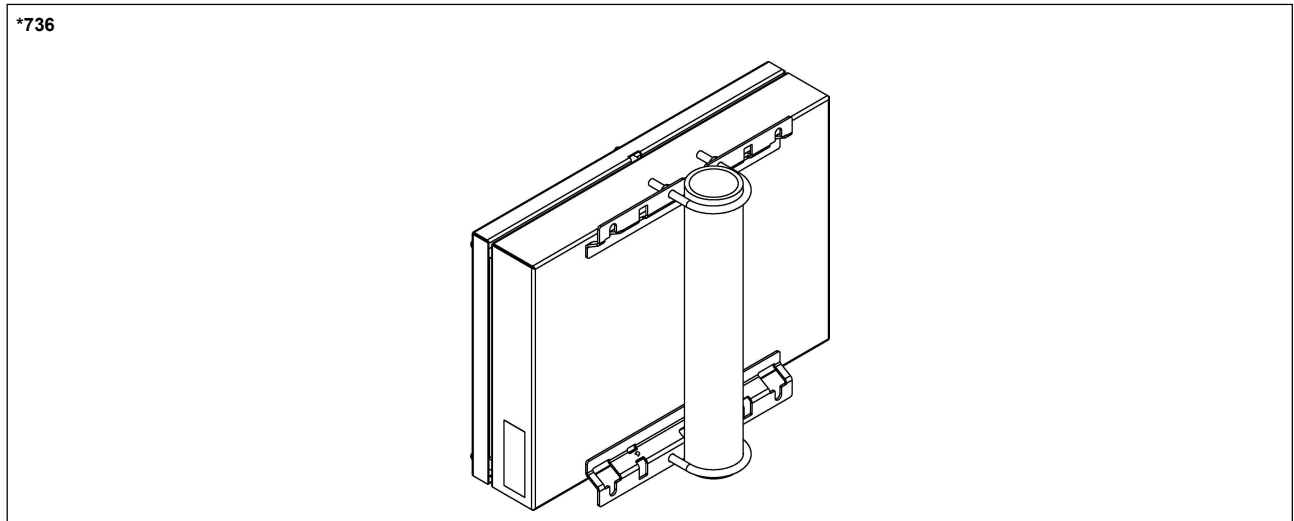
fluid data set	main group	ρ_N [kg/m ³]	API gravity	T [°C]	p [bar]	CTL	CPL
universal	crudes, refin. prod.	610...1000	10...100	0...100	0...100	ρ/ρ_N	MPMS 11.2.1
light ends	LPG, NGL	427...780	50...200	-50...60	0...100	ρ/ρ_N	MPMS 11.2.2
heavy ends	asphalts	875...1163	-10...+20	10...250	-	ρ/ρ_N	-

others on request

Dimensions



Wall and 2" pipe mounting kit

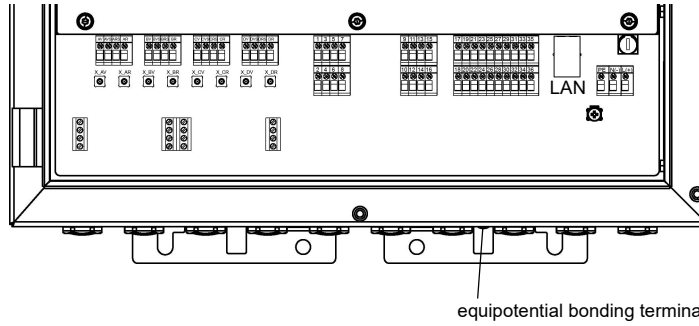


Storage

- 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...+140 °F

Terminal assignment

*736



power supply¹

AC		DC	
terminal	connection	terminal	connection
L	line conductor	(+)	+
N	neutral conductor	(-)	-
PE	protective conductor	PE	protective conductor

¹ cable (by customer): e.g., flexible wires, with insulated wire ferrules, wire cross-section: AWG14 to 24

transducers

measuring channel A, B, C, D

terminal	connection	transducer
*V	signal	↑
*VS	internal shield	
*RS	internal shield	⤴
*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	
35+, 36-	passive current output/HART
35-, 36+	active current output/HART
35, 36	Modbus RTU, Profibus PA, FF H1

temperature probe

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

¹ cable (by customer): e.g., flexible wires, with insulated wire ferrules, wire cross-section: AWG14 to 24

² The number, type and terminal assignment are customized.

