

## TFR5

Room or outdoor temperature sensor

TFR5-####.#0#.####

### Overview

- Sensor made of AISI 316L stainless steel
- Suitable for indoor and outdoor applications
- Optionally available with touch screen
- Cable or fixed sensor
- Wall or tube mounting



### Technical data

#### Performance characteristics

|                                 |   |
|---------------------------------|---|
| Pt100 accuracy class (EN 60751) | B ( $\pm 0.3\text{ °C at }0\text{ °C}$ )<br>$\pm (0.3 + 0.005 \times t)\text{ °C}$<br>A ( $\pm 0.15\text{ °C at }0\text{ °C}$ )<br>$\pm (0.15 + 0.002 \times t)\text{ °C}$<br>1/3 B ( $\pm 0.1\text{ °C at }0\text{ °C}$ )<br>$\pm 1/3 \times (0.3 + 0.005 \times t)\text{ °C}$<br>1/6 B ( $\pm 0.05\text{ °C at }0\text{ °C}$ )<br>$\pm 1/6 \times (0.3 + 0.005 \times t)\text{ °C}$ |
|---------------------------------|---|

#### Process connection

|                        |   |
|------------------------|---|
| Sensor tube dimensions | $\varnothing 5.8 \times 60\text{ mm}$ , with cable sensor<br>$\varnothing 6 \times 100\text{ mm}$ , with fixed sensor |
| Sensor tube material   | AISI 316L (1.4404)  |

#### Ambient conditions

|                             |   |
|-----------------------------|---|
| Operating temperature range | $-30 \dots 80\text{ °C}$ , with DFON touch screen<br>$-40 \dots 85\text{ °C}$ , without DFON touch screen |
| Storage temperature range   | $-30 \dots 80\text{ °C}$ , with DFON touch screen<br>$-40 \dots 85\text{ °C}$ , without DFON touch screen |

|                                 |                        |
|---------------------------------|------------------------|
| Degree of protection (EN 60529) | IP 67                  |
| Humidity                        | < 98 % RH , condensing |

#### Output signal

|                     |  |
|---------------------|--|
| Without transmitter | 1 x Pt100, 4-wire                                    |
| With transmitter    | 4 ... 20 mA , 2-wire<br>4 ... 20 mA , 2-wire + HART® |

#### Housing

|              |   |
|--------------|---|
| Style        | FlexHousing, $\varnothing 80\text{ mm}$ |
| Overall size | Refer to section "Dimensional drawings" |
| Material     | AISI 304 (1.4301)                       |

#### Electrical connection

|           |  |
|-----------|--|
| Connector | M12-A, 5-pin, stainless steel<br>M12-A, 8-pin, stainless steel |
|-----------|--|

#### Electrical connection

|             |   |
|-------------|---|
| Cable       | M16 plastic, cable dia. 5 ... 10 mm<br>M16 stainless steel, cable dia. 5 ... 9 mm<br>M20 plastic, cable dia. 8 ... 13 mm<br>M20 stainless steel, cable dia. 9 ... 13 mm |
| Cable gland | M16x1.5, plastic<br>M16x1.5, stainless steel<br>M20x1.5, plastic<br>M20x1.5, stainless steel  |

#### ATEX II 1G Ex ia IIC T4/T5

|  |                                |
|--|--------------------------------|
| Maximum values for barrier selection, Ui | 28 V DC                        |
| Maximum values for barrier selection, Ii | 0.1 A                          |
| Maximum values for barrier selection, Pi | 0.7 W                          |
| Internal capacitance, Ci                 | 36 nF                          |
| Internal inductance, Li                  | 11 $\mu$ H                     |
| Temperature class, T1 ... T4             | $-20 < T_{amb} < 65\text{ °C}$ |
| Temperature class, T1 ... T5             | $-20 < T_{amb} < 60\text{ °C}$ |

#### ATEX II 3G Ex ec IIC T4/T5

|                              |   |
|------------------------------|---|
| Voltage supply range, Un     | 8 ... 30 V DC , with FlexTop 2202 / 2221<br>6.5 ... 30 V DC , with FlexTop 2211 |
| Current rating, In           | $\leq 0.1\text{ A}$   |
| Temperature class, T1 ... T4 | $-20 < T_{amb} < 70\text{ °C}$  |
| Temperature class, T1 ... T5 | $-20 < T_{amb} < 60\text{ °C}$  |

