

Temperature Sensors HEL-776/HEL-777 Series

PLATINUM RTDs

FUNCTIONAL BEHAVIOR

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

RT = Resistance (W) at temperature T (°C)

R_0 = Resistance (W) at 0°C

T = Temperature in °C

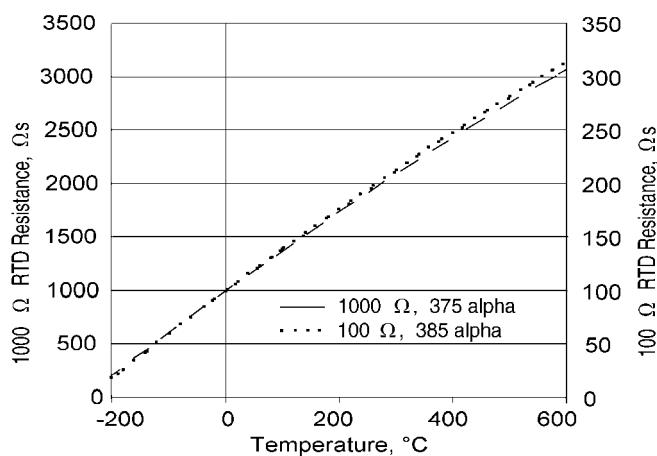
$$A = a + \frac{a_d}{100} \quad B = \frac{-a_d}{100^2} \quad C_{T<0} = \frac{-a_b}{100^4}$$

CONSTANTS

Alpha, α (°C⁻¹)	0.003750 ±0.000029	0.003850 ±0.000010
Delta, δ (°C)	1.605 ± 0.009	1.4999 ± 0.007
Beta, β (°C)[*]	0.16	0.10863
A (°C⁻¹)	3.81x10 ⁻³	3.908x10 ⁻³
B (°C⁻²)	-6.02x10 ⁻⁷	-5.775x10 ⁻⁷
C (°C⁻⁴)[*]	-6.0x10 ⁻¹²	-4.183x10 ⁻¹²

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

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.

ACCURACY VS TEMPERATURE

The HEL-776 and HEL-777 platinum RTDs are available in two base resistance trim tolerances: ±0.2% or ±0.1%. The corresponding resistance interchangeability and temperature accuracy for these tolerances are:

FOR 1000 Ω RTD

Trim Tolerance	Standard ±0.2%		Optional ±0.1%	
	±ΔR (Ω)	±ΔT (°C)	±ΔR (Ω)	±ΔT (°C)
Temperature (°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

FOR 100 Ω RTD

Trim Tolerance	Standard ±0.2%		Optional ±0.1%	
	±ΔR (Ω)	±ΔT (°C)	±ΔR (Ω)	±ΔT (°C)
Temperature (°C)				
-200	.62	1.5	0.46	1.2
-100	.29	0.7	0.24	0.6
0	.20	0.5	0.10	0.3
100	.29	0.7	0.22	0.6

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ELECTRICAL INTERFACING

Fig. 1 illustrates the most common method of measuring an RTD. As R_T increases or decreases with temperature, V_o increases or decreases. An op-amp is used to observe V_o . Lead wire resistance, L_1 and L_2 , add to the RTD leg of the bridge and may affect the temperature reading.

Fig. 2 is a simple circuit that provides a voltage output linear to within 0.1% or a $\pm 0.3^\circ\text{C}$ (0.5°F) error over a range of -40°C to $+150^\circ\text{C}$ (-40°F to $+302^\circ\text{F}$).

Fig. 3 illustrates one way to detect one particular temperature, if required in an application. The potentiometer may be adjusted to correspond to the desired temperature.

