

## 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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Interactive Catalog.**

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### **Sensing and Control**

Honeywell Inc.

11 West Spring Street

Freeport, Illinois 61032

# Temperature Sensors

## Platinum RTDs

HEL-776/HEL-777



### FEATURES

- Linear resistance vs temperature
- Accurate and interchangeable
- Excellent stability
- Small size
- Printed circuit mountable
- Ceramic SIP package

HEL-776 and HEL-777 platinum RTDs are designed to measure temperatures from  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$  ( $-67^{\circ}$  to  $302^{\circ}\text{F}$ ) in printed circuit boards, temperature probes, or other lower temperature applications. Solderable leads in 0.050" or 0.100" spacing provide strong connections for wires or printed circuits.

### TYPICAL APPLICATIONS

- HVAC – room, duct and refrigerant equipment
- Instrument and probe assemblies
- Electronic assemblies – temperature compensation
- Process control – temperature regulation

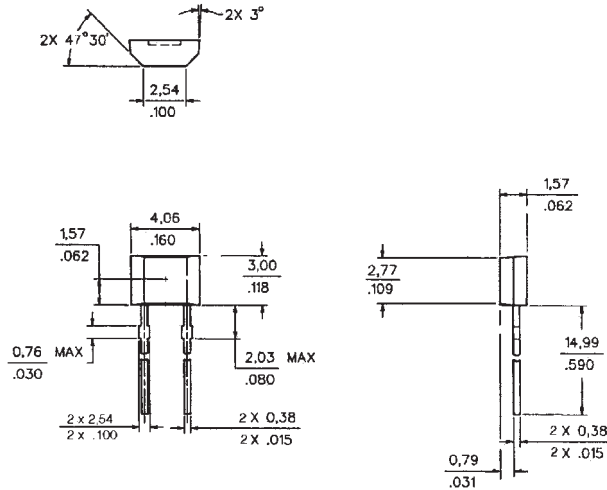
The 1000 $\Omega$ , 375 alpha version, provides 10x greater sensitivity and signal-to-noise. Both are ideal for air temperature sensing.

### ORDER GUIDE

|           |  |
|-----------|--|
| HEL-776-A | Molded SIP pkg. 0.100" lead spacing                      |
| HEL-777-A | Molded SIP pkg. 0.100" lead spacing                      |
| -U        | 1000 $\Omega$ , 0.00375 $\Omega/\Omega/^{\circ}\text{C}$ |
| -T        | 100 $\Omega$ , 0.00385 $\Omega/\Omega/^{\circ}\text{C}$  |
| -0        | $\pm 0.2\%$ Resistance Trim (Standard)                   |
| -1        | $\pm 0.1\%$ Resistance Trim (Optional)                   |

### MOUNTING DIMENSIONS (for reference only) mm/in.

#### HEL-776-A



#### HEL-777-A



Fig. 1: Wheatstone Bridge 2-Wire Interface



Fig. 2: Linear Output Voltage

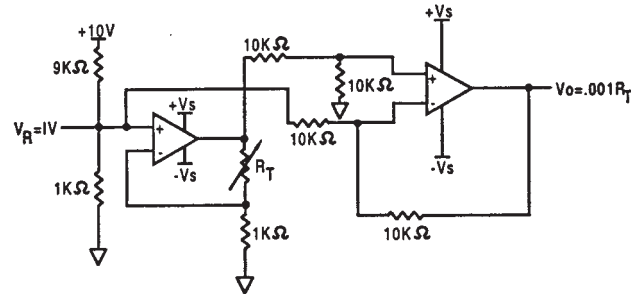


Fig. 3: Adjustable Point (Comparator) Interface



### 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.

Temperature

# Temperature Sensors

HEL-776/HEL-777

## Platinum RTDs

### FUNCTIONAL BEHAVIOR

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

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

R<sub>0</sub> = 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<br>$\pm 0.000029$ | 0.003850<br>$\pm 0.000010$ |
| <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

| Temperature ( $^{\circ}\text{C}$ ) | Standard $\pm 0.2\%$          |                                       | Optional $\pm 0.1\%$          |                                       |
|------------------------------------|-------------------------------|---------------------------------------|-------------------------------|---------------------------------------|
|                                    | $\pm \Delta R^*$ ( $\Omega$ ) | $\pm \Delta T$ ( $^{\circ}\text{C}$ ) | $\pm \Delta R^*$ ( $\Omega$ ) | $\pm \Delta T$ ( $^{\circ}\text{C}$ ) |
| -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



### SPECIFICATIONS

|  |   |
|--|---|
| Sensor Type  | Thin film platinum RTD: $R_0 = 1000 \Omega @ 0^{\circ}\text{C}$ ; $\alpha = 0.00375 \Omega/\Omega/^{\circ}\text{C}$<br>$R_0 = 100 \Omega @ 0^{\circ}\text{C}$ ; $\alpha = 0.00385 \Omega/\Omega/^{\circ}\text{C}$   |
| Temperature Range  | TFE Teflon: $-200^{\circ}$ to $+260^{\circ}\text{C}$ ( $-320^{\circ}$ to $+500^{\circ}\text{F}$ )<br>Fiberglass: $-75^{\circ}$ to $+540^{\circ}\text{C}$ ( $-100^{\circ}$ to $+1000^{\circ}\text{F}$ )  |
| Temperature Accuracy   | $\pm 0.5^{\circ}\text{C}$ or 0.8% of temperature $^{\circ}\text{C}$ ( $R_0 \pm 0.2\%$ trim), whichever is greater<br>$\pm 0.3^{\circ}\text{C}$ or 0.6% of temperature $^{\circ}\text{C}$ ( $R_0 \pm 0.1\%$ trim), whichever is greater (optional)             |
| Base Resistance and Interchangeability, $R_0 \pm \Delta R_0$ | $1000 \pm 2 \Omega$ ( $\pm 0.2\%$ ) @ $0^{\circ}\text{C}$ or $100 \pm 0.2 \Omega$ ( $\pm 0.2\%$ ) @ $0^{\circ}\text{C}$<br>$1000 \pm 1 \Omega$ ( $\pm 0.1\%$ ) @ $0^{\circ}\text{C}$ or $100 \pm 0.2 \Omega$ ( $\pm 0.2\%$ ) @ $0^{\circ}\text{C}$ (optional) |
| Linearity  | $\pm 0.1\%$ of full scale for temperatures spanning $-40^{\circ}$ to $125^{\circ}\text{C}$<br>$\pm 2.0\%$ of full scale for temperatures spanning $-75^{\circ}$ to $540^{\circ}\text{C}$  |
| Time Constant  | $< 0.5$ sec, 0.85 inch O.D. in water at 3 ft/sec; $< 1.0$ sec, 0.85 inch O.D. in still water  |
| Operating Current  | 2 mA maximum for self heating errors of $< 1^{\circ}\text{C}$ ; 1 mA recommended  |
| Stability  | $< 0.25^{\circ}\text{C}/\text{year}$ ; $0.05^{\circ}\text{C}$ per 5 years in occupied environments  |
| Self Heating   | $< 15\text{mW}/^{\circ}\text{C}$ for 0.85 O.D. typical  |
| Insulation Resistance  | $> 50 \text{M}\Omega @ 50 \text{VDC} @ 25^{\circ}\text{C}$  |
| Construction   | Alumina case; Epoxy potting (Teflon leads); Ceramic potting (fiberglass leads)  |
| Lead Material  | Nickel coated stranded copper, Teflon or Fiberglass insulated   |



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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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