



## Thin Film Platinum RTDs

### HRTS Series



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# Thin Film Platinum RTDs

The HRTS Series Thin Film Platinum RTDs (Resistance Temperature Detectors) are designed to measure temperatures from -70 °C to 260 °C [-94 °F to 500 °F]. These fully-assembled elements are ready to use in probe assemblies without the need for fragile splices to extension leads.

These products are manufactured using a thin layer of platinum deposited on an alumina substrate and are laser trimmed to a resistance interchangeability of a standard  $\pm 0.2\%$  ( $\pm 0.5$  °C accuracy) or an optional  $\pm 0.1\%$  ( $\pm 0.3$  °C accuracy). The sensor chip is then glassed, wired and potted to result in an alumina package with Teflon®-insulated lead wires.

## Key Features

- Linear resistance vs temperature
- Interchangeable resistance
- Accurate
- Fast response
- Laser trimmed
- Ceramic case material
- TFE Teflon® lead wires
- Ready-to-use, fully-assembled elements

## Potential Applications

Temperature sensing for monitoring, compensation and regulation in:

### INDUSTRIAL

- HVAC equipment
- Instrument and probe assemblies
- Process control for temperature regulation
- Motor windings and bearings
- Battery packs
- Environmental chambers

### MEDICAL

- Autoclaves

### AEROSPACE AND DEFENSE

- Aircraft
- Space vehicles
- Satellites
- Rovers

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**Table 1. Specifications**

| Characteristic                                                                              | Condition      | Parameter                                                                                                              |
|---------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------|
| Alpha:<br>$R_0 = 1000 \Omega$<br>$R_0 = 100 \Omega$                                         | 0 °C           | 0.00375 $\Omega/\Omega/^\circ\text{C}$<br>0.00385 $\Omega/\Omega/^\circ\text{C}$                                       |
| Temperature range:                                                                          | —              | -70 °C to 260 °C [-94 °F to 500 °F]                                                                                    |
| Temperature accuracy:<br>$R_0 \pm 0.2\%$ trim (standard)<br>$R_0 \pm 0.1\%$ trim (optional) | —              | $\pm 0.5$ °C or 0.8% of temperature, whichever is greater<br>$\pm 0.3$ °C or 0.6% of temperature, whichever is greater |
| Time constant, 1/e                                                                          | metal surfaces | 0.6 s typ.                                                                                                             |
| Operating current                                                                           | —              | 2 mA max. for self heating errors of 1 °C;<br>1 mA recommended                                                         |
| Self heating                                                                                | —              | 0.3 mW/°C                                                                                                              |
| Construction material:<br>case<br>leads                                                     | —              | alumina<br>nickel-coated stranded copper, Teflon® insulated                                                            |

**Table 2. Constant Values ( $\beta = 0$  and  $C = 0$  for  $T > 0$  °C)**

| Constant                           | 1000 $\Omega$          | 100 $\Omega$             | Functional Behavior                                                                                                                                                                                                                                                                                         |
|------------------------------------|------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alpha $\alpha$ (°C <sup>-1</sup> ) | 0.00375 $\pm 0.000029$ | 0.003850 $\pm 0.000010$  | $R_T = R_0(1 + AT + BT^2 - 100CT^3 + CT^4)$<br><br>Where:<br>$R_T$ = Resistance ( $\Omega$ ) at temperature T (°C)<br>$R_0$ = Resistance ( $\Omega$ ) at 0 °C<br>$T$ = Temperature (°C)<br>$A = \alpha + \frac{\alpha\delta}{100}$ $B = -\frac{\alpha\delta}{100^2}$ $C_{T<0} = -\frac{\alpha\beta}{100^4}$ |
| Delta $\delta$ (°C)                | 1.605 $\pm 0.009$      | 1.4999 $\pm 0.007$       |                                                                                                                                                                                                                                                                                                             |
| Beta $\beta$ (°C)                  | 0.16                   | 0.10863                  |                                                                                                                                                                                                                                                                                                             |
| A (°C <sup>-1</sup> )              | $3.81 \times 10^{-3}$  | $3.908 \times 10^{-3}$   |                                                                                                                                                                                                                                                                                                             |
| B (°C <sup>-2</sup> )              | $-6.02 \times 10^{-7}$ | $-5.775 \times 10^{-7}$  |                                                                                                                                                                                                                                                                                                             |
| C (°C <sup>-4</sup> )              | $-6.0 \times 10^{-12}$ | $-4.183 \times 10^{-12}$ |                                                                                                                                                                                                                                                                                                             |

