

# Flexim FLUXUS F532TE Ultrasonic Flowmeter



## Ultrasonic Measurement of Thermal Energy and Volumetric Flow Rate

### Features

- Integrated flow and thermal energy calculator for the determination of the thermal power in real time
- Very high measuring dynamics and fast response time – suitable for monitoring important processes and plants
- Non-invasive measurement using ultrasonic flow transducers for inner pipe diameters 10...2400 mm and temperatures -40...+130 °C
- Temperature measurement and calculation of the thermal energy according to EN 1434
- Suitable for heating and cooling applications
- Smart meter/IoT ready via Ethernet interface with corresponding IP data protocols (e.g. Modbus TCP)
- Sophisticated support software for parameterization, remote control, recording and automatic state diagnosis (FluxDiagReader, FluxDiag, Advanced Meter Verification)

### Applications

Building technology, manufacturing industry, local and district heating/cooling, e.g. in the following areas:

- Energy management
- Internal accounting and balancing
- Network and condition monitoring
- Process optimization
- Predictive maintenance

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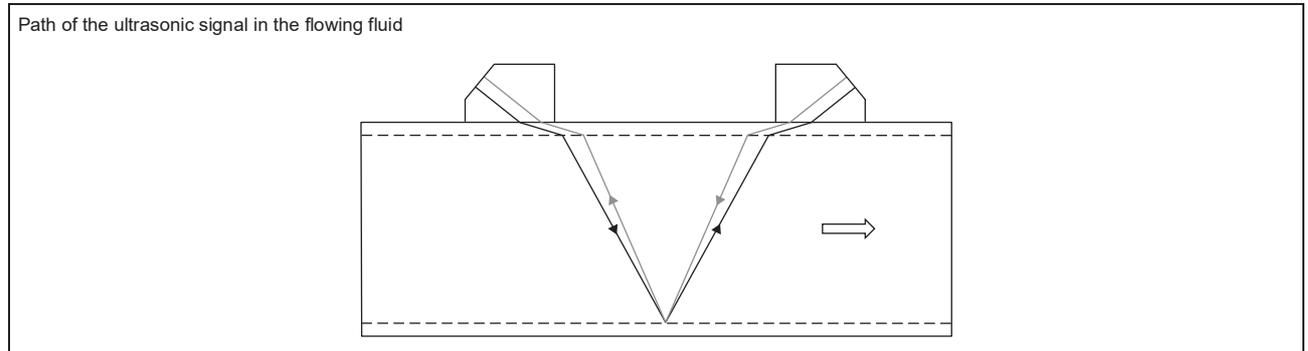
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## Function

### Measurement principle

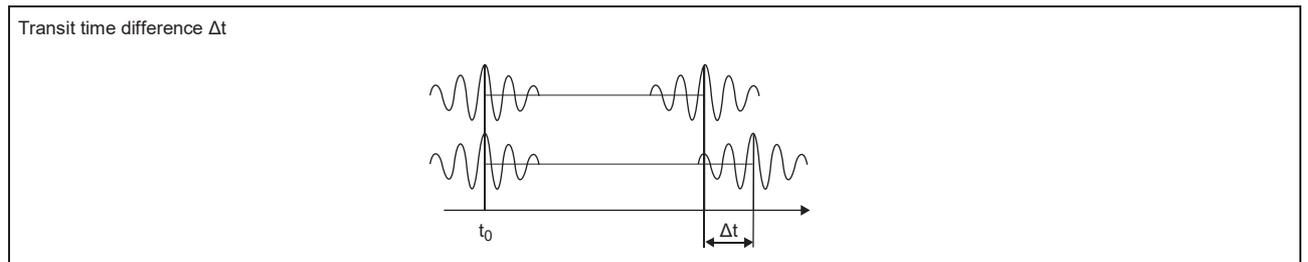
The transducers are mounted on the pipe which is completely filled with the fluid. The ultrasonic signals are emitted alternately by a transducer and received by the other. The physical quantities are determined from the transit times of the ultrasonic signals.



As the fluid where the ultrasound propagates is flowing, the transit time of the ultrasonic signal in flow direction is shorter than the one against the flow direction.

The transit time difference  $\Delta t$  is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow rate.

The integrated microprocessors control the entire measuring cycle. The received ultrasonic signals are checked for measurement usability and evaluated for their reliability. Noise signals are eliminated.



### Calculation of volumetric flow rate

$$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \frac{\Delta t}{2 \cdot \bar{t}_v}$$

where

- $\dot{V}$  - volumetric flow rate
- $k_{Re}$  - fluid mechanic calibration factor
- $A$  - cross-sectional pipe area
- $k_a$  - acoustic calibration factor
- $\Delta t$  - transit time difference
- $\bar{t}_v$  - average of transit times in the fluid

## Calculation of thermal energy rate

The thermal energy rate is calculated with the following formula:

$$\Phi = k_i \cdot \dot{V} \cdot (T_V - T_R) \text{ (heating application)}$$

$$\Phi = k_i \cdot \dot{V} \cdot (T_R - T_V) \text{ (cooling application)}$$

where

$\Phi$  – thermal energy rate

$k_i$  – thermal coefficient

$\dot{V}$  – volumetric flow rate

$T_V$  – supply temperature

$T_R$  – return temperature

The thermal coefficient  $k_i$  results from several thermal energy rate coefficients for the specific enthalpy and density of the fluid. The thermal energy rate coefficients of some fluids are stored in the internal database of the transmitter. Further customised fluids are possible.

## Max. permissible error

The max. permissible error MPE of a complete heat meter is according to EN 1434 the arithmetic sum of the max. permissible errors of the subassemblies: calculator, temperature sensor pair and flow sensor.

$$\text{MPE} = E_c + E_t + E_f$$

where

MPE – total max. permissible error

$E_c$  – max. permissible relative error of the calculator

$E_t$  – max. permissible relative error of the temperature sensor pair

$E_f$  – max. permissible relative error of the flow sensor

### Number of sound paths

The number of sound paths is the number of transits of the ultrasonic signal through the fluid in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflection arrangement**

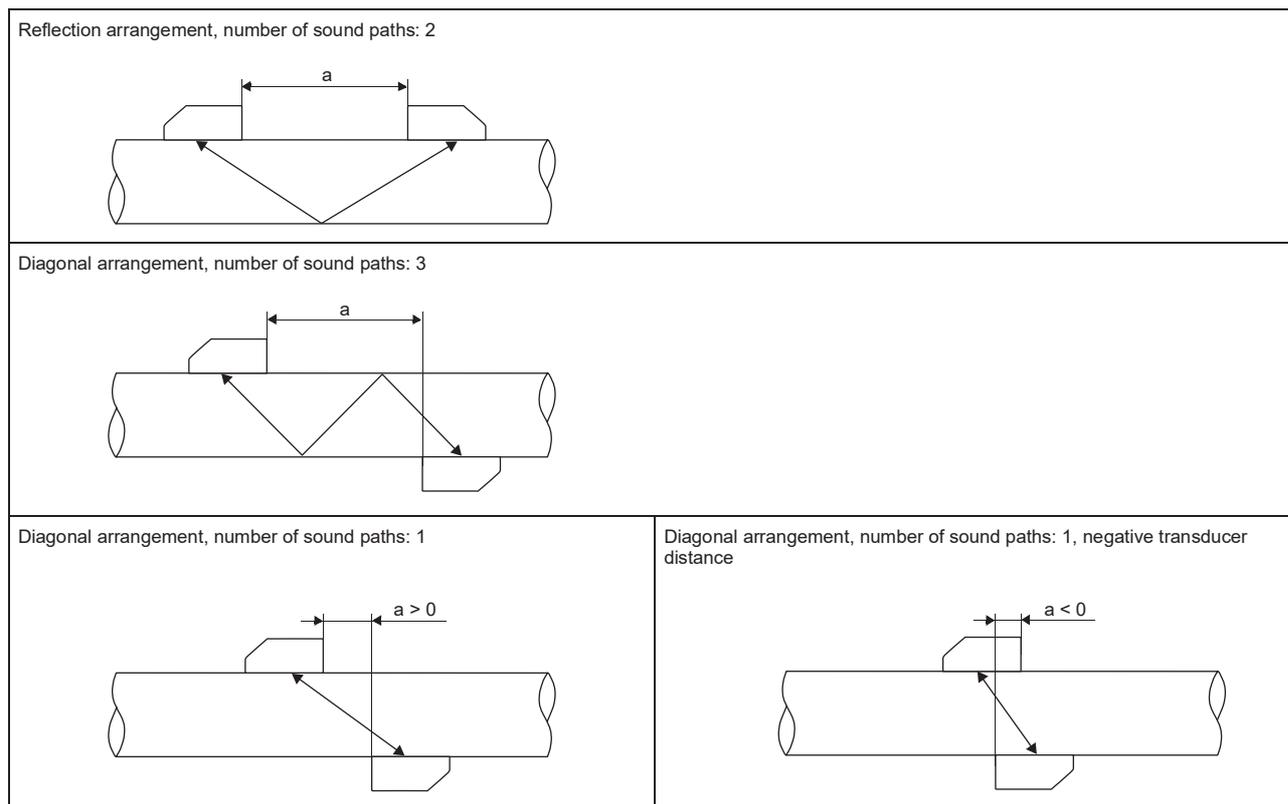
The number of sound paths is even. The transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easy.

