

## Interactive Catalog Replaces Catalog Pages

Honeywell Sensing and Control has replaced the PDF product catalog with the new **Interactive Catalog**. The **Interactive Catalog** is a power search tool that makes it easier to find product information. It includes more installation, application, and technical information than ever before.



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### **Sensing and Control**

Honeywell Inc.

11 West Spring Street

Freeport, Illinois 61032

# Temperature Sensors

## Platinum RTDs

# HRTS Series



### FEATURES

- Resistance interchangeable
- Accurate
- Linear
- Fast
- Laser trimmed
- Bolt, cement-on or strap-on models

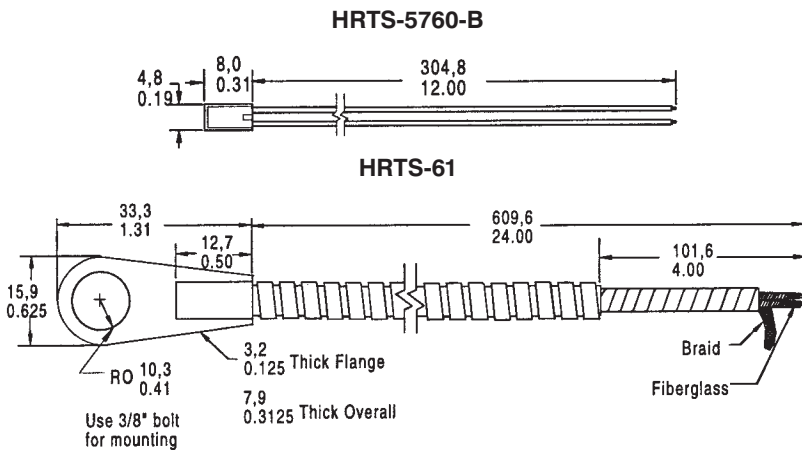
### TYPICAL APPLICATIONS

- HVAC – room, duct and refrigerant equipment
- OEM assemblies
- Electronic assemblies – semiconductor protection, temperature compensation
- Process control – temperature regulation

### ORDER GUIDE

<b>HRTS-5760-B</b>	Miniature, ceramic body, 28 ga TFE Teflon insulated leads (2-wire only)
<b>HRTS-61</b>	Bolt-on, nickel plated copper alloy body, 24 ga fiberglass insulated leads, SST braid, TFE overwrap, spiral armor
<b>-T</b>	100Ω, 0.00385 Ω/Ω/°C, 3-wire leads, DIN specification
<b>-U</b>	1000Ω, 0.00375 Ω/Ω/°C, 2-wire leads
<b>-0</b>	±0.2% Resistance Trim (Standard)
<b>-1</b>	±0.1% Resistance Trim (Optional)
<b>-12</b>	Standard length, HRTS-5760-B
<b>-24</b>	Standard length, HRTS-61

### MOUNTING DIMENSIONS (for reference only)

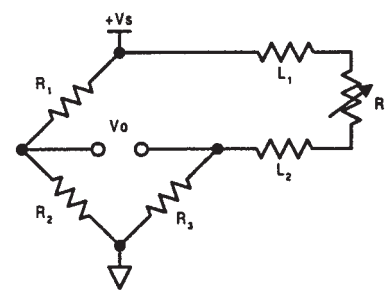


The HRTS is designed to measure surface temperatures from  $-200^{\circ}$  to  $+480^{\circ}$ C ( $-320^{\circ}$  to  $+900^{\circ}$ F) in printed circuit, temperature probe, or other applications.

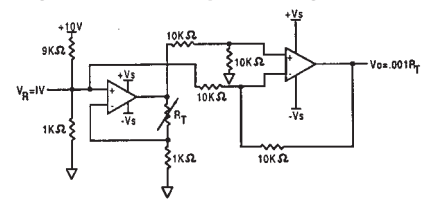
HRTS surface temperature sensors are fully assembled elements, ready to use, without the need for fragile splices to extension leads.

A thin layer of platinum is deposited on an alumina substrate and laser trimmed to a resistance interchangeability of  $\pm 0.2\%$  with  $\pm 0.5^{\circ}$ C accuracy or  $\pm 0.1\%$  with  $\pm 0.3^{\circ}$ C accuracy. The sensor chip is then glassed, wired and potted or ceramic fired to result in a cylindrical alumina package with either Teflon or fiber glass insulated lead wires.

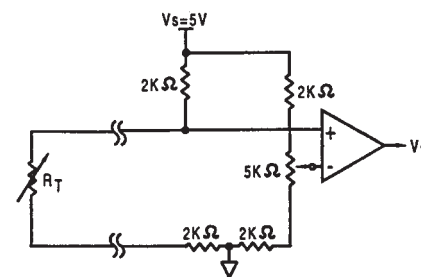
**Fig. 1: Wheatstone Bridge 2-Wire Interface**



**Fig. 2: Linear Output Voltage**



**Fig. 3: Adjustable Point (Comparator) Interface**



Temperature

## Platinum RTDs

### FUNCTIONAL BEHAVIOR

$$R_T = R_0(1 + AT + BT^2 - 100CT^3 + CT^4)$$

$R_T$  = Resistance ( $\Omega$ ) at temperature  $T$  ( $^{\circ}\text{C}$ )

