

# Flexim FLUXUS H731 Ultrasonic Flowmeter



## 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

# Transmitter





## Technical data

		FLUXUS H731 nonEx	FLUXUS H731 ATEX/IECEX	FLUXUS H731 FM Class I Div. 2
design		DE7-H731GP-NNN**-*AL... (aluminum housing) DE7-H731GP-NNN**-*ST... (stainless steel housing)	DE7-H731GP-A2N**-*AL... (aluminum housing) DE7-H731GP-A2N**-*ST... (stainless steel housing)	DE7-H731GP-F2N**-*AL... (aluminum housing) DE7-H731GP-F2N**-*ST... (stainless steel housing)
				
certification type			aluminum housing: 731-ADN (100 to 240 V) 731-ANN (11 to 32 V DC) stainless steel housing: 731-SNN	F731**-F2N...
<b>measurement</b>				
<b>• HPI</b>				
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 <sub>N</sub> 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 <sub>N</sub> - normalized density		
operating density, normalized density				
• repeatability	%	±1 (with field calibration of sound speed)		
<b>• flow</b>				
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		
<b>measurement uncertainty (volumetric flow rate)</b>				
measurement uncertainty of the measuring system <sup>1</sup>		±0.3 % MV ±0.02 ft/s includes calibration certificate traceable to NIST		
measurement uncertainty at the measuring point <sup>2</sup>		±1 % MV ±0.02 ft/s		
<b>transmitter</b>				
power supply		• 100 to 240 V ±10 %/50 to 60 Hz or • 11 to 32 V DC	• 731-ADN, 731-SNN: 100 to 240 V ±10 %/50 to 60 Hz or • 731-ANN, 731-SNN: 11 to 32 V DC	• 100 to 240 V ±10 %/50 to 60 Hz or • 11 to 32 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		
dimensions	inch	see dimensional drawing		
weight	lb	aluminum housing: 9.9 stainless steel housing: 12.8		
fixation		wall mounting, optional: 2" pipe mounting		
ambient temperature	°F	-40* to +140 aluminum housing and 240 V: -40* to +149 * < -4 without operation of the display	731-ADN: -40* to +149 731-ANN, 731-SNN: -40* to +140 * < -4 without operation of the display	-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		

<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)

	FLUXUS H731 nonEx	FLUXUS H731 ATEX/IECEX	FLUXUS H731 FM Class I Div. 2
certificates			
use in unclassified (ordinary) locations	optional: <div> FM25US0185 FM25CA0073</div> ambient temperature: -40* to +140 °F	-	-
explosion protection			
• ATEX/IECEX			
marking	-	<div> 0637  II3G Ex ec IIC T4 Gc II2D Ex tb IIIC T135 °C Db T<sub>a</sub> -40...+65 °C (731-ADN) T<sub>a</sub> -40...+60 °C (731-ANN) T<sub>a</sub> -40...+59/60 °C (731-SNN)</div>	-
certification	-	IBExU24ATEX1014 X, IECEX IBE 23.0024X	-
• FM			
marking	-	-	<div> Cl. I,II,III/Div. 2 / GP. A, B, C, D, F, G / T5 -40 °C ≤ Ta ≤ +60 °C</div>
certification	-	-	FM23US0036, FM23CA0026
measuring functions			
physical quantities	<div>• operating volumetric flow rate, standard volumetric flow rate according to ASTM 1250/TP25/4311, flow velocity, mass flow rate</div> <b>additional output quantities</b> <div>• HPI: API gravity, density, normalized density • interface detection: slope of the HPI physical quantities • fluid detection: according to fluid table</div>		
totalizer	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		
communication interfaces			
service interfaces	measured value transmission, parametrization of the transmitter: <div>• USB<sup>3</sup> • LAN<sup>3</sup></div>		
process interfaces	max. 1 option: <div>• Modbus RTU • HART • Profibus PA • FF H1 • Modbus TCP</div>	max. 1 option: <div>• Modbus RTU • HART • Profibus PA • FF H1</div>	max. 1 option: <div>• Modbus RTU • HART • Profibus PA • FF H1 • Modbus TCP</div>
accessories			
data transmission kit	USB cable		
software	<div>• FluxDiag Reader: reading of measured values and parameters, graphical representation • FluxDiag (optional): reading of measurement data, graphical representation, report generation, parametrization of the transmitter</div>		
data logger			
loggable values	all physical quantities, totalized physical quantities and diagnostic values		
capacity	max. 800 000 measured values		

<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)

