

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 (bi-directional)
- The measurement is zero point stable, drift free and independent of pipe material, process pressure, process temperature and process fluid

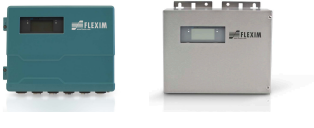
Applications

- 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 F721**-NNN**.*A F721**-NNN**.*S	FLUXUS F721**-A2N**.*A F721**-A2N**.*S	FLUXUS F721**-F2N**.*A F721**-F2N**.*S	FLUXUS F722**-NNN**.*A F722**-NNN**.*S	FLUXUS F722**-A2N**.*A F722**-A2N**.*S	FLUXUS F722**-F2N**.*A F722**-F2N**.*S
						
design	standard field device	standard field device zone 2	standard field device FM Class I Div. 2	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					
synchronised channel averaging	-			x (2 measuring channels necessary)		
flow velocity	m/s 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"> • 100...230 V/50...60 Hz or • 20...32 V DC or • 11...16 V DC 					
power consumption	W < 15					
number of measuring channels	1, optional: 2			1, optional: 2 (1 measuring point)		
damping	s 0...100 (adjustable)					
measuring cycle	Hz 100...1000 (1 channel)					
response time	s 1 (1 channel), option: 0.02					
housing material	aluminum, powder coated or stainless steel 316L (1.4404)					
degree of protection	IP66		aluminum housing: IP66/NEMA 4X stainless steel housing: IP65	IP66		aluminum housing: IP66/NEMA 4X stainless steel housing: IP65
dimensions	mm see dimensional drawing					
weight	kg aluminum housing: 5.4 stainless steel housing: 5.1					
fixation	wall mounting, optional: 2" pipe mounting					
ambient temperature	°C -40...+60 (< -20 without operation of the display)		aluminum housing: -40...+60 40...+55/60 (< -20 without operation of the display) stainless steel housing: -20...+55/60	-40...+60 (< -20 without operation of the display)		aluminum housing: -40...+60 40...+55/60 (< -20 without operation of the display) stainless steel housing: -20...+55/60
display	128 x 64 pixels, backlight					
menu language	English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian					
explosion protection						
• ATEX/IECEX						
marking	-	F721**-A20*A, F721**-A20*S: CE 0637 Ex IIC T4 Gc Ex nA nC ic IIC T4 Ex tb IIC T120 °C Db T _a -40...+60 °C	-	-	F722**-A20*A, F722**-A20*S: CE 0637 Ex IIC T4 Gc Ex nA nC ic IIC T4 Ex tb IIC T120 °C Db T _a -40...+60 °C	-
certification	-	IBExU11ATEX1015, IECEX IBE 11.0008	-	-	IBExU11ATEX1015, IECEX IBE 11.0008	-

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 F721**-NNN**-*A F721**-NNN**-*S	FLUXUS F721**-A2N**-*A F721**-A2N**-*S	FLUXUS F721**-F2N**-*A F721**-F2N**-*S	FLUXUS F722**-NNN**-*A F722**-NNN**-*S	FLUXUS F722**-A2N**-*A F722**-A2N**-*S	FLUXUS F722**-F2N**-*A F722**-F2N**-*S
• FM						
marking			F721**-F20**2, F721**-F20**3:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T5 F721**-F20**1:  NI/Cl. I,II,III/ Div. 2/GP. A,B,C,D,E, F,G/ T4A			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
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					
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, parametrisation of the transmitter: • USB ³ • LAN ³					
process interfaces	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • M-Bus • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • M-Bus • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP	max. 1 option: • RS485 (ASCII sender) • Modbus RTU • BACnet MS/TP • HART • Profibus PA • FF H1 • Modbus TCP • BACnet IP
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	on request					
• switchable current output						
	All switchable current outputs are jointly switched to active or passive.					
range	mA	4...20 (3.2...22)				
accuracy		0.04 % MV ±3 µA				
active output		R _{ext} < 250 Ω				
passive output		U _{ext} = 8...30 V, depending on R _{ext} (R _{ext} < 1 kΩ at 30 V)				
• HART						
range	mA	4...20				
accuracy		0.1 % MV ±15 µA				
active output		U _{int} = 24 V, R _{ext} < 500 Ω				
passive output		U _{ext} = 10...24 V DC, depending on R _{ext} (R _{ext} < 1 kΩ at 24 V)				
• voltage output						
range	V	0...1 or 0...10				
accuracy		0...1 V: 0.1 % MV ±1 mV 0...10 V: 0.1 % MV ±10 mV				
internal resistance		R _{int} = 500 Ω				
• frequency output						
range	kHz	0...5				
optorelay		24 V/4 mA, R _{int} = 66.5 Ω				

