

CL543

Dual T/C & RTD Calibrator With Auto Stopping



INSTRUCTION
SHEET

M4241-0406

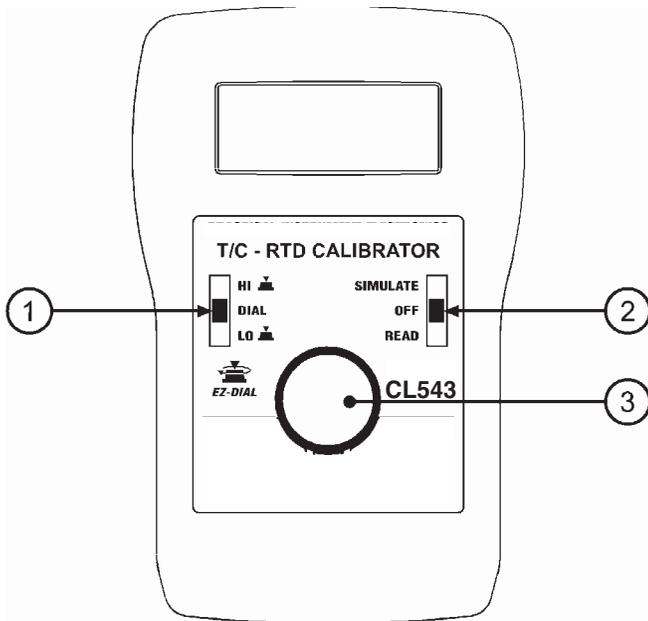
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Basic Keypad Operations

1 EZ-Check™ Switch

For Simulation - 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. Also these stored values can be used for Auto Stepping.

For Read - Slide the switch to the DIAL position. The CL543 will begin making readings. Slide the switch to high and you will get the highest point read and then slide the switch to the low position and you will get the lowest range.



2 SIMULATE/OFF/READ Switch

Turn the CL543 on to SIMULATE to output a temperature, ohms, or mV. Turn the unit to READ to read temperature, ohms, or mV.

3 EZ-Dial™ Knob

Turn the knob to change temperature in 0.1° or 0.01° increments. Push and turn for faster dialing. Double push to get into the CL543 Configuration mode to auto Battery on/off, select Back lighting, C° or F°, RTD or T/C types, Store or step feature, select step size and step time. Then press to store desired EZ-Check™ HI/LO points in SIMULATE mode. Push to clear EZ-Check™ HI/LO points in READ mode.

Note: The CL543 is a Universal Temperature Calibrator that works great calibrating Multi-channel Chart Recorders, Data Acquisition & Computer Systems and Smart transmitters.

The CL543 is GUARANTEED to work with ALL transmitters, recorders and any other RTD input devices that use intermittent, or pulsed excitation current to measure the resistance of the RTD. The CL543 automatically adjusts to the correct excitation current.

CL543 Configuration

Instructions for Enabling and Disabling the Configuration Options

1. Turn the CL543 on to SIMULATE or read.
2. Double Click the EZ-Dial™ Knob at any time to enter configuration menu.
3. Select options by turning the EZ-Dial™ Knob clockwise until the arrow points to the desired option.
4. The option can be enabled or disabled by tapping the EZ-Dial™ Knob.

The CL543 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.

NOTE: Changing the battery will reset menu options to factory settings.

CL543
DOUBLE CLICK
EZ DIAL KNOB
FOR CONFIGURATION

→ AUTO OFF	OFF
TEMP. UNITS	°F
MODE	RTD
RTD	Ω

Model CL543 Configuration Menu

Auto Off ON/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. Press the EZ-Dial™ Knob to select.

Display Units °C/°F

Pressing the EZ-Dial™ Knob to toggles between °C or °F.

Mode - RTD or T/C

You are able to select the different, RTD types - Pt100 $\alpha=3850$, Pt100 $\alpha=3902$, Pt100 $\alpha=3916$, Pt100 $\alpha=3926$,

Cu10 $\alpha=427$, Cu50 $\alpha=428$, Ni110 Bristol, Ni120 $\alpha=672$, Ω

T/C types - B, E, J, K, N, R, S, T, or mV

To change RTD or 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.

CL543 Operating Instructions

Store/Step

→ STORE/STEP	STORE
NUMBER OF STEPS	2
STEP TIME	5
RESOLUTION	LOW

To select three test point values you first have to select Store,

1. Select your high range by sliding the Hi/Lo slide switch to the HI position and dial it to the range desired then press and hold the EZ-Dial™ Knob until **STORED** appears to store the value.
2. Slide the Hi/Lo slide switch to the middle position (dial) and dial it to the range desired. You do not have to press store to keep this value. This position if so desired is adjustable.
3. Slide the Hi/Lo slide switch to the Lo position and dial it to the range desired then press and hold the EZ-Dial™ Knob until **STORED** appears to store the value.

