

|                                                                                   |                                                          |                                        |                                                                                                                 |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  | <b>MODEL 525<br/>FIELD<br/>CALIBRATION<br/>PROCEDURE</b> | DOCUMENT<br>NO.<br><br><b>525-0300</b> | 841 Holt Road Suite 1<br>Webster New York<br>14580<br><br>Business:<br>(585) 872-9350<br>Fax:<br>(585) 872-2638 |
| Created by: L. DeWitt                                                             | DATE: 08-25-05                                           | Sheet 1 of 6                           |                                                                                                                 |

| Rev. | Date     | Appd | BRIEF CHANGE DESCRIPTION |
|------|----------|------|--------------------------|
| A    | 08-25-05 | LBD  | INITIAL RELEASE          |
|      |          |      |                          |
|      |          |      |                          |

### Equipment Needed:

1. Precision OHM Meter with accuracy of 0.0068% at 400Ω.
2. Precision OHM Source with accuracy of 0.0068% at 400Ω.
3. Precision Voltage Meter with an accuracy of 0.0039% at 80.000mV.
4. Precision Voltage Source with an accuracy of 0.0039% at 80.000mV.
5. Precision Thermistor probe with accuracy of  $\pm 0.025^{\circ}\text{C}$  or better (YSI 46046)

OR

6. A stable ice bath or Thermocouple ice point calibrator and a NIST traceable thermocouple wire stable to within  $\pm 0.025^{\circ}\text{C}$ .

Practical Instrument Electronics recommends using a direct junction temperature measurement technique for the most accurate and reliable calibrations of our equipment. This technique uses accurate RTD or thermistor probes to measure the reference junction (cold junction) temperature. While measuring the junction voltage with a DVM and ice bath technique will work. This method is less reliable due to complexity and is generally less accurate due to cumulative errors.

### Precautions:

Avoid touching thermocouple connections, as this will cause temperature errors in calibration. It is recommended that the Model 525 be handled as little as possible during calibration to reduce errors. The heat from your body may cause uneven heating of temperature sensitive components.

### Enabling Calibration:

Place in a fresh battery and allow 15 minutes for the Model 525 to stabilize to the ambient temperature. Remove the EZ-Dial™ Knob, battery cover and the four black Phillips head screws. While holding the Model 525 face down in one hand, carefully separate the top and bottom of the housing. Place the unit into calibration mode by shorting the calibration via located on the bottom right side on the PCB with tweezers and turning the UUT on. Verify the Model 525 is in calibration mode by viewing the bottom center of the LCD for the Firmware Build information.

|                                                                                  |                                                                                |                                                                 |                                                                                                                             |
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| Created by: L. DeWitt                                                            | DATE: 08-25-05                                                                 | Sheet 2 of 6                                                    |                                                                                                                             |

## Source mV Calibration:

Connect the Model 525 (two inner terminals) to a Voltage Meter (See Figure 2).

### LO Calibration:

1. Slide the EZ-Check™ Switch to the LO position indicated by displaying “DIAL TO 0.000 mV” on the bottom of the LCD.
2. Dial the Model 525 so the meter reads 0.000 mV.
3. Press the EZ-Dial™ Knob down.
4. The display will flash “STORE” to confirm that the value was stored.

### HI Calibration:

1. Slide the EZ-Check™ Switch to the HI position indicated by displaying “DIAL TO 80.000 mV” on the bottom of the LCD.
2. Dial the Model 525 so the meter reads 80.000 mV.
3. Press the EZ-Dial™ Knob down.
4. The display will flash “STORE” to confirm that the value was stored.

## Simulate $\Omega$ Calibration:

Switch the Model 525 to Simulate RTD Mode by double-clicking the EZ-Dial™ Knob.  
Connect the Model 525 (two inner terminals) to an OHM Meter in four-wire configuration (See Figure 3).

### LO Calibration:

5. Slide the EZ-Check™ Switch to the LO position indicated by displaying “DIAL TO 0.000  $\Omega$ ” on the bottom of the LCD.
6. Dial the Model 525 so the meter reads 0.000  $\Omega$ .
7. Press the EZ-Dial™ Knob down.
8. The display will flash “STORE” to confirm that the value was stored.

### HI Calibration:

5. Slide the EZ-Check™ Switch to the DIAL position indicated by displaying “DIAL TO MATCH DMM” on the bottom of the LCD and the number 470.000 displayed.
6. Dial the Model 525 so the UUT matches the reading on the DMM.
7. Press the EZ-Dial™ Knob down.
8. The display will flash “STORE” to confirm that the value was stored.

### Middle Calibration:

9. Slide the EZ-Check™ Switch to the HI position indicated by displaying “DIAL TO MATCH DMM” on the bottom of the LCD and the number 015.000 displayed.
10. Dial the Model 525 so the UUT matches the reading on the DMM.
11. Press the EZ-Dial™ Knob down.
12. The display will flash “STORE” to confirm that the value was stored.