#### Compliance and approvals

|                      |  |
|----------------------|--|
| EMC                  | EN 61326-1   |
| Explosion protection | ATEX II 1 G Ex ia IIC T6...T4 Ga<br>ATEX II 3 G Ex ec IIC T5<br>Ex ia Simple apparatus, gas and dust<br>IECEx Ex ia IIC T6...T4 Ga |

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### Display

#### General information

|                   |                    |
|-------------------|--------------------|
| Panel type        | FSTN Graphical LCD |
| Display range     | -9999 ... 99999    |
| Max. digit height | 22 mm              |
| Material          | Polycarbonate      |

#### Ambient conditions

|                                       |               |
|---------------------------------------|---------------|
| Optimal readability temperature range | -10 ... 70 °C |
| Operating temperature range           | -30 ... 80 °C |
| Degree of protection (EN 60529)       | IP 67<br>IP 0 |

#### Input signal

|                               |   |
|-------------------------------|---|
| Input signal from transmitter | FlexTop 2202 / 2211 / 2221: Analog, current loop<br>FlexTop 2212 / 2222: Digital, 2-way for communication between transmitter and display |
| Update time                   | 1 s , max.<br>0.3 s , typ.  |

#### User configurable data

|                             |  |
|-----------------------------|--|
| Error- / Warning-indication | Individually configurable display and backlight indication in white, green or red colour, steady or flashing light. Configurable limits over the range |
| Measuring unit              | °C<br>°F<br>K  |
| User defined measuring unit | 8 × 20 pixel matrix  |

#### Relays

|                        |                        |
|------------------------|------------------------|
| Contacts               | 2 x solid state relays |
| Max. load current      | 75 mA                  |
| Max. switching voltage | 60 V                   |

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## Transmitter

### FlexTop 2202

|                     |  |
|---------------------|--|
| Input Accuracy      | $\leq \pm 0.25\text{ }^{\circ}\text{C}$                                |
| Min. measuring span | 25 °C  |
| Output              | 4 ... 20 mA , 2-wire   |
| Output Accuracy     | $\leq \pm 0.1\text{ }%$ , measuring span<br>$\leq \pm 0.016\text{ mA}$ |
| Power supply        | 8 ... 35 V DC  |
| Programmability     | With FlexProgrammer 9701   |
| Please note         | For further information please see data sheet for FlexTop 2202         |

### FlexTop 2211

|                     |  |
|---------------------|--|
| Input Accuracy      | $\leq \pm 0.1\text{ }^{\circ}\text{C}$                                 |
| Min. measuring span | 25 °C  |
| Output              | 4 ... 20 mA , 2-wire<br>20 ... 4 mA , programmable                     |
| Output Accuracy     | $\leq \pm 0.1\text{ }%$ , measuring span<br>$\leq \pm 0.016\text{ mA}$ |
| Power supply        | 8 ... 35 V DC  |
| Programmability     | With FlexProgrammer 9701   |
| Please note         | For further information please see data sheet for FlexTop 2211         |

### FlexTop 2221

|                     |  |
|---------------------|--|
| Input Accuracy      | $\leq \pm 0.1\text{ }^{\circ}\text{C}$                                 |
| Min. measuring span | 25 °C  |
| Output              | 4 ... 20 mA , 2-wire + HART®<br>20 ... 4 mA , programmable             |
| Output Accuracy     | $\leq \pm 0.1\text{ }%$ , measuring span<br>$\leq \pm 0.016\text{ mA}$ |
| Power supply        | 8 ... 35 V DC  |
| Programmability     | With FlexProgrammer 9701<br>With HART® modem                           |
| Please note         | For further information please see data sheet for FlexTop 2221         |

### FlexTop 2212

|                     |  |
|---------------------|--|
| Input Accuracy      | $\leq \pm 0.06\text{ }^{\circ}\text{C}$                                  |
| Min. measuring span | 10 °C  |
| Output              | 4 ... 20 mA , 2-wire<br>20 ... 4 mA , programmable                       |
| Output Accuracy     | $\leq \pm 0.025\text{ }%$ , measuring span<br>$\leq \pm 0.004\text{ mA}$ |
| Power supply        | 7 ... 40 V DC  |
| Programmability     | With FlexProgram   |
| Please note         | For further information please see data sheet for FlexTop 2212           |

### FlexTop 2222

|                     |  |
|---------------------|--|
| Input Accuracy      | $\leq \pm 0.06\text{ }^{\circ}\text{C}$                                  |
| Min. measuring span | 10 °C  |
| Output              | 4 ... 20 mA , 2-wire + HART®<br>20 ... 4 mA , programmable               |
| Output Accuracy     | $\leq \pm 0.025\text{ }%$ , measuring span<br>$\leq \pm 0.004\text{ mA}$ |
| Power supply        | 7 ... 40 V DC  |
| Programmability     | With FlexProgram<br>With HART® modem                                     |
| Please note         | For further information please see data sheet for FlexTop 2222           |

