

Temperature Sensors

Platinum RTDs

HEL-775 Series



FEATURES

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

TYPICAL APPLICATIONS

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

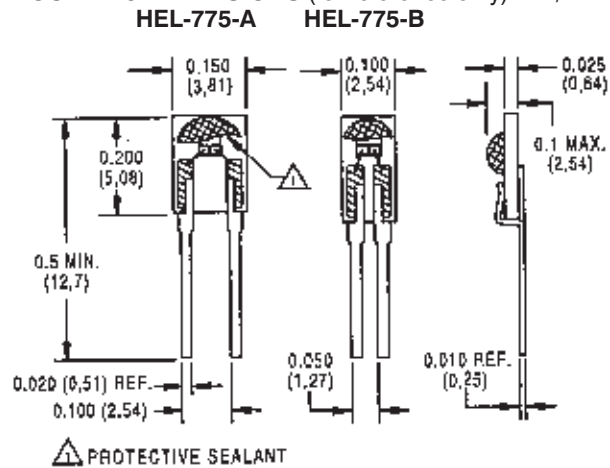
HEL-775 platinum RTDs are designed to measure temperatures from -55° to $+150^{\circ}\text{C}$ (-67° to 302°F) in printed circuit boards, temperature probes, or other lower temperature applications. Solderable leads in 0.050" or 0.100" spacing provide strong connections for wires or printed circuits.

The 1000 Ω , 375 alpha version, provides 10x greater sensitivity and signal-to-noise. The 0.050" lead space models are ideal for probes.

ORDER GUIDE

HEL-775-A	Ceramic SIP pkg. 0.100" lead spacing
HEL-775-B	Ceramic SIP pkg. 0.050" lead spacing
-U	1000 Ω , 0.00375 $\Omega/\Omega/^{\circ}\text{C}$
-T	100 Ω , 0.00385 $\Omega/\Omega/^{\circ}\text{C}$, DIN specification
-0	$\pm 0.2\%$ Resistance Trim (Standard)
-1	$\pm 0.1\%$ Resistance Trim (Optional)

MOUNTING DIMENSIONS (for reference only) mm/in.



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.

Fig. 1: Wheatstone Bridge 2-Wire Interface

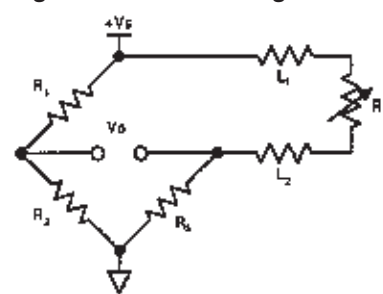


Fig. 2: Linear Output Voltage

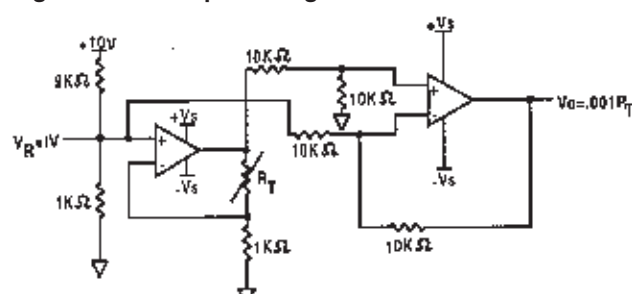
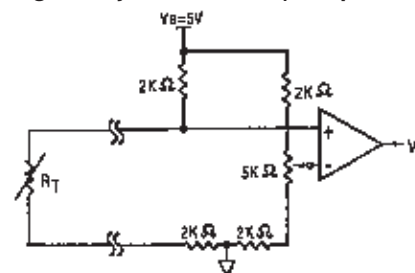


Fig. 3: Adjustable Point (Comparator) Interface



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FUNCTIONAL BEHAVIOR

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

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

R₀ = Resistance (Ω) at 0 $^{\circ}\text{C}$

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

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

Alpha, α ($^{\circ}\text{C}^{-1}$)	0.00375 ± 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}

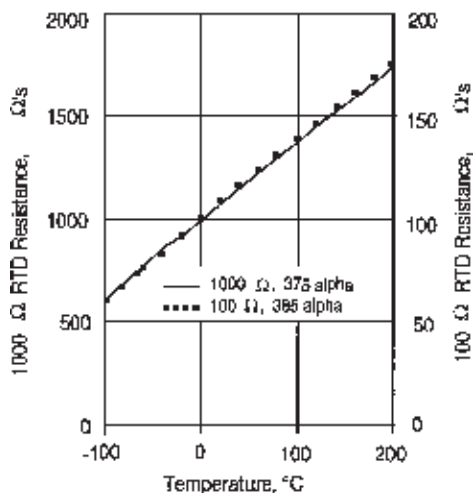
Both $\beta = 0$ and $C = 0$ for $T > 0^{\circ}\text{C}$

ACCURACY VS TEMPERATURE

Tolerance	Standard $\pm 0.2\%$		Optional $\pm 0.1\%$		
	Temperature ($^{\circ}\text{C}$)	$\pm \Delta R^*$ (Ω)	$\pm \Delta T$ ($^{\circ}\text{C}$)	$\pm \Delta R^*$ (Ω)	$\pm \Delta T$ ($^{\circ}\text{C}$)
	-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 Ω RTD. Divide ΔR by 10 for 100 Ω RTD.

RESISTANCE VS TEMPERATURE CURVE



SPECIFICATIONS

Sensor Type	Thin film platinum RTD: $R_0 = 1000 \Omega @ 0^{\circ}\text{C}$; $\alpha = 0.00375 \Omega/\Omega/^{\circ}\text{C}$ $R_0 = 100 \Omega @ 0^{\circ}\text{C}$; $\alpha = 0.00385 \Omega/\Omega/^{\circ}\text{C}$
Temperature Range	-55° to $+150^{\circ}\text{C}$ (-67° to $+302^{\circ}\text{F}$)
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 $\pm 0.3^{\circ}\text{C}$ 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°C or $100 \pm 0.2 \Omega$ ($\pm 0.2\%$) @ 0°C $1000 \pm 1 \Omega$ ($\pm 0.1\%$) @ 0°C or $100 \pm 0.2 \Omega$ ($\pm 0.2\%$) @ 0°C (optional)
Linearity	$\pm 0.15\%$ of full scale for temperatures spanning -55° to 150°C
Time Constant	<10 sec. in air at 10 ft./sec.
Operating Current	1 mA maximum in still air for $<0.3^{\circ}\text{C}$ (0.5°F) self heating
Stability	$<0.05^{\circ}\text{C}$ per 5 years in occupied environments
Self Heating	
HEL-775-A	9.7mW/ $^{\circ}\text{C}$ nominal in air at 10ft/sec, 4.3mW/ $^{\circ}\text{C}$ nominal in enclosed still air
HEL-775-B	6.8mW/ $^{\circ}\text{C}$ nominal in air at 10ft/sec, 3.0mW/ $^{\circ}\text{C}$ nominal in enclosed still air
Insulation Resistance	$>50 \text{ M}\Omega @ 50 \text{ VDC @ } 25^{\circ}\text{C}$
Construction	Alumina substrate with epoxy protection
Lead Material	Phosphor bronze with bright tin lead 60/40 plating
Lead Configuration	2-wire