$R_0$  = Resistance ( $\Omega$ ) at  $0^{\circ}\text{C}$

$T$  = Temperature in  $^{\circ}\text{C}$

$$A = \alpha + \frac{\alpha \delta}{100} \quad B = \frac{-\alpha \delta}{100^2} \quad C_{T < 0} = \frac{-\alpha \beta}{100^4}$$

### CONSTANTS

<b>Alpha, <math>\alpha</math> (<math>^{\circ}\text{C}^{-1}</math>)</b>	0.00375 $\pm 0.000029$	0.003850 $\pm 0.000010$
<b>Delta, <math>\delta</math> (<math>^{\circ}\text{C}</math>)</b>	$1.605 \pm 0.009$	$1.4999 \pm 0.007$
<b>Beta, <math>\beta</math> (<math>^{\circ}\text{C}</math>)</b>	0.16	0.10863
<b>A (<math>^{\circ}\text{C}^{-1}</math>)</b>	$3.81 \times 10^{-3}$	$3.908 \times 10^{-3}$
<b>B (<math>^{\circ}\text{C}^{-2}</math>)</b>	$-6.02 \times 10^{-7}$	$-5.775 \times 10^{-7}$
<b>C (<math>^{\circ}\text{C}^{-4}</math>)</b>	$-6.0 \times 10^{-12}$	$-4.183 \times 10^{-12}$

Both  $\beta = 0$  and  $C = 0$  for  $T > 0^{\circ}\text{C}$

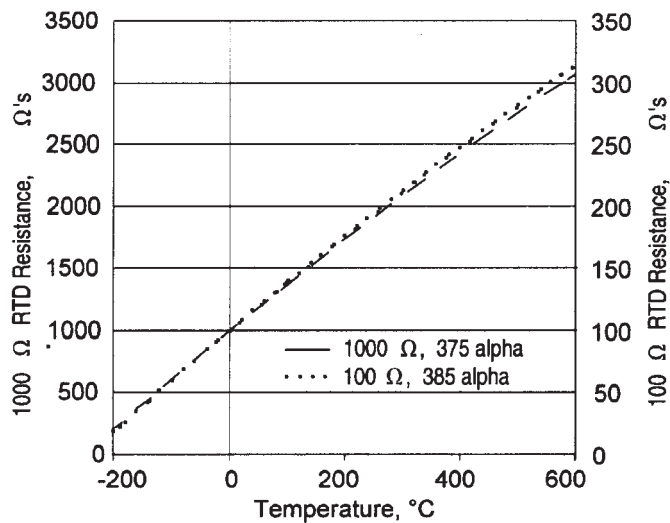
### ACCURACY VS TEMPERATURE

HRTS platinum RTDs are available in two base resistance trim tolerances:  $\pm 0.2\%$  or  $\pm 0.1\%$ . The corresponding resistance interchangeability and temperature accuracy for these tolerances are:

Tolerance	Standard $\pm 0.2\%$		Optional $\pm 0.1\%$		
	Temperature ( $^{\circ}\text{C}$ )	$\pm \Delta R^*$ ( $\Omega$ )	$\pm \Delta T$ ( $^{\circ}\text{C}$ )	$\pm \Delta R^*$ ( $\Omega$ )	$\pm \Delta T$ ( $^{\circ}\text{C}$ )
	-200	6.8	1.6	5.1	1.2
	-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

\*1000 $\Omega$  RTD. Divide  $\Delta R$  by 10 for 100 $\Omega$  RTD.

### RESISTANCE VS TEMPERATURE CURVE



### CAUTION

#### PRODUCT DAMAGE

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take normal ESD precautions when handling this product.

### SPECIFICATIONS

Sensor Type	Thin film platinum RTD: $R_0 = 1000 \Omega @ 0^{\circ}\text{C}$ ; $\alpha = 0.00375 \Omega/\Omega/^{\circ}\text{C}$ $R_0 = 100 \Omega @ 0^{\circ}\text{C}$ ; $\alpha = 0.00385 \Omega/\Omega/^{\circ}\text{C}$
Temperature Range	HRTS-5760-B: $-200^{\circ}$ to $+260^{\circ}\text{C}$ ( $-320^{\circ}$ to $+500^{\circ}\text{F}$ ) HRTS-61: $-75^{\circ}$ to $+425^{\circ}\text{C}$ ( $-100^{\circ}$ to $+800^{\circ}\text{F}$ )
Temperature Accuracy	$\pm 0.5^{\circ}\text{C}$ or $0.8\%$ of temperature @ $0.2\%$ $R_0$ Trim $\pm 0.3^{\circ}\text{C}$ or $0.6\%$ of temperature @ $0.1\%$ $R_0$ Trim Optional
Time Constant, $1/e$	HRTS-5760-B: Typically 0.6 sec. on metal surfaces HRTS-61: Typically 20 sec. On metal surfaces
Operating Current	2 mA max. for self-heating errors of $1^{\circ}\text{C}$ 1 mA recommended
Self-Heating	0.3 mW/ $^{\circ}\text{C}$
Lead Material	Nickel coated stranded copper, Teflon or Fiberglass insulated