

# Pt Temperature Sensor – PTF Family



- Conformal to standard platinum temperature sensors according DIN EN 60751
- $R_0$ : 100 and 1000  $\Omega$
- Class F 0.1 (T = AA), F 0.15 (A), F 0.3 (B) and F 0.6 (C) accuracy
- Wide temperature range
- Different outline dimensions
- Global interchangeability

## DESCRIPTION

The PTF-sensor family combines a group of resistance temperature detectors (RTD) using a Platinum resistor in thin film technology as sensing element. It consists of a structured platinum film on a ceramics substrate, passivated by glass coating. The connection wires are protected with glass on the welding area.

The characteristic curve of this Platinum RTD complies with DIN EN 60751. The usage of Platinum as resistive material guarantees high long term stability.

Due to small outline and low mass this RTD has a low time constant; therefore it is a suitable solution for fast and precise feedback control systems.

## FEATURES

Conformal to DIN EN 60751  
 Wide temperature range: -50 ... +600 °C (Ni/Au wire and Class F 0.3, Ag-Wire versions are limited to 300 °C)  
 Standard nominal resistances values:  
 $R_0$ : 100 and 1000  $\Omega$  (other on request)  
 Class F 0.1 (T = AA), F 0.15 (A), F 0.3 (B) and F 0.6 (C) accuracy  
 Low drift over lifetime  
 Fast response time because of low thermal mass  
 Different outline dimensions available to fit a wide range of space requirements  
 Global interchangeability

## APPLICATIONS

Temperature feedback control  
 White goods  
 Industrial applications  
 Automotive  
 Medical  
 Sensing element for plug-in probes

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## PERFORMANCE SPECS

| Parameter                                    | Symbol             | Condition  | Min.           | Typical                   | Max.                     | Unit   |
|--|--------------------|--|----------------|---------------------------|--------------------------|--------|
| Nominal Resistance at 0 °C                   | R <sub>0</sub>     | Class B  | 99.88<br>998,8 | 100.00<br>1000.0          | 100.12<br>1001,2         | Ω      |
| Tolerance at 25 °C                           | Class B            | Room temperature calibration                                 | -0.43          | 0                         | 0.43                     | °C     |
| Temperature Coefficient of Resistance        | TCR                | 0 °C, 100 °C   |                | 3850                      |                          | ppm/°C |
| Temperature Range                            |                    |  | -50            |                           | 600                      | °C     |
| Self Heating Coefficient in air, flow: 1 m/s |                    | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline |                | 0.5<br>0.33<br>0.5<br>0.5 |                          | °C/mW  |
| Response Time Water Flow: 0.4 m/s            | τ <sub>W,0.9</sub> | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline |                | 0.2<br>0.35<br>0.2<br>0.2 |                          | s      |
| Response Time Air Flow: 1 m/s                | τ <sub>A,0.9</sub> | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline |                | 10<br>17<br>10<br>10      |                          | s      |
| Measuring Current R <sub>0</sub> : 100 Ω     |                    | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline |                |                           | 1.4<br>1.7<br>1.4<br>1.4 | mA     |
| Measuring Current R <sub>0</sub> : 1000 Ω    |                    | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline |                |                           | 0.4<br>0.5<br>0.4<br>0.4 | mA     |

## CALCULATION FORMULAS

The calculation formulas of Pt-RTDs are defined in DIN EN 60751 as following:

**For T ≥ 0 °C:**

$$R(T) = R(0) * (1 + a * T + b * T^2)$$

**For T < 0 °C:**

$$R(T) = R(0) * [1 + a * T + b * T^2 + c * (T - 100 °C) * T^3]$$

**Coefficients:**

$$\begin{aligned} a &= 3.9083E-03 \\ b &= -5.775E-07 \\ c &= -4.183E-12 \end{aligned}$$

**Tolerances:**

|                       |                           |                |
|-----------------------|---------------------------|----------------|
| Class F 0.1 (T = AA): | ± (0.10+0.0017* T/°C ) °C | (-30..+200 °C) |
| Class F 0.15 (A)      | ± (0.15+0.002* T/°C ) °C  | (-30..+300 °C) |
| Class F 0.3 (B):      | ± (0.30+0.005* T/°C ) °C  | (-50..+600 °C) |
| Class F 0.6 (C):      | ± (0.60+0.01* T/°C ) °C   | (-50..+600 °C) |

