

Temperature Sensors HEL-700

PLATINUM RTDs

FUNCTIONAL BEHAVIOR

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

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

R_0 = Resistance (Ω) at 0°C

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

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

CONSTANTS

Alpha, α ($^{\circ}\text{C}^{-1}$)	0.003750 ± 0.000029	0.003850 ± 0.000010
Delta, δ ($^{\circ}\text{C}$)	1.605 ± 0.009	1.4999 ± 0.007
Beta, β ($^{\circ}\text{C}$)[*]	0.16	0.10863
A ($^{\circ}\text{C}^{-1}$)	3.81×10^{-3}	3.908×10^{-3}
B ($^{\circ}\text{C}^{-2}$)	-6.02×10^{-7}	-5.775×10^{-7}
C ($^{\circ}\text{C}^{-4}$)[*]	-6.0×10^{-12}	-4.183×10^{-12}

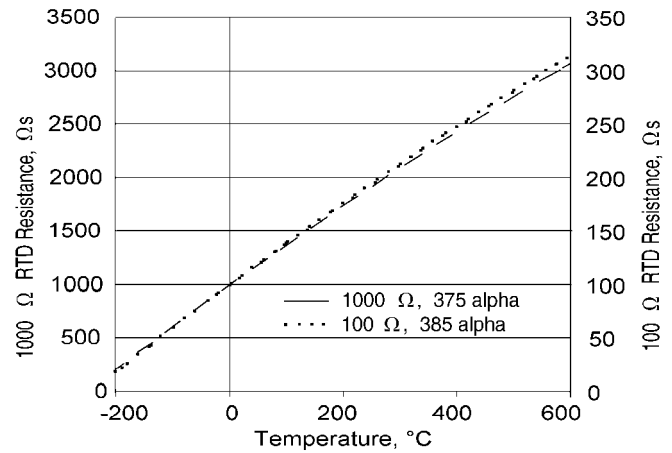
^{*}Both $\beta = 0$ and $C = 0$ for $T > 0^{\circ}\text{C}$

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.

RESISTANCE VS TEMPERATURE CURVE



ACCURACY VS TEMPERATURE

HEL-700 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:

Trim Tolerance	Standard $\pm 0.2\%$		Optional $\pm 0.1\%$	
	$\pm \Delta R$ (Ω)	$\pm \Delta T$ ($^{\circ}\text{C}$)	$\pm \Delta R$ (Ω)	$\pm \Delta T$ ($^{\circ}\text{C}$)
Temperature ($^{\circ}\text{C}$)				
-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

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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

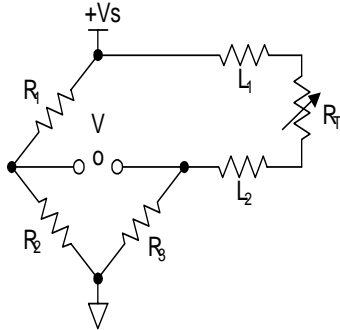


Fig. 2: Linear Output Voltage

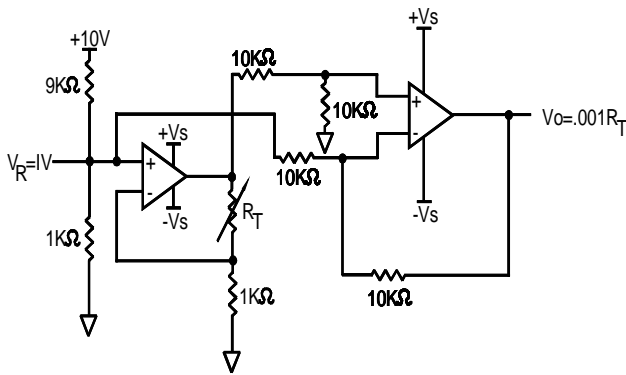
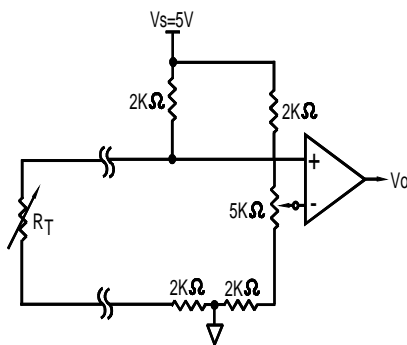
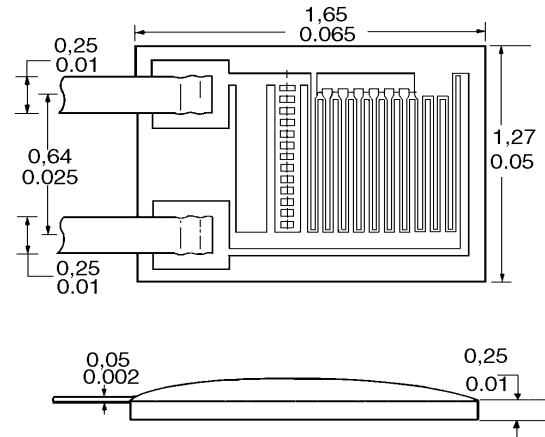


Fig. 3: Adjustable Point (Comparator) Interface

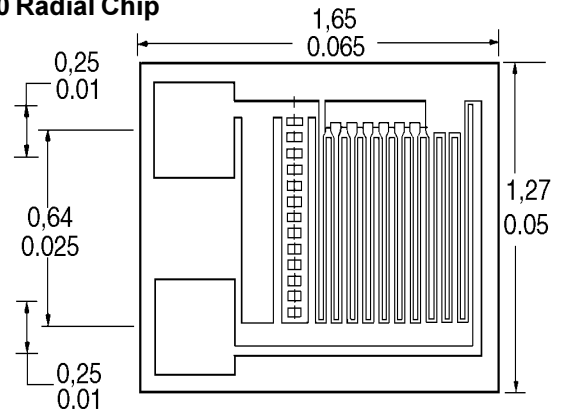


MOUNTING DIMENSIONS (for reference only) mm/in

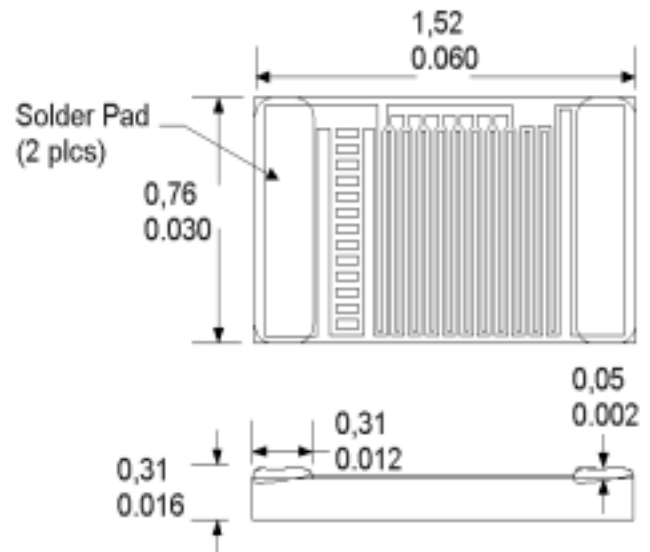
HEL-700 Ribbon Lead



HEL-700 Radial Chip



HEL-700 SMT (Axial) Flip Chip



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