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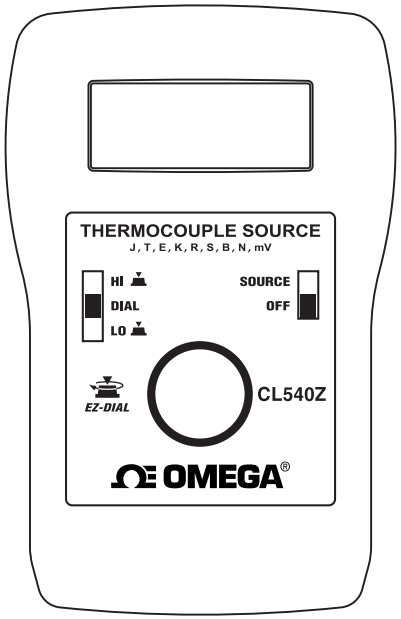
User's Guide



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MADE IN USA

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
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CL540 Field Calibration Procedure Continued

Cold Junction Calibration:

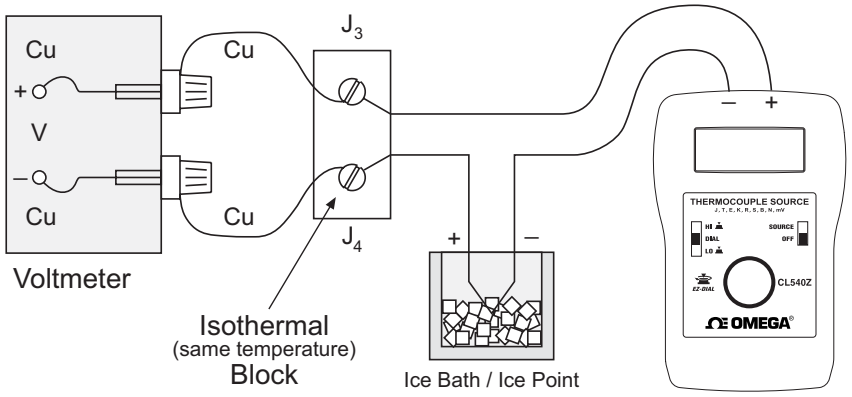
Double click the EZ-Dial knob to enter the Cold Junction Calibration mode. Cal CJ will appear on the top left of the LCD.

1. Connect the Thermistor probe to the + side of the T/C connector.
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 “STORED” to confirm that the value was stored.
8. Verify the UUT (top right side of the LCD) Cold Junction Temperature is tracking with the temperature reading of the Thermistor probe.

If using and ice bath or ice point calibrator to measure the junction voltage with a Voltage meter, follow the steps below.

1. Connect the CL540 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 form the DVM and T/C chart.
5. Press the EZ-Dial Knob down.
6. The display will flash “STORED” to confirm that the value was stored.
7. Verify the UUT (top right side of the LCD) Cold Junction Temperature is tracking with the temperature reading of the DVM and T/C Table.

Figure 1

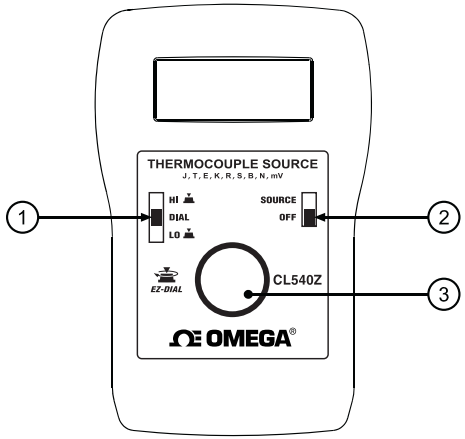


Completion of Calibration:

Turn the CL540 off. Next time the unit is turned on the CL540 will be Calibrated and in normal operational mode.

CL540 Series Operating Instructions

Basic Keypad Operations



① **EZ-Check™ Switch**
Slide the switch to select from three user stored values for the desired calibration points. The User can select HI, DIAL and LO positions. These values can easily be changed to suit the calibration requirements.

② **ON/OFF Switch**
Slide the **ON/OFF Switch** to turn the CL540 on or off.

③ **EZ-Dial™ Knob**
The **EZ-Dial™ Knob** has two adjustment speeds. Simply turning the **EZ-Dial™ Knob** will select fine adjustments. While pressing down and turning the **EZ-Dial™ Knob** will make course adjustments.

*Note: When the **EZ-Check™ Switch** is in the HI or LO position, pressing and holding the **EZ-Dial™ Knob** without turning will store new HI or LO values.*

CL540 Configuration

Instructions for Enabling and Disabling the Configuration Options

1. Turn the CL540 on with the ON/OFF Switch .
2. Press the EZ-Dial Knob while the “PRESS EZ-DIAL KNOB FOR CONFIGURATION” message is displayed.
3. Select options by turning the EZ-Dial Knob until the arrow points to the desired option.
4. The option can be enabled or disabled by pressing the EZ-Dial Knob.

The CL540 configuration menu will exit automatically after 5 seconds of inactivity and go to normal operation with the options selected. These options are recalled at turn on until they are changed again.

PRESS EZ-DIAL KNOB
FOR CONFIGURATION

AUTO OFF ON
DISPLAY UNITS °C
TC TYPE K

CL540 Configuration

CL540 Configuration Menu

Auto Off **ON (default)/OFF**
If Auto Off is ON, the unit will turn off after 30 minutes to save battery life, if there is no user activity. If Auto Off is OFF the unit will stay on until it is turned off from the keypad. This is typically useful for manual loading or continuous use.

Display Units **°C (default)/°F**
Pressing the EZ-Dial™ Knob to toggles between °C or °F

TC **{tc type}**

Model CL540: The T/C type is fixed as ordered from the factory and cannot be changed.

