



CL627A



Universal Thermocouple Calibrator



Operator's Manual

OPERATING INSTRUCTIONS

GENERAL

INITIAL SETUP

The Omega CL627A is internally configurable for ease of use. Simply remove the four corner screws, flip a few DIP switches and follow the simple instructions given below (a condensed guide is found within the calibrator housing). The choices are based on the type of instruments in your shop or plant. For instance if your plant has only type E and your instruments display to 1°C, set up the CL627A to lock out T/C type selection, choose full time °C and display with 1° resolution.

CONFIGURING TEMPERATURE SCALES

°F
°C

The CL627A may be internally set-up for full time use of °C, full time use of °F or selectable °C/°F operation. The selectable mode lets you choose °C or °F each time the unit is turned on (see Configuring Operating Modes below).

LOCKING IN 1° RESOLUTION

1000°

100°

The CL627A may be internally configured for 0.1° or 1° resolution. Select 1° resolution for less critical applications or 0.1° for increased resolution when necessary.

CHANGING T/C TYPES

Up to 14 T/C types plus millivolts may be selected each time the CL627A is turned on

To change T/C types:

J K T E
R S B N
G C D P
L U mV

- 1) Repeatedly press or press and hold the SCROLL pushbutton when switching the unit on or while a T/C type is displayed during the first three seconds after the unit is turned on.
- 2) Continue to hold the SCROLL pushbutton. The LCD will scroll through the list of T/C types & mV.
- 3) Release the SCROLL pushbutton when the desired T/C type is displayed.

Changing the list of available T/C types:

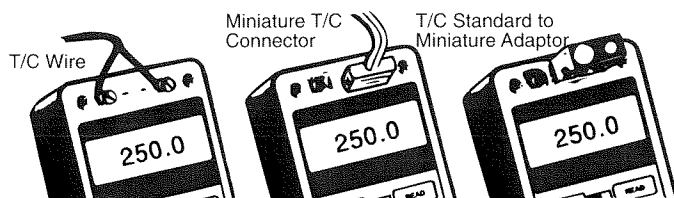
You may create your own T/C list which can be changed at any time.

J K T E
R S B N
G C D P
L U mV

- 1) Turn the Model CL627A off & remove the 4 corner screws.
- 2) Set DIP Switch 2 up (see Configuring Operating Modes below).
- 3) Turn the CL627A on.
- 4) Turn the digital pot (Source Adjustment Knob) to scroll through each T/C type.
- 5) Press the STORE/SCROLL pushbutton to select (Steady) or deselect (Flashing) T/C types to add to the T/C list.
- 6) Continue turning the digital pot to review the selections. Press STORE/SCROLL pushbutton to change any selections.
- 7) Turn the CL627A off, place DIP Switch 2 down & replace the 4 corner screws.

CONNECTIONS

The CL627A has connections for both miniature thermocouple connectors and for direct thermocouple wires. It is essential for accurate calibration that thermocouple wire is used to connect the CL627A to the device being calibrated. Miniature or subminiature thermocouple connectors with thermocouple wire allow for the easiest connection. Different size thermocouple connectors may be used with an adaptor of the same thermocouple type. Copper wires, Copper connectors or Copper adaptors are not recommended as they will cause errors in cold junction compensation. Copper is used only for millivolt applications.



OVER RANGE/UNDER RANGE

OVER
UNDER

TURN-ON

MAX HI LO MIN BAT OVER UNDER READ SOURCE mV

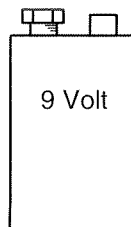
Out-of-range temperatures are indicated by OVER and UNDER on the display. If out-of-range is displayed during READ mode check for proper connections and T/C type.

Each time the CL627A is turned on, the LCD will display all segments for about 1 second. It then displays the currently selected thermocouple type for approximately 3 seconds. The currently selected temperature scale of °C or °F will then display for about 3 seconds. Depending on the configuration, from 1 to 14 T/C types, millivolts or °C or °F may be selected during the thermocouple turn-on mode.