# Pt Temperature Sensor – PTF Family

## TYPICAL PERFORMANCE CURVES



Figure 1: Resistance characteristics



Figure 2: Tolerance chart

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## DIMENSIONAL DRAWING - PTFC OUTLINE



Figure 3: PTFC outline dimensions (mm)

## DIMENSIONAL DRAWING - PTFD OUTLINE

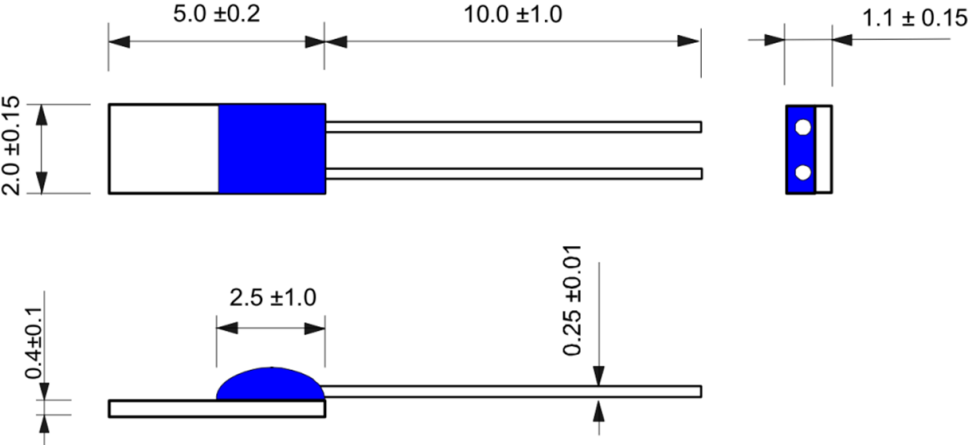


Figure 4: PTFD outline dimensions (mm)

## DIMENSIONAL DRAWING - PTFF OUTLINE



Figure 5: PTFF outline dimensions (mm)

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## DIMENSIONAL DRAWING - PTFM OUTLINE



Figure 6: PTFM outline dimensions (mm)

## TYPE CONFIGURATION MATRIX

| Sensor family | Type | Outline dimensions | Nominal resistance |        | Tolerance class<br>DIN EN 60751 |   |   |   | Connection wire |            |
|---------------|------|--------------------|--------------------|--------|---------------------------------|---|---|---|-----------------|------------|
|               |      |                    | 100 Ω              | 1000 Ω |                                 |   |   |   | Ag wire         | Ni/Au wire |
| PTF           | C    | 2.0 x 2.3          | 101                | 102    | T                               | A | B | C | 1A0             | 1G0        |
| PTF           | D    | 2.0 x 5.0          | 101                | 102    | T                               | A | B | C | 1A0             | 1G0        |
| PTF           | F    | 2.0 x 4.0          | 101                | 102    | T                               | A | B | C | 1A0             | 1G0        |
| PTF           | M    | 1.2 x 4.0          | 101                | 102    | T                               | A | B | C | 1A0             | 1G0        |