**Table 3. Accuracy vs Temperature**

| Temperature<br>(°C) | Tolerance                        |                        |                                  |                        |
|---------------------|----------------------------------|------------------------|----------------------------------|------------------------|
|                     | Standard Trim<br>( $\pm 0.2\%$ ) |                        | Optional Trim<br>( $\pm 0.1\%$ ) |                        |
|                     | $\pm \Delta R^1$<br>( $\Omega$ ) | $\pm \Delta T$<br>(°C) | $\pm \Delta R^1$<br>( $\Omega$ ) | $\pm \Delta T$<br>(°C) |
| -100                | 2.9                              | 0.8                    | 2.4                              | 0.6                    |
| 0                   | 2.0                              | 0.5                    | 1.0                              | 0.3                    |
| 100                 | 2.9                              | 0.8                    | 2.2                              | 0.6                    |
| 200                 | 5.6                              | 1.6                    | 4.3                              | 1.2                    |
| 300                 | 8.2                              | 2.4                    | 6.2                              | 1.8                    |
| 400                 | 11.0                             | 3.2                    | 8.3                              | 2.5                    |
| 500                 | 12.5                             | 4.0                    | 9.6                              | 3.0                    |
| 600                 | 15.1                             | 4.8                    | 10.4                             | 3.3                    |

<sup>1</sup>1000  $\Omega$  RTD. Divide  $\Delta$  by 10 for 100  $\Omega$  RTD.

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Figure 1. Resistance vs Temperature

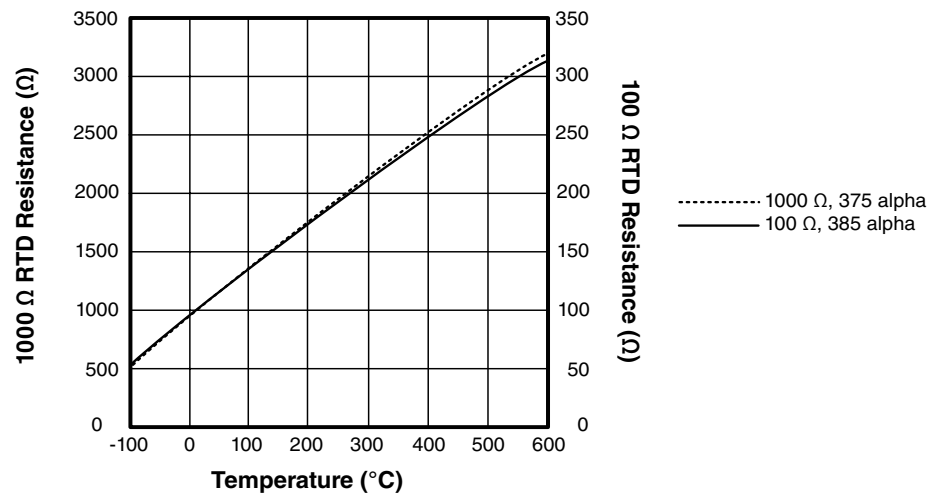
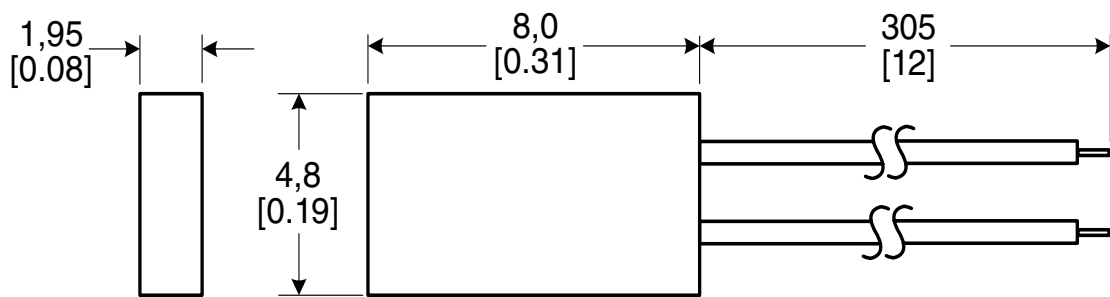


Figure 2. Mounting Dimensions (For reference only. mm/[in].)