### Factory settings FlexTop 2202

|                        |              |
|------------------------|--------------|
| Output range           | 0 ... 120 °C |
| Damping                | 0 s          |
| Output at sensor fault | 23 mA        |

### Factory settings FlexTop 2211

|                        |              |
|------------------------|--------------|
| Output range           | 0 ... 100 °C |
| Damping                | 0 s          |
| Output at sensor fault | 23 mA        |

### Factory settings FlexTop 2221

|                        |              |
|------------------------|--------------|
| Output range           | 0 ... 100 °C |
| Damping                | 0 s          |
| Output at sensor fault | 23 mA        |

### Factory settings FlexTop 2212

|                        |              |
|------------------------|--------------|
| Output range           | 0 ... 100 °C |
| Damping                | 0 s          |
| Output at sensor fault | 23 mA        |

### Factory settings FlexTop 2222

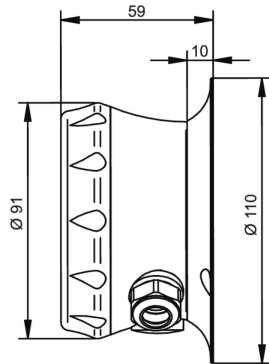
|                        |              |
|------------------------|--------------|
| Output range           | 0 ... 100 °C |
| Damping                | 0 s          |
| Output at sensor fault | 23 mA        |

## TFR5

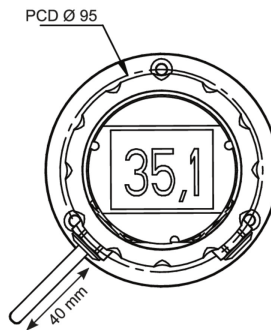
Room or outdoor temperature sensor

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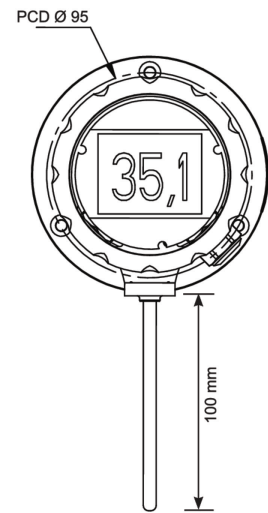
### Dimensional drawings (mm)



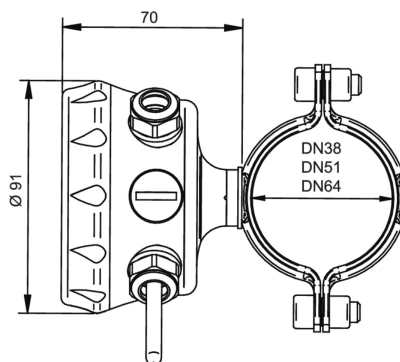
Wall mounted version



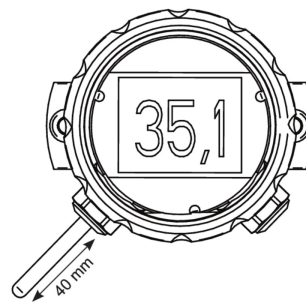
Wall mounted version, cable sensor



Wall mounted version, fixed sensor



Pipe mounted version



Pipe mounted version, cable sensor

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### Electrical connection

| Output type            | Equivalent circuit | Electrical connection | Function                 | Pin assignment |
|------------------------|--------------------|-----------------------|--------------------------|----------------|
| Pt100 (Single element) |                    |                       | Pt100 11                 | 1, 2           |
|                        |                    |                       | Pt100 12                 | 3, 4           |
|                        |                    |                       | Pt100 11                 | 1, 2           |
|                        |                    |                       | Pt100 12                 | 3, 4           |
|                        |                    |                       | N.C.                     | 5              |
|                        |                    |                       | Frame ground             | Plug thread    |
| 4 ... 20 mA, 2-wire    |                    |                       | +Vs                      | 1              |
|                        |                    |                       | Iout                     | 2              |
|                        |                    |                       | +Vs                      | 1              |
|                        |                    |                       | Common for relays 11, 21 | 2              |
|                        |                    |                       | Iout                     | 3              |
|                        |                    |                       | Relay 22                 | 4              |
|                        |                    |                       | Relay 12                 | 5              |
|                        |                    |                       | Frame ground             | Plug thread    |
|                        |                    |                       | N.C.                     | 1              |
|                        |                    |                       | +Vs                      | 2              |
|                        |                    |                       | Relay 21                 | 3              |
|                        |                    |                       | Relay 22                 | 4              |
|                        |                    |                       | Relay 11                 | 5              |
|                        |                    |                       | Relay 12                 | 6              |
|                        |                    |                       | Iout                     | 7              |
|                        |                    |                       | N.C.                     | 8              |
|                        |                    |                       | Frame ground             | Plug thread    |