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| Created by: L. DeWitt                                                                                                       | DATE: 08-25-05                                           | Sheet 3 of 6                           |                                                                                                                 |

## Read mV Calibration:

Switch the Model 525 into READ Mode.

Connect the Model 525 (two inner terminals) to a DC Voltage Source (See Figure 4).

### LO Calibration:

1. Slide the EZ-Check™ switch to the LO position indicated by displaying “APPLY 0.000 mV” on the bottom of the LCD.
2. Set the voltage source to 0.000 mV.
3. Press the EZ-Dial™ Knob down
4. The display will flash “STORE” to confirm that the value was stored.

### HI Calibration:

1. Slide the EZ-Check™ switch to the HI position indicated by displaying “APPLY 80.000 mV” on the bottom of the LCD.
2. Set the voltage source to 80.000 mV.
3. Press the EZ-Dial™ Knob down
4. The display will flash “STORE” to confirm that the value was stored.

## Read $\Omega$ Calibration:

Switch the Model 525 to Read RTD Mode by double-clicking the EZ-Dial™ Knob.

### LO Calibration:

1. Slide the EZ-Check™ Switch to the LO position indicated by displaying “APPLY 0.000  $\Omega$ ” on the bottom of the LCD.
2. Short all 4 input terminals of the UUT.
3. Press the EZ-Dial™ Knob down.
4. The display will flash “STORE” to confirm that the value was stored. The UUT will then display “Please Wait...” while it automatically takes measurements for 2-wire, 3-wire, and 4-wire. Do not make any changes during this time! Once the UUT has completed the auto-cal, proceed to the next step.

### HI Calibration:

1. Slide the EZ-Check™ Switch to the HI Position indicated by displaying “APPLY 400.000  $\Omega$ ” on the left side of the LCD.
2. Connect a precision 400  $\Omega$  standard resistor to all 4 input terminals (See Figure 5).
3. Press the EZ-Dial™ Knob down.
4. The display will flash “STORE” to confirm that the value was stored. The UUT will then display “Please Wait...” while it automatically takes measurements for 2-wire, 3-wire, and 4-wire. Do not make any changes during this time! Once the UUT has completed the auto-cal, proceed to the next step.

|                                                                                  |                                                                                |                                                                 |                                                                                                                             |
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## **Cold Junction Calibration:**

Double click the EZ-Dial™ Knob to enter the Cold Junction Calibration Mode. Slide the EZ-Check™ Switch to either the HI or LO position. “COLD JUNCTION” will appear on the top of the LCD.

### **Using a Thermistor Probe:**

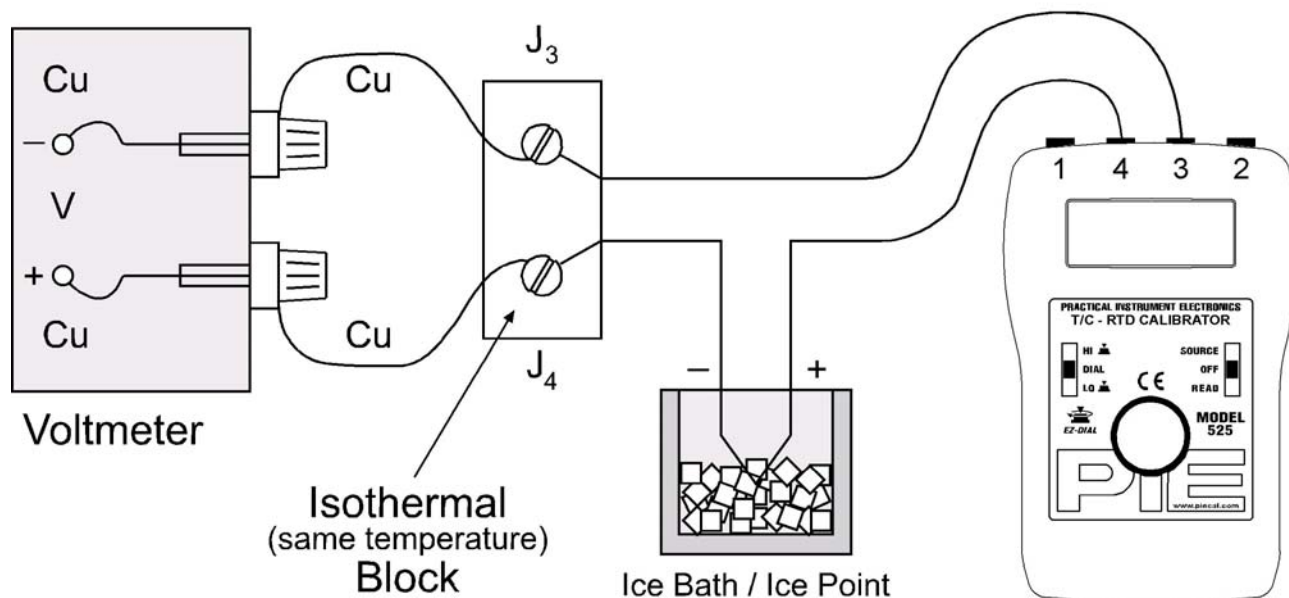
1. Connect the thermistor probe to the brass block marked ‘4W’ (which is thermally-bonded to the temperature sensor and the Omega© connector. (See Figure 6).
2. Connect the other side of the thermistor probe to the OHM meter.
3. Let the temperature settle for 15minutes.
4. Check the Cold Junction Temperature on the top right of the LCD with the temperature reading of the thermistor probe.
5. If the reading is out of specification then dial the EZ-Dial™ to the temperature reading from the thermistor probe.
6. Press the EZ-Dial™ Knob down.
7. The display will flash “STORE” to confirm that the value was stored.
8. Verify the UUT (bottom right side of the LCD) Cold Junction Temperature is tracking with the temperature reading of the thermistor probe. For best results, place the UUT in a draft-free environment, away from air conditioners and/or heaters.

