

Non-intrusive Ultrasonic Thermal Energy and Volume Flowmeter

Stationary ultrasonic clamp-on system for heat quantity and flow measurement of water

Features

- Single channel thermal energy and volume flow measurement device with two temperature inputs (Pt100 clamp-on or insertion temperature probes available)
- Complete integrated thermal energy/BTU metering system
- For inner pipe diameters of 10...400 mm
- Very high temperature accuracy, temperature probes are matched to 0.1 °C in temperature difference
- Available with a 4...20mA current output and offering full Modbus RTU or BACnet MS/TP functionality
- Very high turndown ratio > 1000 : 1
- Measures very low flow velocities down to 0.01 m/s - very important for measuring off peak flow rates (e.g. during night)
- Permanent coupling pads - no grease, no maintenance required

Low Flow Sensitivity

- Thermal energy supply systems are designed to deliver adequate cooling or heating during peak climate conditions. As a result, most applications run at low and sometimes very low flow velocities.
- One of the biggest problems with accurate thermal energy (BTU) metering is that most meters cannot detect such flow velocities and, consequently, often fail to monitor low energy flows. The FLUXUS F502BTU meter is specially designed to accurately meter flow velocities in this low range.



FLUXUS F502BTU

Temperature Accuracy

- In applications with small temperature differentials such as chilled water applications, the temperature measurement accuracy is critically important.
- FLEXIM's temperature measurement system provides a differential measurement uncertainty of better than 0.1 °C.

Applications

- HVAC
- District energy
- Chilled and hot water plants in
 - College campuses
 - Corporate complexes
 - Government complexes
 - Commercial buildings
 - Malls
 - Hospitals
 - Sports arenas
 - etc.
- Industrial cooling and heating
- Geothermal installations
- Industrial processes