Transducers

Overview


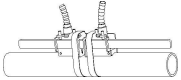
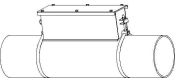
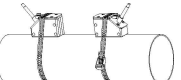

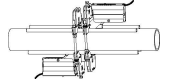
Shear wave transducers

			technical type					
			G	K	M	P	Q	S
zone 2 - FM Class I Div. 2 - nonEx with stripped cable ends normal temperature range			CDG1N53 CLG1N53	CDK1N53 CLK1N53	CDM2N53 CLM2N53	CDP2N53 CLP2N53	CDQ2N53 CLQ2N53	CDS1N53
zone 2 - nonEx IP68			CDG1LI8	CDK1LI8	CDM2LI8	CDP2LI8		
zone 2 - FM Class I Div. 2 - nonEx with stripped cable ends extended temperature range			CDG1E53 ¹ CLG1E53 ¹	CDK1E53 ¹ CLK1E53 ¹	CDM2E53 CLM2E53	CDP2E53 CLP2E53	CDQ2E53 CLQ2E53	
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	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

¹ nonEx, FM

for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Transducer mounting fixture

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

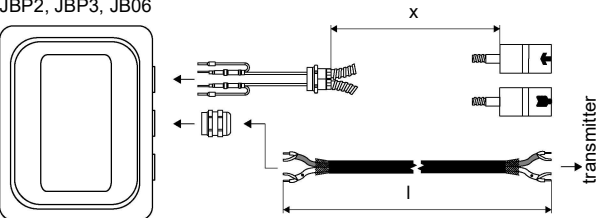
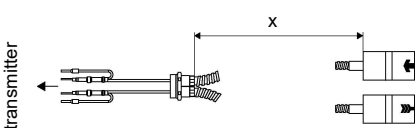
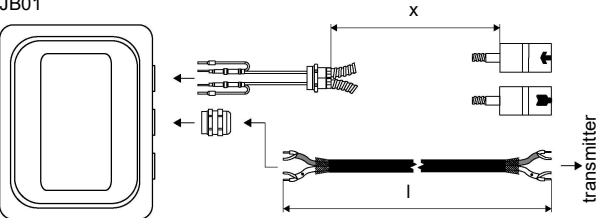
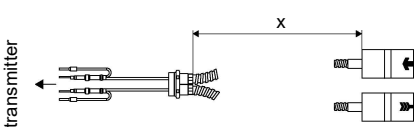
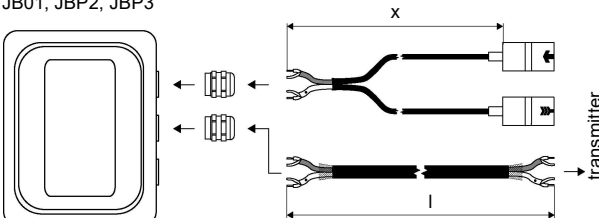
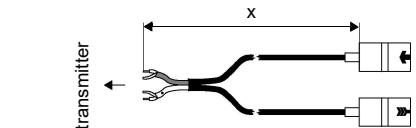
for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Coupling materials for transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range higher temperatures (4th character of transducer order code = E, S)			WaveInjector	
	< 212 °F	< 266 °F	< 356 °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 N or E 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 H or 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	coupling pad type TF	coupling pad type A and coupling pad type VT	coupling pad type B and coupling pad type VT

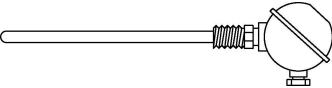
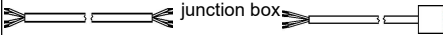
for further data see Technical specification TS_F7xx-transducersVx-xxx_Lus

Connection systems

connection system T1		
connection with extension cable	direct connection	transducers technical type
<div>JBP2, JBP3, JB06</div> 		****N53 ****E53 ****S53
<div>JB01</div> 		****8*
<div>JB01, JBP2, JBP3</div> 		****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
direct connection		
connection with extension cable		
extension cable		

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