## CAUTION PRODUCT DAMAGE

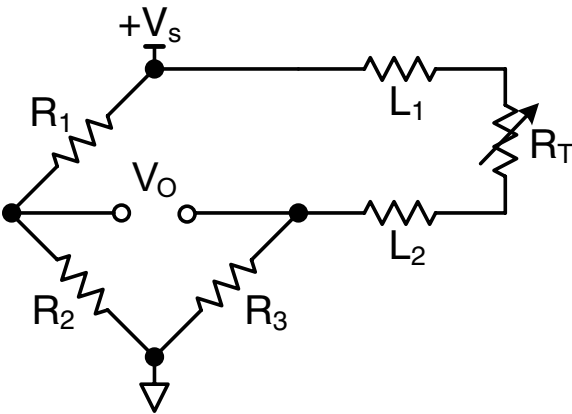
- Ensure proper ESD (Electrostatic Discharge) precautions are followed when handling this product.
- Failure to comply with these instructions may result in product damage.**

Table 4. Order Guide

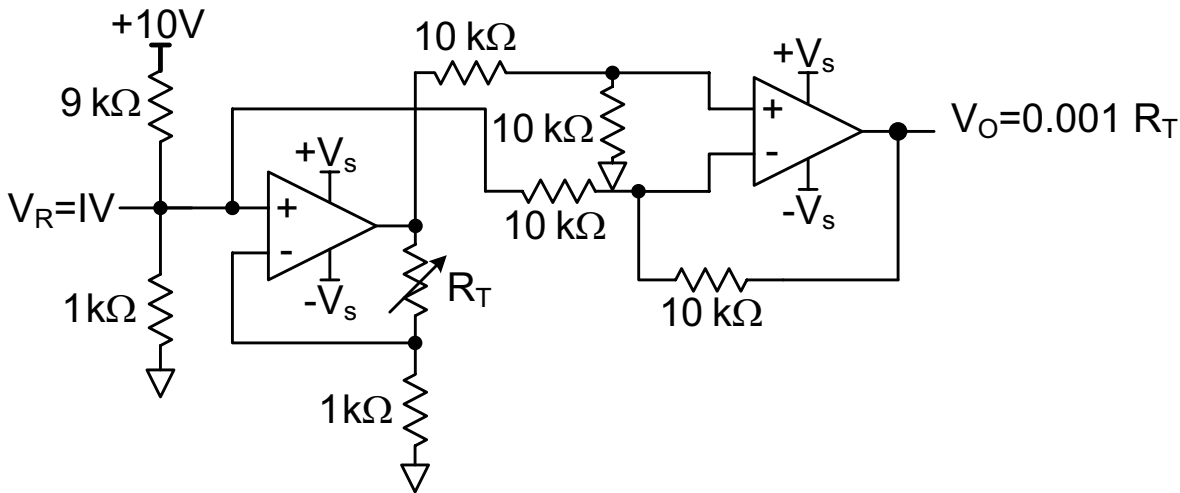
| Catalog Listing    | Description                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HRTS-5760-B-T-0-12 | HRTS Series platinum thin film RTD with two, 28 gauge TFE Teflon®-insulated leadwires, a resistance and alpha of 100 Ω: 0.00385 Ω/Ω/°C, a standard ±0.2% trim resistance, and 305 mm [12 in] leadwires   |
| HRTS-5760-B-T-1-12 | HRTS Series platinum thin film RTD with two, 28 gauge TFE Teflon®-insulated leadwires, a resistance and alpha of 100 Ω: 0.00385 Ω/Ω/°C, an optional ±0.1% trim resistance, and 305 mm [12 in] leadwires  |
| HRTS-5760-B-U-0-12 | HRTS Series platinum thin film RTD with two, 28 gauge TFE Teflon®-insulated leadwires, a resistance and alpha of 1000 Ω: 0.00375 Ω/Ω/°C, a standard ±0.2% trim resistance, and 305 mm [12 in] leadwires  |
| HRTS-5760-B-U-1-12 | HRTS Series platinum thin film RTD with two, 28 gauge TFE Teflon®-insulated leadwires, a resistance and alpha of 1000 Ω: 0.00375 Ω/Ω/°C, an optional ±0.1% trim resistance, and 305 mm [12 in] leadwires |

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Figure 3. Circuits  
Wheatstone Bridge 2-Wire Interface



Linear Output Voltage



Adjustable Point (Comparator) Interface