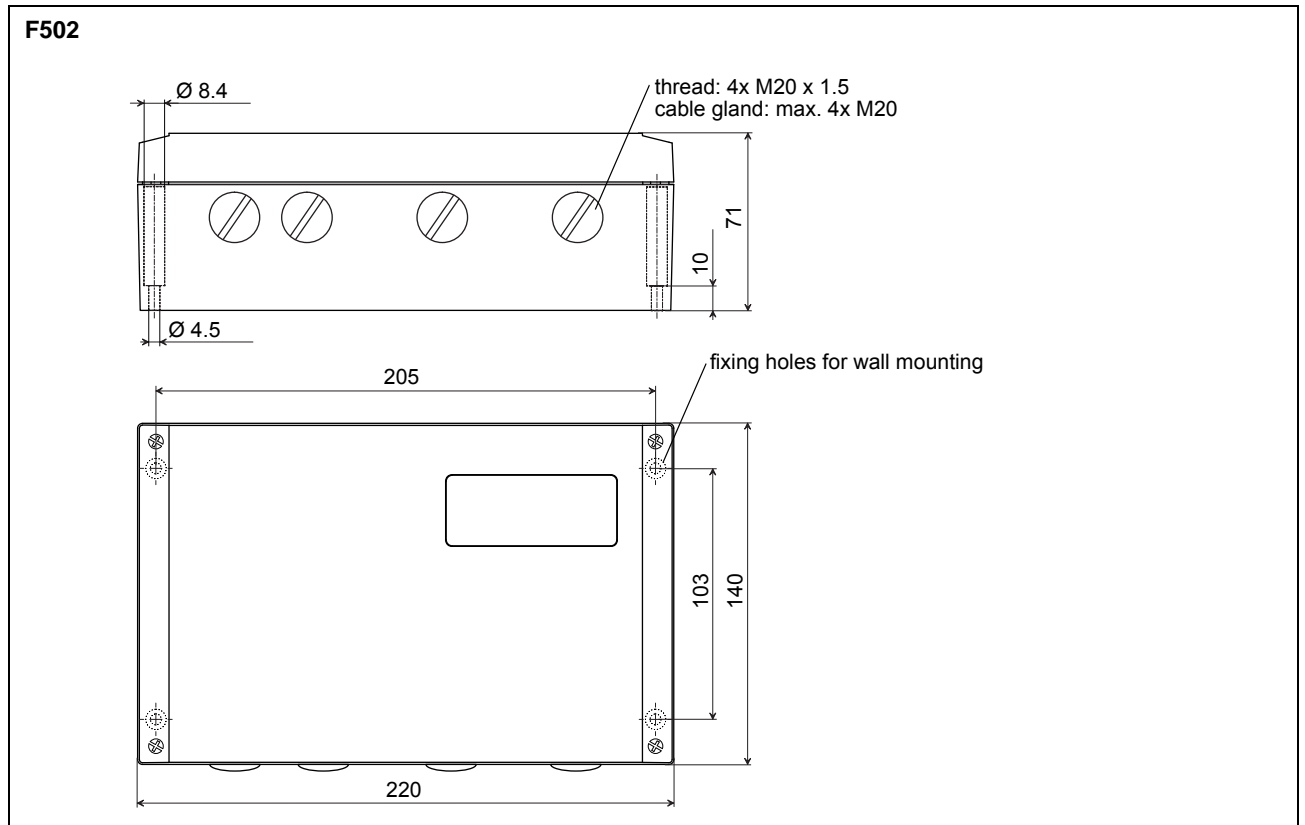
Flow Transmitter

Technical Data

FLUXUS	F502BT-NN
design	field device with 1 measuring channel
application	BTU/energy meter
measurement	
measurement principle	transit time difference correlation principle
flow velocity	0.01...25 m/s
repeatability	0.25 % of reading ± 0.01 m/s
medium	water and thermal fluids (glycol, BP Transcal LT, BP Transcal N, R22 Freon, R134 Freon, ammonia, Shell Termina B, glycol/H ₂ O 20 %, glycol/H ₂ O 30 %, glycol/H ₂ O 40 %, glycol/H ₂ O 50 %, Mobiltherm 594, Mobiltherm 603, R407C, R410A)
accuracy ¹ - measuring system	± 2 % of reading ± 0.01 m/s
flow transmitter	
power supply	100...240 V/50...60 Hz or 20...32 V DC 11...16 V DC
power consumption	< 10 W
number of flow measuring channels	1
damping	0...100 s, adjustable
measuring cycle (1 channel)	10 Hz
response time	1 s
housing material	aluminum, powder coated
degree of protection according to IEC/EN 60529	IP66
dimensions	see dimensional drawing
weight	1.7 kg
fixation	wall mounting, optional: 2" pipe mounting
ambient temperature	-10...+60 °C
display	2 x 16 characters, dot matrix, backlight
menu language	English, German, French, Dutch, Spanish
measuring functions	
physical quantities	volumetric flow rate, mass flow rate, flow velocity, heat flow
totalizer	volume, mass, heat quantity
communication	
interface	optional: RS485 (emitter) or Modbus RTU or BACnet MS/TP
outputs (optional)	
	The outputs are galvanically isolated from the transmitter.
current output	
number	1, optional: 2
range	0/4...20 mA
accuracy	0.1 % of reading ± 15 μ A
active output	$R_{ext} < 500 \Omega$
binary output	
number	1, optional: 2
optorelay	28 V/100 mA
binary output as alarm output - functions	limit, change of flow direction or error
binary output as pulse output - pulse value - pulse width	0.01...1000 units 80...1000 ms
inputs	
	The inputs are galvanically isolated from the transmitter.
temperature input	
number	2
type	Pt100
connection	4-wire
range	-150...+560 °C
resolution	0.01 K
accuracy	± 0.01 % of reading ± 0.03 K