- **diagonal arrangement**

The number of sound paths is odd. The transducers are mounted on opposite sides of the pipe. In case of high signal attenuation by the fluid or pipe, diagonal arrangement with 1 sound path is used.

The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the transmitter.

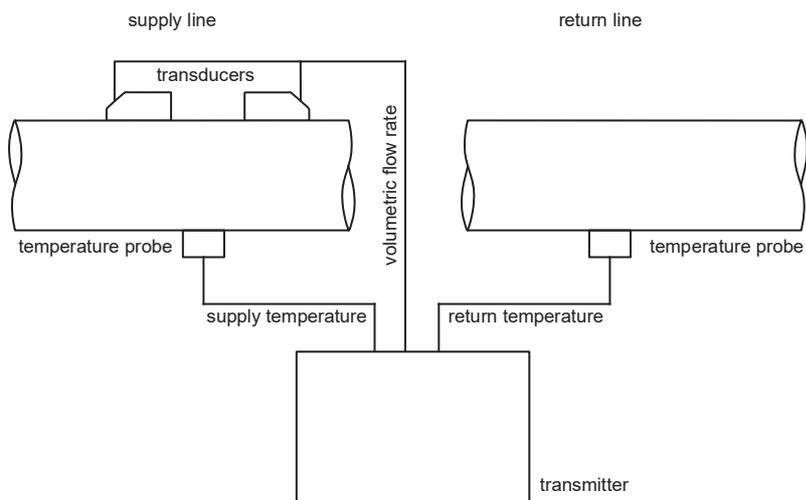
As the transducers can be mounted with the transducer mounting fixture in reflection arrangement or diagonal arrangement, the number of sound paths can be adjusted optimally for the application.



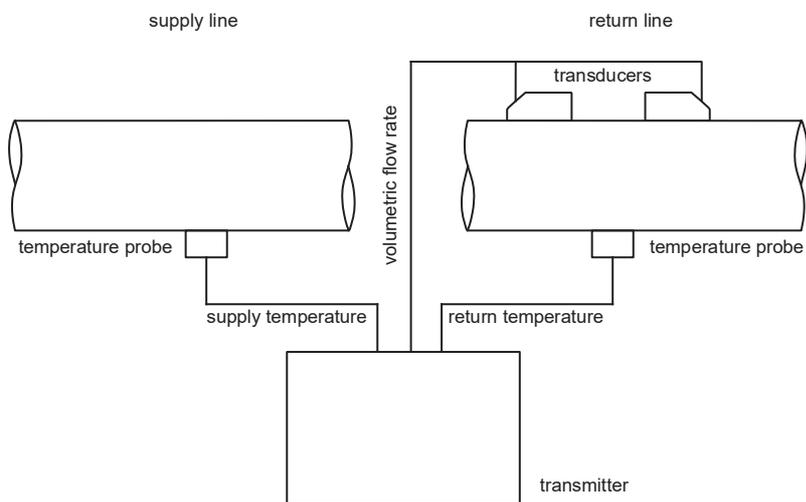
a - transducer distance

### Typical measurement setup

Example of a thermal energy rate measurement measuring the volumetric flow rate in the supply line



Example of a thermal energy rate measurement measuring the volumetric flow rate in the return line



# Transmitter

## Technical data

|  |                   | FLUXUS F532TE (analog outputs)  | FLUXUS F532TE (process interface)   |
|--|-------------------|---|---|
|  |                   |    |   |
| design   |                   | field device with 1 measuring channel   |   |
| application  |                   | energy meter  |   |
| <b>measurement</b>   |                   |   |   |
| <b>• energy</b>  |                   |   |   |
| max. permissible relative error                              |                   | calculator: $E_c = \pm(0.4 + 1 K/\Delta\theta) \%$  |   |
| <b>• temperature</b>   |                   |   |   |
| temperature difference                                       |                   | $\Delta\theta_{\min} = 3 \text{ K}, \Delta\theta_{\max} = 300 \text{ K}$  |   |
| max. permissible relative error                              |                   | temperature sensor pair: $E_t$ - depending on type, see Technical data of temperature probes  |   |
| <b>• flow</b>  |                   |   |   |
| measurement principle  |                   | transit time difference correlation principle   |   |
| flow direction   |                   | bidirectional   |   |
| flow   | m <sup>3</sup> /h | example for 2 sound paths and factory default of the cut-off flow:<br><ul style="list-style-type: none"> <li>• DN 50: Qp = 0.2...200</li> <li>• DN 150: Qp = 1.8...900</li> <li>• DN 500: Qp = 17...5000</li> </ul> |   |
| flow velocity  | m/s               | 0.01...25   |   |
| repeatability  |                   | 0.15 % MV $\pm$ 0.005 m/s   |   |
| fluid  |                   | water, water/glycol: 0...100 %  |   |
| 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>• 90...250 V/50...60 Hz or</li> <li>• 11...32 V DC</li> </ul>  |   |
| power consumption  | W                 | < 10  |   |
| number of measuring channels                                 |                   | 1   |   |
| damping  | s                 | 0...100 (adjustable)  |   |
| measuring cycle  | Hz                | 100...1000  |   |
| response time  | s                 | 1   |   |
| housing material   |                   | aluminum, powder coated   |   |
| degree of protection   |                   | IP66  |   |
| dimensions   | mm                | see dimensional drawing   |   |
| weight   | kg                | 2.25  |   |
| fixation   |                   | wall mounting, optional: 2" pipe mounting   |   |
| ambient temperature  | °C                | -20...+60   |   |
| display  |                   | 128 x 64 pixels, backlight  |   |
| menu language  |                   | English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian, Chinese   |   |
| <b>measuring functions</b>                                   |                   |   |   |
| physical quantities  |                   | thermal energy rate, volumetric flow rate, mass flow rate, flow velocity  |   |
| totaliser  |                   | thermal energy, volume, mass  |   |
| 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:<br><ul style="list-style-type: none"> <li>• USB</li> <li>• LAN</li> </ul>  | measured value transmission, parametrisation of the transmitter:<br><ul style="list-style-type: none"> <li>• USB</li> <li>• LAN</li> </ul>                                      |
| process interfaces   |                   | -   | 1 option:<br><ul style="list-style-type: none"> <li>• Modbus RTU</li> <li>• BACnet MS/TP</li> <li>• M-Bus</li> <li>• HART</li> <li>• Modbus TCP</li> <li>• BACnet IP</li> </ul> |