- 1) Move the power switch to SOURCE or READ
- 2) All segments on the LCD are turned on during self test
- 3) The display will indicate the selected T/C type for 3 seconds. Repeatedly press or press and hold the SCROLL pushbutton to change to the desired T/C type (based on configuration).
- 4) The display will indicate the selected temperature scale for 3 seconds. Press the SCROLL pushbutton to switch between °C & °F (based on configuration). If a single T/C type, fixed °C or fixed °F have been selected, the user prompts for these selections will be skipped during turn-on. The three "QUICK-CHEK" temperature values will be the same as previously stored. Each time a different T/C type is selected, the three "QUICK-CHEK" values for that type will be recalled.

Hint: The CL627A will automatically convert the temperatures in memory between °F and °C. For example, if 212.0°F is stored in HI and the CL627A is switched to °C, 100.0°C will be displayed.

CHANGING BATTERY

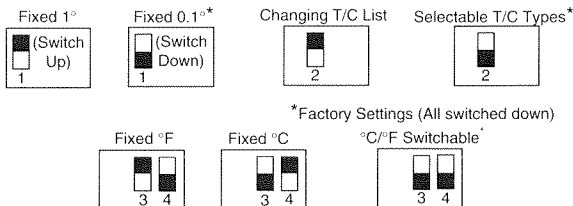


Low battery is indicated by BAT on the LCD Display. Approximately 10 Hours of operation remain before the LCD goes blank and the CL627A shuts itself down. Turn the CL627A off, remove the four corner screws and lift the unit out of the case. The battery is fastened to the bottom printed circuit board and is easily removed. Replace screws and turn on when ready to use.

CONFIGURING OPERATING MODES

(Setting DIP Switches)

- 1) Turn the Model CL627A OFF
- 2) Remove the 4 corner screws and lift faceplate assembly out of the case
- 3) Set the DIP switches for your options as diagrammed below



SPECIFICATIONS

(Unless otherwise indicated, specifications are in $\pm\%$ of span @ 23°C)

GENERAL

GENERAL ACCURACY: $\pm(0.008\%$ of reading +0.006 millivolts)
 COLD JUNCTION COMPENSATION: Built-in for specified thermocouple type, characterized to T/C curve
 COLD JUNCTION TEMPERATURE EFFECT: Within 0.05° per °C change in ambient temperature over operating range
 OPERATING TEMPERATURE RANGE: -5 to +140°F (-20 to +60°C)
 STORAGE TEMPERATURE RANGE: -22 to +175°F (-30 to +80°C)
 RELATIVE HUMIDITY: 10 to 90%, non-condensing
 ZERO STABILITY: Included in Cold junction effect
 WARM UP TIME: 1 Minute to full rated accuracy
 OVERLOAD PROTECTION: 120 volts AC/DC for 30 seconds on connecting leads, in any mode
 BATTERY LIFE: 9 Volt Alkaline: Nominal 40 hours
 LOW BATTERY: "BAT" indication on LCD at 7 Volts nominal, approximately 10 hours left. Batteries should be removed when storing the unit >3 months.
 REFERENCE DRIFT: <10 PPM/°C

OVERALL SIZE: 2 1/2 x 2 5/8 x 5 1/8 inches (63.5 x 66.7 x 130 mm)
 WEIGHT: 10.9 oz. (0.31kg)
 CARRYING CASE: Included, zippered with belt loop and shoulder strap

SOURCE MODE

OUTPUT IMPEDANCE: <0.1 ohms
 SOURCE CURRENT: up to 8 mA (drives 80mV into 10 Ohms)
 OUTPUT NOISE: <4 microvolts p-p for frequencies of 10 Hz or below
 OVERLOAD: Indicates OVER and blanks digits on the display

READ MODE

INPUT IMPEDANCE: >10 Megohms
 OPEN THERMOCOUPLE DETECTION: 450 millisecond check pulse. Nominal threshold, 10 K Ohms. Displays "—" for open circuit
 NORMAL MODE REJECTION: 50/60 Hz, 50 dB
 COMMON MODE REJECTION: 50/60 Hz, 120 dB