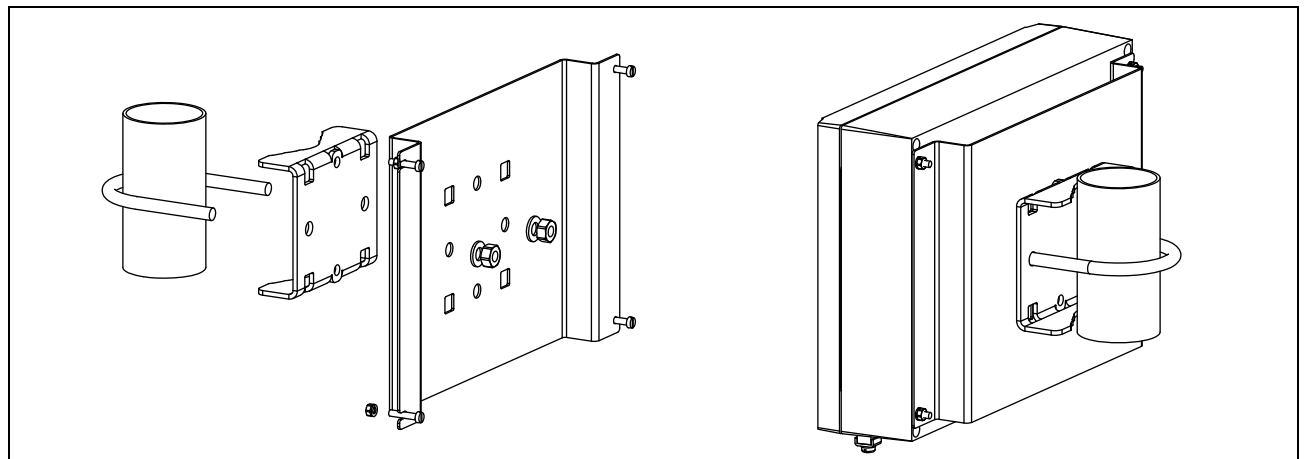
¹ for reference conditions and $v > 0.25$ m/s

Dimensions



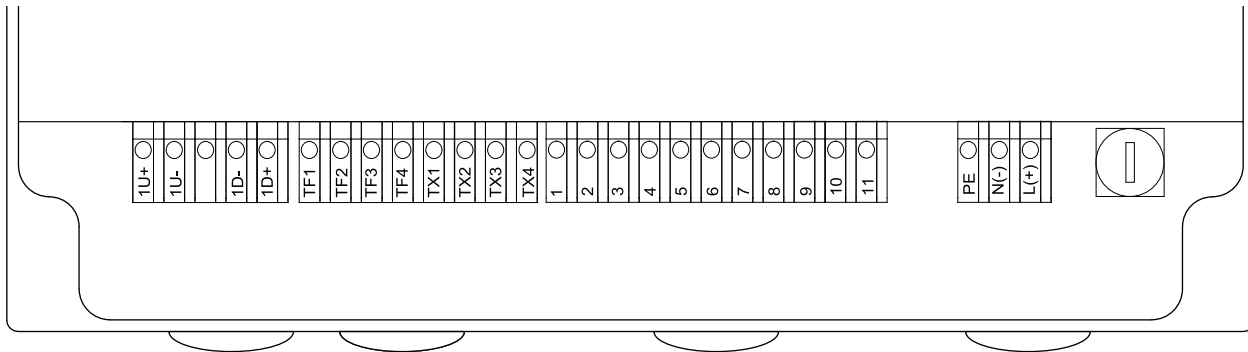
in mm

2 " Pipe Mounting Kit (optional)



Terminal Assignment

F502BT



power supply

terminal	connection (AC)	connection (DC)
PE	earth	earth
N(-)	neutral	-
L(+)	phase	+

transducers

extension cable, transducer cable	
measuring channel A	
terminal	connection
1U+	transducer ↑, signal
1U-	transducer ↑, internal shield
1D-	transducer ↘, internal shield
1D+	transducer ↘, signal
cable gland	external shield