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

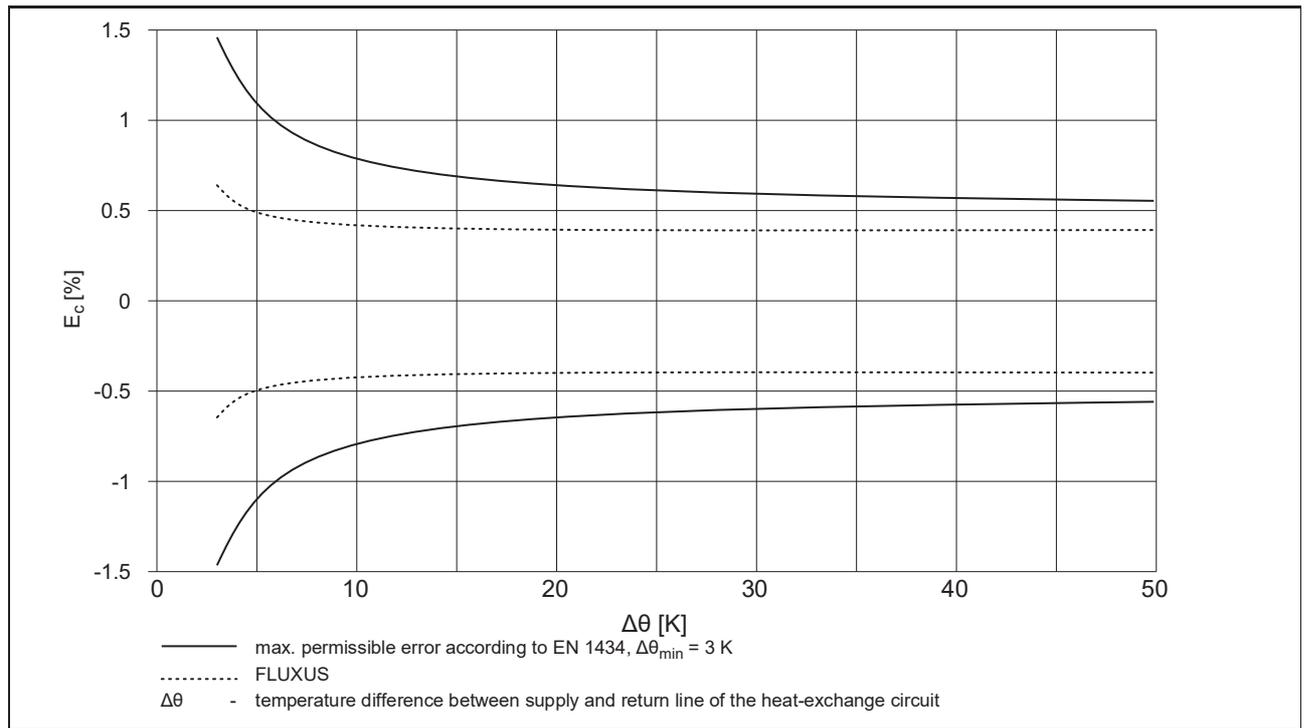
<sup>2</sup> for transit time difference principle and reference conditions

|                                    | FLUXUS F532TE (analog outputs)  | FLUXUS F532TE (process interface)  |
|------------------------------------|---|--|
| <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 and totalised physical quantities   |  |
| capacity                           | max. 800 000 measured values  |  |
| <b>outputs</b>                     |   |  |
|                                    | The outputs are galvanically isolated from the transmitter.   |  |
| <b>• switchable current output</b> |   |  |
|                                    | configurable according to NAMUR NE 43   |  |
| number                             | 1   | optional: 1 (HART)   |
| range                              | 4...20 (alarm current: 3.2...3.99, 20.01...24, hardware fault current: 3.2)   | 4...20 (alarm current: 3.2...3.99, 20.01...24, hardware fault current: 3.2)  |
| uncertainty                        | 0.04 % of output value $\pm 3 \mu\text{A}$  | 0.04 % of output value $\pm 3 \mu\text{A}$   |
| active output                      | $R_{\text{ext}} = 250...530 \Omega$ , $U_{\text{opencircuit}} = 28 \text{ V DC}$  | $R_{\text{ext}} = 250...530 \Omega$ , $U_{\text{opencircuit}} = 28 \text{ V DC}$   |
| passive output                     | $U_{\text{ext}} = 9...30 \text{ V DC}$ , depending on $R_{\text{ext}}$ ( $R_{\text{ext}} < 458 \Omega$ at 20 V)   | $U_{\text{ext}} = 9...30 \text{ V DC}$ , depending on $R_{\text{ext}}$ ( $R_{\text{ext}} < 458 \Omega$ at 20 V)  |
| current output in HART mode        |   |  |
| • range                            | mA  | 4...20 (alarm current: 3.5...3.99, 20.01...22, hardware fault current: 3.2)  |
| • active output                    | -   | $R_{\text{ext}} = 250...530 \Omega$ , $U_{\text{opencircuit}} = 28 \text{ V DC}$   |
| • passive output                   | -   | $U_{\text{ext}} = 9...30 \text{ V DC}$ , depending on $R_{\text{ext}}$ ( $R_{\text{ext}} = 250...458 \Omega$ at 20 V)  |
| <b>• digital output</b>            |   |  |
| number                             | 2   | -  |
| functions                          | <ul style="list-style-type: none"> <li>frequency output</li> <li>binary output</li> <li>pulse output</li> </ul>   | -  |
| type                               | open collector (passive)  | -  |
| operating parameters               | $5...30 \text{ V}$ , $I_{\text{max}} = 100 \text{ mA}$ , $R_{\text{int}} = 20 \Omega$<br>Low: $U < 2 \text{ V}$ at $I_{\text{loop}} = 2 \text{ mA}$ ( $R_{\text{ext}} = 12 \text{ k}\Omega$ at $U_{\text{ext}} = 24 \text{ V}$ )<br>High: $U > 15 \text{ V}$ ( $R_{\text{ext}} = 12 \text{ k}\Omega$ at $U_{\text{ext}} = 24 \text{ V}$ ) | -  |
| frequency output                   |   |  |
| • range                            | kHz   | 0.002...10   |
| • damping                          | s   | 0...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...1000  |
| • pulse width                      | ms  | 0.05...1000  |
| • pulse rate                       |   | max. 10 000 pulses   |
| <b>inputs</b>                      |   |  |
|                                    | The inputs are galvanically isolated from the transmitter.  |  |
| <b>• temperature input</b>         |   |  |
| number                             | 2   |  |
| type                               | Pt100/Pt1000  |  |
| connection                         | 4-wire  |  |
| range                              | $^{\circ}\text{C}$  | -150...+560  |
| resolution                         | K   | 0.01   |
| accuracy                           |   | $\pm 0.01 \text{ \% MV} \pm 0.03 \text{ K}$ at 18...28 $^{\circ}\text{C}$<br>$\pm 0.01 \text{ \% MV} \pm 0.03 \text{ K} \pm 0.0005 \text{ \%}/\text{K}$ at $<18 \text{ }^{\circ}\text{C}/>28 \text{ }^{\circ}\text{C}$ |
| cable resistance                   | $\Omega$  | max. 1000  |

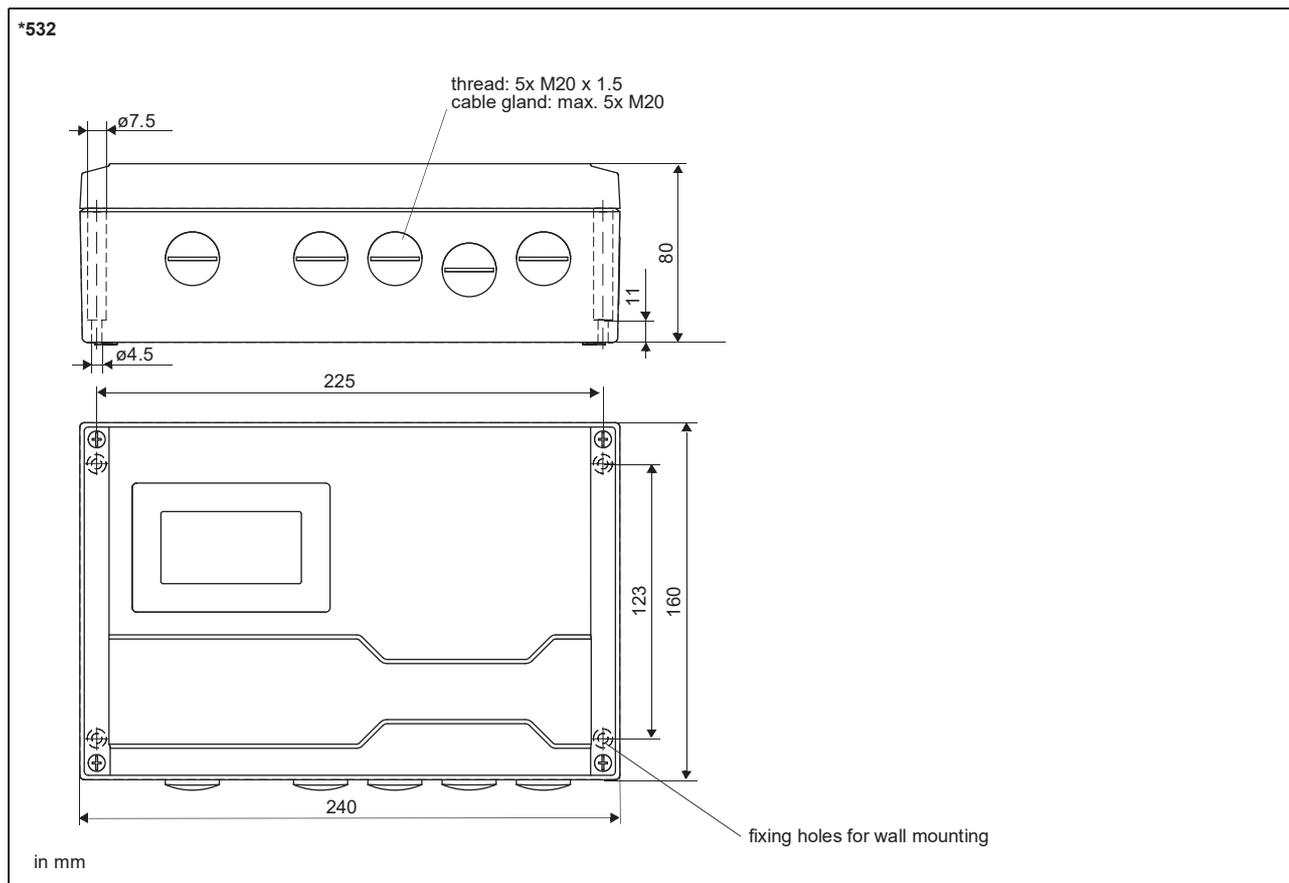
<sup>1</sup> with aperture calibration of the transducers

