



**FLEXIM**

**Technical specification**

**FLUXUS H721**

## **Ultrasonic process monitoring and flow measurement of hydrocarbons**

### **Features**

- Measurement of standard volumetric flow rate according to ASTM and API determination
- Fluid data sets for all classes of hydrocarbons integrated in the transmitter
- Guided application adaptation

### **Applications**

Applications in single and multiproduct pipelines:

- Leakage detection
- Check metering
- Fluid detection, batch/interface detection
- Fluid quality monitoring



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## Transmitter

### Technical data

	<b>FLUXUS H721**-NNN**-*A H721**-NNN**-*S</b>	<b>FLUXUS H721**-A2N**-*A H721**-A2N**-*S</b>	<b>FLUXUS H721**-F2N**-*A H721**-F2N**-*S</b>		
					
design	standard field device	standard field device zone 2	standard field device FM Class I Div. 2		
<b>measurement</b>					
<b>• HPI</b>					
standard volumetric flow rate	%	$\pm 1$ (crude oil, refined products, liquefied gases, heavy oils)			
• measurement uncertainty	%	$VCF = CTL \cdot CPL = \rho/\rho_N$ VCF - volume correction factor CTL - correction for the effect of temperature on liquid CPL - correction for the effect of pressure on liquid $\rho$ - operating density $\rho_N$ - normalised density			
standard volumetric flow rate correction					
operating density, normalised density	%	$\pm 1$ (with field calibration of sound speed)			
• repeatability	%				
<b>• flow</b>					
measurement principle		transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content			
flow velocity	m/s	0.01...25			
repeatability		0.15 % MV $\pm 0.005$ 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			
<b>measurement uncertainty (volumetric flow rate)</b>					
measurement uncertainty of the measuring system <sup>1</sup>		$\pm 0.3$ % MV $\pm 0.005$ m/s			
measurement uncertainty at the measuring point <sup>2</sup>		$\pm 1$ % MV $\pm 0.005$ m/s			
<b>transmitter</b>					
power supply		<ul style="list-style-type: none"> <li>100...230 V/50...60 Hz or</li> <li>20...32 V DC or</li> <li>11...16 V DC</li> </ul>			
power consumption	W	< 15			
number of measuring channels		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			
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...+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			
<b>explosion protection</b>					
<b>• ATEX/IECEx</b>					
marking	-	H721**-A20*A, H721**-A20*S: CE 0637 II3G Ex nA nC ic IIC T4 Gc Ex tb IIIC T120 °C Db Ta -40...+60 °C	-		
certification	-	IBExU11ATEX1015, IECEx IBE 11.0008			

<sup>1</sup> with aperture calibration of the transducers<sup>2</sup> for transit time difference principle and reference conditions<sup>3</sup> outside the explosive atmosphere (housing cover open)

		<b>FLUXUS</b> H721**-NNN**-*A H721**-NNN**-*S	<b>FLUXUS</b> H721**-A2N**-*A H721**-A2N**-*S	<b>FLUXUS</b> H721**-F2N**-*A H721**-F2N**-*S
<b>• FM</b>				
marking		-	-	H721**-F20*S2, H721**-F20*S3:  NI/Cl. I,II,III/Div. 2/ GP. A,B,C,D,E,F,G/ T5
<b>measuring functions</b>				
physical quantities		<ul style="list-style-type: none"> <li>operating volumetric flow rate, standard volumetric flow rate according to ASTM 1250/TP25/4311, flow velocity, mass flow rate</li> </ul> <b>additional output quantities</b> <ul style="list-style-type: none"> <li>HPI: API gravity, density, normalised density</li> <li>interface detection: slope of the HPI physical quantities</li> <li>fluid detection: according to fluid table</li> </ul>		
totaliser		volume, mass		
calculation functions		average, difference, sum (2 measuring channels necessary)		
diagnostic functions		sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times		
<b>communication interfaces</b>				
service interfaces		measured value transmission, parametrisation of the transmitter:		
		<ul style="list-style-type: none"> <li>USB<sup>3</sup></li> <li>LAN<sup>3</sup></li> </ul>		
process interfaces		max. 1 option: <ul style="list-style-type: none"> <li>Modbus RTU</li> <li>HART</li> <li>Profibus PA</li> <li>FF H1</li> <li>Modbus TCP</li> </ul>		
<b>accessories</b>				
data transmission kit		USB cable		
software		<ul style="list-style-type: none"> <li>FluxDiagReader: reading of measured values and parameters, graphical representation</li> <li>FluxDiag (optional): reading of measurement data, graphical representation, report generation, parametrisation of the transmitter</li> </ul>		
<b>data logger</b>				
loggable values		all physical quantities, totalised physical quantities and diagnostic values		
capacity		max. 800 000 measured values		
<b>outputs</b>				
		The outputs are galvanically isolated from the transmitter.		
number		on request		
<b>• switchable current output</b>				
		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		$R_{ext} < 250 \Omega$		
passive output		$U_{ext} = 8...30$ V, depending on $R_{ext}$ ( $R_{ext} < 1$ kΩ at 30 V)		
<b>• HART</b>				
range	mA	4...20		
accuracy		0.1 % MV ±15 µA		
active output		$U_{int} = 24$ V, $R_{ext} < 500 \Omega$		
passive output		$U_{ext} = 10...24$ V DC, depending on $R_{ext}$ ( $R_{ext} < 1$ kΩ at 24 V)		
<b>• voltage output</b>				
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		$R_{int} = 500 \Omega$		
<b>• frequency output</b>				
range	kHz	0...5		
optorelay		24 V/4 mA, $R_{int} = 66.5 \Omega$		