Specifications subject to change without notice

RANGES & ACCURACIES

T/C TYPE	°C RANGE	ACCURACY	°F RANGE	ACCURACY
J	-210.0 TO -180.0	$\pm 0.3^\circ$	-346.0 TO -292.0	$\pm 0.5^\circ$
	-180.0 TO -50.0	± 0.2	-292.0 TO -58.0	± 0.4
	50.0 TO 500.0	± 0.1	-58.0 TO 932.0	± 0.2
	500.0 TO 1200.0	± 0.2	932.0 TO 2192.0	± 0.4
K	-230.0 TO -100.0	$\pm 0.6^\circ$	-382.0 TO -148.0	$\pm 1.1^\circ$
	-100.0 TO 1050.0	± 0.2	-148.0 TO 1922.0	± 0.4
	1050.0 TO 1371.1	± 0.3	1922.0 TO 2500.0	± 0.5
T	-260.0 TO -200.0	$\pm 1.0^\circ$	-436.0 TO -328.0	$\pm 1.8^\circ$
	-200.0 TO -50.0	± 0.5	-328.0 TO -58.0	± 0.9
	-50.0 TO 0.0	± 0.2	-58.0 TO 32.0	± 0.4
	0.0 TO 400.0	± 0.1	32.0 TO 752.0	± 0.2
E	-240.0 TO -200.0	$\pm 0.4^\circ$	-400.0 TO -328.0	$\pm 0.7^\circ$
	-200.0 TO -100.0	± 0.2	-328.0 TO -148.0	± 0.4
	-100.0 TO 850.0	± 0.1	-148.0 TO 1562.0	± 0.2
	850.0 TO 1000.0	± 0.2	1562.0 TO 1832.0	± 0.4
R	-18.3 TO 250.0	$\pm 1.2^\circ$	-1.0 TO 482.0	$\pm 2.2^\circ$
	250.0 TO 750.0	± 0.6	482.0 TO 1382.0	± 1.1
	750.0 TO 1600.0	± 0.5	1382.0 TO 2912.0	± 0.9
	1600.0 TO 1767.8	± 0.6	2912.0 TO 3214.0	± 1.1
S	-18.3 TO 100.0	$\pm 1.2^\circ$	-1.0 TO 212.0	$\pm 2.1^\circ$
	100.0 TO 400.0	± 0.8	212.0 TO 752.0	± 1.4
	400.0 TO 1700.0	± 0.6	752.0 TO 3092.0	± 1.1
	1700.0 TO 1767.8	± 0.7	3092.0 TO 3214.0	± 1.3
B	315.6 TO 550.0	$\pm 1.8^\circ$	600.0 TO 1022.0	$\pm 3.2^\circ$
	550.0 TO 900.0	± 1.1	1022.0 TO 1652.0	± 2.0
	900.0 TO 1150.0	± 0.7	1652.0 TO 2102.0	± 1.3
	1150.0 TO 1820.0	± 0.6	2102.0 TO 3308.0	± 1.1