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

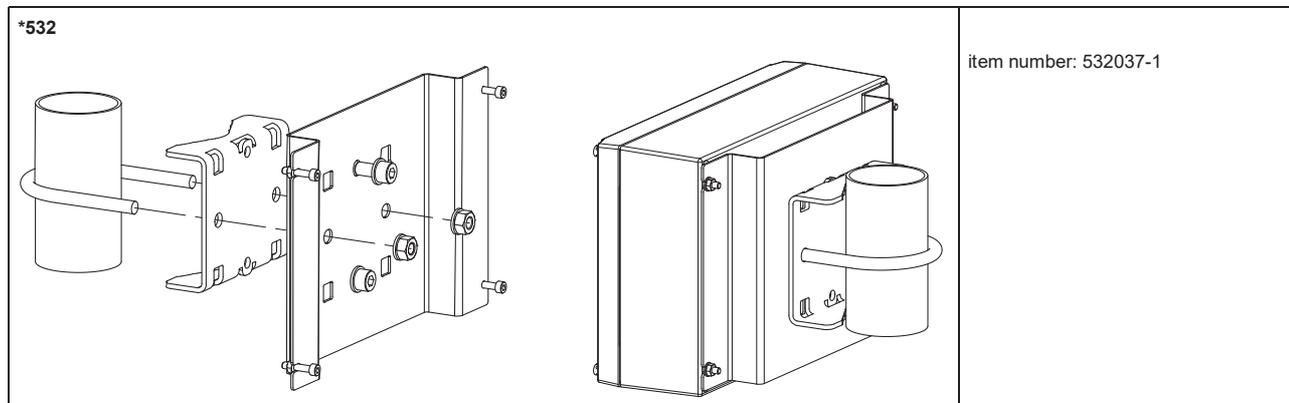
**Max. permissible error of the calculator**



### Dimensions



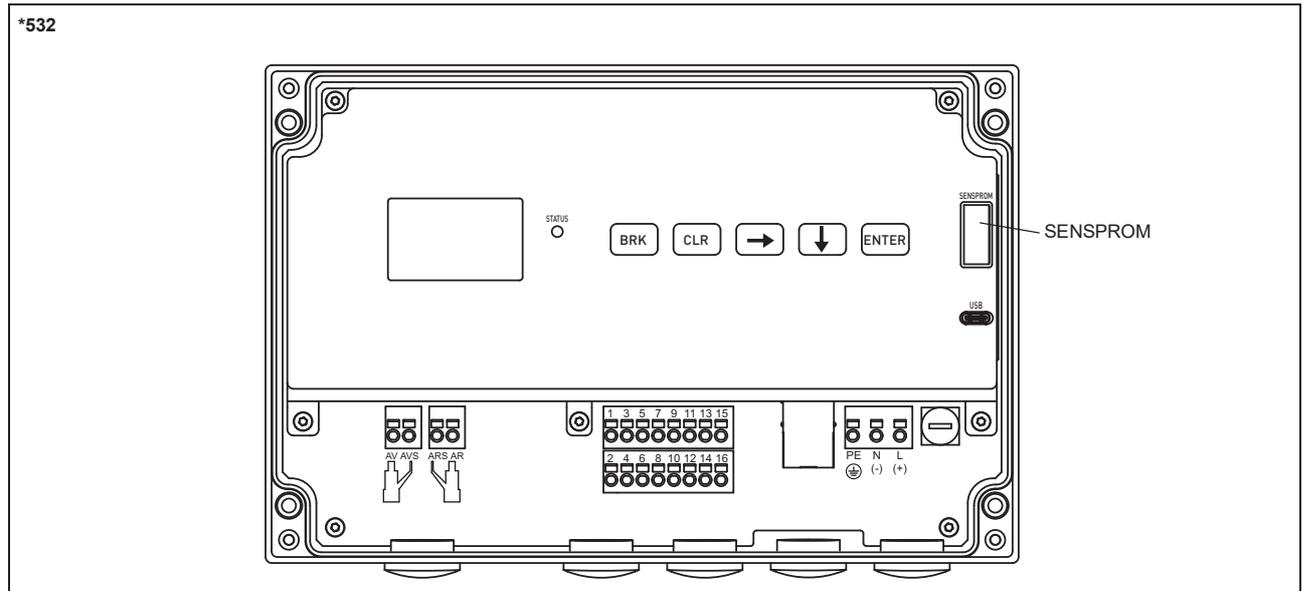
### 2" pipe mounting kit (optional)



### 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)                   | terminal  | connection (DC)            |
| PE                              | protective conductor              | PE  | protective conductor       |
| N                               | neutral conductor                 | (-)   | -                          |
| L                               | line conductor                    | (+)   | +                          |
| transducers, extension cable    |                                   |   |                            |
| terminal                        | connection                        | transducer  |                            |
| AV                              | signal                            |   |                            |
| AVS                             | internal shield                   |   |                            |
| ARS                             | internal shield                   |   |                            |
| AR                              | signal                            |   |                            |
| cable gland                     | external shield                   |   |                            |
| outputs, inputs <sup>1, 2</sup> |                                   |   |                            |
| terminal                        | connection                        |   |                            |
| 13+, 14-                        | passive current output            |   |                            |
| 13-, 14+                        | active current output             |   |                            |
| 9+, 10-, 11+, 12-               | digital output                    |   |                            |
| 15+, 16-                        | passive current output/HART       |   |                            |
| 15-, 16+                        | active current output/HART        |   |                            |
| 1, 2, 3, 4, 5, 6, 7, 8          | temperature input                 |   |                            |
| temperature probe               |                                   |   |                            |
| terminal                        | direct connection (clamp-on)      | connection with extension cable (clamp-on)  | direct connection (inline) |
| 1, 5                            | red                               | red   | red                        |
| 2, 6                            | white                             | white   | white                      |
| 3, 7                            | red/blue                          | grey  | grey                       |
| 4, 8                            | white/blue                        | blue  | blue                       |
| communication interfaces        |                                   |   |                            |
| terminal                        | connection                        | communication interface   |                            |
| 15                              | signal +                          | <ul style="list-style-type: none"> <li>• Modbus RTU<sup>1</sup></li> <li>• BACnet MS/TP<sup>1</sup></li> <li>• M-Bus<sup>1</sup></li> </ul> |                            |
| 16                              | signal -                          |   |                            |
| USB                             | type C<br>Hi-Speed USB 2.0 Device | service (FluxDiag/FluxDiagReader)   |                            |
| LAN                             | RJ45<br>10/100 Mbps Ethernet      | <ul style="list-style-type: none"> <li>• service (FluxDiag/FluxDiagReader)</li> <li>• Modbus TCP</li> <li>• BACnet IP</li> </ul>            |                            |

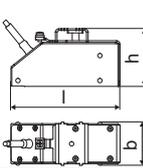
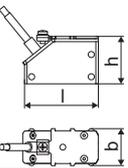
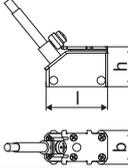
<sup>1</sup> cable (by customer): e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm<sup>2</sup>

