

ControlWave[®] Micro Resistance Temperature Detector Module and Thermocouple Module

The Resistance Temperature Detector (RTD) module and the Thermocouple (TC) module allow the ControlWave[®] Micro to accurately monitor a wide range of temperature sensors.

RTD Module

The RTD module monitors the temperature signal from an RTD sensor within a fixed range. The RTD module provides four channels for measuring the resistance of 2-wire, 3-wire, or 4-wire 100-ohm platinum RTD sensors. The RTD module determines the RTD type (2, 3, or 4-wire) by the position of a jumper on the terminal block.

The RTD module consists of an isolated RTD printed circuit board with two 10-point terminal blocks (for local termination) or two 14-pin mass termination header blocks (for remote termination) and a module cover.

For more information on remote terminations, refer to *Product Data Sheet CWMICRO*.

Each channel contains signal conditioning circuitry, a 24-bit Analog to Digital Converter (ADC), and opto-isolation circuitry. Each channel provides electrical isolation of 500 Vdc (channel to channel/system bus) and surge protection.



RTD Module



TC Module

TC Module

The TC module (also referred to as the Low-Level Analog Input or LLAI module) provides six individually isolated differential inputs for thermocouples or ± 10 mV inputs, plus one prewired cold junction compensation (CJC) input for temperature compensation at the terminal block.

The TC module consists of an isolated printed circuit board with two 10-point terminal blocks (for local termination) or two 14-pin mass termination header blocks (for remote termination), and a module cover.

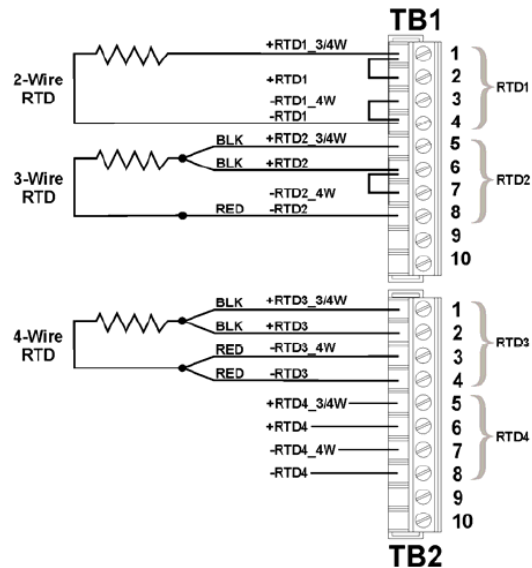
For more information on remote terminations, refer to *Product Data Sheet CWMICRO*.

Each channel contains signal conditioning circuitry, a 24-bit Analog to Digital Converter (ADC), and opto-isolation circuitry. Each channel provides electrical isolation of 500 Vdc (channel to channel/system bus) and surge protection.

The module provides CJC at the terminal block with a factory installed CJC board and built-in RTD sensor. The CJC board is factory installed on local or remote terminal blocks and is electrically isolated.

RTD Module

Field Wiring Terminals



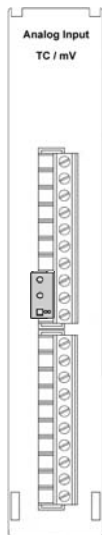
Input

Quantity	4	
Type	100 ohm platinum DIN 43760 alpha = 0.00385	
Input Configuration	2, 3, or 4 platinum wire RTD	
Voltage Input Impedance	9.8 kΩ	
Input Current	330 μA	
Bus Access	8 bits wide	
Input Common Mode Range	500 Vdc to chassis or other channels	
Electrical Isolation	500 Vdc channel to channel/system bus	
Surge Suppression	12 Vdc transorb across input. Meets IEEE 472-1978.	
Common Mode Rejection	120 dB	
Normal Mode Rejection	80 dB	
Channel Data Acquisition	50 μs	
Conversion Time (all four inputs)	3-wire	266 ms
	4-wire	200 ms
Resolution	16-bit	
Input Temperature Ranges	-200°C to +850°C (-328°F to +1562°F)	
Absolute Accuracy at 25 °C (77 °F)	Process Temperature Range -200 °C to -80 °C (-328 °F to -112 °F)	±2.5 °C (4.5 °F)
	Process Temperature Range -80 °C to 850 °C (-112 °F to 1562 °F)	±0.5 °C (0.9 °F)