		FLUXUS H731 nonEx	FLUXUS H731 ATEX/IECEX	FLUXUS H731 FM Class I Div. 2
outputs				
		The outputs are galvanically isolated from the transmitter.		
number		on request, 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.		
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 <sub>ext</sub> = 250 to 530 Ω, U <sub>opencircuit</sub> = 28 V DC		
passive output		U <sub>ext</sub> = 9 to 30 V DC, depending on R <sub>ext</sub> (R <sub>ext</sub> < 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 <sub>ext</sub> = 250 to 530 Ω, U <sub>opencircuit</sub> = 28 V DC		
• passive output		U <sub>ext</sub> = 9 to 30 V DC, depending on R <sub>ext</sub> (R <sub>ext</sub> = 250 to 458 Ω at 20 V)		
• digital output				
functions		• frequency output • binary output • pulse output		
type		open collector (passive)		
operating parameters		OC30V (IEC 60947-5-6) 5 to 30 V, I <sub>max</sub> = 20 mA, R <sub>int</sub> = 1020 Ω Low: U < 2 V at I <sub>loop</sub> = 2 mA (R <sub>ext</sub> = 11 kΩ at U <sub>ext</sub> = 24 V) High: U > 15 V (R <sub>ext</sub> = 11 kΩ at U <sub>ext</sub> = 24 V) or OC30V/100mA 5 to 30 V, I <sub>max</sub> = 100 mA, R <sub>int</sub> = 20 Ω Low: U < 2 V at I <sub>loop</sub> = 2 mA (R <sub>ext</sub> = 12 kΩ at U <sub>ext</sub> = 24 V) High: U > 15 V (R <sub>ext</sub> = 12 kΩ at U <sub>ext</sub> = 24 V)		OC30V (IEC 60947-5-6) 5 to 30 V, I <sub>max</sub> = 20 mA, R <sub>int</sub> = 1020 Ω Low: U < 2 V at I <sub>loop</sub> = 2 mA (R <sub>ext</sub> = 11 kΩ at U <sub>ext</sub> = 24 V) High: U > 15 V (R <sub>ext</sub> = 11 kΩ at U <sub>ext</sub> = 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		on request, current inputs and outputs: max. 4		
• temperature input				
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.		
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 <sub>int</sub> = 75 Ω, I <sub>max</sub> ≤ 30 mA U <sub>opencircuit</sub> = 28 V (open circuit) U <sub>min</sub> = 21.4 V at 20 mA		
• range	mA	0 to 20		
passive input		U <sub>ext</sub> = 24 V, R <sub>int</sub> = 35 Ω, I <sub>max</sub> ≤ 24 mA		
• range	mA	0 to 20		

<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)

## Fluid data sets

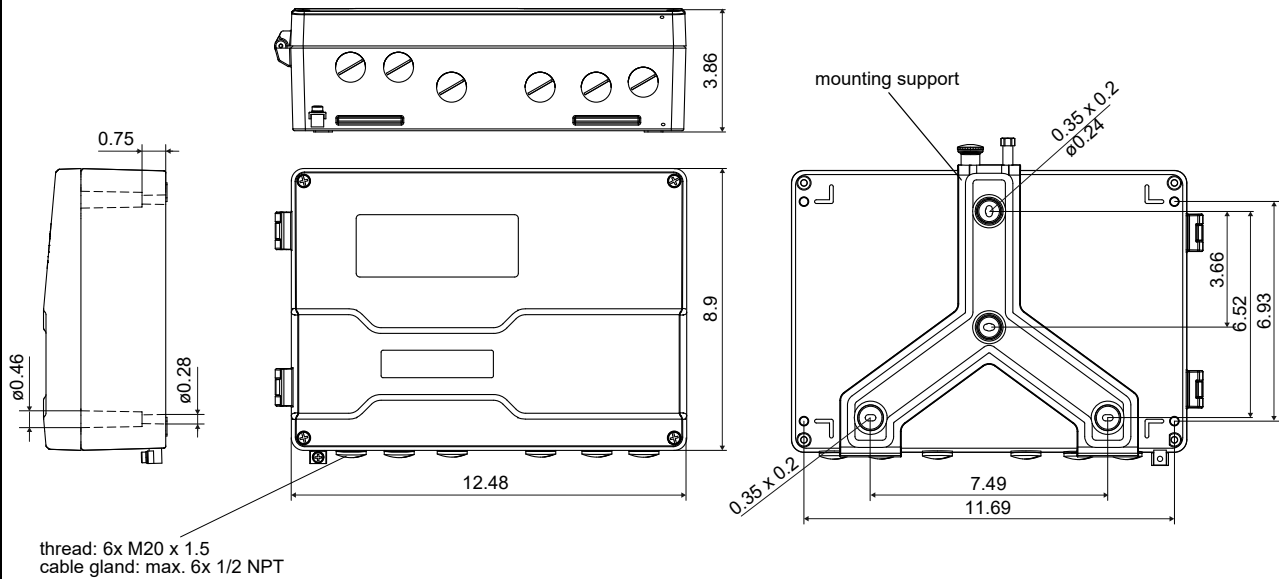
The transmitter contains fluid data sets for the HPI measuring mode.