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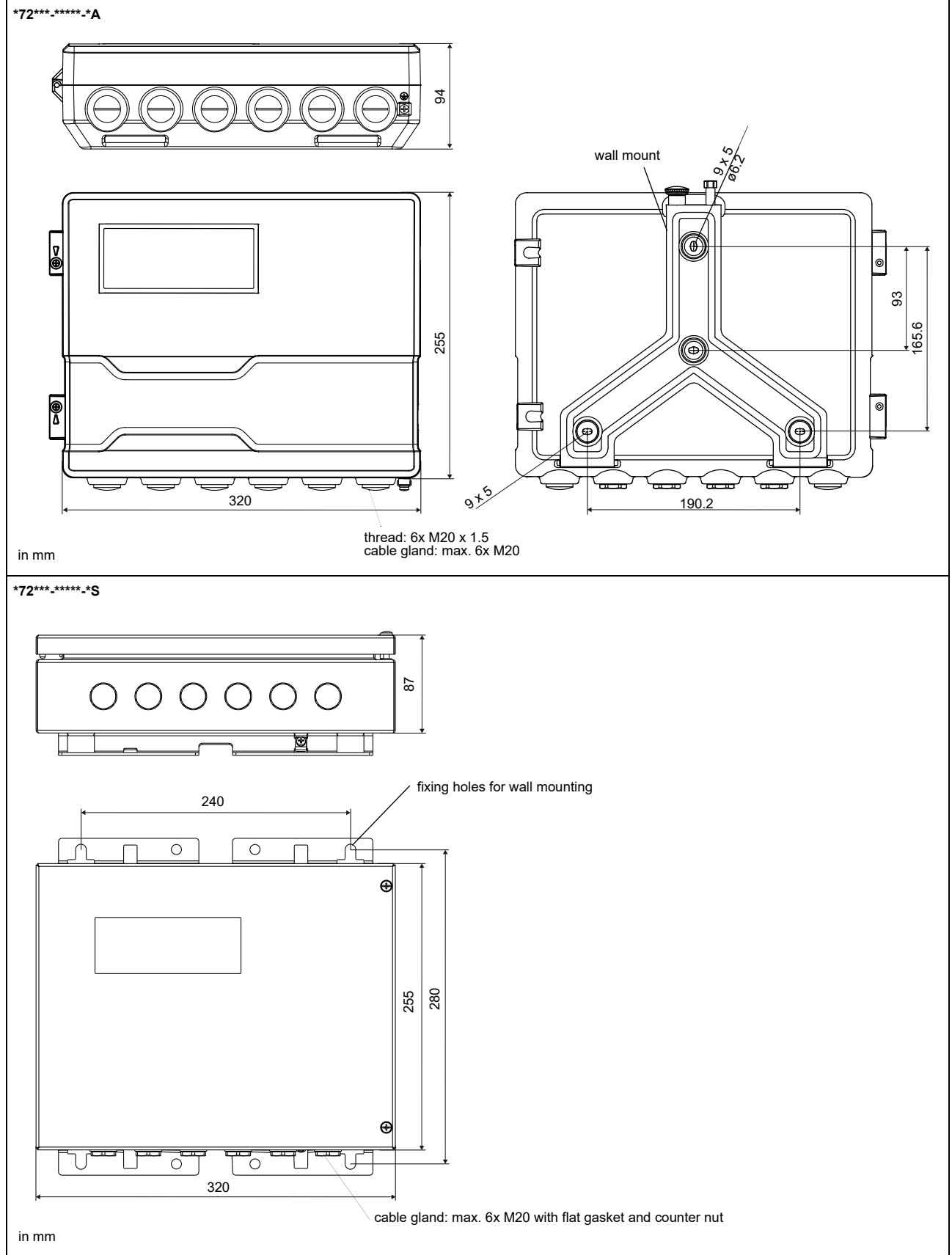
	FLUXUS F721**-NNN**.*A F721**-NNN**.*S	FLUXUS F721**-A2N**.*A F721**-A2N**.*S	FLUXUS F721**-F2N**.*A F721**-F2N**.*S	FLUXUS F722**-NNN**.*A F722**-NNN**.*S	FLUXUS F722**-A2N**.*A F722**-A2N**.*S	FLUXUS F722**-F2N**.*A F722**-F2N**.*S
• digital output						
functions	<ul style="list-style-type: none"> • frequency output • binary output • pulse output 					
number	3					
operating parameters	5...30 V / < 100 mA					
frequency output						
• range	kHz	0...5				
binary output						
• binary output as alarm output	limit, change of flow direction or error					
pulse output						
• functions	mainly for totalising					
• pulse value	units	0.01...1000				
• pulse width	ms	0.05...1000				
inputs						
	The inputs are galvanically isolated from the transmitter.					
number	max. 4, on request					
• temperature input						
type	Pt100/Pt1000					
connection	4-wire					
range	°C	-150...+560				
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...20				
passive input	R _{int} = 50 Ω, P _{int} < 0.3 W					
• range	mA	-20...+20				
• voltage input						
range	V	0...1				
accuracy	0.1 % MV ±1 mV					
internal resistance	R _{int} = 1 MΩ					
• binary input						
switching signal	5...30 V, 1 mA		5...26 V, 1 mA		5...30 V, 1 mA	
functions	<ul style="list-style-type: none"> • reset of the measured values • reset of the totalisers • stop of the totalisers • activation of the measuring mode for highly dynamic flows 					