outputs

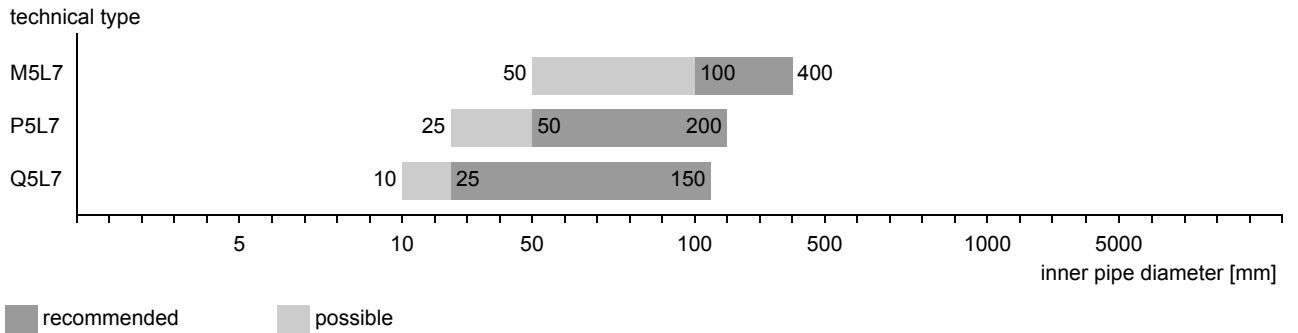
terminal	connection
1(-), 2(+)	binary output (optorelay)
3(-), 4(+)	binary output (optorelay)
5(-), 6(+)	current output I1
7(-), 8(+)	current output I2
9 (-), 10 (+), 11 (shield)	RS485 (Modbus or BACnet MS/TP)

inputs

terminal	temperature probe	
	direct connection	connection with extension cable
TF1, TX1	red	red
TF2, TX2	red/blue	grey
TF3, TX3	white/blue	blue
TF4, TX4	white	white

Transducers

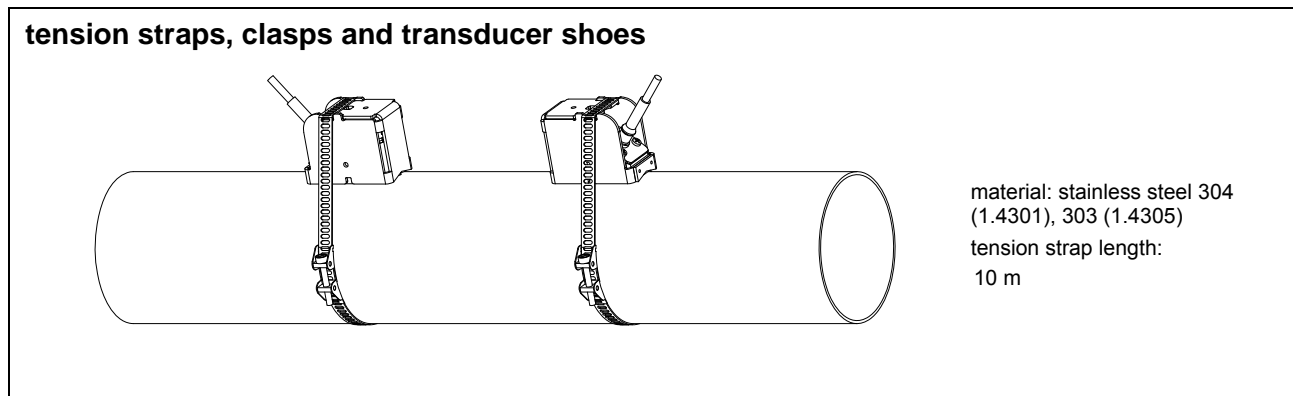
Transducer Selection



Technical Data

technical type		M5L7	P5L7	Q5L7
transducer frequency	MHz	1	2	4
inner pipe diameter d				
min. extended	mm	50	25	10
min. recommended	mm	100	50	25
max.		400	200	150
material				
housing		PEEK with stainless steel cap 304 (1.4301)	PEEK with stainless steel cap 304 (1.4301)	PEEK with stainless steel cap 304 (1.4301)
contact surface		PEEK	PEEK	PEEK
degree of protection according to IEC/EN 60529		IP67	IP67	IP67
transducer cable				
type		2606	2606	2606
length	m	15	15	15
dimensions				
length l	mm	59	59	36
width b	mm	28	28	18
height h	mm	31	31	21
dimensional drawing				
ambient temperature				
min.	°C	-40	-40	-40
max.	°C	+100	+100	+100