<sup>1</sup> with aperture calibration of the transducers<sup>2</sup> for transit time difference principle and reference conditions<sup>3</sup> outside the explosive atmosphere (housing cover open)

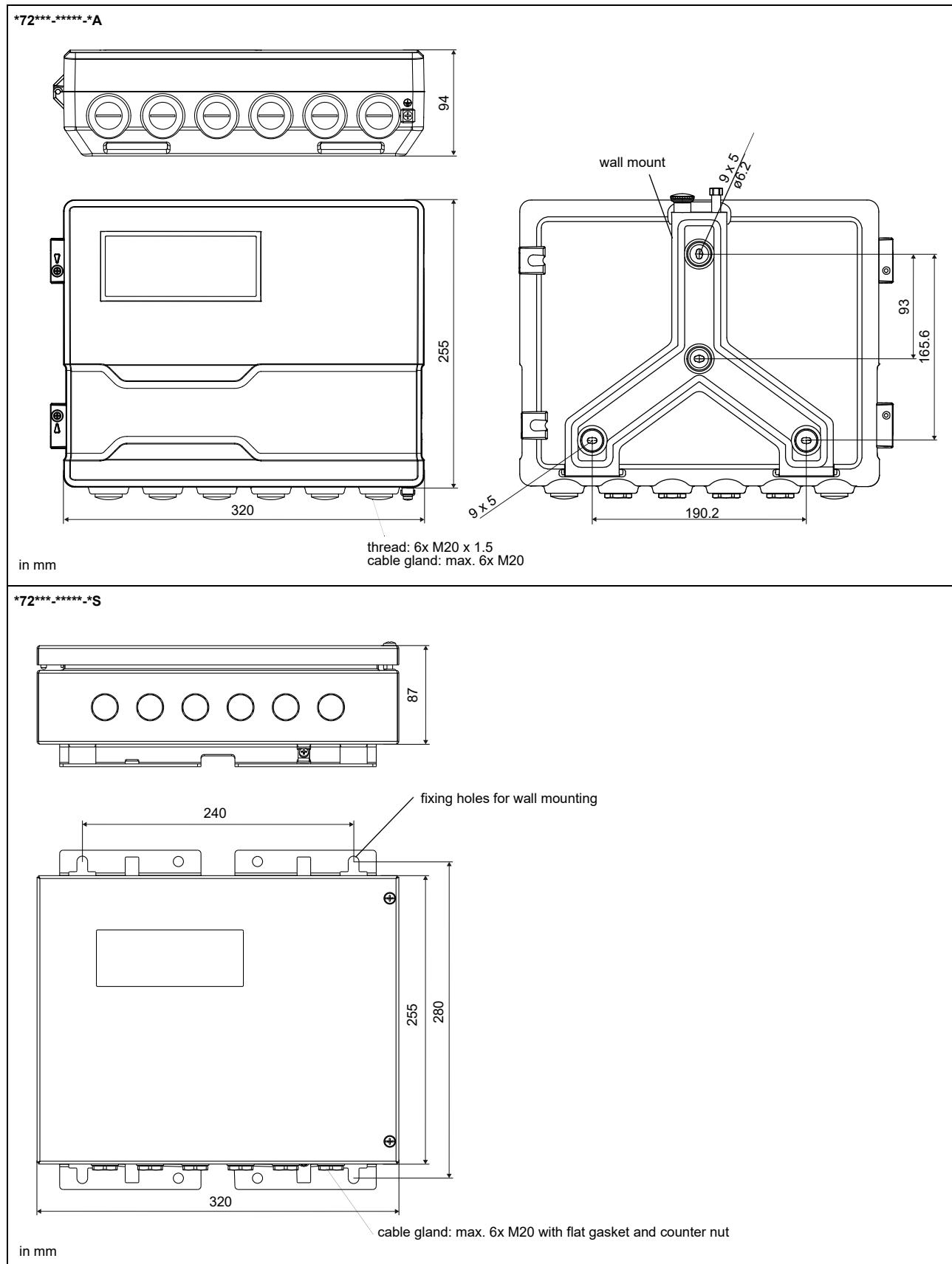
	<b>FLUXUS</b> H721**-NNN**-*A H721**-NNN**-*S	<b>FLUXUS</b> H721**-A2N**-*A H721**-A2N**-*S	<b>FLUXUS</b> H721**-F2N**-*A H721**-F2N**-*S
<b>• digital output</b>			
functions		• frequency output • binary output • pulse output	
number		3	
operating parameters		5...30 V/< 100 mA	
<b>frequency output</b>			
• range	kHz	0...5	
<b>binary output</b>			limit, change of flow direction or error
<b>pulse output</b>			mainly for totalising
• functions		units	0.01...1000
• pulse value			ms
• pulse width			0.05...1000
<b>inputs</b>			
		The inputs are galvanically isolated from the transmitter.	
number		max. 4, on request	
<b>• temperature input</b>			
type		Pt100/Pt1000	
connection		4-wire	
range	°C	-150...+560	