¹ with aperture calibration of the transducers

² for transit time difference principle and reference conditions

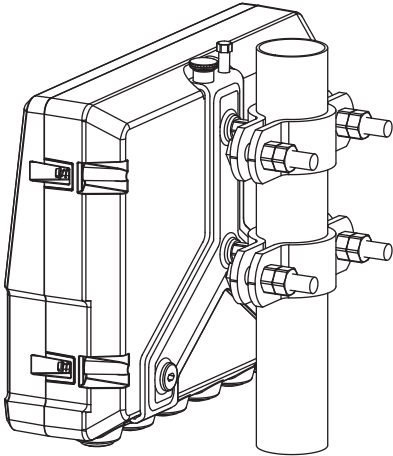
³ outside the explosive atmosphere (housing cover open)

Dimensions



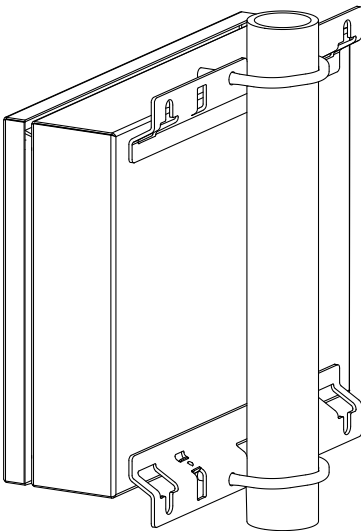
2" pipe mounting kit

*72***_****_*A



item number: 721037-4

*72***_****_*S

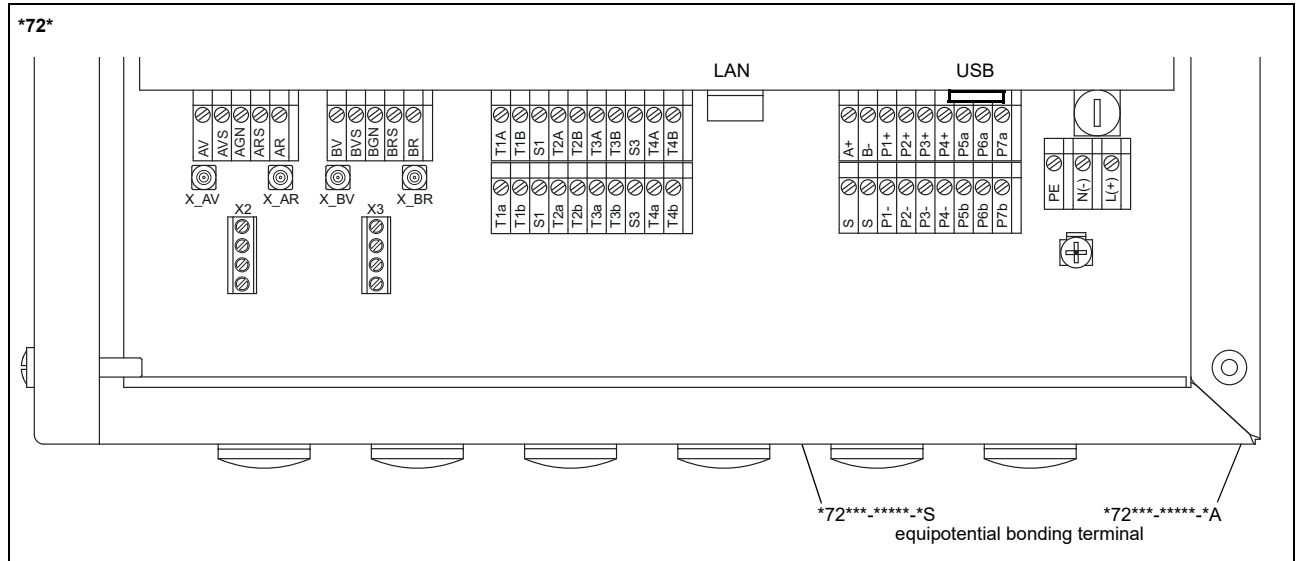


item number: 721110-4

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



power supply ¹							
terminal		connection (AC)			connection (DC)		
PE		protective conductor			protective conductor		
N(-)		neutral conductor			-		
L(+)		outer conductor			+		
transducers							
transducer cable (transducers *****8*, ****LI*), extension cable				transducer cable (transducers *****52)			
measuring channel A		measuring channel B			measuring channel A		measuring channel B
terminal	connection	terminal	connection	transducer	terminal	terminal	connection
AV	signal	BV	signal	↑	X_AV	X_BV	SMB connector
AVS	shield	BVS	shield				
ARS	shield	BRS	shield	↗	X_AR	X_BR	SMB connector
AR	signal	BR	signal				
outputs ^{1, 2}							
terminal		connection		terminal	connection		communication interface
P1+...P4+ P1-...P4-		current output, voltage output, frequency output, HART (P1)		A+	signal +		<ul style="list-style-type: none"> • RS485¹ • Modbus RTU¹ • BACnet MS/TP¹ • M-Bus¹ • Profibus PA¹ • FF H1¹
				B-	signal -		
P5a...P7a P5b...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		
analog inputs ^{1, 2}							