Transducer Mounting Fixture

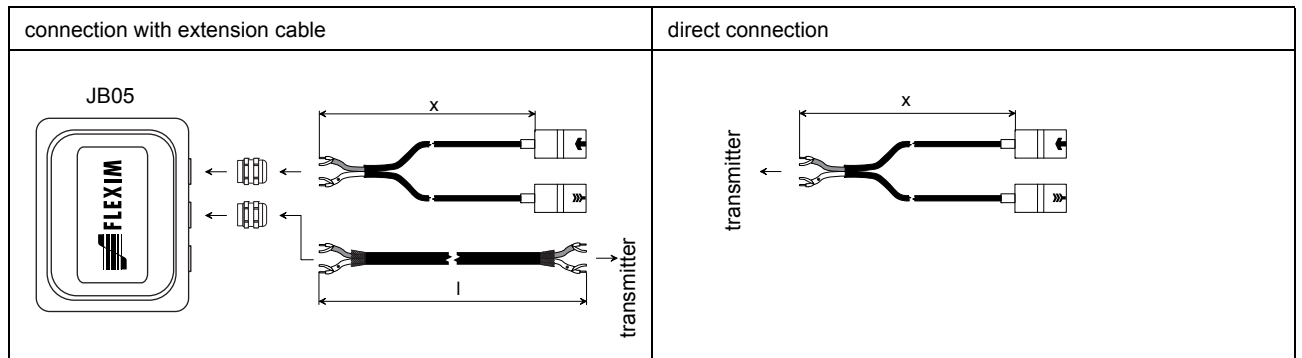


Coupling Materials for Transducers

Technical Data

type	order code	ambient temperature °C	material	transducer
coupling foil type VT	990739-6	-10...+200	fluoroelastomer	M5L7, P5L7
	990739-5			Q5L7

Connection Systems



x - transducer cable length
 l - max. length of extension cable

Transducer Cable

Technical Data

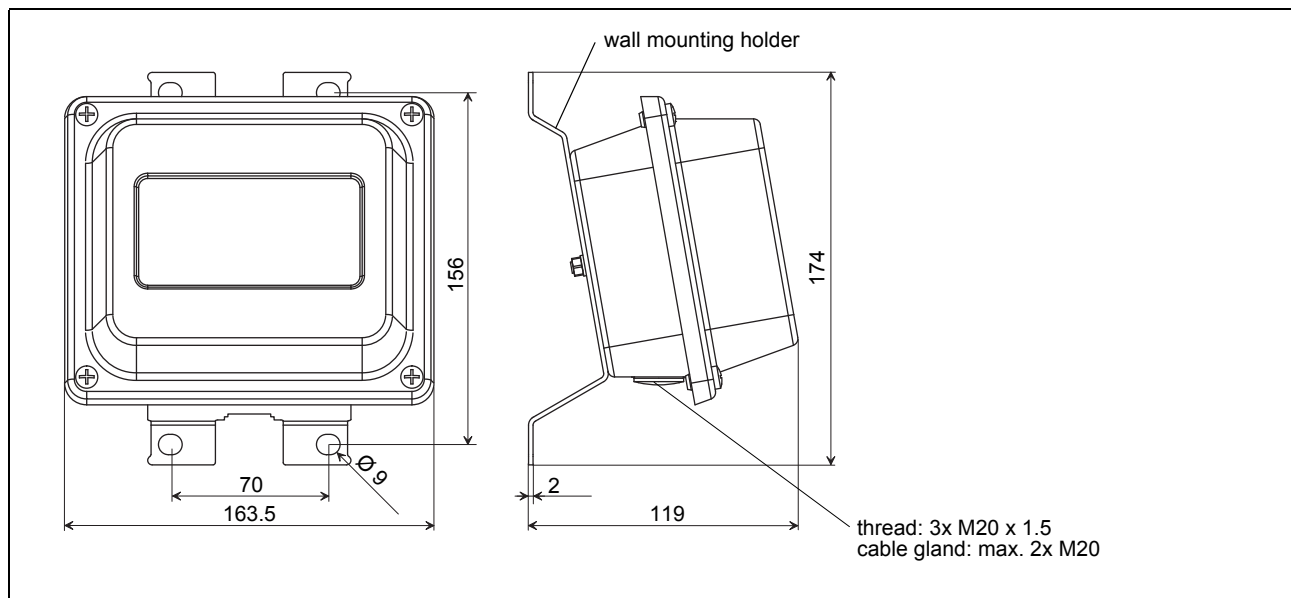
		transducer cable		extension cable	
type		2606	2552	2615	
standard length x	m	10	-	-	
max. length l	m	-	90	90	
ambient temperature	°C	-30...+100	-25...+80	-40...+70	
properties				halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2	
cable jacket					
material		PUR	TPV	PUR	
outer diameter	mm	5	12	12	
thickness	mm			2	
colour		grey	black	black	
shield		x	x	x	