resolution	K	0.01	
accuracy		±0.01 % MV ±0.03 K	
<b>• current input</b>			
accuracy		0.1 % MV ±10 µA	
active input		U <sub>int</sub> = 24 V, R <sub>int</sub> = 50 Ω, P <sub>int</sub> < 0.5 W, not short-circuit proof	
• range	mA	0...20	
passive input		R <sub>int</sub> = 50 Ω, P <sub>int</sub> < 0.3 W	
• range	mA	-20...+20	
<b>• voltage input</b>			
range	V	0...1	
accuracy		0.1 % MV ±1 mV	
internal resistance		R <sub>int</sub> = 1 MΩ	
<b>• binary input</b>			
switching signal		5...30 V, 1 mA	
functions		<ul style="list-style-type: none"> <li>• reset of the measured values</li> <li>• reset of the totalisers</li> <li>• stop of the totalisers</li> <li>• activation of the measuring mode for highly dynamic flows</li> </ul>	
		5...26 V, 1 mA	

<sup>1</sup> with aperture calibration of the transducers

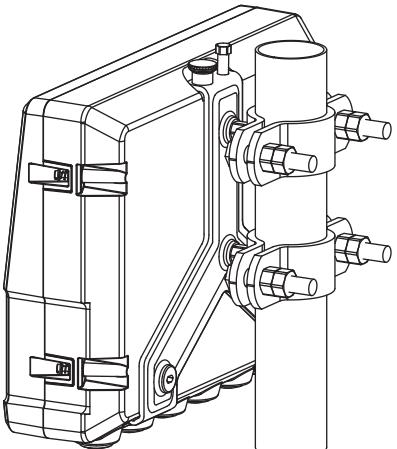
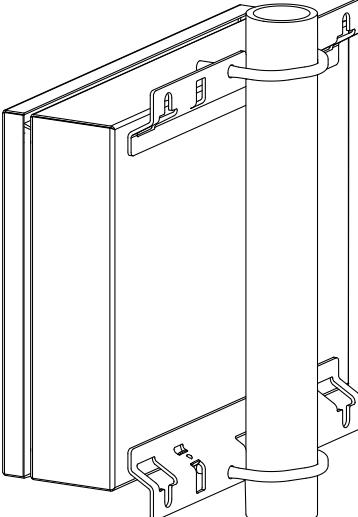
<sup>2</sup> for transit time difference principle and reference conditions