Absolute Accuracy Over Operating Temperature Range -20°C to 70°C (-4°F to 158°F)	Process Temperature Range -200°C to -80°C (-328°F to -112°F)	±3.0°C (5.4°F)
	Process Temperature Range -80°C to 850°C (-112°F to 1562°F)	±1.0°C (1.8°F)
Power		
Consumption	4 Inputs	0.6 W
Physical		
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)	
Weight	142 g (5 oz)	
Terminations	Local	Two 10-point terminal block assemblies
	Remote	Two 14-pin mass termination headers
Wiring	Up to size 14 AWG at the removable terminal blocks.	
Environmental		
Same as the ControlWave Micro in which it is installed		
Approvals		
Same as the ControlWave Micro in which it is installed		

ControlWave Micro TC Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Positive Input 1
2	Negative Input 1
3	Positive Input 2
4	Negative Input 2
5	Positive Input 3
6	Negative Input 3
7	Not Used
8	CJC Positive (prewired)
9	CJC Positive (prewired)
10	CJC Negative (prewired)

Terminal Block 2	Definition
1	Positive Input 4
2	Negative Input 4
3	Positive Input 5
4	Negative Input 5
5	Positive Input 6
6	Negative Input 6
7	Not Used
8	Not Used
9	Not Used
10	Not Used

Input	
Quantity	6 channels
Type	Differential
Input Configuration	+/- 10 mV or Thermocouple: B, C, E, J, K, N, R, S, and T

Voltage Input Impedance	10 M Ω	
Input Current	75 nA max	
Bus Access	8 bits wide	
Input Common Mode Range	500 Vdc to chassis and channel to channel	
Electrical Isolation	500 Vdc channel to channel/system bus	
Surge Suppression	180 Vrms MOV meets IEEE 472-1978	
Common Mode Rejection	120 dB	
Normal Mode Rejection	80 dB	
Overvoltage Protection	120 Vdc/Vac	
Channel Data Acquisition	50 ms	
Conversion Time	66 ms	
Absolute Accuracy at 25 °C (77 °F) / Over Operating Temp	± 10 mV Input	$\pm 0.025\%$ / $\pm 0.05\%$
	Thermocouple Type B	Process Temperature Range 100 °C to 200 °C (212 °F to 392 °F) ± 8 °C / ± 16 °C
		Process Temperature Range 200 °C to 390 °C (392 °F to 734 °F) ± 4 °C / ± 8 °C
		Process Temperature Range 390 °C to 840 °C (734 °F to 1544 °F) ± 2 °C / ± 4 °C
		Process Temperature Range 840 °C to 1820 °C (1544 °F to 3308 °F) ± 1 °C / ± 2 °C
	Thermocouple Type C	Process Temperature Range 0 °C to 2315 °C (32 °F to -4199 °F) ± 0.75 °C / ± 1.5 °C
	Thermocouple Type E	Process Temperature Range -270 °C to -260 °C (-454 °F to -436 °F) ± 3 °C / ± 6 °C
		Process Temperature Range -260 °C to -225 °C (-436 °F to -373 °F) ± 1 °C / ± 2 °C
		Process Temperature Range -225 °C to -200 °C (-373 °F to -328 °F) ± 0.75 °C / ± 1.5 °C
		Process Temperature Range -200 °C to 1000 °C (-328 °F to 1832 °F) ± 0.5 °C / ± 1 °C
	Thermocouple Type J	Process Temperature Range -210 °C to 190 °C (-346 °F to 374 °F) ± 0.75 °C / ± 1.5 °C
		Process Temperature Range 190 °C to 1200 °C (374 °F to 2192 °F) ± 0.5 °C / ± 1 °C
	Thermocouple Type K	Process Temperature Range -270 °C to -260 °C (-454 °F to -436 °F) ± 5 °C / ± 10 °C
		Process Temperature Range -260 °C to -245 °C (-436 °F to -409 °F) ± 2 °C / ± 4 °C
		Process Temperature Range -245 °C to -180 °C (-409 °F to -292 °F) ± 1 °C / ± 2 °C