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

## Transducers

### Technical data

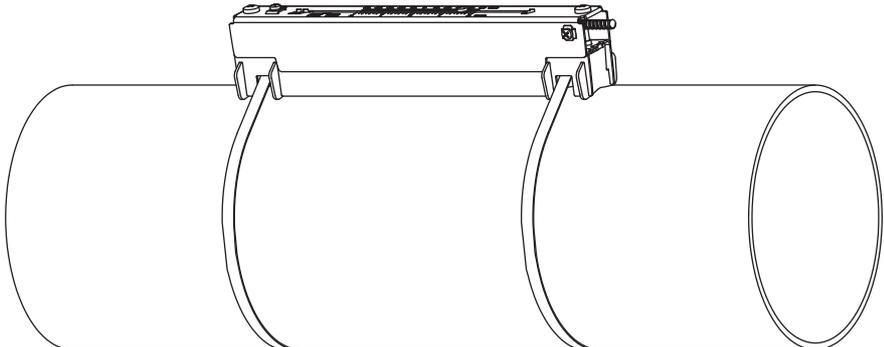
#### Shear wave transducers (max. 100 °C)

| order code                   |     | FSK-LNNN-**T1   | FSM-LNNN-**T1   | FSP-LNNN-**T1 | FSQ-LNNN-**T1   |
|------------------------------|-----|---|---|---------------|---|
| technical type               |     | CDK1LZ7   | CDM2LZ1   | CDP2LZ1       | CDQ2LZ1   |
| transducer frequency         | MHz | 0.5   | 1   | 2             | 4   |
| <b>inner pipe diameter d</b> |     |   |   |               |   |
| min. extended                | mm  | 100   | 50  | 25            | 10  |
| min. recommended             | mm  | 200   | 100   | 50            | 25  |
| max. recommended             | mm  | 2000  | 1000  | 400           | 150   |
| max. extended                | mm  | 2400  | 1200  | 480           | 240   |
| <b>pipe wall thickness</b>   |     |   |   |               |   |
| min.                         | mm  | 5   | 2.5   | 1.2           | 0.6   |
| <b>material</b>              |     |   |   |               |   |
| housing                      |     | PEEK with stainless steel cover 316Ti (1.4571)                                    |   |               |   |
| contact surface              |     | PEEK  |   |               |   |
| degree of protection         |     | IP66  |   |               |   |
| <b>transducer cable</b>      |     |   |   |               |   |
| type                         |     | 2606  |   |               |   |
| length                       | m   | 10  |   |               |   |
| <b>dimensions</b>            |     |   |   |               |   |
| length l                     | mm  | 126.5   | 64  |               | 40  |
| width b                      | mm  | 51  | 32  |               | 22  |
| height h                     | mm  | 67.5  | 40.5  |               | 25.5  |
| dimensional drawing          |     |  |  |               |  |
| weight (without cable)       | kg  | 0.36  | 0.066   |               | 0.016   |
| pipe surface temperature     | °C  | -40...+100  |   |               |   |
| ambient temperature          | °C  | -40...+100  |   |               |   |

**Shear wave transducers (max. 130 °C)**

| order code                   |     | FSK-NNNN-**T1                                 | FSM-NNNN-**T1 | FSP-NNNN-**T1 | FSQ-NNNN-**T1 |
|------------------------------|-----|---|---------------|---------------|---------------|
| technical type               |     | C(DL)K1N53                                    | C(DL)M2N53    | C(DL)P2N53    | C(DL)Q2N53    |
| transducer frequency         | MHz | 0.5   | 1             | 2             | 4             |
| <b>inner pipe diameter d</b> |     |   |               |               |               |
| min. extended                | mm  | 100   | 50            | 25            | 10            |
| min. recommended             | mm  | 200   | 100           | 50            | 25            |
| max. recommended             | mm  | 2000  | 1000          | 400           | 150           |
| max. extended                | mm  | 2400  | 1200          | 480           | 240           |
| <b>pipe wall thickness</b>   |     |   |               |               |               |
| min.                         | mm  | 5   | 2.5           | 1.2           | 0.6           |
| <b>material</b>              |     |   |               |               |               |
| housing                      |     | PEEK with stainless steel cover 316L (1.4404) |               |               |               |
| contact surface              |     | PEEK  |               |               |               |
| degree of protection         |     | IP66  | IP66/IP67     |               |               |
| <b>transducer cable</b>      |     |   |               |               |               |
| type                         |     | 1699  |               |               |               |
| length                       | m   | 5   | 4             | 3             |               |
| <b>dimensions</b>            |     |   |               |               |               |
| length l                     | mm  | 126.5   | 64            | 40            |               |
| width b                      | mm  | 51  | 32            | 22            |               |
| height h                     | mm  | 67.5  | 40.5          | 25.5          |               |
| dimensional drawing          |     |   |               |               |               |
| weight (without cable)       | kg  | 0.36  | 0.066         | 0.016         |               |
| pipe surface temperature     | °C  | -40...+130                                    |               |               |               |
| ambient temperature          | °C  | -40...+130                                    |               |               |               |
| temperature compensation     |     | x   |               |               |               |

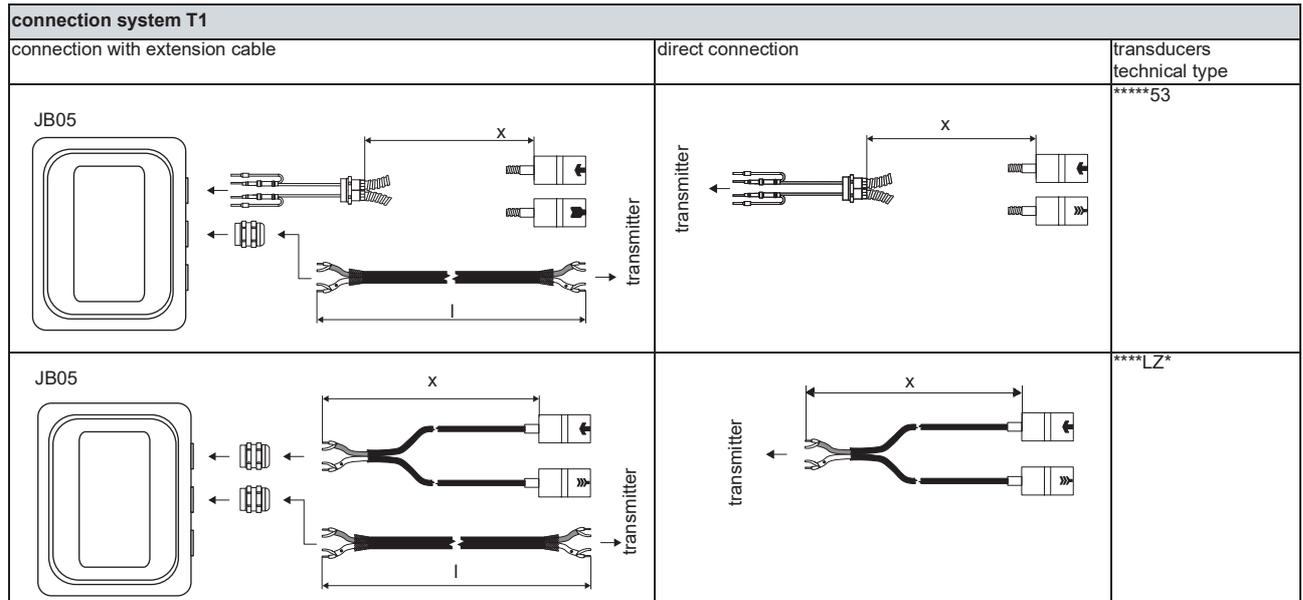
### Transducer mounting fixture

|   |   |
|---|---|
| <p>Variofix L (VL)</p>  | <p>material: stainless steel 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568)<br/>                 inner length:<br/> <b>VLK:</b> 348 mm<br/> <b>VL(MP):</b> 234 mm<br/> <b>VLQ:</b> 176 mm<br/>                 dimensions:<br/> <b>VLK:</b> 423 x 90 x 93 mm<br/> <b>VL(MP):</b> 309 x 57 x 63 mm<br/> <b>VLQ:</b> 247 x 43 x 47 mm</p> |
|---|---|

### Coupling materials for transducers

| type                     | ambient temperature<br>°C | remark |
|--------------------------|---------------------------|--------|
| coupling compound type N | -30...+130                | < 24 h |
| coupling foil type VT    | -10...+200                |        |

