

Thermocouple and RTD Calibrator



High Accuracy Automated Temperature Calibration

CL543B



No Points

- ✓ **Calibrate Thermocouple Instruments to 0.1 and 0.01, °F and °C**
 - Types J, K, T, E, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) and P (Platinel): -13.000 to 80.000 mV
- ✓ **Calibrate RTD Instruments to 0.1 and 0.01, °F and °C**
 - Pt 10, 50, 100, 200, 500 and 1000Ω (3850)
 - Pt 100Ω (alpha = 3902, 3916, 3926)
 - Cu 10 and 50Ω and Ni 120Ω
- ✓ **Calibrate with Confidence**
 - Resolution to 0.01, °F and °C; Accurate to 0.2°
 - Cold Junction Sensor Accurate to 0.05°C
 - NIST Traceable Cold Junction Sensor in Isothermal Block
- ✓ **Perform Heat Treating Surveys and Accuracy Tests**
 - Meets or Exceeds the Requirement of AMS 2750 as Both a Secondary Standard Instrument and as a Field Test Instrument
- ✓ **Troubleshoot RTD Sensors and Instruments**
 - Automatic Detection of 2-, 3- or 4-Wire Connections Indicates When Individual Wire Connections are Open
 - Verify Proper Instrument Operation by Measuring the Excitation Current
- ✓ **Fast Easy Calibrations**
 - Instantly Select 3 Outputs with the EZ-CHECK Switch
 - Easily Find Trip Points with 2 Speed EZ-DIAL Knob and Automatic Stepping
- ✓ **Easily Change Thermocouple Types and Scale**
 - Double Click to Select Thermocouple Type, °F and °C

- ✓ **Use in the Plant, Field or Shop**
 - Includes Rubber Boot and mV Test Leads
 - Low Profile Switches Resist Accidental Damage
 - Brass Screws for Thermocouple Wires Plus Miniature Thermocouple Socket
- ✓ **Easy-to-Read Display**
 - Backlight Ideal for Dark Areas
- ✓ **Simple “No Tool” Battery Changes**
 - 4 “AA” Batteries Included
- ✓ **Verify Resistance, Cold Junction Temperature and Output**
 - Secondary Display of Resistance for RTDs and Compensated millivolt Setting, and Cold Junction Temperature for Thermocouple
- ✓ **Secondary Display**
 - Shows millivolts and Cold Junction Temperature While Displaying Thermocouple Temperature, and Shows Ohms while Displaying RTD Temperature
- ✓ NIST Cert (No Points)



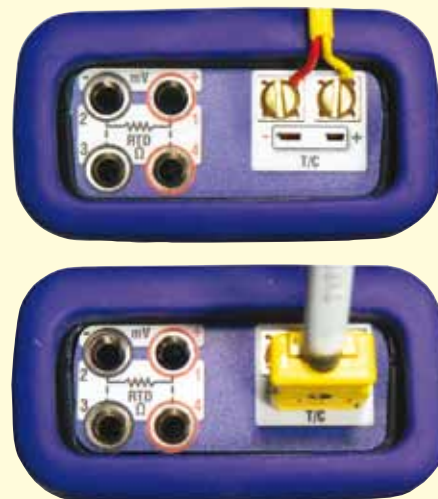
CL543B shown smaller than actual size.

THERMOCOUPLE CONNECTIONS

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

Plug thermocouple wires into the miniature thermocouple jack or place bare thermocouple wires onto the brass block under the screws.

The CL543B has two banana jacks (1+ and 2-) mounted in the top end of the housing. These are not temperature compensated and are to be used only for millivolt signals.



Screw terminal for thermocouple wire plus miniature thermocouple socket isothermal block with ±0.05°C cold junction sensor.