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T/C TYPE	°C RANGE	ACCURACY	°F RANGE	ACCURACY
N	-230.0 TO -180.0	$\pm 1.0^\circ$	-382.0 TO -292.0	$\pm 1.8^\circ$
	-180.0 TO -50.0	± 0.5	-292.0 TO -58.0	± 0.9
	-50.0 TO 1100.0	± 0.2	-58.0 TO 2012.0	± 0.4
	1100.0 TO 1300.0	± 0.3	2012.0 TO 2372.0	± 0.5
G (W)	100.0 TO 150.0	$\pm 1.2^\circ$	212.0 TO 302.0	$\pm 2.2^\circ$
	150.0 TO 400.0	± 0.8	302.0 TO 752.0	± 1.4
	400.0 TO 1700.0	± 0.4	752.0 TO 3092.0	± 0.7
	1700.0 TO 2320.0	± 0.7	3092.0 TO 4208.0	± 1.3
C (WS)	-1.1 TO 1500.0	$\pm 0.5^\circ$	30.0 TO 2372.0	$\pm 0.9^\circ$
	1500.0 TO 1900.0	± 0.6	2372.0 TO 3452.0	± 1.1
	1900.0 TO 2100.0	± 0.7	3452.0 TO 3812.0	± 1.3
	2100.0 TO 2320.0	± 0.9	3812.0 TO 4208.0	± 1.6
D	-1.1 TO 50.0	$\pm 0.6^\circ$	30.0 TO 122.0	$\pm 1.1^\circ$
	50.0 TO 1400.0	± 0.4	122.0 TO 2552.0	± 0.7
	1400.0 TO 1800.0	± 0.5	2552.0 TO 3272.0	± 0.9
	1800.0 TO 2320.0	± 0.9	3272.0 TO 4208.0	± 1.6
P Platinel®	-217.8 TO -150.0	$\pm 0.6^\circ$	-360.0 TO -238.0	$\pm 1.1^\circ$
	-150.0 TO -50.0	± 0.4	-238.0 TO -58.0	± 0.7
	-50.0 TO 1000.0	± 0.2	-58.0 TO 1832.0	± 0.4
	1000.0 TO 1395.0	± 0.3	1832.0 TO 2543.0	± 0.5
L J DIN	-200.0 TO -50.0	$\pm 0.2^\circ$	-328.0 TO -58.0	± 0.4
	-50.0 TO 500.0	± 0.1	-58.0 TO 932.0	± 0.2
	500.0 TO 750.0	± 0.2	932.0 TO 1382.0	± 0.4
U T DIN	-200.0 TO -75.0	$\pm 0.3^\circ$	-328.0 TO -103.0	$\pm 0.5^\circ$
	-75.0 TO 100.0	± 0.2	-103.0 TO 212.0	± 0.4
	100.0 TO 600.0	± 0.1	212.0 TO 1112.0	± 0.2

mV -99.999 TO 99.999 mV $\pm(0.008\%$ of Reading +0.006 millivolts)

WARRANTY

OMEGA ENGINEERING, INC. warrants this unit to be free of any defects in materials and workmanship for a period of 37 months from date of purchase. OMEGA 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 should malfunction, 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 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 being damaged as a result of excessive corrosion; or current, heat, moisture, 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.

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USA and Canada:

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Engineering Service: 1-800-872-9436 / 1-800-USA-WHENSM
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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, patient connected applications

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to @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. P.O. 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. P.O. number to cover the cost of repair,
2. Model and serial number of 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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OPERATING INSTRUCTIONS

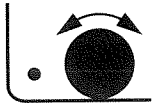
SOURCE MODE (Millivolt output or Simulate T/C temperatures)

SOURCE



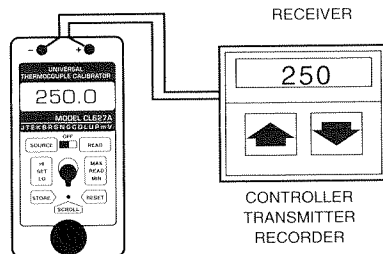
STORE ● RESET

OUTPUT

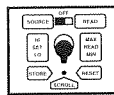
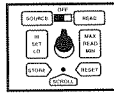


- 1) Set up the CL627A for the correct T/C type and temperature scale ($^{\circ}\text{C}$ or $^{\circ}\text{F}$)
- 2) Disconnect the input wires from the device to be calibrated or checked
- 3) Connect the CL627A to the device to be calibrated, being careful to observe proper polarity & T/C type
- 4) Adjust the digital pot to the desired output value

Whenever SOURCE mode is selected the word SOURCE will appear on the LCD display. To change the output value, turn the speed sensitive digital pot. Turning the pot slowly will cause a gradual change in the output. A faster change will occur when the pot is turned faster. This function operates in all three output positions (HI, SET & LO).



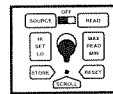
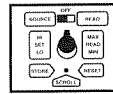
STORE



- 1) Switch to HI or LO
- 2) Turn the digital pot to desired value
- 3) Press the STORE/SCROLL pushbutton. The LCD will flash once to show that the value was saved

If a value is in the SET position and you want that value stored in HI or LO, press and hold the STORE/SCROLL pushbutton while moving the switch to HI or LO. Then release the STORE button.