### Connection systems



### Cable

| transducer cable    |      |                                       |
|---------------------|------|---------------------------------------|
| type                |      | 1699      2606                        |
| weight              | kg/m | 0.094      0.033                      |
| ambient temperature | °C   | -55...+200      -40...+100            |
| cable jacket        |      |                                       |
| material            |      | PTFE      PUR                         |
| outer diameter      | mm   | 2.9      5                            |
| thickness           | mm   | 0.3      -                            |
| colour              |      | brown      grey                       |
| shield              | x    | x                                     |
| sheath              |      |                                       |
| material            |      | stainless steel 316Ti (1.4571)      - |
| outer diameter      | mm   | 8      -                              |

| extension cable     |  |
|---------------------|--|
| type                | 2615   |
| weight              | kg/m 0.18  |
| ambient temperature | °C -30...+70   |
| properties          | halogen-free<br>fire propagation test according to IEC 60332-1<br>combustion test according to IEC 60754-2 |
| cable jacket        |  |
| material            | PUR  |
| outer diameter      | mm 12  |
| thickness           | mm 2   |
| colour              | black  |
| shield              | x  |

### Cable length

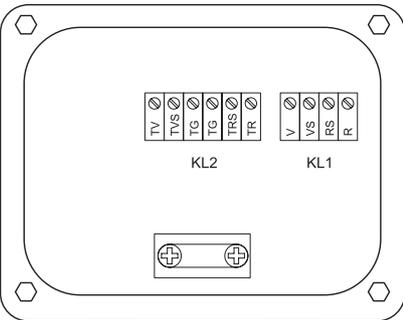
| transducer frequency       | K    |       | M, P |       | Q  |      |
|----------------------------|------|-------|------|-------|----|------|
| transducers technical type | x    | l     | x    | l     | x  | l    |
| CDK1LZ7                    | m 10 | ≤ 300 | -    | -     | -  | -    |
| CD*2LZ1                    | m -  | -     | 10   | ≤ 300 | 10 | ≤ 90 |
| ****N53                    | m 5  | ≤ 300 | 4    | ≤ 300 | 3  | ≤ 90 |

x - transducer cable length

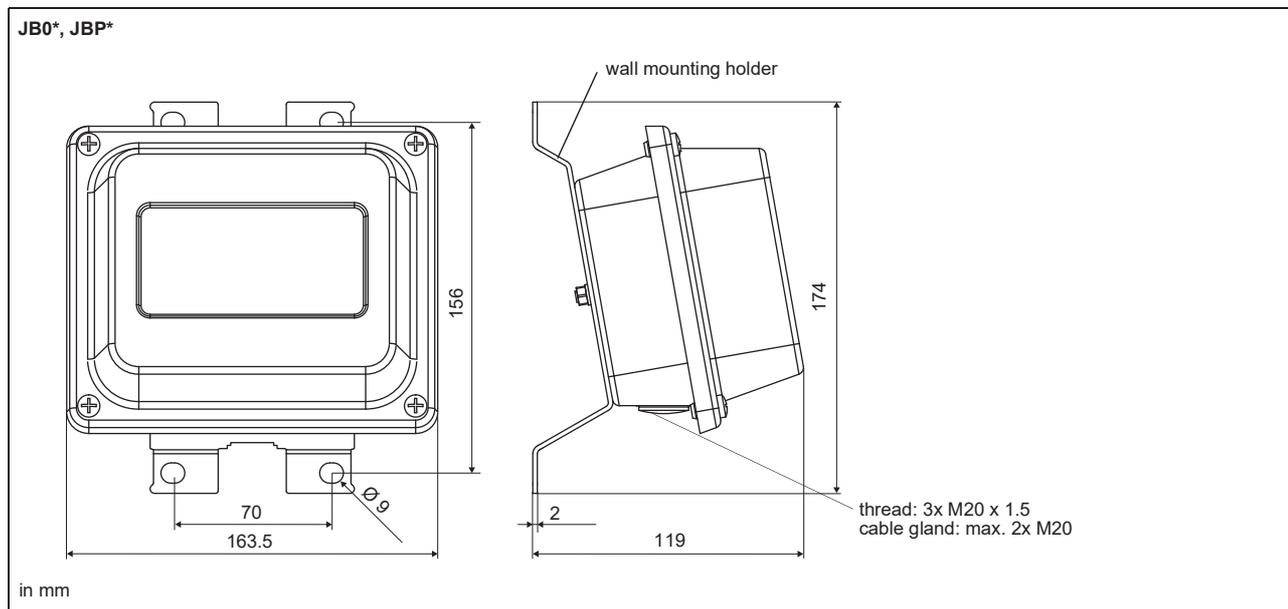
l - max. length of extension cable (depending on the application)

# Junction box

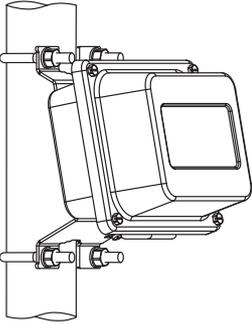
## Technical data

| JB05   |          |   |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|--|----------|---|----------------|----------|------------|------------|-----|---|--------|---|----|-----------------|--|----|-----------------|---|---|--------|--|----------------|----------|------------|-----|----|--------|-----|-----------------|-----|-----------------|----|--------|
| weight   | kg       | 1.2 kg                                      |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| fixation   |          | wall mounting<br>optional: 2" pipe mounting |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| <b>material</b>  |          |   |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| housing  |          | stainless steel 316L (1.4404)               |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| gasket   |          | silicone                                    |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| degree of protection   |          | IP66/IP67                                   |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| ambient temperature  | °C       | -40...+80                                   |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"></div> <div style="width: 65%;"> <p><b>Connection</b></p>  <p><b>Transducers</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> <th>transducer</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL1</td> <td>V</td> <td>signal</td> <td>↑</td> </tr> <tr> <td>VS</td> <td>internal shield</td> <td></td> </tr> <tr> <td>RS</td> <td>internal shield</td> <td>↕</td> </tr> <tr> <td>R</td> <td>signal</td> <td></td> </tr> </tbody> </table> <p><b>Extension cable</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL2</td> <td>TV</td> <td>signal</td> </tr> <tr> <td>TVS</td> <td>internal shield</td> </tr> <tr> <td>TRS</td> <td>internal shield</td> </tr> <tr> <td>TR</td> <td>signal</td> </tr> </tbody> </table> </div> </div> |          |   | terminal strip | terminal | connection | transducer | KL1 | V | signal | ↑ | VS | internal shield |  | RS | internal shield | ↕ | R | signal |  | terminal strip | terminal | connection | KL2 | TV | signal | TVS | internal shield | TRS | internal shield | TR | signal |
| terminal strip   | terminal | connection                                  | transducer     |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| KL1  | V        | signal                                      | ↑              |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | VS       | internal shield                             |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | RS       | internal shield                             | ↕              |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | R        | signal                                      |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| terminal strip   | terminal | connection                                  |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
| KL2  | TV       | signal                                      |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | TVS      | internal shield                             |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | TRS      | internal shield                             |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |
|  | TR       | signal                                      |                |          |            |            |     |   |        |   |    |                 |  |    |                 |   |   |        |  |                |          |            |     |    |        |     |                 |     |                 |    |        |

## Dimensions

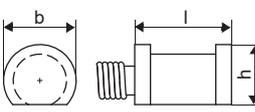
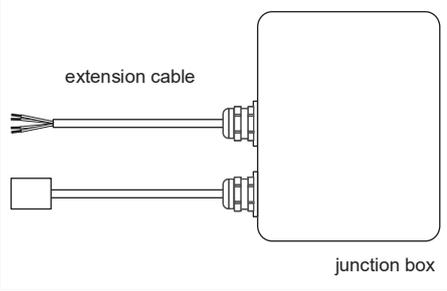
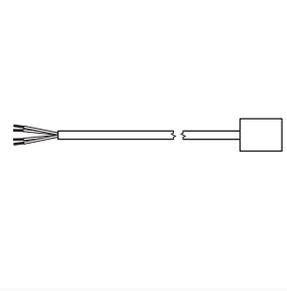
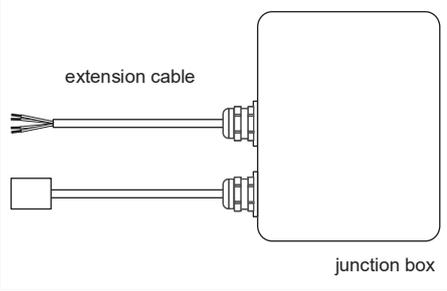
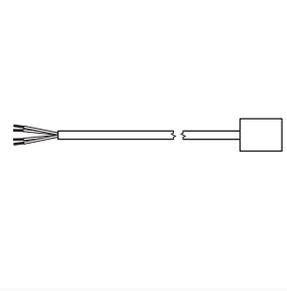
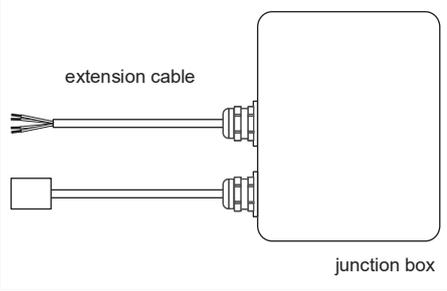
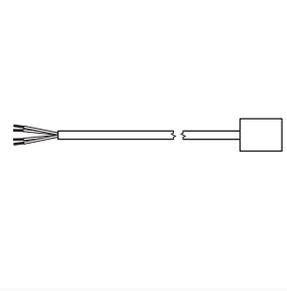
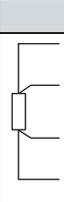
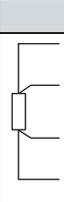
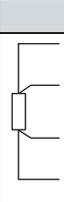


