Technical information

iTEMP® Pt  TMT180

Pt100 head transmitter for an economical, high accuracy temperature monitoring. Settable using a PC, for installation in a DIN B sensor head.

Application areas

- Economical and technical alternative to direct wiring to DCS or PLC
- PC programmable (PCP) Temperature head transmitter for converting a Pt100 input signal into a scalable 4 to 20 mA analog output signal

Features and benefits

- Operation, visualization and maintenance with PC, using ReadWin® 2000 operating freeware
- Very high accuracy up to 0.18 °F
- Breakdown information in event of sensor break or short-circuit, enables a quick maintenance intervention
- Online configuration during measurement using configuration kit for an easy setup
- Customer specific measurement range setting for high flexibility
- Long term stability: < 0.05%

and also:

- Electromagnetic compatibility to IEC 61326 for use in noisy environments
- Fully potted electronics allow humidity
- Captive screws for ease of connection
- Linearization curve match improves accuracy
- UL recognized component to UL 3111-1
- GL German Lloyd marine approval
- CSA General Purpose
Function and system design

Measuring principle
Electronic monitoring and conversion of Pt100 input signals in industrial temperature measurement.

Measuring system
The iTEMP® Pt TMT180 temperature head transmitter is a two wire transmitter with an analog output. It has measurement input for resistance thermometer Pt100 in 2-, 3- or 4-wire connection. Set up of the TMT180 is done using the TMT180A or TXU10 configuration kit and PC (ReadWin® 2000 operating freeware).

Input

Measured variable
Temperature

Measuring range

<table>
<thead>
<tr>
<th>Type</th>
<th>Measurement ranges</th>
<th>min. span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100 acc. to IEC 60751</td>
<td>-328 to 1202 °F [-200 to 650 °C]</td>
<td>18 °F (10 °C)</td>
</tr>
<tr>
<td></td>
<td>-58 to 482 °F [-50 to 250 °C]</td>
<td>18 °F (10 °C)</td>
</tr>
</tbody>
</table>

- Connection type: 2-, 3- or 4-wire connection
- Cable resistance compensation possible in the 2-wire system (0 to 20 Ω)
- Sensor cable resistance: max. 11 Ω per cable
- Sensor current: ≤ 0.6 mA

Output

Output signal
analog 4 to 20 mA, 20 to 4 mA

Breakdown information
Breakdown information is created when the measuring information is invalid or not present anymore and gives a complete listing of all errors occurring in the measuring system.

<table>
<thead>
<tr>
<th>Breakdown type</th>
<th>Signal (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under ranging</td>
<td>3.8</td>
</tr>
<tr>
<td>Over ranging</td>
<td>20.5</td>
</tr>
<tr>
<td>Sensor break; sensor short circuit low</td>
<td>≤ 3.6</td>
</tr>
<tr>
<td>Sensor break; sensor short circuit high</td>
<td>≥ 21.0</td>
</tr>
</tbody>
</table>

Source impedance
max. \( V_{power\ supply} - 10 \, V \) / 0.022 A (current output)
e.g. \( 24 \, V - 10 \, V \)/0.022 A = 636.4 Ω

Transmission behavior
temperature linear

Input current required
≤ 3.5 mA

Current limit
≤ 23 mA

Switch on delay
4 s (during power up Ia ≤ 3.8 mA)
Power supply

Electrical connection

![Head transmitter terminal connections]

Supply voltage

U_b = 10 to 35 V DC, polarity protected

Residual ripple

Allowable ripple U_ss ≤ 3 V at U_b ≥ 13 V; f_max. = 1 kHz

Performance characteristics

Response time

1 s

Reference conditions

Calibration temperature 77 °F ± 9 °F (+25 °C ± 5 °C)

Maximum measured error

<table>
<thead>
<tr>
<th>Type</th>
<th>Measurment accuracy¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance thermometer (RTD)</td>
<td></td>
</tr>
<tr>
<td>Pt100 -328 to 1202 °F (-200 to 650 °C)</td>
<td>0.36 °F or 0.08%</td>
</tr>
<tr>
<td>Pt100² -58 to 482 °F (-50 to 250 °C)</td>
<td>0.18 °F or 0.08%</td>
</tr>
</tbody>
</table>

1) % is related to the adjusted measurement range (the value to be applied is the greater)
2) as option

Influence of power supply

≤ ± 0.01%/V deviation from 24 V
Percentages refer to the full scale value.

Influence of ambient temperature (temperature drift)

Resistance thermometer (Pt100);

Td = ± (8.3 ppm/°F * (range end value + 328) + 27.8 ppm/°F * preset meas. range) * Δ θ

Δ θ = Deviation of the ambient temperature according to reference condition (77 °F ± 9 °F)

Influence of load

±0.02%/100 Ω
Percentages refer to the full scale value.