### **Using an Ice Bath or Ice Point Calibrator:**

1. Connect the Model 525 as shown in Figure 1.
2. Let the temperature settle for 15 minutes.
3. Check the Cold Junction Temperature on the top right of the LCD to the voltage reading on the DVM and T/C chart.
4. If the reading is out of Specification then dial the EZ-Dial™ to the correct reading from the DVM and T/C chart.
5. Press the EZ-Dial™ Knob down.
6. The display will flash “STORE” to confirm that the value was stored.
7. Verify the UUT (bottom right side of the LCD) Cold Junction Temperature is tracking with the temperature reading of the DVM and T/C Table

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**Figure 1**



### Completion of Calibration:

Turn the Model 525 OFF. Next time the unit is turned on the Model 525 will be calibrated and in normal operational mode.

|                                                                                  |                                                          |                                        |                                                                                                                 |
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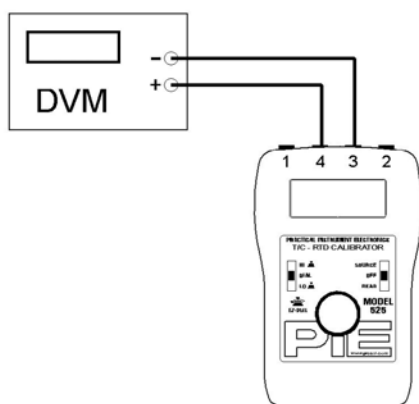


FIGURE 2 (Source mV)

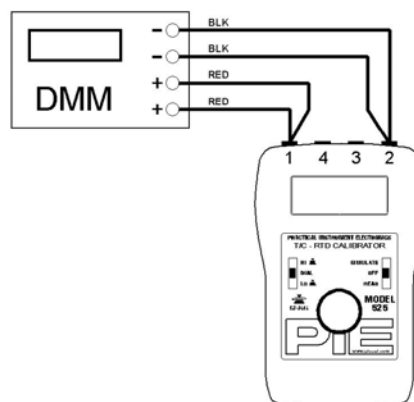


FIGURE 3 (Source OHM)

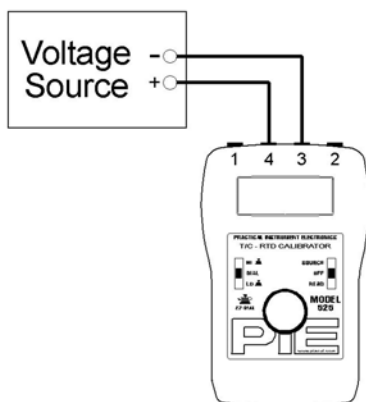


FIGURE 4 (Read mV)

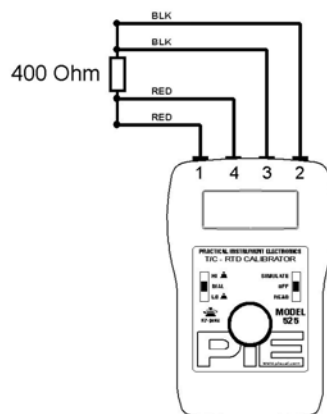


FIGURE 5 (Read OHM)

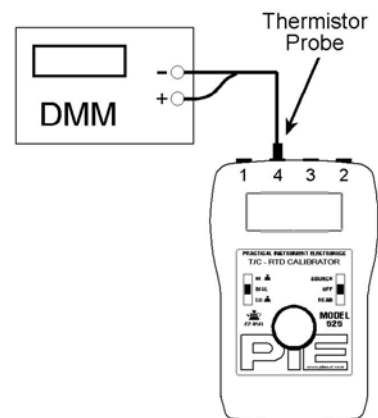


FIGURE 6 (Cold Junction Cal)