Junction Box

Technical Data

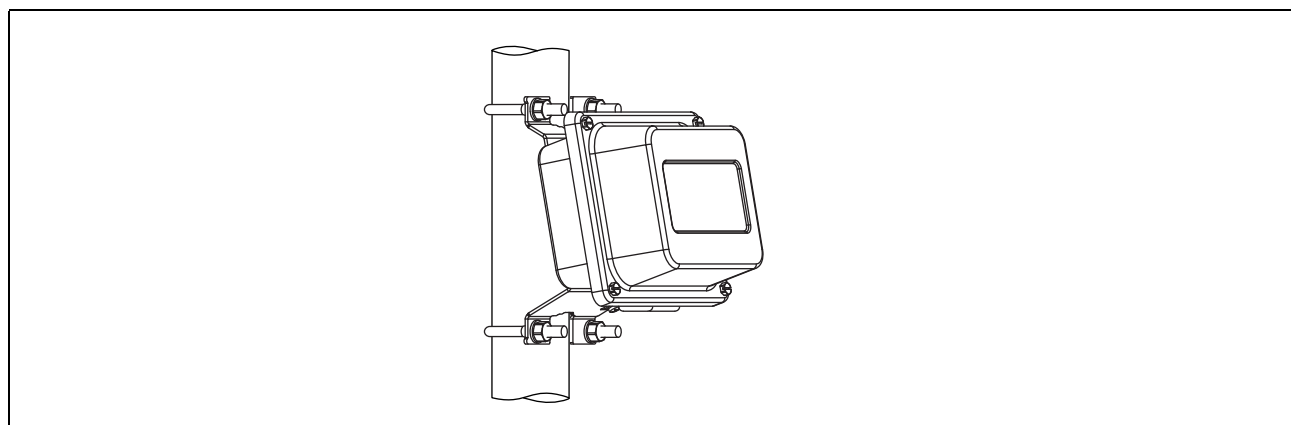
technical type	JB05	
dimensions	see dimensional drawing	
fixation	wall mounting, optional: 2 " pipe mounting	
material		
housing	stainless steel 304 (1.4301)	
gasket	silicone	
degree of protection according to IEC/ EN 60529	IP67	
ambient temperature		
min.	°C	-40
max.	°C	+80

Dimensions



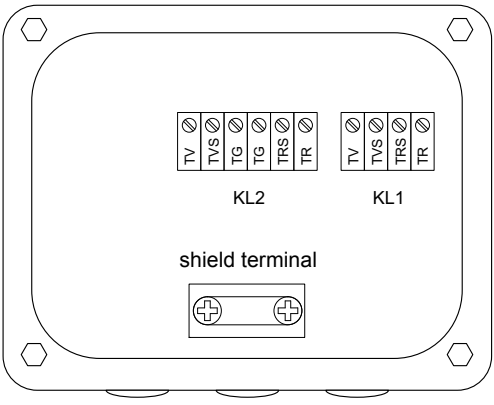
in mm

2 " Pipe Mounting Kit (optional)