Long-term stability

≤ 0.18 °F/Year (≤ 0.1 °C/Year) or ≤ 0.05%/Year
Values under reference operating conditions. % refer to the set span. The highest value is valid.
Installation conditions

Installation instructions

- Installation angle: No limit
- Installation area: Connection head accord. to DIN 43 729 Form B; TAF10 field housing

Environment conditions

Ambient temperature limits

-40 to 185 °F (−40 to +85 °C)

Storage temperature

-40 to 212 °F (−40 to +100 °C)

Climate class

As per IEC 60 654-1, Class C

Condensation

allowed

Degree of protection

IP 00, NEMA 4 (IP 66) installed in TAF10 Field housing

Shock and vibration resistance

4g / 2 to 150 Hz according to IEC 60 068-2-6

Electromagnetic compatibility (EMC)

CE Electromagnetic Compatibility Compliance

The device meets all requirements listed under IEC 61326 Amendment 1, 1998. This recommendation is an uniform and practical way of determining whether the devices used in laboratory and process control are immune to interference with an objective to increase its functional safety.

<table>
<thead>
<tr>
<th>Discharge of static electricity</th>
<th>IEC 61000-4-2</th>
<th>6 kV cont., 8 kV air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic fields</td>
<td>IEC 61000-4-3</td>
<td>80 to 2000 Hz</td>
</tr>
<tr>
<td>Burst (signal)</td>
<td>IEC 61000-4-4</td>
<td>1 kV / 2 kV (B)</td>
</tr>
<tr>
<td>Transient voltage</td>
<td>IEC 61000-4-5</td>
<td>1 kV unsym. / 0.5 kV sym.</td>
</tr>
<tr>
<td>HF coupling</td>
<td>IEC 61000-4-6</td>
<td>0.15 to 80 MHz</td>
</tr>
</tbody>
</table>

1) self recovery

Mechanical construction

Design, dimensions

Dimensions of the head transmitter in mm (inch)
Weight
approx. 1.4 oz (40 g)

Material
Housing: PC
Potting: PUR

Terminals
• Cable up to max. 16 AWG - secure screws
• or 16 AWG with wire end ferrules

Human interface

Remote operation
Configuration
Configuration kit TMT180A-VM or TXU10, configurable on PC software program ReadWin® 2000. Starting from version R2.00.00 of the TMT180A the temperature head transmitter is configurable without voltage supply.

Interface
PC interface connection cable TTL-/-RS 232 or USB with plug.

Configurable parameters
Sensor type and connection type Pt100, engineering units (°C/°F), measurement range, cable resistance compensation on 2 wire connection, fault conditioning, output signal (4 to 20 mA/20 to 4 mA), offset, measurement point identification (8 characters), output simulation

Certificates and approvals

CE mark
This unit complies with the legal requirements laid out within the EU regulations.

GL
Ship building approval (Germanischer Lloyd)

UL
Recognized component to UL 3111-1

CSA GP
CSA General Purpose

Other standards and guidelines
• IEC 60529:
  Degrees of protection by housing (IP code)
• IEC 61010:
  Safety requirements for electrical measurement, control and laboratory instrumentation
• IEC 61326:
  Electromagnetic compatibility (EMC requirements)
• NAMUR
  Standardization association for measurement and control in chemical and pharmaceutical industries. (www.namur.de)
• NEMA
  Standardization association for the electrical industry
Accessories

- TMT180A-VM - Configuration kit iTEMP® PCP:
  Setup program (ReadWin® 2000) and PC serial interface connection cable (TTL/RS 232C) for configuration of the TMT180 (Order-No.: TMT180A-VM)
- TXU10 Configuration kit iTEMP® PCP:
  Setup program (ReadWin® 2000) and PC serial interface connection cable (USB) with adapter 4 pin plug for configuration of the TMT180 (Order-No.: TXU10-AA)

Ordering information

How to order

<table>
<thead>
<tr>
<th>Temperature head transmitter iTEMP® Pt TMT180</th>
<th>PC programmable temperature transmitter, configurable measurement range for Pt100, analog output 4 to 20 mA, 2-wire technology, failure mode to NAMUR NE43, for mounting in Form B head to DIN 43729</th>
</tr>
</thead>
</table>
| Certification                                  | A Version for non hazardous areas  
|                                                | B CSA General Purpose                                                                                  |
| Programming                                    | 1 PC-programmable                                                                                       |
|                                                | 2 Programming blocked                                                                                   |
| Max. range accuracy                            | 1 -328 to 1202 °F (-200 to 650 °C), 0.08% of span or 0.36 °F                                           |
|                                                | 2 -58 to 482 °F (-50 to 250 °C), 0.08% of span or 0.18 °F                                               |
| Configuration transmitter connection           | 3 RTD 3-wire                                                                                           |
|                                                | 4 RTD 4-wire                                                                                           |
|                                                | 2 RTD 2-wire                                                                                           |
| Configuration range                            | KA -40 to 140 °F (-40 to 60 °C)                                                                         |
|                                                | MB 0 to 200 °F (-18 to 93 °C)                                                                           |
|                                                | MC 0 to 300 °F (-18 to 149 °C)                                                                          |
|                                                | MD 0 to 500 °F (-18 to 260 °C)                                                                          |
| Model                                          | A Standard model                                                                                       |
|                                                | B Works calibration certificate                                                                         |
|                                                | K Standard model, North America region                                                                  |
| TMT180-                                        | <= Order code (complete)                                                                               |
Further Documentation

- Operating manual iTEMP® Pt TMT180 (BA163R/24/ae)
- Brief operating manual TAF10 Field housing (KA093R/09/a2)