

3 YEAR
WARRANTY

MADE IN
USA



User's Guide



CL540A



CL540ZA

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CL540A and CL540ZA Thermocouple Source



CL540A & CL540ZA

Thermocouple Source

Operating Instructions

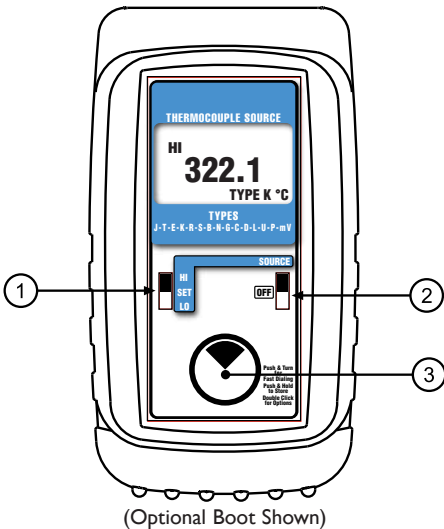


(Shown without optional boot)

Product Description

- **Easy to use**
With the CL540A/CL540ZA you can check & calibrate all your thermocouple instruments.
- **Take it without into the shop, plant or field**
Carry it without worry - protect it with an optional rubber boot and rugged, low profile switches. Easy to operate even in the dark areas of the plant with the backlit display.
- **Calibrate directly in temperature (°C & °F)**
Stop carrying around a millivolt source and thermocouple tables. The PIECAL CL540A/CL540ZA works with the thermocouples you use including types J, T, E, K, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) and Platinel II. Easily set any value quickly to within 0.1° with the adjustable digital potentiometer "DIAL" plus store any three temperatures for instant recall with the HI/SET/LO switch.
- **Compatible with all process instruments**
Connect directly to the thermocouple inputs of smart transmitters, PLCs, DCS and multichannel recorders and verify their outputs or displays.

Basic Operation



① HI/SET/LO SWITCH

SOURCE: Instantly output two preset thermocouple temperatures by moving the HI/SET/LO switch to the "LO" position or "HI" position. For fast three point checks select the "DIAL" position. The Omega CL540A/CL540ZA will remember the last "DIAL" value, even with the power off.

These values can easily be changed to suit the calibration requirements. The temperatures stored in the HI and LO positions are also used for Auto Stepping.

② SOURCE/OFF Switch

Select "SOURCE" to output in °C, °F, or millivolts.

③ KNOB

SOURCE: Turn the knob to adjust the output level. Turn clockwise to increase the output, counter clockwise to decrease the output in 0.1° steps at a time. Push down and turn the knob for faster dialing.

Press and hold the knob for two seconds to store desired HI/LO points in SOURCE mode.

Double click the knob to get into the Omega CL540A/CL540ZA Configuration Mode. Use configuration to select °C or °F, T/C Type (CL540ZA Only) and Auto Off On/Off.

CHANGING BATTERIES

Low battery is indicated by "BAT" on the display. Approximately one to four hours of typical operation remain before the CL540A/CL540ZA will automatically turn off. To change the batteries; remove the optional rubber boot, remove the battery door from the back of the unit by sliding the door downward. This allows access to the battery compartment. Replace with four (4) "AA" 1.5V batteries being careful to check the polarity. Replace the battery door and replace the boot. All stored configuration options (T/C Type, HI/SET/LO Memories, etc., are reset to factory settings when the batteries are removed.

Note: Alkaline batteries are supplied and recommended for maximum battery life and performance.

Configuration

Configure the Calibrator

Move ② POWER SWITCH to “SOURCE” or “READ”.

MODEL 54#B V#.##
DOUBLE CLICK
EZ-DIAL KNOB
FOR CONFIGURATION

Setup

Double click the ③ DIAL KNOB at any time the unit is on and the following displays will appear for 15 seconds:

| | |
|------------|----|
| > EXIT | 15 |
| TEMP UNITS | °C |
| T/C | K |
| AUTO OFF | ON |

Turn the ③ DIAL KNOB to move through the menu. Press the ③ DIAL KNOB to toggle between OFF and ON or to scroll through the settings.

EXIT MENU - exits this menu immediately and saves any changes. Menu will automatically exit after 15 seconds of inactivity (countdown timer is displayed).

TEMP UNITS - pressing the knob will toggle between °C and °F.

T/C -

CL540A: pressing the knob will toggle between the factory configured T/C Type and mV.

CL540ZA: pressing the knob will cycle through T/C types J, T, E, K, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN), Platinel II and mV.

AUTO OFF - If AUTO OFF is ON, the unit will turn off after 30 minutes of inactivity to save battery life. If AUTO OFF is OFF the unit will stay on until the POWER SWITCH is moved to the off position.