{tc type} is **one** of:
B, E, J, K, N, R, S, T, or mV

Model CL540Z: To change T/C type, press the EZ-Dial™ Knob. Turn the EZ-Dial™ Knob to scroll through the list of available types. Press again to save and return to the configuration menu.

{tc type} is **any** of:
B, E, J, K, N, R, S, T, or mV

EZ-Dial™ Knob

Turning the EZ-Dial™ Knob to adjust the output up or down. Fine adjustments can be made by turning the EZ-Dial™ Knob. Coarse adjustments can be made by pressing and turning the EZ-Dial™. New values can be stored into the HI and LO EZ-Check™ positions by pressing down on the EZ-Dial™ Knob until “STORED” is indicated on the display.

EZ-Check™ Switch

The EZ-Check™ Switch has three positions: HI, DIAL, and LO. Its position is shown at the left edge of the display with "HI" and "LO" indicators. The output is adjustable in all three positions. The EZ-Check™ Switch allows user-selected values to be stored in the HI and LO positions when used in combination with the EZ-Dial™ Knob.

To store new EZ-Check™ value(s):

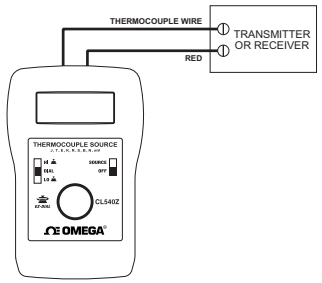
1. Dial the display to match the desired stored outputs for the HI or LO positions.
2. Press down on the EZ-Dial™ Knob until the confirmation message "STORED" appears.
3. Recall the values by moving the switch between HI, DIAL, and LO.

Operational description: When returning to previously set EZ-Check™ positions, the DIAL position always recalls the last output value it was dialed to. The HI and LO positions will recall the last STORED value, NOT the last output value it was last dialed to.

Hint: For faster calibrations, the product has been designed so the position of the switch can be felt. This tactile feature allows continuous monitoring of the device being calibrated without looking back at the CL540 display. This is also useful in poor lighting or under difficult operating conditions.

Connection Diagram

Two Wire Connection to Transmitter



Specifications

General Specifications:

(Unless otherwise indicated all specifications are rated from a nominal 23 °C, 70 % RH for 1 year from calibration)

Temperature Range	-25 to 60 °C (-10 to 140 °F)
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing
	10 % ≤RH ≤70 % (35 to 60 °C), Non-condensing
Size	4.9 X 3.15 X 1.82 inches (125.5 X 80 X 46.2 mm)
Weight	7.2 oz (204 grams)
Battery	9V Alkaline provides 45 hours of continuous use
Miscellaneous	Low battery indication with nominal 1 hour of operation left
	Overload Protected to 60V for 30 seconds or less
	High contrast graphic liquid crystal display with *0.357" (9.07 mm)* high digits

Source Thermocouple Specifications (ITS-90 Curves):

Millivolt Uncertainty	±(0.015% of mV Setting + 0.009 mV)
Temperature Coefficient of mV Source	±0.005mV/°C Ambient
Output Noise	±5µVpp from 0.1 Hz to 10 Hz
Output Impedance	0.2Ω
Cold Junction Uncertainty	±0.25°C (0.5°F)
Cold Junction Sensor Temperature Coefficient	±0.05°/° in ambient temperature (°C or °F)
General Temperature Accuracy	±(0.015% of mV setting + 0.009mV) ± 0.25°C (0.5°F)
Output Dial Adjustment Resolution	0.1°C or °F for Model 521/1°C or °F for Model 520
Span	-13.000 - 80.000 mV
T/C Type B	594 – 1820°C (1101.2 – 3308.0°F)
T/C Type E	-260 - 1000°C (-436.0 – 1832.0°F)
T/C Type J	-210 – 1200°C (-346.0 – 2192.0 °F)
T/C Type K	-245 - 1372°C (-409.0 – 2501.6°F)
T/C Type N	-229 - 1300°C (-380.2 – 2372.0°F)
T/C Type R	24 - 1768°C (75.2 – 3214.4°F)
T/C Type S	21 - 1768°C (69.8 – 3214.4°F)
T/C Type T	-251 - 400°C (-419.8 – 752.0°F)

CL540 Field Calibration Procedure

Suggested Equipment:

1. Precision Voltage Meter with an accuracy of 0.0066% at 80.000mV
2. Precision Thermistor probe with accuracy of ± 0.063°C or better (YSI 46046 ±0.05°C)
   OR
3. A stable ice bath or Thermocouple ice point calibrator and a NIST traceable thermocouple wire stable to within ±0.063°C.

We recommend 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 CL540 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:

Install a fresh battery and allow 15 minutes for the CL540 to stabilize to ambient temperature. Remove the EZ-Dial Knob, battery cover and the four black Phillips head screws. While holding the CL540 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 left side on the PCB with tweezers and turning the UUT on. Verify the CL540 is in Calibration mode by viewing the top Left of the LCD for the word CAL.

Source mV Calibration:

LO Calibration:

1. Connect the CL540 terminals to a Voltage meter.
2. Slide the EZ-Check™ switch to the LO Position indicated by displaying a LO on the left side of the display.
3. Dial the CL540 so the meter reads 0.000 mV.
4. Press the EZ-Dial Knob down.
5. The display will flash "STORED" to confirm that the value was stored.

HI Calibration:

1. Slide the EZ-Check™ switch to the HI Position indicated by displaying a HI on the left side of the display.
2. Dial the CL540 so the meter reads 80.000 mV.
3. Press the EZ-Dial Knob down.
4. The display will flash "STORED" to confirm that the value was stored.