Specifications

Operating Temperature Range:

-20 to 60°C (-5 to 140°F)

Storage Temperature Range:

-30 to 60°C (-22 to 140°F)

Temperature Effect: $\leq \pm 25$ ppm/°C of range

Cold Junction Sensor: $\leq \pm 0.01\%$ °° from ambient temperature (°C or °F)

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

Normal Mode Rejection: 50/60 Hz, 50 dB

Common Mode Rejection: 50/60 Hz, 120 dB

Dimensions: 143 L x 76 W x 41 mm H (5.63 x 3 x 1.60")

Weight: 0.34 kg (12.1 oz) with boot and batteries

Batteries: Four "AA" alkaline 1.5V (LR6) (included), optional NiMh rechargeable battery kit [120 Vac (North America only); charger, 4 NiMh batteries, AC and DC cords

Battery Life: 50 hours, low battery indication with nominal 1 hour of operation left

Over-Voltage Protection: Up to 60 vrms (rated for 30 seconds), protection against misconnection

Alerts: Red LED displays OVERLOAD or out of range conditions

Display: High contrast graphic liquid crystal display, LED backlighting for use in low lit areas

VOLTAGE SOURCE

Ranges and Resolution:

-13.000 to 80.000 mV and -13.0000 to 80.0000 mV

Accuracy: $\pm(0.008\%$ of setting + 0.006 mV)

Source Current: ≥ 10 mA

Output Impedance: $< 0.3\Omega$

RMS Noise: $\leq \pm 0.0005$ mV from 0.1 to 10 Hz

Short Circuit Duration: Infinite

VOLTAGE READ

Ranges and Resolution:

-13.000 to 80.000 mV and -13.0000 to 80.0000 mV

Accuracy: $\pm(0.008\%$ of reading + 0.006 mV)

Input resistance: ≥ 10 M Ω

RTD CONNECTIONS

Simulating or reading RTDs uses copper wire. Plug 2-, 3- or 4-wires into the corresponding jacks on the calibrator. For RTD source the CL543B simulates the (+) RTD from jacks 1 and 4 and the (-) RTD from jacks 2 and 3.

When reading an RTD sensor the CL543B uses patented circuitry to automatically detects if 2-, 3- or 4-wires are connected. This is helpful to troubleshoot sensor connections.



Banana jacks for 2-, 3- and 4-wire RTD.

THERMOCOUPLE SOURCE

Accuracy: $\pm(0.008\%$ of setting + 0.006 mV)

Cold Junction Compensation: $\pm 0.05^\circ\text{C}$ ($\pm 0.09^\circ\text{F}$); thermistor traceable to NIST for 11 years

Output Impedance: $< 0.3\Omega$

Source Current: > 10 mA (drives 80 mV into 10 Ω)

RMS Noise: $\leq \pm 0.0005$ mV from 0.1 to 10 Hz

THERMOCOUPLE READ

Accuracy: $\pm(0.008\%$ of reading + 0.006 mV)

Cold Junction Compensation: $\pm 0.09^\circ\text{F}$ ($\pm 0.05^\circ\text{C}$); thermistor traceable to NIST for 11 years

Input Impedance: > 10 M Ω

Open Thermocouple Threshold: 10,000 Ω nominal

Pulse: < 10 microamp pulse for 300 milliseconds

RTD AND Ω SOURCE

3- and 4-Wire Accuracy:

From 1 to 10.2 mA External Excitation Current: $\pm(0.015\%$ of setting + 0.05 Ω)

Below 1 mA of External Excitation Current:

Add (0.025 mV/mA excitation current)

2-Wire Accuracy: Add 0.1 Ω to 3-wire and 4-wire accuracy

Resistance Ranges:

400 Ω Range: 0.00 to 401.00 and 0.000 to 401.000

4000 Ω Range: 0.0 to 4010.0 and 0.00 to 4010.00

RMS Noise:

400 Ω Range: $\leq \pm 0.005\Omega$ from 0.1 to 10 Hz

4000 Ω Range: $\leq \pm 0.05\Omega$ from 0.1 to 10 Hz



Kick stand for bench use.