### 2" pipe mounting kit

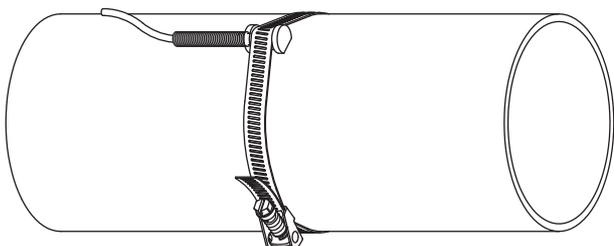
|  |                              |
|--|------------------------------|
| <p><b>JB**</b></p>  | <p>item number: 751035-2</p> |
|--|------------------------------|

# Clamp-on temperature probe (optional)

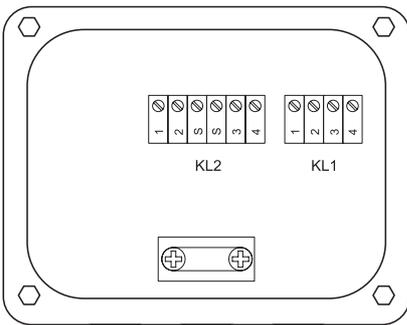
## Technical data

| PT12N, PT12N-LC  |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|--|---|---------------------------------|-------------------------------------|--|---|----------|--------------------------|-------|-------------------------------------|-----------------|-----|----|---------|-------------|-----|--|-----|---------------------|---------------|--|-----------|------------------|-------|--|----|---------------------|--|--|--|----------|-----|--|-----|----------------|--------------|--|----------|--------|-------|--|------|
| order code   | <b>PT12N:</b><br>• 770414-2<br><b>PT12N-LC:</b><br>• 770414-4   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| design   | clamp-on<br>option: with long cable   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| type   | 2x Pt100, matched according to EN 1434  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| connection   | 4-wire  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| measuring range  | °C -30...+250   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| accuracy $\theta$  | $\pm(0.15 \text{ }^\circ\text{C} + 2 \cdot 10^{-3} \cdot  \theta \text{ [}^\circ\text{C]} )$<br>class A   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| max. permissible relative error  | $E_t = 0.1 \text{ K (} 3 \text{ K} < \Delta\theta \leq 6 \text{ K)}$<br>$E_t = 0.2 \text{ K (} 6 \text{ K} < \Delta\theta \leq 30 \text{ K)}$<br>$E_t = 0.3 \text{ K (} 30 \text{ K} < \Delta\theta \leq 50 \text{ K)}$ |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| response time  | s 50  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| housing material   | aluminum  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| degree of protection   | IP54  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>dimensions</b>  |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| length l   | mm 20   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| width b  | mm 15   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| height h   | mm 13   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| dimensional drawing  |    |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| weight   | kg 0.25   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>accessories</b>   |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| thermal conductivity foil 250 °C   | x   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>Connection system</b>   |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <table border="1"> <thead> <tr> <th>connection with extension cable</th> <th>direct connection</th> </tr> </thead> <tbody> <tr> <td>  </td> <td>  </td> </tr> </tbody> </table>   |   | connection with extension cable | direct connection                   |  |  |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| connection with extension cable  | direct connection   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|    |    |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>Connection</b>  |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <table border="1"> <thead> <tr> <th></th> <th>temperature probe</th> </tr> </thead> <tbody> <tr> <td rowspan="4">  </td> <td>red</td> </tr> <tr> <td>red/blue</td> </tr> <tr> <td>white/blue</td> </tr> <tr> <td>white</td> </tr> </tbody> </table>   |   |                                 | temperature probe                   |   | red   | red/blue | white/blue               | white |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|  | temperature probe   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|   | red   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|  | red/blue  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|  | white/blue  |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
|  | white   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>Cable</b>   |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <table border="1"> <thead> <tr> <th></th> <th>PT12N</th> <th>PT12N-LC</th> <th>extension cable</th> </tr> </thead> <tbody> <tr> <td>type</td> <td>4 x 0.22 mm<sup>2</sup></td> <td></td> <td>LIYCY 8 x 0.14 mm<sup>2</sup> grey</td> </tr> <tr> <td>standard length</td> <td>m 3</td> <td>15</td> <td>5/10/25</td> </tr> <tr> <td>max. length</td> <td>m -</td> <td></td> <td>200</td> </tr> <tr> <td>ambient temperature</td> <td>°C -30...+250</td> <td></td> <td>-25...+80</td> </tr> <tr> <td>min. bend radius</td> <td>mm 27</td> <td></td> <td>68</td> </tr> <tr> <td colspan="4"><b>cable jacket</b></td> </tr> <tr> <td>material</td> <td>PFA</td> <td></td> <td>PVC</td> </tr> <tr> <td>outer diameter</td> <td>mm 3.8 ±0.15</td> <td></td> <td>4.8 ±0.2</td> </tr> <tr> <td>colour</td> <td>black</td> <td></td> <td>grey</td> </tr> </tbody> </table> |   |                                 | PT12N                               | PT12N-LC   | extension cable   | type     | 4 x 0.22 mm <sup>2</sup> |       | LIYCY 8 x 0.14 mm <sup>2</sup> grey | standard length | m 3 | 15 | 5/10/25 | max. length | m - |  | 200 | ambient temperature | °C -30...+250 |  | -25...+80 | min. bend radius | mm 27 |  | 68 | <b>cable jacket</b> |  |  |  | material | PFA |  | PVC | outer diameter | mm 3.8 ±0.15 |  | 4.8 ±0.2 | colour | black |  | grey |
|  | PT12N   | PT12N-LC                        | extension cable                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| type   | 4 x 0.22 mm <sup>2</sup>  |                                 | LIYCY 8 x 0.14 mm <sup>2</sup> grey |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| standard length  | m 3   | 15                              | 5/10/25                             |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| max. length  | m -   |                                 | 200                                 |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| ambient temperature  | °C -30...+250   |                                 | -25...+80                           |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| min. bend radius   | mm 27   |                                 | 68                                  |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| <b>cable jacket</b>  |   |                                 |                                     |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| material   | PFA   |                                 | PVC                                 |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| outer diameter   | mm 3.8 ±0.15  |                                 | 4.8 ±0.2                            |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |
| colour   | black   |                                 | grey                                |  |   |          |                          |       |                                     |                 |     |    |         |             |     |  |     |                     |               |  |           |                  |       |  |    |                     |  |  |  |          |     |  |     |                |              |  |          |        |       |  |      |