"QUIK-CHEK"



Any time you need a stored value just throw the "QUIK-CHEK" switch. Any value in the T/C range may be stored in HI & LO. The CL627A remembers the HI, LO and SET values for all T/C types (45 memories) and millivolts for you with the power on or off. Each time a different T/C type is selected, the latest three "QUIK-CHEK" values for that type will be recalled.

OVERLOAD

The CL627A will indicate OVER and blank the digits on the display when the output leads have been shorted or when the device being calibrated requires more than 10mA.

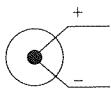
READ MODE (MEASURE THERMOCOUPLES)

READ



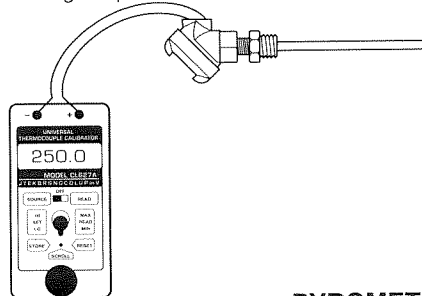
STORE ● RESET

INPUT

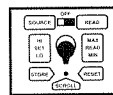
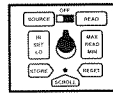


- 1) Set up the CL627A for the correct T/C type and temperature scale ($^{\circ}\text{C}$ or $^{\circ}\text{F}$)
- 2) Disconnect the wires from the thermocouple to be read or checked.
- 3) Connect the CL627A to the sensor, being careful to observe proper polarity & T/C type
- 4) Display present reading, Maximum or Minimum temperatures

Whenever READ mode is selected the word READ will appear on the LCD. The CL627A can measure temperatures for all T/C types with resolutions of 0.1° and 1° . The display is updated twice per second to continuously track fast moving temperatures.

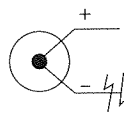


MIN/MAX



To read the Maximum or Minimum temperature since INPUT mode was entered, simply switch to MAX or MIN. The value will appear on the LCD along with the word MAX or MIN. The MAX/MIN values are automatically updated and may be viewed at any time without disturbing the other values. Pressing the RESET/SCROLL pushbutton will transfer the present temperature into both MAX and MIN and will update them as the measured temperature changes.

OPEN THERMOCOUPLES



The CL627A checks for open or high resistance thermocouples. Open or burned out T/Cs are indicated by "—" on the display. Temperatures out of range for the T/C TYPE selected will be indicated by OVER and UNDER on the display.

PYROMETER CALIBRATION

Some thermocouple input pyrometers and controllers operate on the D'Arsonval meter movement principle. Millivolts from the thermocouple input drive a low resistance coil directly. For example, a coil may have a typical resistance of 60 ohms. Since the pyrometer resistance is so low, resistance of the input thermocouple leads must be taken into account. Pyrometers of this type have fixed or adjustable series resistance which corrects for lead length resistance.

To use the CL627A to drive low resistance loads:

- 1) Disconnect the sensing thermocouple leads at the thermocouple head.
- 2) Connect leads from the CL627A to the extension wires going to the pyrometer, using the screw connectors in the head. (If the sensing thermocouple sheath is within 1/4 to 2 times the length of the CL627A lead length, the error due to resistance will be negligible).
- 3) Set the temperatures to be used for calibration per the recommendation of the pyrometer manufacturer.

If the thermocouple head cannot be accessed:

- 1) Determine the installed length of extension wire between the head and the pyrometer.
- 2) Select thermocouple extension wire of the same type, wire size and length as the installed wire between the head and the pyrometer to make up a calibrating wire.
- 3) Replace the active thermocouple extension wire with the calibrating wire at the pyrometer terminals.
- 4) Connect the other ends of the calibrating wire to the CL627A and calibrate the pyrometer.

Note: A resistor of the same ohm value as the wire between the head and the pyrometer may be used in series with one lead instead of a length of calibrating wire. Make certain that both input and output leads to the resistor are the same temperature.

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

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 Gauges
- ☑ Load cells & Pressure Gauges
- ☑ 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