

MINCO

CT325 TEMPERATURE CONTROLLER INSTALLATION AND OPERATING INSTRUCTIONS



- ◆ Heat items with up to 240 watts
- ◆ DC only – Up to 60 VDC
- ◆ Signals to display, on your voltmeter, the set point and actual temperatures in °C
- ◆ Heat an item to boiling temperature or just heat it to body temperature
- ◆ Quiet, solid-state reliability

Why pay more for a controller with a digital display which is not used after installation?

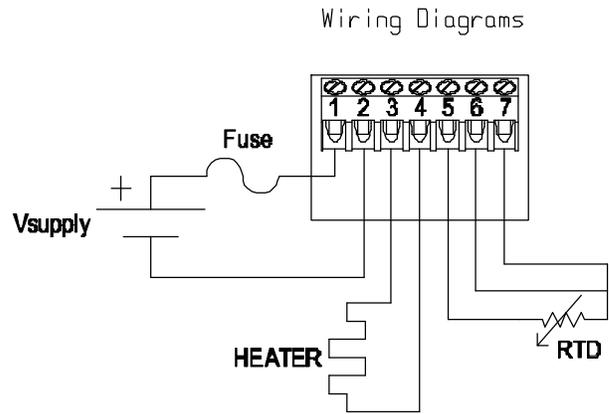
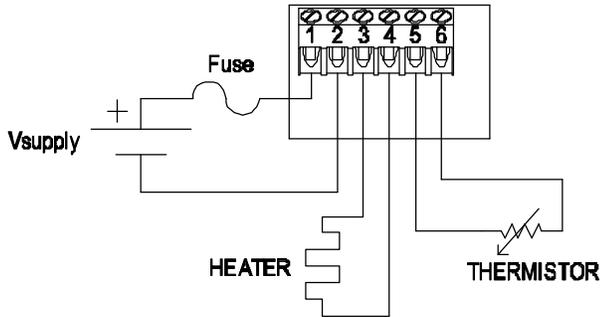
The temperature which the sensor sees is turned into a voltage signal. Simply connect a voltmeter to the test pins to read the actual temperature and the set point temperature.

The CT325 is an ON/OFF temperature controller. The resistance of a temperature sensor is compared to the setting of the setpoint potentiometer. When the temperature is below setpoint, the solid-state output transistor switches the heat on. At temperatures above setpoint, the output transistor is turned off, and there is no heating. The “Heat LED” light is on when the heater is on.

Installation:

Locate the CT325 near the sensor and heater, in a location away from heavy dust and condensation. The ambient temperature range must be between -40 and 70 °C (-40 and 158 °F). Mount with a #6 machine or #8 self-tapping screw.

Power: Wire the CT325 as shown below, observing the +/- polarity of the power supply. Add a fuse that is sized to protect your heater load. A separate thermostat may be used for added protection. Maximum DC supply voltage is either 7.5 or 60 VDC depending on the CT325 being used.



Sensor:

Thermistor – Wire as at left.

3-wire RTD – Wire as at right. The controller will compensate for the resistance in the leadwires going to the RTD. For a 3-wire RTD, the two common wires are usually of the same color and they go to terminals 6 and 7. You can identify the common wires because their measured resistance will be only a few tenths of an ohm.

2-wire RTD - Connect the 2-wire RTD to terminals 5 & 6 and jumper terminal 6 to 7. To determine the amount of error due to lead resistance use the following formula: $\text{Error}(\text{°C}) = (D \times R_L \times 2) / \Delta R_{\text{RTD}}$

Where D = Distance between RTD and CT325

R_L = Resistance of leadwire per foot

ΔR_{RTD} = Nominal change in resistance of RTD per °C (.385 Ω for PD, 3.85 Ω for PF)

Extension wires – To locate the RTD farther away, add 3 extension wires, using wire of the same gauge, from the same spool, and make the length of all wires identical. To extend wires for RTD's having only two wires, using the same guidelines, run three wires out to the two leadwires from the RTD.

Temperature sensor resistances:

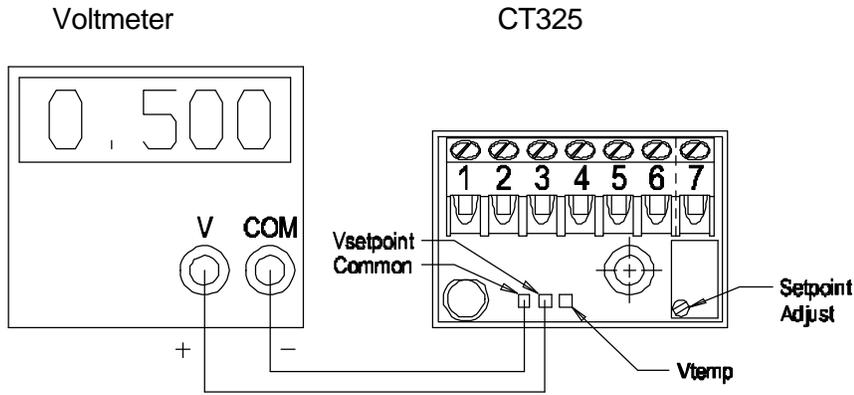
	0°C	10°C	20°C	25°C	30°C	40°C	50°C
	32°F	50°F	68°F	77°F	86°F	104°F	122°F
PD (Ω)	100.00	103.90	107.79	109.74	111.67	115.54	119.40
PF (Ω)	1000.0	1039.3	1077.9	1097.4	1116.7	1155.4	1194.0
TF (Ω)	155,600	97,490	62,240	50,000	40,350	26,640	17,940