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

others on request

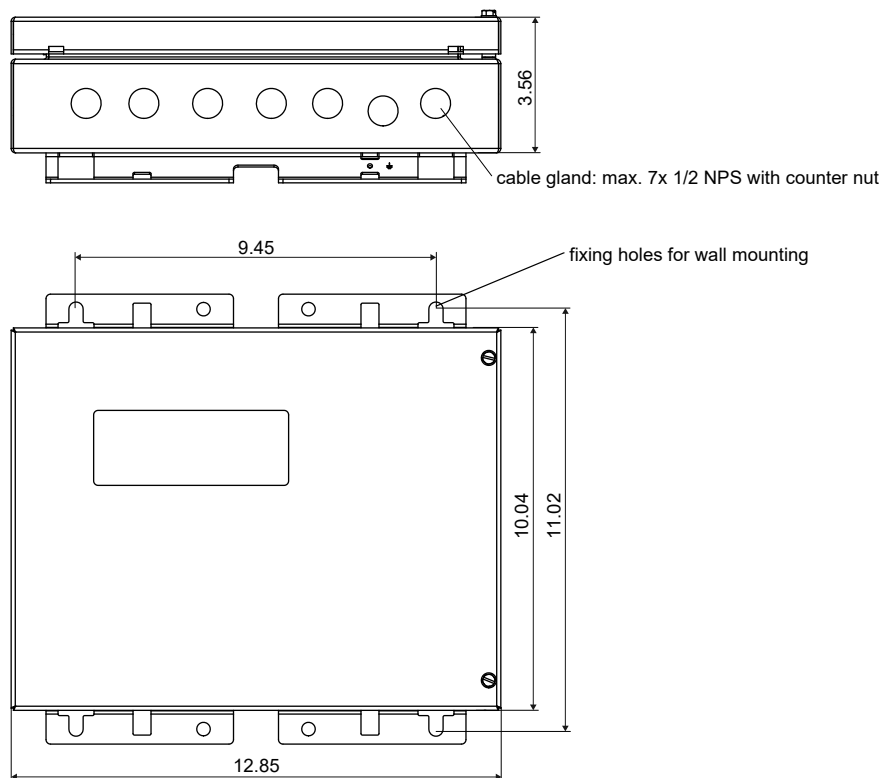
## Dimensions

### \*731 (aluminum housing)



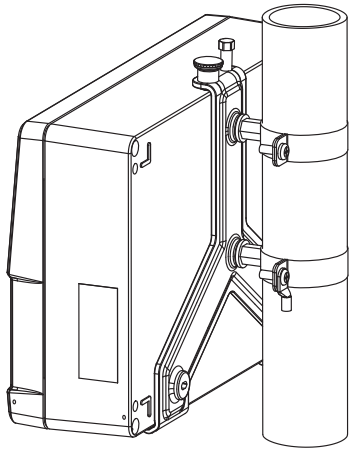
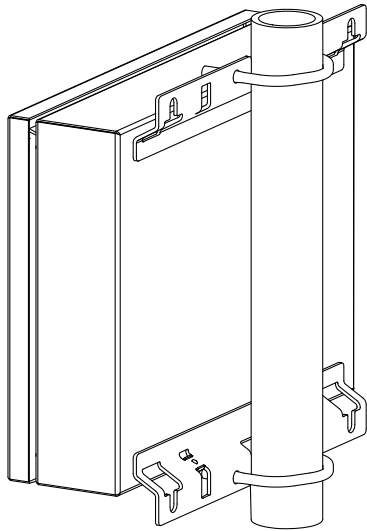
in inch

### \*731 (stainless steel housing)



in inch

## 2" pipe mounting kit

<p><b>*731 (aluminum housing)</b></p> 	<p>item number: 731037-1</p>
<p><b>*731 (stainless steel housing)</b></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: -40...+140 °F