Allowable Excitation Current Range:

400 Ω Range: 10.2 mA max; steady or pulsed/intermittent

4000 Ω Range: 1 mA max; steady or pulsed/intermittent

Pulsed Excitation Current

Compatibility: DC to 0.01 second pulse width, 0.025 mV, mA excitation current

RTD AND OHMS READ

Resistance Ranges:

400 Ω Range: 0.00 to 401.00 and 0.000 to 401.000

4000 Ω Range: 0.0 to 4010.0 and 0.00 to 4010.00

Accuracy: $\pm(0.015\%$ of reading + 0.05 Ω)

Excitation Current: 0.9 mA to 401 Ω , 0.4 mA to 4010 Ω (nominal)

Thermocouples Ranges and Accuracies

Table Based on Accuracy: $\leq \pm(0.008\%$ of reading + 0.006 mV)

Note: Doesn't include cold junction error of $\pm 0.05^\circ\text{C}$

Thermocouple Type	$^\circ\text{C}$ Range	$^\circ\text{C}$	$^\circ\text{F}$ Range	$^\circ\text{F}$	Thermocouple Material
J	-200.00 to -150.00	$\pm 0.25^\circ$	-328.00 to -238.00	$\pm 0.55^\circ$	+Iron -Constantan
	-150.00 to -50.00	$\pm 0.17^\circ$	-238.00 to -58.00	$\pm 0.35^\circ$	
	-50.00 to 300.00	$\pm 0.13^\circ$	-58.00 to 572.00	$\pm 0.24^\circ$	
	300.00 to 850.00	$\pm 0.15^\circ$	572.00 to 1562.00	$\pm 0.28^\circ$	
	850.00 to 1200.00	$\pm 0.20^\circ$	1562.00 to 2192.00	$\pm 0.36^\circ$	
K	-230.00 to -100.00	$\pm 0.70^\circ$	-382.00 to -148.00	$\pm 1.26^\circ$	+ Chromel [®] -Alumel [®]
	-100.00 to 600.00	$\pm 0.19^\circ$	-148.00 to 1112.00	$\pm 0.34^\circ$	
	600.00 to 1000.00	$\pm 0.24^\circ$	1112.00 to 1832.00	$\pm 0.43^\circ$	
	1000.00 to 1371.1	$\pm 0.31^\circ$	1832.00 to 2500.00	$\pm 0.55^\circ$	
T	-260.00 to -240.00	$\pm 1.66^\circ$	-436.00 to -400.00	$\pm 2.98^\circ$	+Copper -Constantan
	-240.00 to -210.00	$\pm 0.60^\circ$	-400.00 to -346.00	$\pm 1.07^\circ$	
	-210.00 to -100.00	$\pm 0.41^\circ$	-346.00 to -148.00	$\pm 0.74^\circ$	
	-100.00 to 50.00	$\pm 0.18^\circ$	-148.00 to 122.00	$\pm 0.33^\circ$	
	50.00 to 400.00	$\pm 0.14^\circ$	122.00 to 752.00	$\pm 0.24^\circ$	
E	-240.00 to -225.00	$\pm 0.51^\circ$	-400.00 to -373.00	$\pm 0.92^\circ$	+Chromel -Constantan
	-225.00 to -100.00	$\pm 0.27^\circ$	-373.00 to -148.00	$\pm 0.48^\circ$	
	-100.00 to 750.00	$\pm 0.13^\circ$	-148.00 to 1382.00	$\pm 0.24^\circ$	
	750.00 to 1000.00	$\pm 0.16^\circ$	1382.00 to 1832.00	$\pm 0.29^\circ$	
R	-18.30 to 250.00	$\pm 1.26^\circ$	-1.00 to 482.00	$\pm 2.27^\circ$	+Pt/13Rh -Platinum
	250.00 to 750.00	$\pm 0.64^\circ$	482.00 to 1382.00	$\pm 1.14^\circ$	
	750.00 to 1600.00	$\pm 0.54^\circ$	1382.00 to 2192.00	$\pm 0.97^\circ$	
	1600.00 to 1767.80	$\pm 0.63^\circ$	2192.00 to 3214.00	$\pm 1.13^\circ$	
S	-18.30 to 150.00	$\pm 1.22^\circ$	-1.00 to 302.00	$\pm 2.20^\circ$	+Pt/10Rh -Platinum
	150.00 to 500.00	$\pm 0.72^\circ$	302.00 to 932.00	$\pm 1.30^\circ$	
	500.00 to 1650.00	$\pm 0.63^\circ$	932.00 to 3002.00	$\pm 1.14^\circ$	
	1650.00 to 1767.80	$\pm 0.73^\circ$	3002.00 to 3214.00	$\pm 1.31^\circ$	
B	315.60 to 550.00	$\pm 1.88^\circ$	600.00 to 1022.00	$\pm 3.39^\circ$	+Pt/30Rh -Pt/6Rh
	550.00 to 900.00	$\pm 1.03^\circ$	1022.00 to 1652.00	$\pm 1.86^\circ$	
	900.00 to 1150.00	$\pm 0.72^\circ$	1652.00 to 2102.00	$\pm 1.30^\circ$	
	1150.00 to 1820.00	$\pm 0.63^\circ$	2102.00 to 3308.00	$\pm 1.14^\circ$	
N	-230.00 to -100.00	$\pm 1.10^\circ$	-382.00 to -148.00	$\pm 1.98^\circ$	+Nicrosil-Nisil
	-100.00 to 0.00	$\pm 0.30^\circ$	-148.00 to 32.00	$\pm 0.53^\circ$	
	0.00 to 1100.00	$\pm 0.24^\circ$	32.00 to 2012.00	$\pm 0.44^\circ$	
	1100.00 to 1300.00	$\pm 0.27^\circ$	2012.00 to 2372.00	$\pm 0.49^\circ$	
G (W)	100.00 to 450.00	$\pm 1.14^\circ$	212.00 to 842.00	$\pm 2.05^\circ$	+Tungsten-W26/Re
	440.00 to 1700.00	$\pm 0.44^\circ$	842.00 to 3092.00	$\pm 0.79^\circ$	
	1700.00 to 2000.00	$\pm 0.54^\circ$	3092.00 to 3632.00	$\pm 0.97^\circ$	
	2000.00 to 2320.00	$\pm 0.73^\circ$	3632.00 to 4208.00	$\pm 1.32^\circ$	