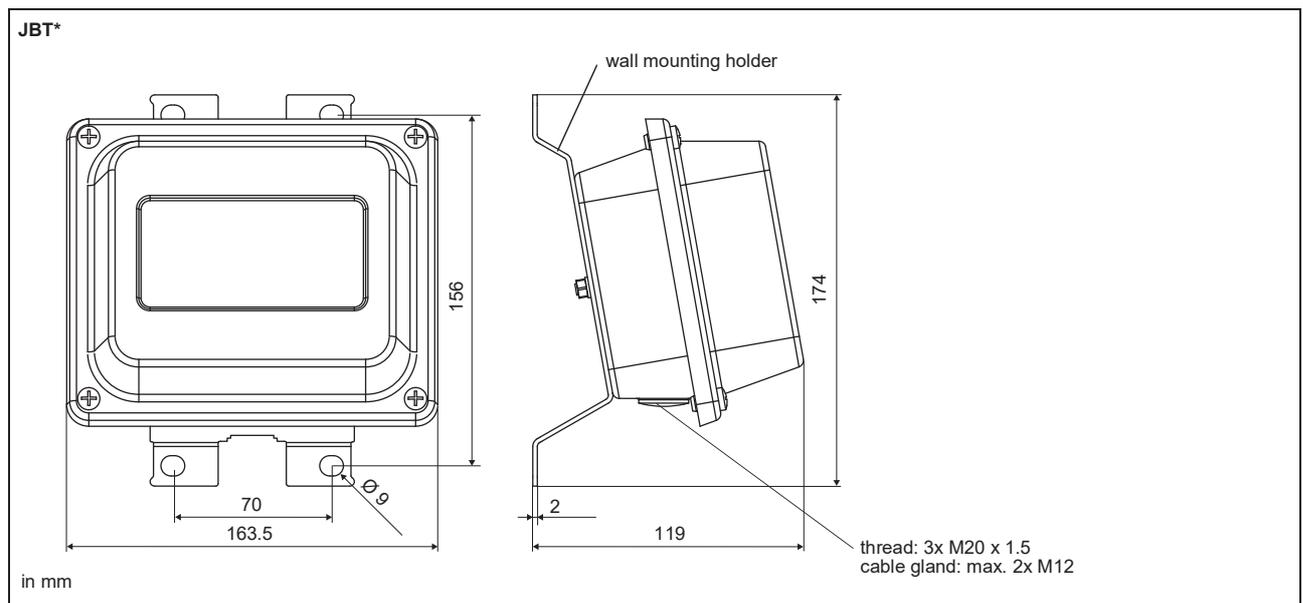
## Fixation

|  |  |
|--|--|
| <p>tension strap PT12N</p>  | <p>material: stainless steel 301 (1.4310), 410 (1.4006)<br/>thermal insulation necessary</p> |
|--|--|

### Junction box

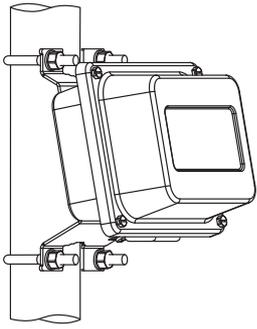
| JBT3  |   |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|---|---|----------------|----------|------------|-----|---|-----|---|----------|---|-------|---|------------|----------------|----------|------------|-----|---|-----|---|------|---|-------|---|------|
| item number   | 751040-36                                   |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| weight  | kg 1.2 kg                                   |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| fixation  | wall mounting<br>optional: 2" pipe mounting |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| <b>material</b>   |   |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| housing   | stainless steel 316L (1.4404)               |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| gasket  | silicone                                    |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| degree of protection  | IP67  |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| <b>ambient temperature</b>  |   |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| min.  | °C -40                                      |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| max.  | °C +80                                      |                |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>Connection</b></p>  </div> <div style="width: 45%;"> <p><b>Temperature probe</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL1</td> <td>1</td> <td>red</td> </tr> <tr> <td>2</td> <td>red/blue</td> </tr> <tr> <td>3</td> <td>white</td> </tr> <tr> <td>4</td> <td>white/blue</td> </tr> </tbody> </table> <p><b>Extension cable</b></p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL2</td> <td>1</td> <td>red</td> </tr> <tr> <td>2</td> <td>grey</td> </tr> <tr> <td>3</td> <td>white</td> </tr> <tr> <td>4</td> <td>blue</td> </tr> </tbody> </table> </div> </div> |   | terminal strip | terminal | connection | KL1 | 1 | red | 2 | red/blue | 3 | white | 4 | white/blue | terminal strip | terminal | connection | KL2 | 1 | red | 2 | grey | 3 | white | 4 | blue |
| terminal strip  | terminal                                    | connection     |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| KL1   | 1   | red            |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 2   | red/blue       |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 3   | white          |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 4   | white/blue     |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| terminal strip  | terminal                                    | connection     |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
| KL2   | 1   | red            |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 2   | grey           |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 3   | white          |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |
|   | 4   | blue           |          |            |     |   |     |   |          |   |       |   |            |                |          |            |     |   |     |   |      |   |       |   |      |

### Dimensions



### 2" pipe mounting kit

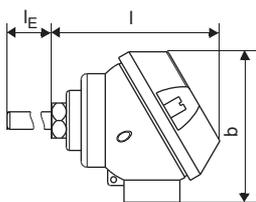
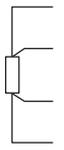
JB\*\*



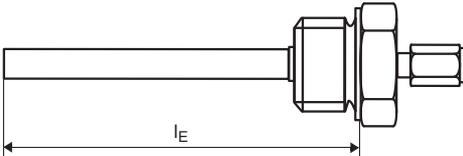
item number: 751035-2

## Inline temperature probe (optional)

### Technical data

| PT12N-IT-P<br>PT12N-IU-P  |   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
|---|---|-------|-------------------|-------|---|-----|-----|---|-----|------|---|-------|------|---|-------|-------|
| item number   | <b>PT12N-IT-P:</b> <ul style="list-style-type: none"> <li>• 770416-1 (matched, without cable)</li> <li>• 770416-11 (matched, 10 m)</li> <li>• 770416-12 (matched, 20 m)</li> </ul> <b>PT12N-IU-P:</b> <ul style="list-style-type: none"> <li>• 770416-2 (matched, without cable)</li> <li>• 770416-21 (matched, 10 m)</li> <li>• 770416-22 (matched, 20 m)</li> </ul> |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| design  | inline  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| type  | Pt100   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| connection  | 4-wire  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| measuring range   | °C -30...+200   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| accuracy T  | ±(0.15 °C + 2 · 10 <sup>-3</sup> ·  T [°C] )<br>class A   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| accuracy ΔT<br>(2x Pt matched according to EN 1434)                               | ≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| response time   | s T50: 5, T90: 19   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| housing   | 316Ti (1.4571)<br>connecting head J: aluminum   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| degree of protection  | IP65  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| <b>dimensions</b>   |   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| length l  | mm 72<br>PT12N-IT-P: l <sub>E</sub> = 140<br>PT12N-IU-P: l <sub>E</sub> = 230   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| width b   | mm 51   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| dimensional drawing   |    |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| weight  | kg PT12N-IT-P: 0.136<br>PT12N-IU-P: 0.142   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| <b>connection</b>   |   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
|  | <table border="1"> <thead> <tr> <th></th> <th>temperature probe</th> <th>cable</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>red</td> <td>red</td> </tr> <tr> <td>2</td> <td>red</td> <td>grey</td> </tr> <tr> <td>3</td> <td>white</td> <td>blue</td> </tr> <tr> <td>4</td> <td>white</td> <td>white</td> </tr> </tbody> </table>                                  |       | temperature probe | cable | 1 | red | red | 2 | red | grey | 3 | white | blue | 4 | white | white |
|   | temperature probe   | cable |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| 1   | red   | red   |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| 2   | red   | grey  |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| 3   | white   | blue  |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| 4   | white   | white |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| <b>cable</b>  |   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| type  | LIYCY 8 x 0.14 mm <sup>2</sup>  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| standard length   | m 10/20   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| max. length   | m 200   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| ambient temperature   | °C -25...+80  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| min. bend radius  | mm 68   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| <b>cable jacket</b>   |   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| material  | PVC   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| outer diameter  | mm 4.8 ±0.2   |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |
| colour  | grey  |       |                   |       |   |     |     |   |     |      |   |       |      |   |       |       |

### Fixation

| threaded thermowell PT12N-I  |                                | PT12N-IT-P                    | PT12N-IU-P |
|--|--------------------------------|-------------------------------|------------|
|   | mounting length l <sub>E</sub> | mm 120                        | 210        |
| <b>material</b>  |                                |                               |            |
| threaded thermowell  |                                | stainless steel 316L (1.4404) |            |
| clamping nut   |                                | galvanised steel 1.0037, PTFE |            |
| weight   | kg                             | 0.08                          | 0.091      |
| outer diameter   | mm                             | 8                             |            |
| process connection   |                                | G 1/2"                        |            |
| fluid pressure   |                                | PN25 (water)                  |            |
| <b>max. flow velocity<sup>1</sup></b>  |                                |                               |            |
| water  | m/s                            | 6.93                          | 4.37       |
| glycol/H <sub>2</sub> O  | m/s                            | 8.4                           | 3.78       |
| <sup>1</sup> max. permissible values for laminar flows; further influences like motors, pumps, valves which provoke turbulences, water hammers, pulsations, oscillations, etc. have to be considered by the customer |                                |                               |            |



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