Thin Film Platinum RTDs, HEL-700 Series

Table 1. Specifications

Characteristic	Condition	Parameter
Alpha: R_0 = 1000 Ω R_0 = 100 Ω	0 °C	 0.00375 Ω/Ω/°C 0.00385 Ω/Ω/°C
Temperature range: TFE Teflon fiberglass	—	 -70 °C to 260 °C [-94 °F to 500 °F] -75 °C to 540 °C [-100 °F to 1000 °F]
Temperature accuracy: R_0 ±0.2% trim (standard) R_0 ±0.1% trim (optional)	—	 ±0.5°C or 0.8% of temperature, whichever is greater ±0.3°C or 0.6% of temperature, whichever is greater
Base resistance and interchangeability, R_0 ±ΔR_0: R_0 ±0.2% trim (standard) R_0 ±0.1% trim (optional)	0 °C	 1000 Ω ±2 Ω 1000 Ω ±1 Ω
Linearity: -40 °C to 125 °C -75 °C to 540 °C	—	 ±0.1% of full scale ±2.0% of full scale
Time constant	water at 3 ft/s still water	<0.5 s for 0.086 in O.D. <1.0 s for 0.086 in O.D.
Operating current	—	2 mA max. minimal self heating errors of 1 °C; 1 mA recommended
Stability	occupied environments	<0.25 °C /year; 0.05 °C /5 years
Self heating	—	<15 mW/°C typ. for 0.086 in O.D.
Insulation resistance	50 Vdc at 25 °C	>50 MΩ
Construction/material: case Teflon®-insulated leads fiberglass-insulated leads	—	 high purity alumina nickel-coated stranded copper, epoxy potting nickel-coated stranded copper, ceramic potting

Table 2. Constant Values (β = 0 and C = 0 for T > 0 °C)

Constant	1000 Ω	100 Ω
Alpha α (°C^{-1})	0.00375 ±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})	3.81 x 10^{-3}	3.908 x 10^{-3}
B (°C^{-2})	-6.02 x 10^{-7}	-5.775 x 10^{-7}
C (°C^{-4})	-6.0 x 10^{-12}	-4.183 x 10^{-12}

Functional Behavior

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

Where:
R_T = Resistance (Ω) at temperature T (°C)
R_0 = Resistance (Ω) at 0 °C
T = Temperature (°C)

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

CAUTION

PRODUCT DAMAGE

- Ensure proper ESD (Electrostatic Discharge) precautions are followed when handling this product.

Failure to comply with these instructions may result in product damage.

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Table 3. Accuracy vs Temperature

Temperature (°C)	Tolerance			
	Standard Trim (±0.2%)		Optional Trim (±0.1%)	
	±ΔR[1] (Ω)	±ΔT (°C)	±ΔR[1] (Ω)	±ΔT (°C)
-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

[1]1000 Ω RTD. Divide Δ by 10 for 100 Ω RTD.

Table 4. NIST Calibration

Temperature (°C)	Standard Temperature Point (±ΔT (°C))		
	1	2	3
-100	0.5	0.27	0.15
0	0.03	0.03	0.03
100	0.4	0.11	0.07
200	0.8	0.02	0.08
300	1.2	0.33	6.2
400	1.6	0.5	8.3
500	2.0	0.8	9.6
600	2.6	1.2	10.4

[1]NIST-traceable calibration provides resistance readings at 1, 2 or 3 standard temperature points to yield a resistance versus temperature curve with 10x better accuracy.

Figure 1. Resistance vs Temperature

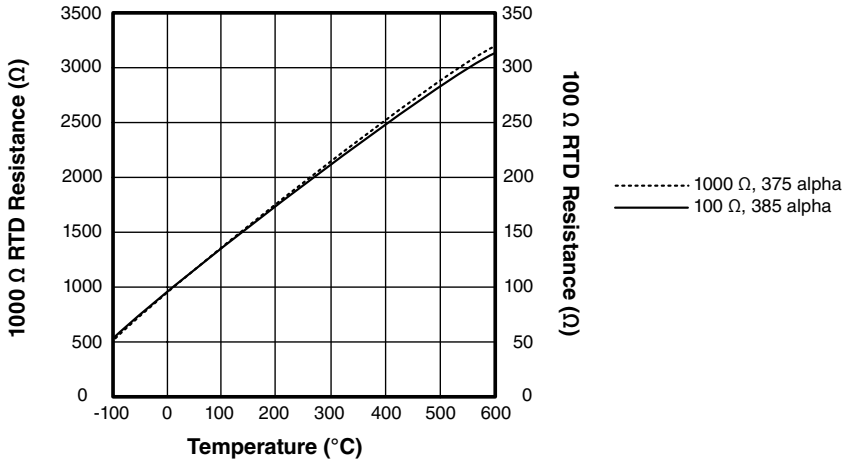

Figure 2. Nomenclature and Ordering Guide

For example, a **HEL-705-U-0-12-C1** part number defines an HEL-700 Series Thin Film RTD with two, 28 gauge TFE Teflon® insulted leadwires, an alpha of 1000 Ω: 0.00375 Ω/Ω/°C, a standard ±0.2% trim resistance, 12 inch leadwires, and a NIST calibration report at 0 °C.

HEL- Product Series

HEL-700 Series Thin Film Platinum RTDs

705- Leadwire Insulation Material, Gauge and Number

705	TFE Teflon®, 28 gauge; 1000 Ω: 2-wire, 100 Ω: 2-wire
707	fiberglass, 28 gauge; 1000 Ω: 2-wire, 100 Ω: 2-wire
711	TFE Teflon®, 28 gauge; 1000 Ω: 2-wire, 100 Ω: 3-wire
712	fiberglass, 28 gauge; 1000 Ω: 2-wire, 100 Ω: 3-wire
716	TFE Teflon®, 24 gauge; 1000 Ω: 2-wire, 100 Ω: 3-wire
717	fiberglass, 24 gauge; 1000 Ω: 2-wire, 100 Ω: 3-wire

U- Resistance and Alpha

U	1000 Ω: 0.00375 Ω/Ω/°C
T	100 Ω: 0.00385 Ω/Ω/°C (DIN Standard)

0- Resistance Trim

0	Standard: ±0.2%
1	Optional: ±0.1%

12- Leadwire Length

12	12 inches

C1 NIST Calibration Report

00	none
C1	at 0 °C
C2	at 0 °C and 100 °C
C3	at 0 °C, 100 °C and 260 °C