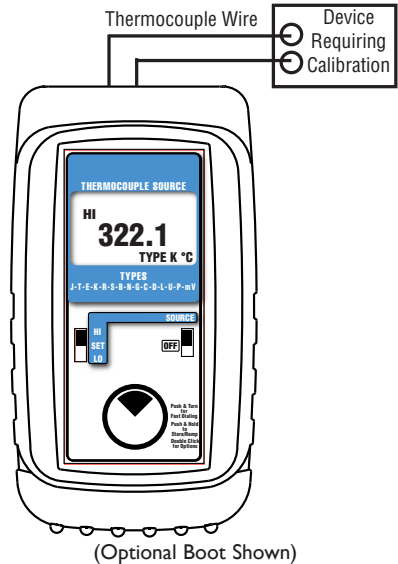
Note: All settings are remembered even with the power off. Removing the batteries resets the values to factory defaults.

Connections

Simulating thermocouples requires the use of thermocouple or extension grade thermocouple wire.

Plug thermocouple wires into the female miniature thermocouple connector mounted in the top end of the housing.

The CL540A/CL540ZA has two banana jacks mounted in the top end of the housing. These are not temperature compensated and are to be used only for millivolt signals.



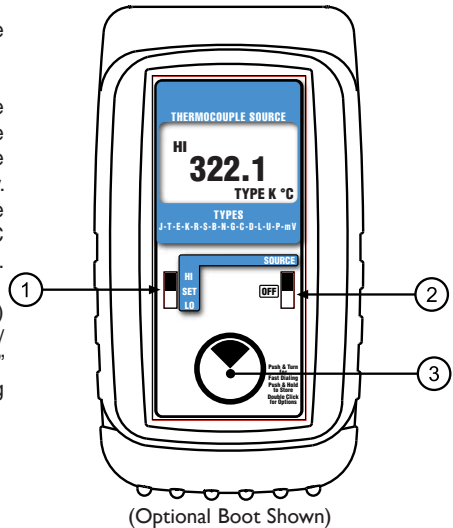
Sourcing Thermocouple

SOURCE

Choose this function to provide a simulated thermocouple signal into controllers, temperature transmitters, indicators or any input devices that measure thermocouple sensors..

- 1) Disconnect the thermocouple sensor from the device to be calibrated.
- 2) Select “**SOURCE**” with slide switch ②.
- 3) Connect a thermocouple wire (matching the type of wire to sensor being simulated) with miniature male T/C connector to the inputs of the device being calibrated, making sure to check polarity. Millivolt outputs (without cold junction) may be connected with a copper (white) miniature T/C connector or the banana jacks with copper wire.

The output is adjusted in 0.1° (or 0.001 mV) increments by turning the knob ③ while the HI/SET/LO switch ① is in the “HI”, “LO” or “SET” position. Press and turn the knob for faster dialing with 10° (or 0.100) increments.



Storing HI/SET/LO Outputs

STORING HI and LO Outputs

Choose this function to provide a simulated thermocouple signal into controllers, temperature transmitters, indicators or any other input device that measure thermocouple sensors..

- 1) Store your high (SPAN) output temperature by moving the HI/SET/LO switch to the **HI** position and turn the ③ EZ-Dial knob until the desired temperature is on the display. Press and hold the knob until **STORED** appears to store the value. Release the knob.
- 2) Store your low (ZERO) output temperature by moving the HI/SET/LO switch to the **LO** position and turn the ③ knob until the desired temperature is on the display. Press and hold the knob until **STORED** appears to store the value. Release the knob.
- 3) Instantly output your SPAN and ZERO temperature outputs by moving the HI/SET/LO switch between HI and LO. You may also select any third temperature output (such as mid-range) using the SET position on the HI/SET/LO switch.

Specifications

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

| General | |
|--|---|
| Accuracy | $\pm(0.015\% \text{ of Reading} + 0.009 \text{ mV})$ |
| Cold Junction Compensation | $\pm 0.45^\circ\text{F} (\pm 0.25^\circ\text{C})$ |
| Millivolt Range | -13.000 to 80.000 mV |
| Operating Temperature Range | -25 to 60 °C (-10 to 140 °F) |
| Temperature Drift | $\leq 50 \text{ ppm of range (includes mV and Cold Junction)}$ |
| Relative Humidity Range | 10 % \leq RH \leq 90 % (0 to 35 °C), Non-condensing 10 % \leq RH \leq 70 % (35 to 60 °C), Non-condensing |
| Size With Boot | 4.96 x 2.73 x 1.79 inches, 126 x 69 x 45 mm (L x W x H) 5.67 x 3.06 x 2.05 inches, 144 x 78 x 52 mm (L x W x H) |
| Weight With Boot | 8.4 ounces, 0.24 kg (including batteries) 11 ounces, 0.32 kg (including batteries) |
| Batteries | Four "AA" Alkaline 1.5V (LR6) |
| Battery Life | 50 Hours |
| Optional NiMh Rechargeable battery kit | 120 VAC for North America Only; charger, four NiMh batteries, AC & DC cords [Part # 020-0103] |
| Low Battery | Low battery indication with nominal 1 hour of life left |
| Protection against misconnection | Over-voltage protection to 60 V dc (rated for 30 seconds) |
| Display | High contrast graphic liquid crystal display. LED backlighting for use in low lit areas. |