		Process Temperature Range -180 °C to -145 °C (-292 °F to -229 °F)	±0.75 °C / ±1.5 °C
		Process Temperature Range -145 °C to 1372 °C (-229 °F to -2501 °F)	±0.5 °C / ±1 °C
Thermocouple Type N		Process Temperature Range -270 °C to -260 °C (-454 °F to -436 °F)	±8 °C / ±10 °C
		Process Temperature Range -260 °C to -250 °C (-436 °F to -418 °F)	±4 °C / ±4 °C
		Process Temperature Range -250 °C to -230 °C (-418 °F to -382 °F)	±2 °C / ±2 °C
		Process Temperature Range -230 °C to -150 °C (-382 °F to -238 °F)	±1 °C / ±1.5 °C
		Process Temperature Range -150 °C to 1300 °C (-238 °F to 2372 °F)	±0.5 °C / ±1 °C
	Thermocouple Type R		Process Temperature Range -50 °C to 50 °C (-58 °F to 122 °F)
		Process Temperature Range 50 °C to 1720 °C (122 °F to 3128 °F)	±1 °C / ±2 °C
Thermocouple Type S		Process Temperature Range -50 °C to 50 °C (-58 °F to 122 °F)	±2 °C / ±4 °C
		Process Temperature Range 50 °C to 1760 °C (122 °F to 3200 °F)	±1 °C / ±2 °C
Thermocouple Type T		Process Temperature Range -270 °C to -260 °C (-454 °F to -436 °F)	±4 °C / ±8 °C
		Process Temperature Range -260 °C to -250 °C (-436 °F to -418 °F)	±2 °C / ±4 °C
		Process Temperature Range -250 °C to -180 °C (-418 °F to -292 °F)	±1 °C / ±4 °C
		Process Temperature Range -180 °C to -135 °C (-292 °F to -211 °F)	±0.75 °C / ±1.5 °C
		Process Temperature Range -135 °C to 400 °C (-211 °F to 752 °F)	±0.5 °C / ±1 °C

Cold Junction Compensation

RTD Error with Cold Junction Compensation at 25 °C (77 °F)	Thermocouple Type B	Process Temperature Range 100 °C to 1820 °C (212 °F to 3308 °F)	±0.3 °C
	Thermocouple Type C	Process Temperature Range 0 °C to 2315 °C (32 °F to 4199 °F)	±0.3 °C
	Thermocouple Type E	Process Temperature Range -270 °C to -260 °C	±10 °C
		Process Temperature Range -260 °C to -245 °C	±3 °C
		Process Temperature Range -244 °C to -200 °C	±1.5 °C
		Process Temperature Range -200 °C to -87 °C	±0.75 °C

	Process Temperature Range -86 °C to 25 °C	±0.39 °C
	Process Temperature Range 25 °C to 1000 °C	±0.3 °C
Thermocouple Type J	Process Temperature Range -210 °C to -111 °C	±0.8 °C
	Process Temperature Range -110 °C to 25 °C	±0.4 °C
	Process Temperature Range 190 °C to 1200 °C	±0.3 °C
Thermocouple Type K	Process Temperature Range -270 °C to -261 °C	±15 °C
	Process Temperature Range -260 °C to -247 °C	±4.5 °C
	Process Temperature Range -246 °C to -261 °C	±20.5 °C
	Process Temperature Range -270 °C to -221 °C	±2.2 °C
	Process Temperature Range -220 °C to -160 °C	±1.1 °C
	Process Temperature Range -159 °C to 25 °C	±0.55 °C
	Process Temperature Range 25 °C to 1372 °C	±0.3 °C
Thermocouple Type N	Process Temperature Range -270 °C to -261 °C	±20.5 °C
	Process Temperature Range -260 °C to -250 °C	±5.0 °C
	Process Temperature Range -250 °C to -231 °C	±2.7 °C
	Process Temperature Range -230 °C to -189 °C	±1.4 °C
	Process Temperature Range -188 °C to -71 °C	±0.7 °C
	Process Temperature Range -71 °C to -25 °C	±0.35 °C
	Process Temperature Range -25 °C to -1300 °C	±0.3 °C
Thermocouple Type R	Process Temperature Range -50 °C to 50 °C (-58 °F to 122 °F)	±0.49 °C
	Process Temperature Range 50 °C to 1720 °C (122 °F to 3128 °F)	±0.3 °C
Thermocouple Type S	Process Temperature Range -50 °C to 50 °C (-58 °F to 122 °F)	±0.45 °C
	Process Temperature Range 50 °C to 1760 °C (122 °F to 3200 °F)	±0.3 °C

Thermocouple Type T	Process Temperature Range -270 °C to -261 °C	±10.3 °C
	Process Temperature Range -260 °C to -243 °C	±3 °C
	Process Temperature Range -242 °C to -196 °C	±1.5 °C
	Process Temperature Range -195 °C to -61 °C	±0.75 °C
	Process Temperature Range -60 °C to 25 °C	0.375 °C
	Process Temperature Range 25 °C to 400 °C	±0.3 °C

Open Circuit Detection

Yes

Power

Consumption 0.96 W

Physical

Dimensions 152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L).

Weight 142 g (5 oz)

Terminations	Local	Two 10-point terminal block assemblies
	Remote	Two 14-pin mass termination headers

Wiring Up to size 14 AWG at the removable terminal blocks.

Environmental

Same as the ControlWave Micro in which it is installed.

Approvals

Same as the ControlWave Micro in which it is installed.

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