<sup>3</sup> outside the explosive atmosphere (housing cover open)

## Dimensions



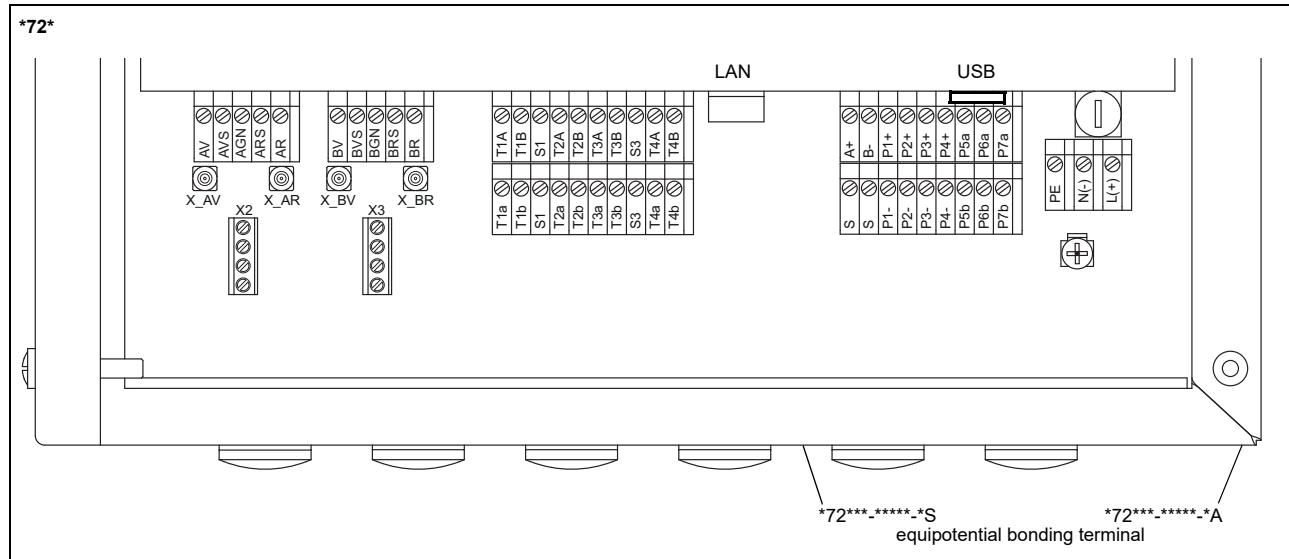
## 2" pipe mounting kit

*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 <sup>1</sup>			
terminal	connection (AC)		connection (DC)
PE	protective conductor		protective conductor
N(-)	neutral conductor		-
L(+)	outer conductor		+
transducers			
transducer cable (transducers ****8*, ****L1*), extension cable		measuring channel A	measuring channel B
measuring channel A	measuring channel B		
terminal	connection	terminal	connection
AV	signal	BV	signal
AVS	shield	BVS	shield
ARS	shield	BRS	shield
AR	signal	BR	signal
outputs <sup>1, 2</sup>			
terminal	connection		communication interface
P1+...P4+	current output, voltage output, frequency output, HART (P1)		A+
P1-...P4-			signal +
P5a...P7a	digital output		B-
P5b...P7b			signal -
S	shield		S
USB	type B Hi-Speed USB 2.0 Device		• RS485 <sup>1</sup> • Modbus RTU <sup>1</sup> • BACnet MS/TP <sup>1</sup> • M-Bus <sup>1</sup> • Profibus PA <sup>1</sup> • FF H1 <sup>1</sup>
LAN	RJ45 10/100 Mbps Ethernet		• service (FluxDiag/ FluxDiagReader) • BACnet IP • Modbus TCP
analog inputs <sup>1, 2</sup>			
terminal	temperature probe	passive sensor	active sensor
terminal	direct connection	connection with extension cable	connection
T1a...T4a	red	red	not connected
T1A...T4A	red/blue	grey	-
T1b...T4b	white/blue	blue	+
T1B...T4B	white	white	not connected
S1, S3	shield	shield	not connected
binary inputs <sup>1, 2</sup>			
terminal	P1+...P2+	P1-...P2-	

<sup>1</sup> cable (by customer):

- e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm<sup>2</sup>
- outer diameter of the cable (\*72\*\*\*-\*\*\*\*-\*S with ferrite nut): max. 7.6 mm

<sup>2</sup> The number, type and terminal assignment are customised.