| Source | |
|------------------|---|
| Output Impedance | < 0.3 Ohms |
| Source Current | > 20 mA (drives 80 mV into 10 Ohms) |
| Noise | $\leq 4 \text{ microvolts p-p for frequencies of 10 Hz or below}$ |

Additional Information

This product is calibrated on equipment traceable to NIST and includes a Certificate of Calibration. Test Data is available for an additional charge.

OMEGA ENGINEERING, INC. recommends a calibration interval of one year. Contact your local representative for recalibration and repair services.

Ranges & Accuracies

| T/C Type | Degrees C Range | Accuracy | Degrees F Range | Accuracy | T/C Material | ISA/ANSI Color |
|----------|------------------|----------|------------------|----------|-----------------------------------|-------------------------|
| J | -200.0 to -180.0 | ±0.5° | -346.0 to -292.0 | ±0.9° | +Iron -Constantan Jacket | White Red Black |
| | -180.0 to -50.0 | ±0.4° | -292.0 to -58.0 | ±0.7° | | |
| | -50.0 to 500.0 | ±0.3° | -58.0 to 932.0 | ±0.5° | | |
| | 500.0 to 1200.0 | ±0.4° | 932.0 to 2192.0 | ±0.7° | | |
| K | -230.0 to -100.0 | ±0.8° | -382.0 to -148.0 | ±1.4° | +Chromel® -Alumel® Jacket | Yellow Red Yellow |
| | -100.0 to 1050.0 | ±0.4° | -148.0 to 1922.0 | ±0.7° | | |
| | 1050.0 to 1371.1 | ±0.5° | 1922.0 to 2500.0 | ±0.9° | | |
| T | -260.0 to -200.0 | ±1.2° | -436.0 to -328.0 | ±2.2° | +Copper -Constantan Jacket | Blue Red Blue |
| | -200.0 to -50.0 | ±0.7° | -328.0 to -58.0 | ±1.3° | | |
| | -50.0 to 0.0 | ±0.4° | -58.0 to 32.0 | ±0.7° | | |
| | 0.0 to 400.0 | ±0.3° | 32.0 to 752.0 | ±0.5° | | |
| E | -240.0 to -200.0 | ±0.6° | -400.0 to -328.0 | ±1.1° | +Chromel -Constantan Jacket | Purple Red Purple |
| | -200.0 to -100.0 | ±0.4° | -328.0 to -148.0 | ±0.7° | | |
| | -100.0 to 850.0 | ±0.3° | -148.0 to 1562.0 | ±0.5° | | |
| | 850.0 to 1000.0 | ±0.4° | 1562.0 to 1832.0 | ±0.7° | | |
| R | -13.3 to 250.0 | ±1.4° | -1.0 to 482.0 | ±2.5° | +Pt/13Rh -Platinum Jacket | Black Red Green |
| | 250.0 to 750.0 | ±0.8° | 482.0 to 1382.0 | ±1.4° | | |
| | 750.0 to 1600.0 | ±0.7° | 1382.0 to 2192.0 | ±1.3° | | |
| | 1600.0 to 1767.8 | ±0.8° | 2192.0 to 3214.0 | ±1.4° | | |
| S | -18.3 to 100.0 | ±1.4° | -1.0 to 212.0 | ±2.5° | +Pt/10Rh -Platinum Jacket | Black Red Green |
| | 100.0 to 400.0 | ±1.0° | 212.0 to 752.0 | ±1.8° | | |
| | 400.0 to 1700.0 | ±0.8° | 752.0 to 3092.0 | ±1.4° | | |
| | 1700.0 to 1767.8 | ±0.9° | 3092.0 to 3214.0 | ±1.6° | | |
| B | 315.6 to 550.0 | ±2.0° | 600 to 1022.0 | ±3.6° | +Pt/30Rh -Pt/6Rh Jacket | Grey Red Grey |
| | 550.0 to 900.0 | ±1.3° | 1022.0 to 1652.0 | ±2.3° | | |
| | 900.0 to 1150.0 | ±0.9° | 1652.0 to 2102.0 | ±1.6° | | |
| | 1150.0 to 1820.0 | ±0.8° | 2102.0 to 3308.0 | ±1.5° | | |