Memory will be maintained even when power is off.

To start stepping after you have selected the step size and step time as described below scroll back up the configuration mode to STORE/STEP and select step then let the unit time out of configuration mode. Place the slide switch in either Hi or Lo position and press and hold the EZ-Dial™ Knob to start and also to stop.

Step Size

To change the step size, press the EZ-Dial™ Knob to find the desired step size or %.

Step Time

To change the step time, press the EZ-Dial™ Knob to find the desired step time indicated in seconds. This is the time in-between each step.

Display Resolution

To Select between High resolution 0.01°, 000.000Ω or Low resolution 0.1°, 000.00Ω, press the EZ-Dial™ Knob to find the desired display setting.

Double-click the EZ-Dial™ Knob to return to the configuration menu at any time of operation.

Read Mode

Slide the SIMULATE/OFF/READ switch to READ for direct RTD or T/C input. Then slide the EZ-Check™ Switch to DIAL position to monitor the RTD or T/C input. The CL543 displays temperature corresponding to resistance input for the selected RTD type. Memory is updated every second once the unit is turned on or the CLEAR option is used. This helps when looking at temperature drift or for any other deviation. Slide the EZ-Check™ Switch to HI and LO to recall maximum and minimum saved readings. Observe the "HI" and "LO" switch position indicators in the display. Press and hold the EZ-Dial™ Knob to clear saved readings. The display flashes "CLEARED" as a confirmation.

Be sure the switch is in the DIAL position to monitor input.

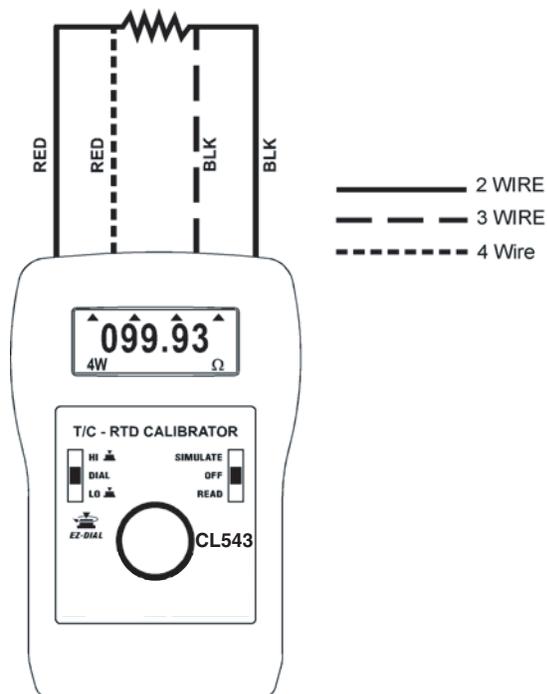
Turning the EZ-Dial™ Knob has no effect in read mode.

RTD READ ONLY-Automatic 2, 3, or 4 wire detect: Connect 2, 3, or 4 wires to the RTD sensor. Follow the connection diagrams. The CL543 indicates "2W", "3W", or "4W" in the lower left corner of the display. It will also place an arrow under each connected wire to show which wire is connected and will indicate if there is an "ERROR". Use this feature for troubleshooting unconnected leads or sensors. **See below figure.**

RTD Read Connection, (wire kit supplied)

RTD Read Mode Connection

Display Indications:	
Check Connections 1 and 2	You have to have wires 1 and 2 connected correctly before trying to connect up to a 3 or 4 wire transmitter
OVERRANGE or UNDERRANGE	The resistance input exceeds the range of the selected RTD type.
OPEN RTD	No RTD is connected.
MISCONNECT	The CL543 is incorrectly connected for a 3-wire or 4-wire reading. Both black leads are required.



CL543 Operating Instructions

Source Mode

Slide the SIMULATE/OFF/READ switch to SIMULATE for direct RTD or T/C output. The CL543 outputs resistance corresponding to temperature for the selected RTD or outputs mV corresponding to temperature for the selected T/C type.

Turn the EZ-Dial™ Knob to change temperature, push and turn for faster dialing.

Slide the EZ-Check™ Switch to HI or LO to recall stored settings. While in the HI or LO position, dial a new setting and press the EZ-Dial™ Knob to store. The DIAL position always holds the last setting dialed there. Using the STORED Values gives you very accurate values for repeatability. Adjusting the EZ-Dial™ Knob you can check for controller actions, trip points or hysteresis.