terminal		temperature probe		passive sensor		active sensor	
		direct connection	connection with extension cable	connection		connection	
T1a...T4a		red	red	not connected		not connected	
T1A...T4A		red/blue	grey	-		+	
T1b...T4b		white/blue	blue	+		not connected	
T1B...T4B		white	white	not connected		-	
S1, S3		shield	shield	not connected		not connected	
binary inputs ^{1, 2}							
terminal							
P1+...P2+, P1-...P2-							

¹ cable (by customer):
 - e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm²
 - outer diameter of the cable (*72***.*****.S with ferrite nut): max. 7.6 mm

² The number, type and terminal assignment are customised.

Transducers


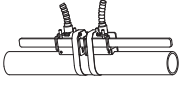


Overview

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		transducer box WI for Wavelinjector with chains
				
				transducer box WI for Wavelinjector with threaded rods
		Variofix C with bolt mounting plates outer pipe diameter: VCM: max. 46 mm VCC: 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			Wavelinjector	
	< 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			

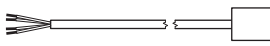
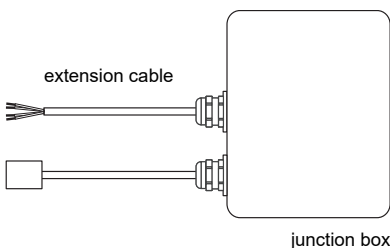
for further data see Technical specification TS_F7xx-transducersVx-xxx_Leu

Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
<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>*****L1*</p>

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	• 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