Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at www.omega.com

TEMPERATURE
- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE
- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL
- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY
- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION
- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS
- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL
- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

User’s Guide
CL510 SERIES
RTD Simulator

Shop online at
www.omega.com
E-mail: info@omega.com

ISO 9001
MANUFACTURED IN
STAMFORD, CT
ISO 9002
MANUFACTURED IN
MANCHESTER, UK
These products are not designed for use in, and should not be used for, human applications.

WARNING: 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 the 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 which wear are not warranted, including but 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 it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS 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.

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.
CL510 Field Calibration Procedure

Suggested Equipment:

1. Precision OHM Meter with accuracy of 0.0275% at 400 Ω.

Enabling Calibration:
Install a fresh battery and allow 15 minutes for the CL510 to stabilize to ambient temperature. Remove the EZ-Dial Knob, battery cover and the four black Phillips head screws. While holding the CL510 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 CL510 is in Calibration mode by viewing the top left of the LCD for the word CAL.

Source OHM Calibration:

LO Calibration:
1. Connect the CL510 terminals to an Ohm meter in four wire Mode.
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 CL510 so the meter reads 0.00 Ω.
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 CL510 so the meter reads 400.00 Ω.
3. Press the EZ-Dial Knob down.
4. The display will flash “STORED” to confirm that the value was stored.

Completion of Calibration:

Turn the CL510 off. Next time the unit is turned on the CL510 will be Calibrated and in normal operational mode.

CL510 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 to turn the CL510 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 coarse 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 a new HI or LO EZ-Check™ value.

CL510 Configuration

Instructions for Enabling and Disabling the Configuration Options

1. Turn the CL510 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 CL510 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.

CL510 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 toggle between °C or °F.

RTD Type

CL510: The RTD type is fixed as ordered from the factory and cannot be changed.

CL510-7: To change RTD 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.

CL510 Configuration Menu
CL510 Series Operating Instructions

EZ-Dial™ Knob

Turn 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 CL510 display. This is also useful in poor lighting or under difficult operating conditions.

Specifications

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>-25 to 60 °C</td>
</tr>
<tr>
<td>Relative Humidity Range</td>
<td>10 % ≤RH ≤90 %</td>
</tr>
<tr>
<td>Size</td>
<td>4.9 X 3.15 X 1.82 inches (125.5 X 80 X 46.2 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>9.1 oz (258 grams)</td>
</tr>
<tr>
<td>Battery</td>
<td>9V Alkaline provides 45 hours of continuous use</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Low battery indication with nominal 1 hour of operation left</td>
</tr>
<tr>
<td></td>
<td>Protection to 60V DC or AC peak up to 30 seconds in duration</td>
</tr>
<tr>
<td></td>
<td>High contrast graphic liquid crystal display with 0.357&quot; (9.07 mm) high digits</td>
</tr>
</tbody>
</table>

RTD Curve Simulation Specifications (1T9-90 Curves):

<table>
<thead>
<tr>
<th>Specification</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>±0.315% of Setting in Ω + 0.05Ω (0.05Ω)</td>
</tr>
<tr>
<td>Typical accuracies for RTD curves are:</td>
<td></td>
</tr>
<tr>
<td>Pt100</td>
<td>±0.25°C (±0.5°F)</td>
</tr>
<tr>
<td>Cu10</td>
<td>±1.5°C (±3°F)</td>
</tr>
<tr>
<td>Ni110, Ni 1200</td>
<td>±0.25°C (±0.5°F)</td>
</tr>
<tr>
<td>Allowable Excitation Current</td>
<td>100µA to 10.2 mA, steady or pulsed/intermittent/smart</td>
</tr>
<tr>
<td>for accuracies below 100µA add</td>
<td>±10µA/Excitation Current (units are in Ω)</td>
</tr>
<tr>
<td>Pulsed Excitation Current Compatibility</td>
<td>DC to 0.01 second pulse widths</td>
</tr>
<tr>
<td>Output Dial Adjustment Resolution</td>
<td>0.1°F or 0.1°C Adjustment Resolution for Model 511</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>±0.05°C/°C Ambient</td>
</tr>
</tbody>
</table>

Connection Diagrams

Two Wire Connection to Transmitter

Three Wire Connection to Transmitter

Four Wire Connection to Transmitter