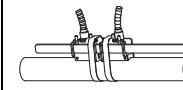
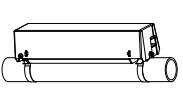
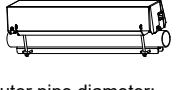
## Transducers

### 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	
<b>inner pipe diameter d</b>						
min. extended	mm	400	100	50	25	10
min. recommended	mm	500	200	100	50	25
max. recommended	mm	4000	2000	1000	400	150
max. extended	mm	6500	2400	1200	480	240
<b>pipe wall thickness</b>						
min.	mm	11	5	2.5	1.2	0.6
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 frequency S		
	Varifix C with bolt mounting plates	transducer box WI for Wavelinjector with threaded rods
		
	outer pipe diameter: VCM: max. 46 mm VCQ: max. 36 mm	outer pipe diameter: 35...380 mm

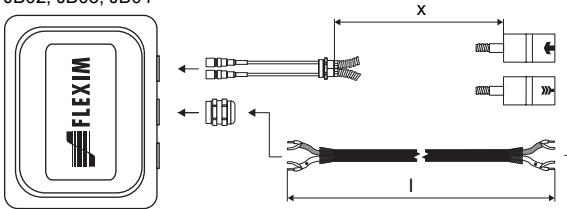
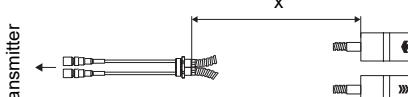
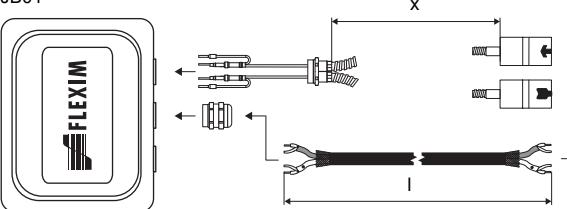
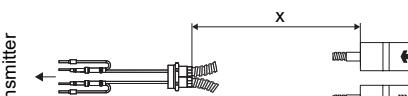
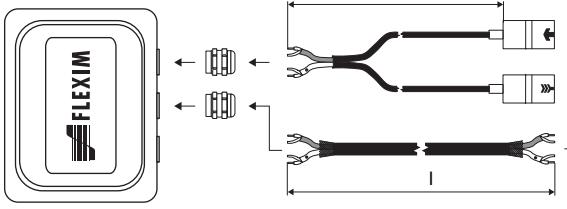
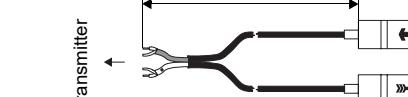
for further data see Technical specification TS\_F7xx-transducersVx-xXX\_Leu

#### Coupling materials for transducers

	normal temperature range	extended temperature range			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						

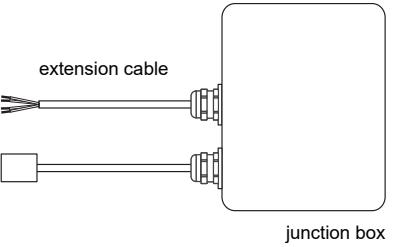
for further data see Technical specification TS\_F7xx-transducersVx-xXX\_Leu

## Connection systems

connection system TS		
connection with extension cable	direct connection	transducers technical type
JB02, JB03, JB04 	transmitter 	****52
connection system T1		
connection with extension cable	direct connection	transducers technical type
JB01 	transmitter 	****8*
JB01, JBP2, JBP3 	transmitter 	***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	Pt100 • clamp-on • -45...+250 °C • response time: 8 s
direct connection		
		
connection with extension cable		
		

see Technical specification TS\_PTVx-xXX\_Leu