Double-click the EZ-Dial™ Knob to return to the configuration menu.

Auto Stepping in Source Mode

Select the step size by pressing the EZ-Dial™ Knob to find the desired step size or %. Select the step time by pressing the EZ-Dial™ Knob to find the desired step time indicated in seconds.

RTD Connection Diagrams, (wire lead kit supplied)

SOURCE ONLY: (See opposite figure)

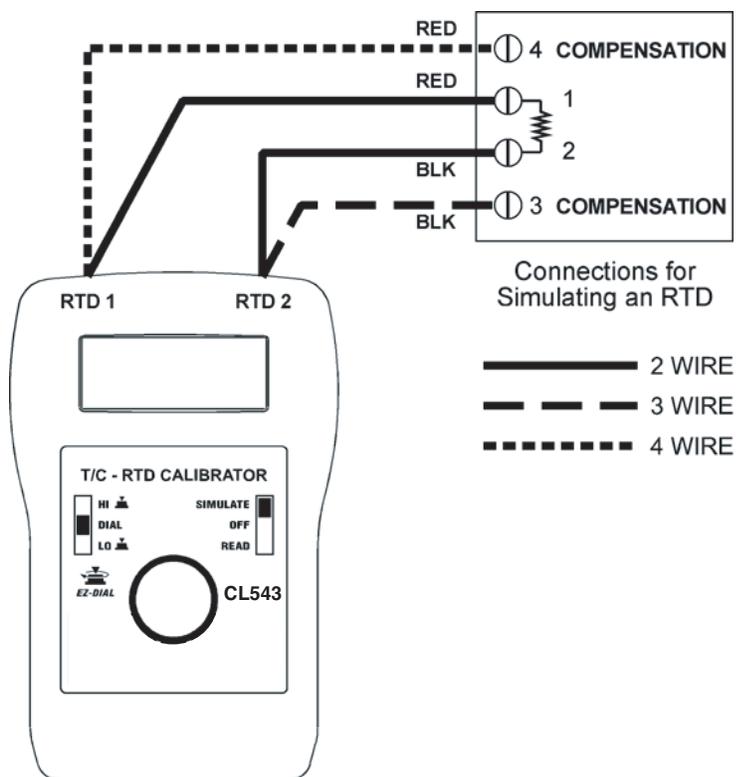
To connect to a 2 wire transmitter connect one red lead to post 1 (RTD1) and connect one black lead to post 2 (RTD2).

To connect to a 3 wire transmitter connect one red lead to post 1 (RTD1) and connect two black leads to post 2 (RTD2).

To connect to a 4 wire transmitter connect two red leads to post 1 (RTD1) and connect two black leads to post 2 (RTD2).

NOTE:

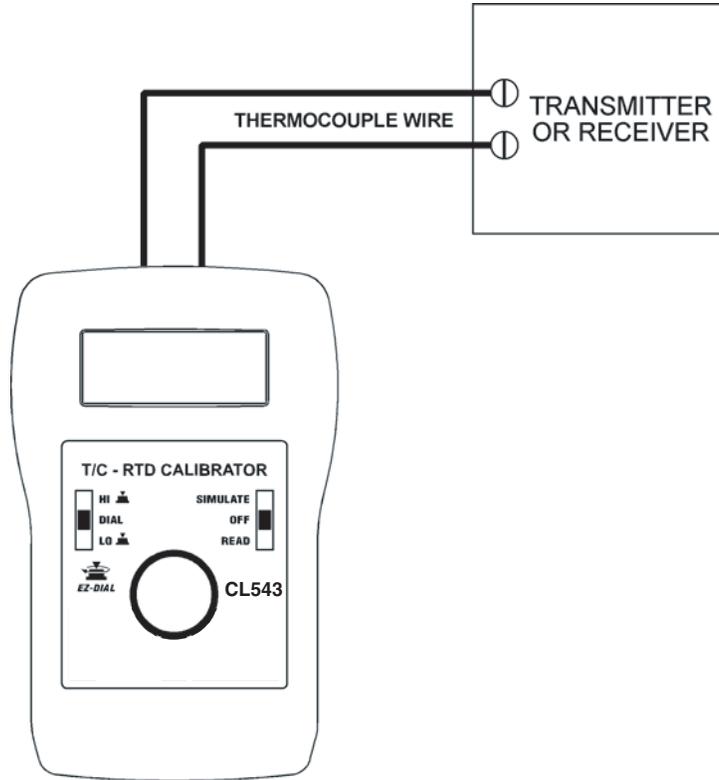
3 WIRE & 4 WIRE TERMINALS ARE FOR READ MODE ONLY. See figure page 2.