Thermocouples Ranges and Accuracies

Table Based on Accuracy: $\leq \pm(0.008\%$ of reading + 0.006 mV)

Note: Doesn't include cold junction error of $\pm 0.05^\circ\text{C}$

Thermocouple Type	$^\circ\text{C}$ Range	$^\circ\text{C}$	$^\circ\text{F}$ Range	$^\circ\text{F}$	Thermocouple Material
C (W5)	-1.10 to 1150.00	$\pm 0.44^\circ$	30.00 to 2102.00	$\pm 0.80^\circ$	+W5/Re -W26/Re
	1150.00 to 1750.00	$\pm 0.61^\circ$	2102.00 to 3182.00	$\pm 1.09^\circ$	
	1750.00 to 2050.00	$\pm 0.74^\circ$	3182.00 to 3722.00	$\pm 1.33^\circ$	
	2050.00 to 2320.00	$\pm 0.99^\circ$	3722.00 to 4208.00	$\pm 1.79^\circ$	
D (W3)	-1.00 to 150.00	$\pm 0.63^\circ$	30.00 to 302.00	$\pm 1.13^\circ$	+W3/Re -W25/Re
	150.00 to 1200.00	$\pm 0.41^\circ$	302.00 to 2192.00	$\pm 0.73^\circ$	
	1200.00 to 1700.00	$\pm 0.51^\circ$	2192.00 to 3092.00	$\pm 0.92^\circ$	
	1700.00 to 2320.00	$\pm 0.97^\circ$	3092.00 to 4208.00	$\pm 1.75^\circ$	
P	0.00 to 950.00	$\pm 0.23^\circ$	32.00 to 1742.00	$\pm 0.41^\circ$	+Pd55/Pt31/Au14 -Au65/Pd35
	950.00 to 1395.00	$\pm 0.34^\circ$	1742.00 to 2543.00	$\pm 0.61^\circ$	
DIN Wire					
L J-DIN	-200.00 to -100.00	$\pm 0.21^\circ$	-328.00 to -148.00	$\pm 0.38^\circ$	+Iron -Constantan
	-100.00 to 350.00	$\pm 0.13^\circ$	-148.00 to 662.00	$\pm 0.24^\circ$	
	350.00 to 900.00	$\pm 0.15^\circ$	662.00 to 1652.00	$\pm 0.27^\circ$	
U U-DIN	-200.00 to -150.00	$\pm 0.37^\circ$	-328.00 to -238.00	$\pm 0.66^\circ$	+Copper -Constantan
	-150.00 to 100.00	$\pm 0.22^\circ$	-238.00 to 212.00	$\pm 0.40^\circ$	
	100.00 to 600.00	$\pm 0.15^\circ$	212.00 to 1112.00	$\pm 0.28^\circ$	

