

- 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<sub>0</sub>: 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



#### **PERFORMANCE SPECS**

| Parameter  | Symb<br>ol     | 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<br>B     | Room temperature calibration   | -0.43                    | 0                         | 0.43                     | °C     |
| Temperature Coefficient of Resistance              | TCR            | 0 °C, 100 °C   |                          | 3850                      |                          | ppm/°C |
| Temperature Range                                  |                | Class C (F0.6)<br>Class B (F 0.3)<br>Class A (F 0.15)<br>Class T (F 0.1) | -50<br>-50<br>-30<br>-30 |                           | 600<br>600<br>300<br>200 | °C     |
| Self Heating Coefficient<br>in air,<br>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<br>Flow: 0.4 m/s               | τw,0.9         | 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<br>Flow: 1 m/s                   | TA,0.9         | PTFC outline<br>PTFD outline<br>PTFF outline<br>PTFM outline             |                          | 10<br>17<br>10<br>10      |                          | S      |
| Measuring Current $R_0$ : 100 $\Omega$             |                | 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 $R_0$ : 1000 $\Omega$            |                | 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 
$$T \ge 0$$
 °C:

 $R_{(T)} = R_{(0)} * (1 + a * T + b * T^{2})$ 

For T < 0 °C:

 $R_{(T)} = R_{(0)} * [1 + a * T + b * T^{2} + c * (T - 100^{\circ}C) * T^{3}]$ 

**Coefficients:** 

| a = 3.9083E-03 |
|----------------|
| b = -5.775E-07 |
| c = -4.183E-12 |

#### **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 ) <sup>'°</sup> 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) |



### **TYPICAL PERFORMANCE CURVES**



Figure 1: Resistance characteristics



Figure 2: Tolerance chart



1.1±0.15

## Pt Temperature Sensor – PTF Family

#### **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)



#### **DIMENSIONAL DRAWING - PTFM OUTLINE**



#### **TYPE CONFIGURATION MATRIX**

| Sensor family | Туре | Outline<br>dimensions | Nominal resistance |        | Tolerance class<br>DIN EN 60751 |   |   | iss<br>i1 | Connection wire |            |
|---------------|------|-----------------------|--------------------|--------|---------------------------------|---|---|-----------|-----------------|------------|
|               |      |                       | 100 Ω              | 1000 Ω |                                 |   |   |           | Ag wire         | Ni/Au wire |
| PTF           | С    | 2.0 x 2.3             | 101                | 102    | Т                               | А | В | С         | 1A0             | 1G0        |
| PTF           | D    | 2.0 x 5.0             | 101                | 102    | Т                               | А | В | С         | 1A0             | 1G0        |
| PTF           | F    | 2.0 x 4.0             | 101                | 102    | Т                               | Α | В | С         | 1A0             | 1G0        |
| PTF           | М    | 1.2 x 4.0             | 101                | 102    | Т                               | Α | В | С         | 1A0             | 1G0        |
|               |      |                       |                    |        |                                 |   |   |           |                 |            |

#### PACKING AND MINIMUM ORDER QUANTITY

| Packing   | PCS per Packing unit | MOQ          |
|---|----------------------|--------------|
| Transparent Blister Box 80(120)mm x 50(60)mm x 20mm | 500 (bulk)           | 500 per Type |



### **ORDERING INFORMATION I**

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



## **ORDERING INFORMATION II**

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



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