Terminal Assignment

JB05



transducers

terminal strip KL1

terminal	connection
TV	transducer ↗, signal
TVS	transducer ↗, internal shield
TRS	transducer ↘, internal shield
TR	transducer ↘, signal
cable gland	external shield

extension cable

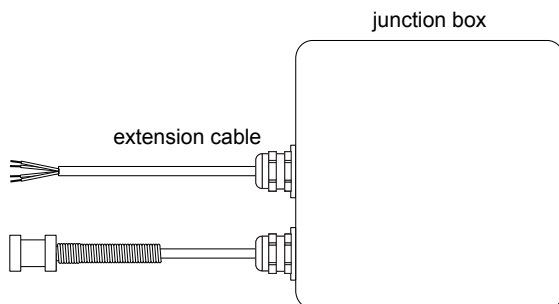
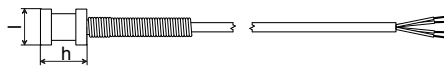
terminal strip KL2

terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

Clamp-on Temperature Probe (optional)

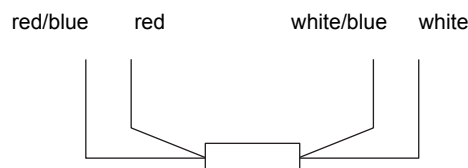
Technical Data

technical type		PT12N	PT12N
order code		770415-1	770414-1
type		Pt100	2x Pt100 matched according to EN 1434-1
connection		4-wire	
measuring range	°C	-30...+250	
accuracy T		$\pm(0.15 \text{ °C} + 2 \cdot 10^{-3} \cdot T [^{\circ}\text{C}])$ class A	
accuracy ΔT		-	$\leq 0.1 \text{ K}$ ($3 \text{ K} < \Delta T < 6 \text{ K}$), more corresponding to EN 1434-1
response time	s	50	
housing		aluminum	
degree of protection according to IEC/EN 60529		IP66	
weight	kg	0.25	0.5
fixation		clamp-on	
accessories (optional)			
thermal conductivity paste 200 °C		x	
thermal conductivity foil 250 °C		x	
dimensions			
length l	mm	15	
width b	mm	15	
height h	mm	20	



Connection

Temperature Probe



Cable

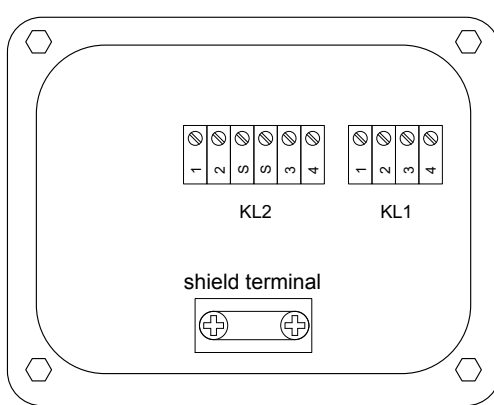
		cable of temperature probe	extension cable
type		4 x 0.25 mm ² black or white	LIYCY 8 x 0.14 mm ² grey
standard length	m	3	5/10/25
max. length	m	-	200
cable jacket		PTFE	PVC

Junction Box

technical type	JBT3	
dimensions	see dimensional drawing	
fixation	wall mounting optional: 2 " pipe mounting	
material		
housing	stainless steel 304 (1.4301)	
gasket	silicone	
degree of protection according to IEC/ EN 60529	IP67	
cable gland	max. 2x M12	
ambient temperature		
min.	°C	-40
max.	°C	+80

Terminal Assignment

JBT3



The diagram shows a rectangular junction box with four mounting holes at the corners. Inside, there are two terminal strips labeled KL2 and KL1, each with four terminals numbered 1 to 4. Below the terminal strips is a shield terminal with two connection points marked with a plus sign (+).

temperature probe

terminal strip KL1

terminal	connection
1	red
2	red/blue
3	white
4	white/blue

extension cable

terminal strip KL2

terminal	connection
1	red
2	grey
3	white
4	blue



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