### Ordering information

Ordering key - Configuration possibilities see website

|  | TFR5 | - | # | # | # | # | . | # | # | # | . | #### |
|--|------|---|---|---|---|---|---|---|---|---|---|------|
| Product  | TFR5 |   |   |   |   |   |   |   |   |   |   |      |
| Housing  |      |   |   |   |   |   |   |   |   |   |   |      |
| FlexHousing Ø80 mm, stainless steel AISI 304, wall mounting                      |      |   |   |   |   |   |   |   |   |   |   |      |
| FlexHousing Ø80 mm, stainless steel AISI 304, pipe mounting DN38                 |      |   |   |   |   |   |   |   |   |   |   |      |
| FlexHousing Ø80 mm, stainless steel AISI 304, pipe mounting DN51                 |      |   |   |   |   |   |   |   |   |   |   |      |
| FlexHousing Ø80 mm, stainless steel AISI 304, pipe mounting DN65                 |      |   |   |   |   |   |   |   |   |   |   |      |
| FlexHousing Ø80 mm, stainless steel AISI 304, wall mounting, fixed sensor 100 mm |      |   |   |   |   |   |   |   |   |   |   |      |
| Electrical connection  |      |   |   |   |   |   |   |   |   |   |   |      |
| M12-A, 5-pins  |      |   |   |   |   |   |   |   |   |   |   |      |
| M12-A, 5-pins (male) + M12-A, 4-pins (female)                                    |      |   |   |   |   |   |   |   |   |   |   |      |
| M12-A, 8-pin   |      |   |   |   |   |   |   |   |   |   |   |      |
| M16x1.5 cable gland  |      |   |   |   |   |   |   |   |   |   |   |      |
| M20x1.5 cable gland  |      |   |   |   |   |   |   |   |   |   |   |      |

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### Ordering information

Ordering key - Configuration possibilities see website

TFR5 - # # # # . # # # # . ####

#### Material el. connection

|                                   |   |
|-----------------------------------|---|
| Plastic                           | 1 |
| Stainless steel AISI 304 (1.4301) | 3 |

#### Display

|                                    |   |
|------------------------------------|---|
| Without display, Ø80 housing       | 1 |
| With display, relays not activated | 2 |
| With display, relays activated     | 4 |

#### Transmitter / socket

|   |   |
|---|---|
| Ceramic socket Pt100                    | 1 |
| Transmitter 2202                        | 2 |
| 4 ... 20 mA, accuracy ±0,25 °C          |   |
| Transmitter 2211                        | 3 |
| 4 ... 20 mA, accuracy ±0,10 °C          |   |
| Transmitter 2221                        | 4 |
| 4 ... 20 mA + HART®, accuracy ±0,10 °C  |   |
| Transmitter 2212                        | 6 |
| 4 ... 20 mA, accuracy < ±0.06°C         |   |
| Transmitter 2222                        | 7 |
| 4 ... 20 mA + HART®, accuracy < ±0.06°C |   |

#### Safety

|                                      |   |
|--------------------------------------|---|
| Standard                             | 0 |
| Ex ia IIC T6...T4 (Gas)              | 1 |
| Ex ec IIC T5...T4 (Gas)              | 3 |
| Ex ia Simple apparatus, gas and dust | 9 |

#### Configuration

|                                    |   |
|------------------------------------|---|
| No configuration                   | 0 |
| Configuration of temperature range | 1 |
| Configuration of Range + Display   | 2 |

#### Sensor element

|                           |   |
|---------------------------|---|
| None                      | 0 |
| 1 x Pt100, 1/1 B EN 60751 | 1 |
| 1 x Pt100, 1/3 B EN 60751 | 5 |
| 1 x Pt100, 1/6 B EN 60751 | 7 |
| 1 x Pt100, 1/1 A EN 60751 | A |

#### Cable length (cm)

|          |      |
|----------|------|
| 0 - 9999 | #### |
|----------|------|