## Terminal assignment

\*731

The diagram shows the top view of the FLUXUS H731 terminal block. It features several connector groups: AV, AR, BV, and BR (each with a positive and negative terminal); ROM A and ROM B (each with four terminals); a LAN port; and a power supply terminal. There are also two equipotential bonding terminals, one for aluminum housing and one for stainless steel housing. The terminal block is shown with its internal wiring and terminal numbering.

power supply<sup>1</sup>

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

transducers			
measuring channel A		measuring channel B	
terminal	connection	terminal	connection
AV or AV+	signal	BV or BV+	signal
AVS or AV-	shield	BVS or BV-	shield
ARS or AR-	shield	BRS or BR-	shield
AR or AR+	signal	BR or BR+	signal

outputs, inputs<sup>1, 2</sup>

terminal	connection
depending on configuration	current output, digital output, current input
1, 2, 3, 4 5, 6, 7, 8 9, 10, 11, 12 13, 14, 15, 16	temperature input
29+, 30-	passive current output/HART
29-, 30+	active current output/HART
29, 30	Modbus RTU, BACnet MS/TP, 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	<ul style="list-style-type: none"><li>• service (FluxDiag/FluxDiagReader)</li><li>• Modbus TCP</li><li>• BACnet IP</li></ul>

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

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

## Transducers

### Overview

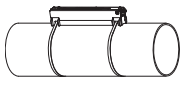
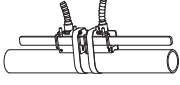
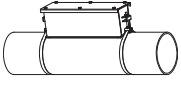
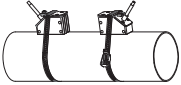
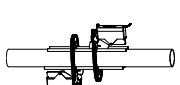
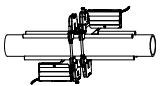
#### Shear wave transducers

			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 <sup>1</sup> CLG1E53 <sup>1</sup>	CDK1E53 <sup>1</sup> CLK1E53 <sup>1</sup>	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

<sup>1</sup> 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	
				<b>WaveInjector with threaded rods</b>
				 outer pipe diameter: 1.4 to 15 inch

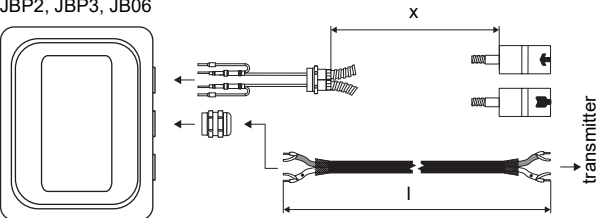
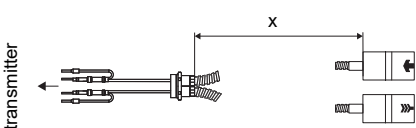
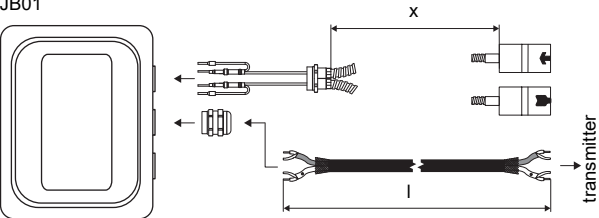
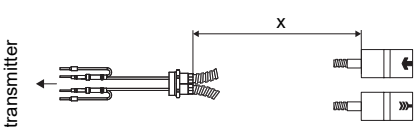
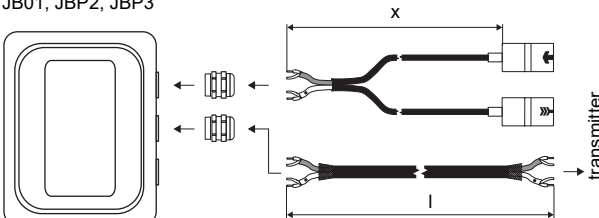
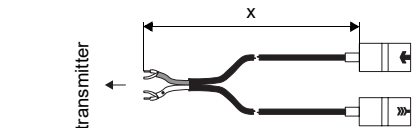
for further data see Technical specification TS\_F7xx-transducersVx-xxx\_Lus

#### 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 type 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

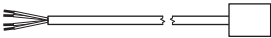
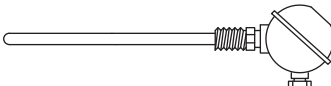
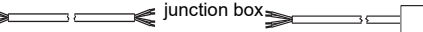
for further data see Technical specification TS\_F7xx-transducersVx-xxx\_Lus

Connection systems

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

for further data see Technical specification TS\_F7xx-transducersVx-xxx\_Lus

Temperature Probes

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

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