Table Based on 3 & 4 Wire RTD Accuracy: $\leq \pm(0.015\%$ of reading +0.05 Ω) [read based on 1.0 mA of fixed excitation current]

RTD Type	Alpha	$^\circ\text{C}$ Range	$^\circ\text{C}$	$^\circ\text{F}$ Range	$^\circ\text{F}$
Pt 100 Ω DIN/IEC/JIS 1989 ITS-90	1.385 (0.004)	-200.00 to -150.00	$\pm 0.13^\circ$	-328.0 to -238.00	$\pm 0.24^\circ$
		-150.00 to 360.00	$\pm 0.24^\circ$	-238.00 to 660.00	$\pm 0.44^\circ$
		360.00 to 740.00	$\pm 0.34^\circ$	660.00 to 1364.00	$\pm 0.61^\circ$
		740.00 to 850.00	$\pm 0.37^\circ$	1364.00 to 1562.00	$\pm 0.67^\circ$
Pt 10 Ω DIN/IEC/JIS 1989 Based on ITS-90	1.385 (0.004)	-200.00 to -120.00	$\pm 1.24^\circ$	-328.00 to -184.00	$\pm 2.24^\circ$
		-120.0 to 210.00	$\pm 1.44^\circ$	-184.00 to 410.00	$\pm 2.59^\circ$
		210.00 to 370.00	$\pm 1.54^\circ$	410.00 to 698.00	$\pm 2.77^\circ$
		370.00 to 650.00	$\pm 1.74^\circ$	698.00 to 1202.00	$\pm 3.14^\circ$
		650.00 to 850.00	$\pm 1.91^\circ$	1202.00 to 1562.00	$\pm 3.44^\circ$
Pt 50 Ω DIN/IEC/JIS 1989 ITS-90	1.385 (0.004)	-200.00 to 200.00	$\pm 0.34^\circ$	-328.00 to 392.00	$\pm 0.62^\circ$
		200.00 to 550.00	$\pm 0.44^\circ$	392.00 to 1022.00	$\pm 0.80^\circ$
		550.00 to 850.00	$\pm 0.54^\circ$	1022.00 to 1562.00	$\pm 0.98^\circ$
Pt 200 Ω DIN/IEC/JIS 1989 ITS-90	1.385 (0.004)	-200.00 to -120.00	$\pm 0.08^\circ$	-328.00 to -184.00	$\pm 0.14^\circ$
		-120.00 to 180.00	$\pm 0.14^\circ$	-184.00 to 356.00	$\pm 0.24^\circ$
		180.00 to 450.00	$\pm 0.19^\circ$	356.00 to 842.00	$\pm 0.34^\circ$
		450.00 to 680.00	$\pm 0.24^\circ$	842.00 to 1256.00	$\pm 0.44^\circ$
		680.00 to 850.00	$\pm 0.29^\circ$	1256.00 to 1562.00	$\pm 0.52^\circ$