CL543 Operating Instructions

T/C Connection Diagram

Two Wire Connection to Transmitter



Color Codes FOR T/C Connections

T/C TYPE	T/C MATERIAL	ISA/ANSI COLOR	T/C TYPE	T/C MATERIAL	ISA/ANSI COLOR
J	+IRON	WHITE	N	+NICROSIL	ORANGE
	-CONSTANTAN	RED		-NISIL	RED
	JACKET	BLACK		JACKET	ORANGE
K	+CHROMEGA®	YELLOW	G (W)	+TUNGSTEN	WHITE
	-ALOMEGA®	RED		-W26/Re	RED
	JACKET	YELLOW		JACKET	WHITE/BLUE
T	+COPPER	BLUE	C (W5)	+W5/Re	WHITE
	-CONSTANTAN	RED		-W26/Re	RED
	JACKET	BLUE		JACKET	WHITE/RED
E	+CHROMEGA®	PURPLE	D	+W3/Re	WHITE
	-CONSTANTAN	RED		-W25/Re	RED
	JACKET	PURPLE		JACKET	WHT/YEL
R	+Pt/13rH	BLACK	P Platinel®	+Pd55/Pt31/Au14	YELLOW
	-PLATINUM	RED		-Au65/Pd35	RED
	JACKET	GREEN		JACKET	BLACK
S	+Pt/10Rh	BLACK	L J DIN	din colors	
	-PLATINUM	RED		+IRON	RED
	JACKET	GREEN		-CONSTANTAN	BLUE
B	+Pt30Rh	GREY	U T DIN	JACKET	BLUE
	-Pt/6Rh	RED		+COPPER	RED
	JACKET	GREY		-CONSTANTAN	BROWN
				JACKET	BROWN

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CL543 Operating Instructions

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
Overall Size	4.9 X 3.15 X 1.82 inches (125.5 X 80 X 46.2 mm)
Overall Weight (including 9V battery)	8.3 oz (235 grams)
Battery	9V Alkaline provides 45 hours of continuous use Low battery indication with nominal 1 hour of operation left
Overload Protection	Overload protected to 60 volts for up to 30 seconds in duration
Display	High-contrast graphic liquid crystal display with 0.357" (9.07 mm) high digits
Maximum Resolution	0.01°, 0.001Ω or 0.001mV

Thermocouple Specifications:

Accuracy	±(0.004 % of mV reading + 0.003 mV) in mV (at 90 days) ±(0.008 % of mV reading + 0.006 mV) in mV (at 1 year)
Temperature Coefficient of mV Source	50 ppm/°C of output range
Cold Junction Calibration Accuracy	±0.1 °C (0.2 °F)
Cold Junction Sensor Temperature Coefficient	±0.025 °/° in ambient temperature (°C or °F)
Output Range	-13.000 to +80.000 mV
Output Noise	±5 μV pp from 0.1 Hz to 10 Hz
Output Impedance	0.2 Ω (200 nV/μA)
Output Source Current	< 8 mA
Input Noise	< ±1 LSD from 0.1 Hz to 10 Hz
Input Impedance	> 10 MΩ
Open T/C Test Pulse	< 10μA for 300 ms
Open T/C Response Time	< 3 seconds
Open T/C Threshold	10 kΩ nominal

RTD Specifications:

Accuracy	±(0.008 % of reading + 0.03Ω) in Ohms (at 90 days) ±(0.015 % of reading + 0.05 Ω) in Ohms (at 1 year)
Temperature Coefficient	10 ppm/°C
Allowable Excitation Current	100 μA to 10.2 mA, steady or pulsed/intermittent/smart
for excitation currents below 100μA add	±10μV/Excitation Current (units are in Ω)
Pulsed Excitation Current Compatibility	DC to 0.01 second pulse widths
Read Mode Excitation Current	620μA nominal

Available Options:

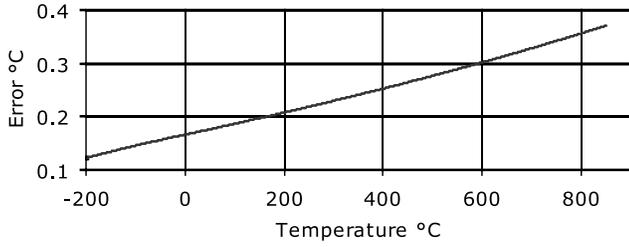
Carrying Case	Part Number: 020-0205 case with logo
T/C Wire Kit	Part Number: 020-0202 (J, T, E, K thermocouple leads with mini plug) Part Number: 020-0203 (B, R/S, N thermocouple leads with mini plug)