Fig. 1: Wheatstone Bridge 2-Wire Interface

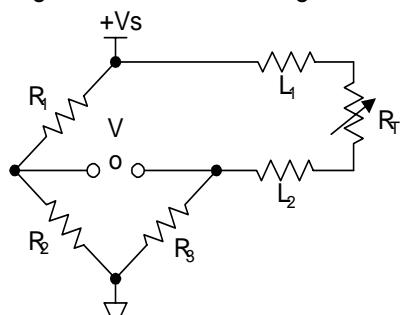


Fig. 2: Linear Output Voltage

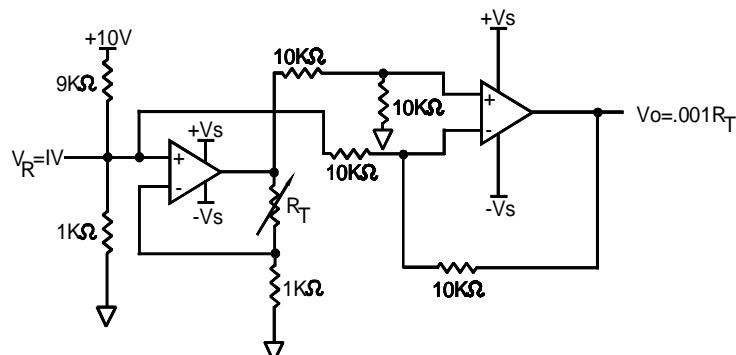
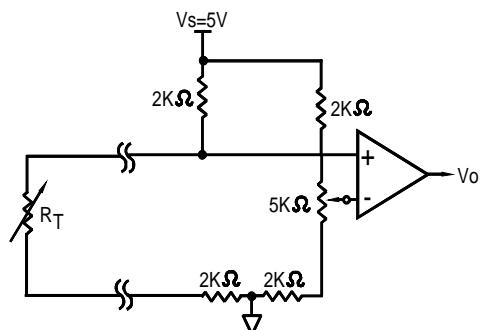


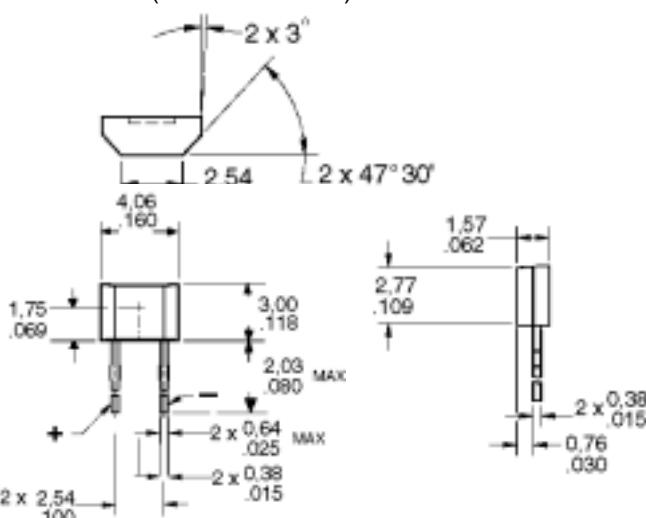
Fig. 3: Adjustable Point (Comparator) Interface



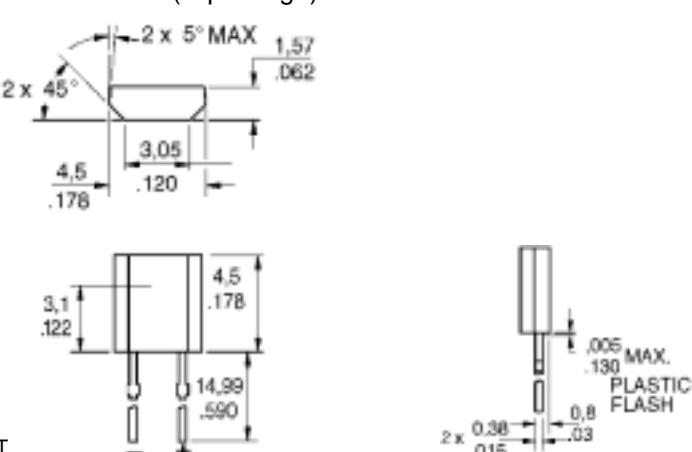
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MOUNTING DIMENSIONS (for reference only) mm/in

HEL-776-A (TO-92 modified)



HEL-777-A (U package)



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WARRANTY and REMEDY

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For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

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