(Cold Junction Accuracy not included)

Ranges & Accuracies

| T/C Type | Degrees C Range | Accuracy | Degrees F Range | Accuracy | T/C Material | ISA/ANSI Color |
|-------------------|------------------|----------|------------------|----------|---|------------------------------|
| N | -230.0 to -180.0 | ±1.2° | -382.0 to -292.0 | ±2.2° | +Nicrosil -Nisil Jacket | Orange Red Orange |
| | -180.0 to -50.0 | ±0.7° | -292.0 to -58.0 | ±1.3° | | |
| | -50.0 to 1100.0 | ±0.4° | -58.0 to 2012.0 | ±0.7° | | |
| | 1100.0 to 1300.0 | ±0.5° | 2012.0 to 2372.0 | ±0.9° | | |
| G (W) | 100.0 to 150.0 | ±1.4° | 212.0 to 302.0 | ±2.5° | +Tungsten -W26/Re Jacket | White Red White/Blue |
| | 150.0 to 400.0 | ±1.0° | 302.0 to 752.0 | ±1.8° | | |
| | 400.0 to 1700.0 | ±0.6° | 752.0 to 3092.0 | ±1.1° | | |
| | 1700.0 to 2320.0 | ±0.9° | 3092.0 to 4208.0 | ±1.6° | | |
| C (W5) | -1.1 to 1500 | ±0.7° | 30.0 to 2372.0 | ±1.3° | +W5/Re -W26/Re Jacket | White Red White/Red |
| | 1500 to 1900 | ±0.8° | 2372.0 to 3452.0 | ±1.4° | | |
| | 1900.0 to 2100.0 | ±0.9° | 3452.0 to 3812.0 | ±1.6° | | |
| | 2100.0 to 2320.0 | ±1.1° | 3812.0 to 4208.0 | ±2.0° | | |
| D | -1.0 to 50.0 | ±0.8° | 30.0 to 122.0 | ±1.4° | +W3/Re -W25/Re Jacket | White Red White/Yellow |
| | 50.0 to 1400.0 | ±0.6° | 122.0 to 2552.0 | ±1.3° | | |
| | 1400.0 to 1800.0 | ±0.7° | 2552.0 to 3272.0 | ±1.3° | | |
| | 1800.0 to 2320.0 | ±1.1° | 3272.0 to 4208.0 | ±2.0° | | |
| P Platinel® | -217.8 to -150.0 | ±0.8° | -360.0 to -238.0 | ±1.4° | +Pd55/Pt31/Au14 -Au65/Pd35 Jacket | Yellow Red Black |
| | -150.0 to -50.0 | ±0.6° | -238.0 to -58.0 | ±1.1° | | |
| | -50.0 to 1000.0 | ±0.4° | -58.0 to 1832.0 | ±0.7° | | |
| | 1000.0 to 1395.0 | ±0.5° | 1832.0 to 2543.0 | ±0.9° | | |
| DIN Colors | | | | | | |
| L J-DIN | -200.0 to -50.0 | ±0.4° | -328.0 to -58.0 | ±0.7° | +Iron -Constantan Jacket | Red Blue Blue |
| | -50.0 to 500.0 | ±0.3° | -58.0 to 932.0 | ±0.5° | | |
| | 500.0 to 750.0 | ±0.4° | 932.0 to 1382.0 | ±0.7° | | |
| U T-DIN | -200.0 to -75.0 | ±0.5° | -328.0 to -103.0 | ±0.9° | +Copper -Constantan Jacket | Red Brown Brown |
| | -75.0 to 100.0 | ±0.4° | -103.0 to 212.0 | ±0.7° | | |
| | 100.0 to 600.0 | ±0.3° | 212.0 to 1112.0 | ±0.5° | | |

(Cold Junction Accuracy not included)

Accessories

Included:

Four "AA" Alkaline batteries, Certificate of Calibration
mV Wire Kit

1 Red & 1 Black Lead with Retractable Shield Banana Plugs & Alligator Clips

Part Number

020-0207

Optional Accessories:

Rubber Boot
Small Carrying Case (fits unit with or without boot)
Ni-MH 1 Hour Charger with 4 Ni-MH AA Batteries
(100-120 V AC input for North America Only)

Part Number

HH500A-RB

SC-HH500

020-0103



More Than a Simple Boot

The optional boot provides more than just protection. Flip out the tilt stand and free up both hands for calibration adjustments.



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WARNING: These products are not designed for use in, and should not be used for, human applications.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **three (3) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

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
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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