CL543 Operating Instructions

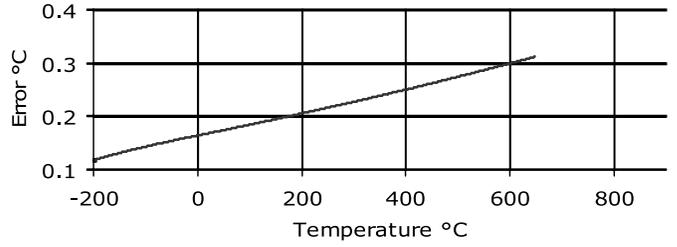
RTD Temperature Accuracy

The following charts give *worst-case* temperature accuracy based on stated resistance accuracy at 1 year.
Excitation current 100 μ to 10.2 mA

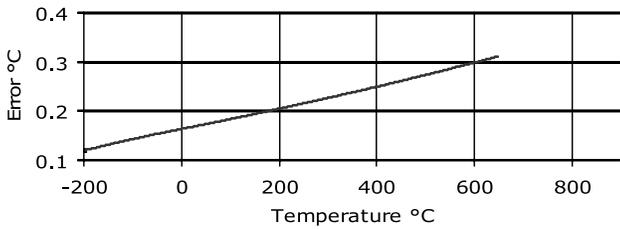
**Pt100 TCR=0.00385
-200 to 850 °C**



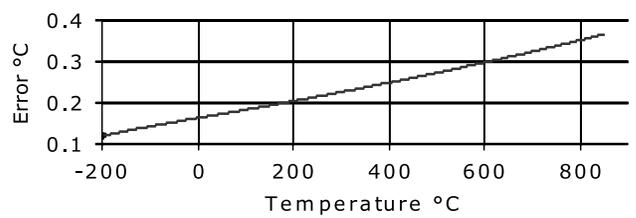
**Pt100 TCR=0.003902
-200 to 648.9 °C**



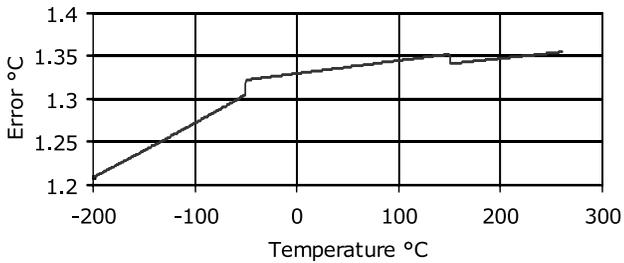
**Pt100 TCR=0.003916
-200 to 648.9 °C**



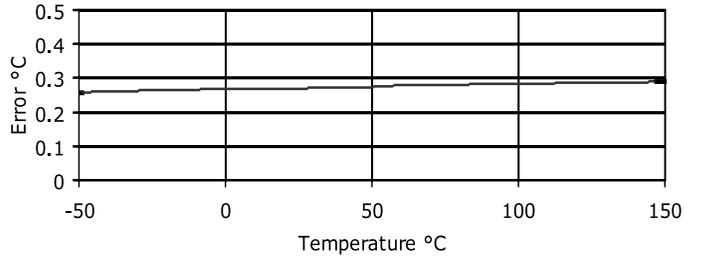
**Pt100 TCR=0.003926
-200 to 850 °C**



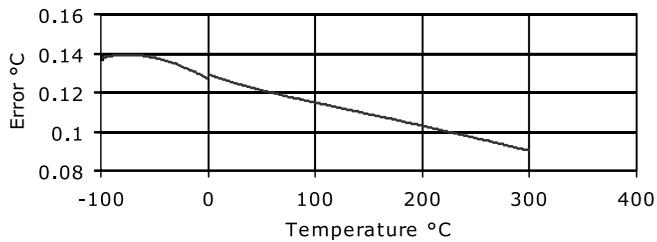
**Cu10 TCR=0.00427
-200 to 260 °C**



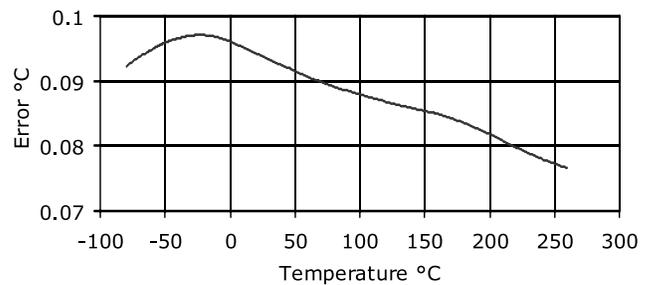
**Cu50 TCR=0.00428
-50 to 150 °C**



**Ni110 TCR=0.00530
-100 to 300 °C**



**Ni120 TCR=0.00672
-80 to 260 °C**

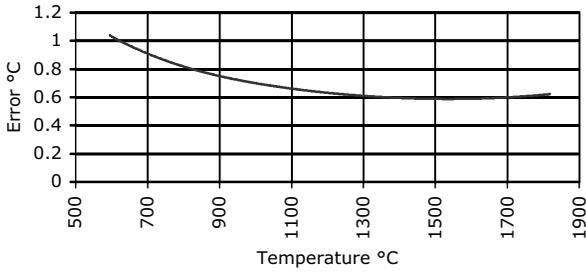


CL543 Operating Instructions

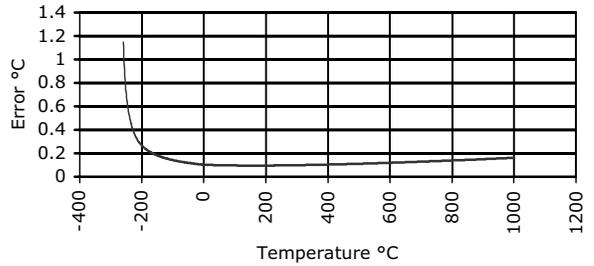
Thermocouple Temperature Accuracy

The following charts give *worst-case* temperature accuracy based on stated millivolt accuracy at 1 year. Temperature is uncompensated on the horizontal axis, referenced to 0 °C. Cold Junction calibration accuracy of 0.1 °C is not included in the temperature error.