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## ORDERING INFORMATION I

| Product Number  | Type        | Description  |
|---|-------------|--|
| <b>Platinum Thin Film Sensors PTFC-Type (2 mm x 2.3 mm)</b> |             |  |
| G-PTCO-005  | PTFC101C1G0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ni/Au-wire       |
| G-PTCO-002  | PTFC101B1G0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ni/Au-wire       |
| G-PTCO-011  | PTFC101A1G0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ni/Au-wire      |
| G-PTCO-058  | PTFC101T1G0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ni/Au-wire  |
| G-PTCO-159  | PTFC101C1A0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ag-wire          |
| G-PTCO-160  | PTFC101B1A0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ag-wire          |
| G-PTCO-161  | PTFC101A1A0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ag-wire         |
| G-PTCO-162  | PTFC101T1A0 | 100 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ag-wire     |
| G-PTCO-046  | PTFC102C1G0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ni/Au-wire      |
| G-PTCO-006  | PTFC102B1G0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ni/Au-wire      |
| G-PTCO-029  | PTFC102A1G0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ni/Au-wire     |
| G-PTCO-154  | PTFC102T1G0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ni/Au-wire |
| G-PTCO-163  | PTFC102C1A0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ag-wire         |
| G-PTCO-157  | PTFC102B1A0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ag-wire         |
| G-PTCO-164  | PTFC102A1A0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ag-wire        |
| G-PTCO-165  | PTFC102T1A0 | 1000 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ag-wire    |
| <b>Platinum Thin Film Sensors PTFD-Type (2 mm x 5 mm)</b>   |             |  |
| G-PTCO-013  | PTFD101C1G0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ni/Au-wire       |
| G-PTCO-024  | PTFD101B1G0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ni/Au-wire       |
| G-PTCO-037  | PTFD101A1G0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ni/Au-wire      |
| G-PTCO-155  | PTFD101T1G0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ni/Au-wire  |
| G-PTCO-166  | PTFD101C1A0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ag-wire          |
| G-PTCO-053  | PTFD101B1A0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ag-wire          |
| G-PTCO-158  | PTFD101A1A0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ag-wire         |
| G-PTCO-152  | PTFD101T1A0 | 100 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ag-wire     |
| G-PTCO-167  | PTFD102C1G0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ni/Au-wire      |
| G-PTCO-126  | PTFD102B1G0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ni/Au-wire      |
| G-PTCO-168  | PTFD102A1G0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ni/Au-wire     |
| G-PTCO-150  | PTFD102T1G0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ni/Au-wire |
| G-PTCO-169  | PTFD102C1A0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ag-wire         |
| G-PTCO-035  | PTFD102B1A0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ag-wire         |
| G-PTCO-170  | PTFD102A1A0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ag-wire        |
| G-PTCO-151  | PTFD102T1A0 | 1000 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ag-wire    |

# Pt Temperature Sensor – PTF Family

## ORDERING INFORMATION II

| Product Number  | Type        | Description  |
|---|-------------|--|
| <b>Platinum Thin Film Sensors PTFF-Type (2 mm x 4 mm)</b>   |             |  |
| G-PTCO-171  | PTFF101C1G0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ni/Au-wire       |
| G-PTCO-172  | PTFF101B1G0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ni/Au-wire       |
| G-PTCO-173  | PTFF101A1G0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ni/Au-wire      |
| G-PTCO-174  | PTFF101T1G0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ni/Au-wire  |
| G-PTCO-175  | PTFF101C1A0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ag-wire          |
| G-PTCO-176  | PTFF101B1A0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ag-wire          |
| G-PTCO-177  | PTFF101A1A0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ag-wire         |
| G-PTCO-178  | PTFF101T1A0 | 100 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire     |
| G-PTCO-149  | PTFF102C1G0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ni/Au-wire      |
| G-PTCO-101  | PTFF102B1G0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ni/Au-wire      |
| G-PTCO-179  | PTFF102A1G0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ni/Au-wire     |
| G-PTCO-180  | PTFF102T1G0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ni/Au-wire |
| G-PTCO-181  | PTFF102C1A0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ag-wire         |
| G-PTCO-182  | PTFF102B1A0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ag-wire         |
| G-PTCO-183  | PTFF102A1A0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ag-wire        |
| G-PTCO-184  | PTFF102T1A0 | 1000 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire    |
| <b>Platinum Thin Film Sensors PTFM-Type (1.2 mm x 4 mm)</b> |             |  |
| G-PTCO-148  | PTFM101C1G0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ni/Au-wire       |
| G-PTCO-032  | PTFM101B1G0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ni/Au-wire       |
| G-PTCO-142  | PTFM101A1G0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ni/Au-wire      |
| G-PTCO-156  | PTFM101T1G0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ni/Au-wire  |
| G-PTCO-185  | PTFM101C1A0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ag-wire          |
| G-PTCO-186  | PTFM101B1A0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ag-wire          |
| G-PTCO-187  | PTFM101A1A0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ag-wire         |
| G-PTCO-188  | PTFM101T1A0 | 100 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire     |
| G-PTCO-189  | PTFM102C1G0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ni/Au-wire      |
| G-PTCO-012  | PTFM102B1G0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ni/Au-wire      |
| G-PTCO-050  | PTFM102A1G0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ni/Au-wire     |
| G-PTCO-153  | PTFM102T1G0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ni/Au-wire |
| G-PTCO-190  | PTFM102C1A0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ag-wire         |
| G-PTCO-191  | PTFM102B1A0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ag-wire         |
| G-PTCO-192  | PTFM102A1A0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ag-wire        |
| G-PTCO-193  | PTFM102T1A0 | 1000 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire    |

# Pt Temperature Sensor – PTF Family

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