Table Based on 3 & 4 Wire RTD Accuracy: $\leq \pm(0.015\%$ of reading $+0.05\Omega)$ [read based on 1.0 mA of fixed excitation current]

RTD Type	Alpha	°C Range	°C	°F Range	°F
Pt 500Ω DIN/IEC/JIS 1989 ITS-90	1.385 (0.004)	-200.00 to -90.00	±0.08°	-328.00 to -194.00	±0.14°
		-120.00 to 180.00	±0.14°	-184.00 to 356.00	±0.24°
		180.00 to 450.00	±0.19°	356.00 to 842.00	±0.34°
		450.00 to 680.00	±0.24°	842.00 to 1256.00	±0.44°
		680.00 to 850.00	±0.29°	1256.00 to 1562.00	±0.52°
Pt 1000Ω DIN/IEC/JIS 1989 ITS-90	1.385 (0.004)	-200.00 to 170.00	±0.08°	-328.00 to 338.00	±0.14°
		170.00 to 470.00	±0.14°	338.00 to 878.00	±0.24°
		470.00 to 730.00	±0.19°	878.00 to 1346.00	±0.34°
		730.00 to 850.00	±0.22°	1346.00 to 1562.00	±0.39°
Pt 100Ω (Burns)	1.390 (0.004)	-195.61 to -100.00	±0.14°	-320.10 to -148.00	±0.26°
		-100.00 to 370.00	±0.24°	-148.00 to 698.00	±0.44°
		370.00 to 648.90	±0.31°	698.00 to 1200.00	±0.56°
Pt 100Ω (Old JIS 1981)	1.392 (0.004)	-200.00 to -140.00	±0.13°	-328.00 to -220.00	±0.24°
		-140.00 to 130.00	±0.19°	-220.00 to 266.00	±0.34°
		130.00 to 370.00	±0.24°	266.00 to 698.00	±0.44°
		370.00 to 648.90	±0.31°	698.00 to 1200.00	±0.56°
Pt 100Ω (US Lab)	1.393 (0.004)	-200.00 to -140.00	±0.13°	-328.00 to -220.00	±0.24°
		-140.00 to 130.00	±0.19°	-220.00 to 266.00	±0.34°
		130.00 to 380.00	±0.24°	266.00 to 716.00	±0.44°
		380.00 to 610.00	±0.30°	716.00 to 1130.00	±0.54°
		610.00 to 850.00	±0.37°	1130.00 to 1562.00	±0.66°
Copper 10 Ω (Minco)	1.427 (0.004)	-200.00 to -150.00	±1.24°	-328.00 to -238.00	±2.24°
		-150.00 to 90.00	±1.34°	-238.00 to 194.00	±2.42°
		90.00 to 260.00	±1.36°	194.00 to 500.00	±2.44°
Copper 50Ω	1.4280 (0.00428)	-50.00 to 150.00	±0.29°	-58.00 to 302.00	±0.52°
Ni 120Ω (Pure)	1.6720 (0.00672)	-80.00 to 260.00	±0.10°	-112.00 to 500.00	±0.17°

To Order	
Model No.	Description
CL543B	Thermocouple and RTD temperature calibrator

Comes complete with 4 "AA" alkaline batteries, NIST Cert (no points), rubber boot, deluxe hands free carrying case, mA/V test leads, 1 red and 1 black lead with banana plugs and alligator clips, RTD wire kit, 2 red and 2 black leads with banana plugs and spade lugs, and operator's manual.

Ordering Example: CL543B, thermocouple and RTD temperature calibrator with calibration certificate.



OMEGACARESM extended warranty program is available for models shown on this page. Ask your sales representative for full details when placing an order. OMEGACARESM covers parts, labor and equivalent loaners.