	60°C	65°C	70°C	75°C	80°C	90°C	100°C
	140°F	149°F	158°F	167°F	176°F	194°F	212°F
PD (Ω)	123.24	125.16	127.08	128.99	130.90	134.71	138.51
PF (Ω)	1232.4	1251.6	1270.8	1289.9	1309.0	1347.1	1385.1
TF (Ω)	12,310	10,270	8,604	7,239	6,117	4,428	3,256

	110°C	120°C	130°C	140°C	150°C	160°C	170°C
	230°F	248°F	266°F	284°F	302°F	320°F	338°F
PD (Ω)	142.29	146.07	149.83	153.58	157.33	161.05	164.77
PF (Ω)	1422.93	1460.68	1498.32	1535.84	1573.25	1610.54	1647.72
TF (Ω)	2,429	1,836					

	180°C	190°C	200°C
	356°F	374°F	392°F
PD (Ω)	168.48	172.17	175.86
PF (Ω)	1684.78	1721.73	1758.56
TF (Ω)			

Operation:



50.0°C set point is shown.

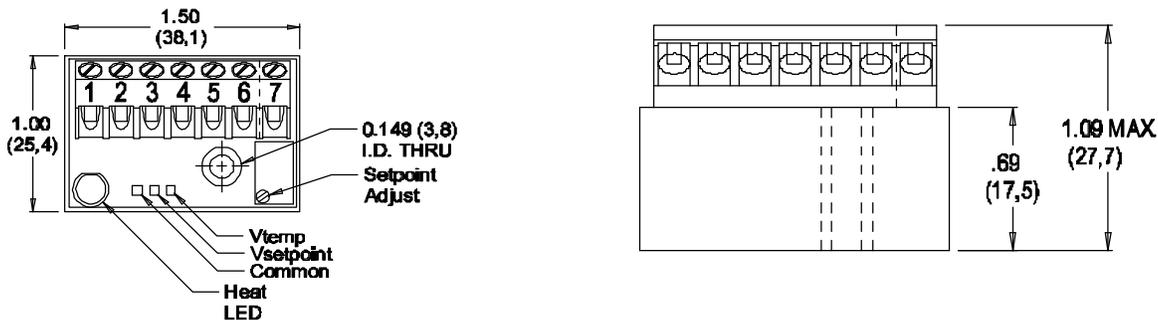
Adjust Setpoint:

1. Connect voltmeter as shown above.
2. Turn the Setpoint Adjust screw until the voltmeter displays the setpoint temperature you want, simply shifting the decimal point on your voltmeter reading. In the example drawn above, the voltmeter reading of 0.500 volts means 50.0°C. To raise the temperature turn the adjustment screw clockwise.

Reading temperature of sensor:

1. Connect voltmeter as shown above except move the positive voltmeter lead to the Vtemp pin of the CT325.
2. The Vtemp pin outputs 0.010 V/°C, exactly the same as the Vsetpoint pin does. For example, if the voltmeter is displaying 0.603 volts, this corresponds to a temperature of 60.3°C.

Dimensions:



Model code:

CT325	Model number: CT325
PD	Sensor type: PD = 100 Ω platinum RTD (2 to 100°C) PF = 1000 Ω platinum RTD (2 to 100°C) TF = 50 kΩ thermistor (25 to 75°C)
1	Power supply: 1 = 4.75 to 10 VDC 2 = 7.50 to 60 VDC
B	Temperature range: A = 25 to 75°C (Thermistor only) B = 2 to 100°C (RTD only) C = 2 to 200°C (RTD only)
5	Deadband: 5 = 0.5°C
CT325PD1B5 ... Sample part number	

Specifications:

Input: 100 ohm or 1000 ohm platinum RTD, 0.00385 ohm/ohm/°C, 2- or 3-leads, or 50kΩ NTC thermistor, 2-lead.

Setpoint range:

2 to 100°C (36 to 212°F) or 2 to 200°C (36 to 392°F) for platinum RTD models.
25 to 75°C (77 to 167°F) for thermistor model.

Consult factory for other ranges.

Setpoint stability: +/- 0.02% of span/°C.

Vtemp signal: 0.010 V/°C over specified range.

Platinum RTD Sensor		Thermistor Sensor	
2°C	0.02V	25°C	0.25V
50°C	0.50V	50°C	0.50V
100°C	1.00V	75°C	0.75V
200°C	2.00V		

Accuracy: ± 1°C 1% of span ± 2% of span

Linearity: ± 0.1% of span ± 2% of span

Deadband: 0.5°C.

Input power: 4.75 to 60 VDC.

Output: Open drain, 4 amps max. DC.

Leadwire compensation (3-wire RTD): ±0.06°C/ohm for 100 ohm or 1000 ohm platinum up to 25 ohms per leg.

Fault protection: Heater disabled on RTD short or thermistor open. No heater protection; external fuse recommended.

Operating ambient temperature range: -40 to 70°C (-40 to 158°F).

Relative humidity: 0 to 95% non-condensing.

Physical: Polycarbonate case, epoxy-sealed. 1 oz. (28g).

Connections: Terminal block for wires AWG 22 to AWG 14.

Mounting: Mounting hole for #6 screw through or #8 thread-forming screw.



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