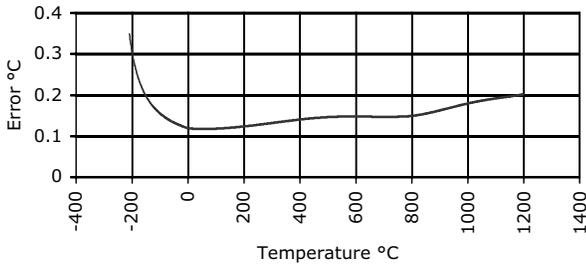
TYPE B
594 to 1820 °C



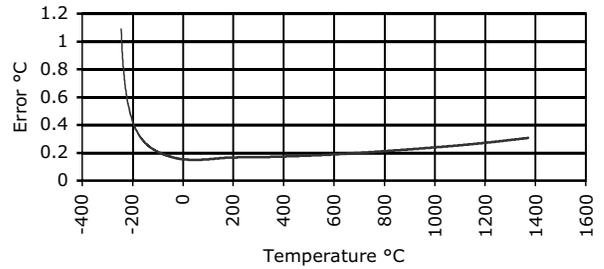
TYPE E
-260 to 1000 °C



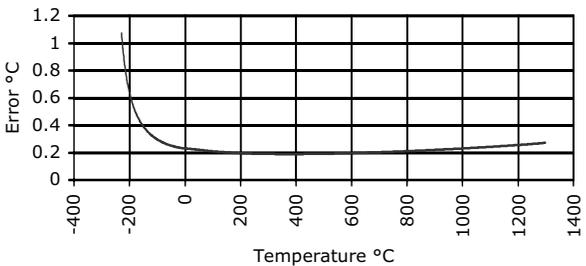
TYPE J
-210 to 1200 °C



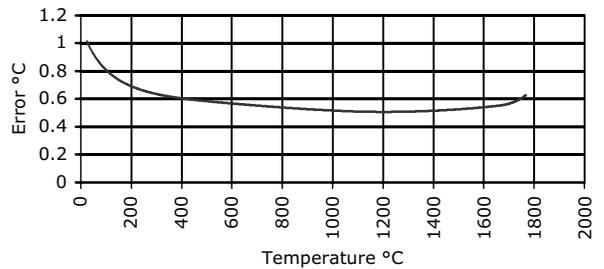
TYPE K
-245 to 1372 °C



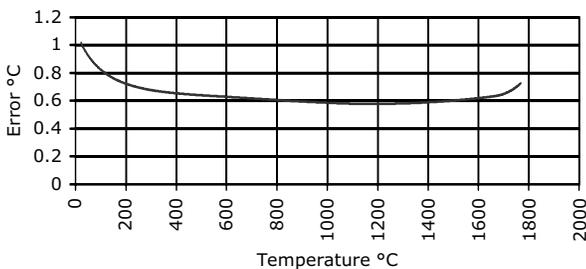
TYPE N
-229 to 1300 °C



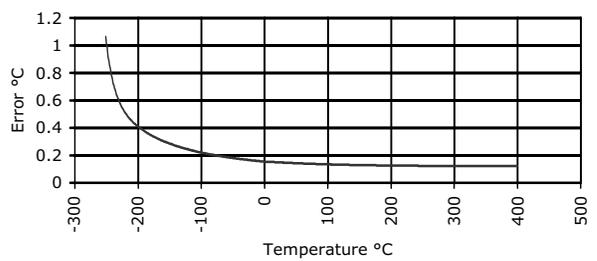
TYPE R
24 to 1768 °C



TYPE S
21 to 1768 °C



TYPE T
-251 to 400 °C



CL543 Field Calibration Procedure

Equipment Needed:

1. Precision OHM Meter with accuracy of 0.0068% at 400 Ω .
2. Precision OHM Source with accuracy of 0.0068% at 400 Ω .
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 $\pm 0.025^{\circ}\text{C}$.

OMEGA Engineering, Inc. 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 CL543 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 CL543 to stabilize to the ambient temperature. Remove the EZ-Dial™ Knob, battery cover and the four black Phillips head screws. While holding the CL543 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 CL543 is in calibration mode by viewing the bottom center of the LCD for the Firmware Build information.

Source mV Calibration:

Connect the CL543 (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 CL543 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 CL543 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 Ω Calibration:

Switch the CL543 to Simulate RTD Mode by double-clicking the EZ-Dial™ Knob. Connect the CL543 (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 Ω ” on the bottom of the LCD.
6. Dial the CL543 so the meter reads 0.000 Ω .
7. Press the EZ-Dial™ Knob down.
8. The display will flash “STORE” to confirm that the value was stored.

CL543 Field Calibration Procedure

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 CL543 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 CL543 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.

Read mV Calibration:

Switch the CL543 into READ Mode.

Connect the CL543 (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 Ω Calibration:

Switch the CL543 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 Ω ” 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 Ω ” on the left side of the LCD.
2. Connect a precision 400 Ω 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.

CL543 Field Calibration Procedure

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.

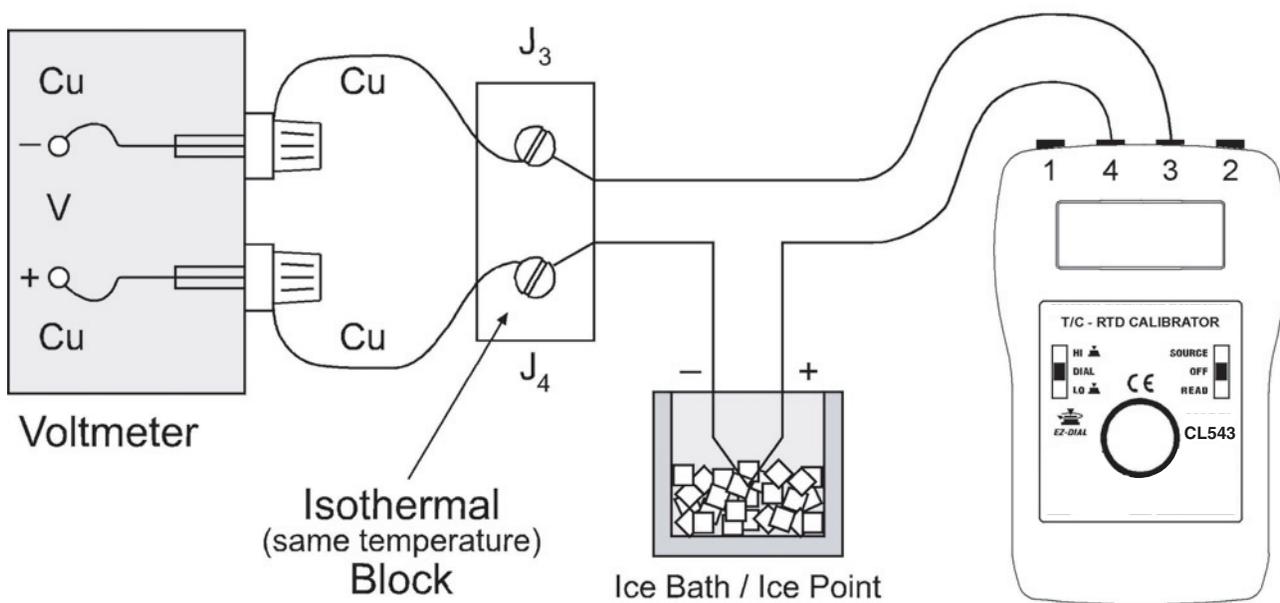
Using a Thermistor Probe:

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 15 minutes.
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 CL543 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

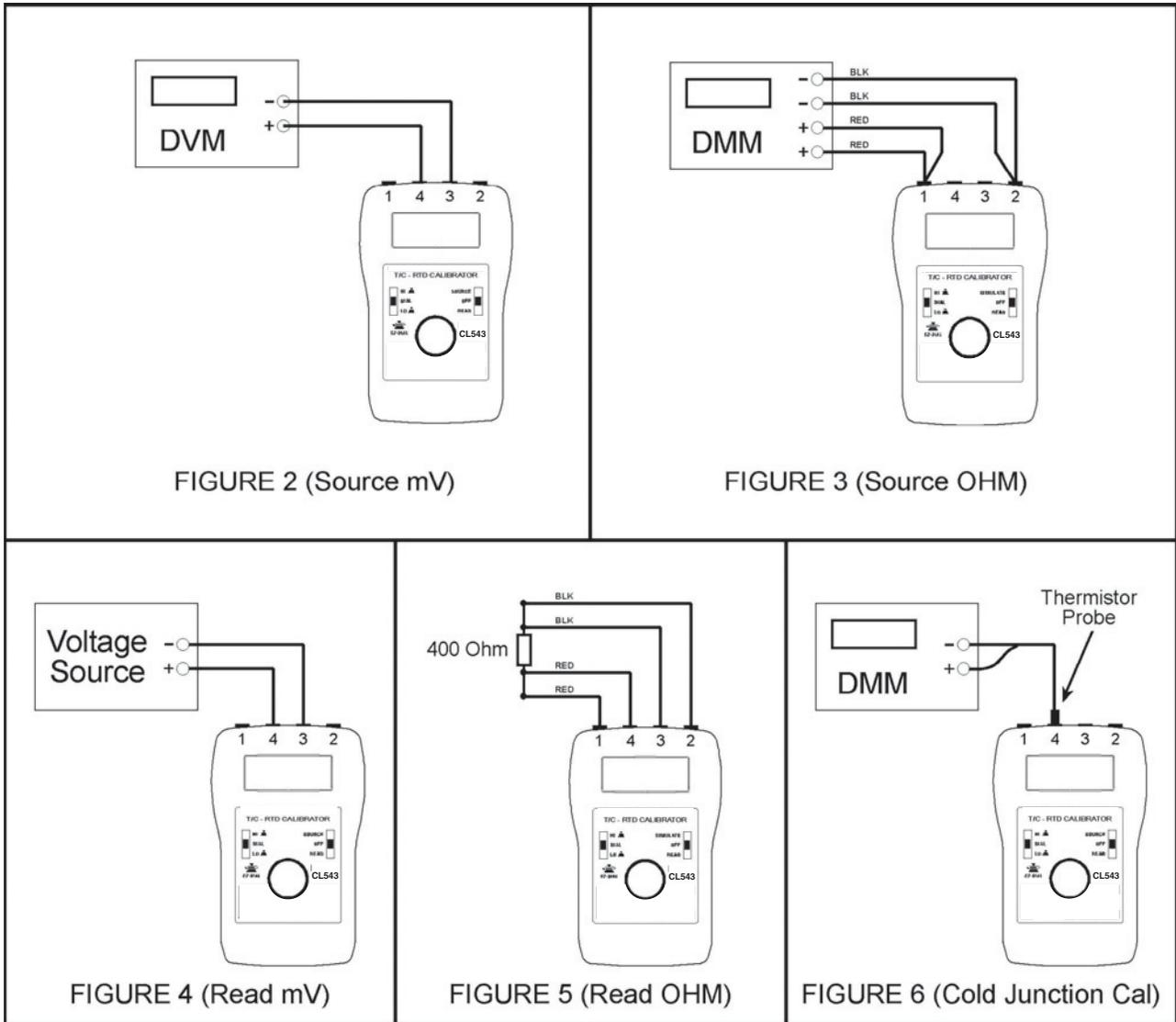
Figure 1



CL543 Field Calibration Procedure

Completion of Calibration:

Turn the CL543 OFF. Next time the unit is turned on the CL543 will be calibrated and in normal operational mode.



CL543 Operating Instructions

NOTES:



OMEGAnet® Online Service
omega.com

Internet e-mail
info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
Tel: (203) 359-1660
FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1, Canada
Tel: (514) 856-6928
FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

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Customer Service: 1-800-622-2378/1-800-622-BEST®
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It is the policy of OMEGA Engineering, Inc. 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 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.



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

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. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

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