



# User's Guide



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## M-4336/0606

### CL300A Precision Thermocouple Calibrator



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# CL300A

## 1. Introduction

The Omega CL300A is designed to be a simple to use, high accuracy thermocouple calibrator capable of either simulating or reading J, K, T, L, E, R, S, T, B, C, or mV thermocouple types. A standard thermocouple mini-connector along with screw terminals for bare wire makes connections easy while providing direct contact with the internal cold junction compensation circuitry.

When used as a thermocouple simulator, the CL300A provides control which allow the user to either "step" in increments or decades.

### 1.1 Customer Service

#### **Omega Engineering**

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Box 4047  
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[www.omega.com](http://www.omega.com)  
email: [cservice@omega.com](mailto:cservice@omega.com)

### 1.2 Unpacking

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment please call Omega at 1-800-826-6342. When the shipment is received inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE: The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

### 1.3 Safety information

#### **Symbols Used**

The following table lists the International Electrical Symbols. Some or all of these symbols may be used on the instrument or in this manual.

Symbol	Description
	AC (Alternating Current)
	AC-DC
	Battery
	CE Complies with European Union Directives
	DC
	Double Insulated
	Electric Shock
	Fuse
	PE Ground
	Hot Surface (Burn Hazard)
	Read the User's Manual (Important Information)
	Off
	On

The following definitions apply to the terms "Warning" and "Caution".

- "Warning" identifies conditions and actions that may pose hazards to the user.
- "Caution" identifies conditions and actions that may damage the instrument being used.

Use the calibrator only as specified in this manual, otherwise injury and damage to the calibrator may occur.

 **Warning**

**To avoid possible electric shock or personal injury:**

- Do not apply more than the rated voltage. See specifications for supported ranges.
- Follow all equipment safety procedures.
- Do not use the calibrator if it is damaged. Before you use the calibrator, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Select the proper function and range for your measurement.
- Make sure the battery cover is closed and latched before you operate the calibrator.
- Remove test leads from the calibrator before you open the battery door.
- Inspect the test leads for damaged insulation or exposed metal.
- When using the probes, keep your fingers away from the probe contacts. Keep your fingers behind the finger guards on the test leads.
- Do not use the calibrator if it operates abnormally. Protection may be impaired. When in doubt, have the calibrator serviced.
- Do not operate the calibrator around explosive gas, vapor, or dust.
- Disconnect test leads before changing to another measure or source function.
- When servicing the calibrator, use only specified replacement parts.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.

 **Caution**

**To avoid possible damage to calibrator or to equipment under test:**

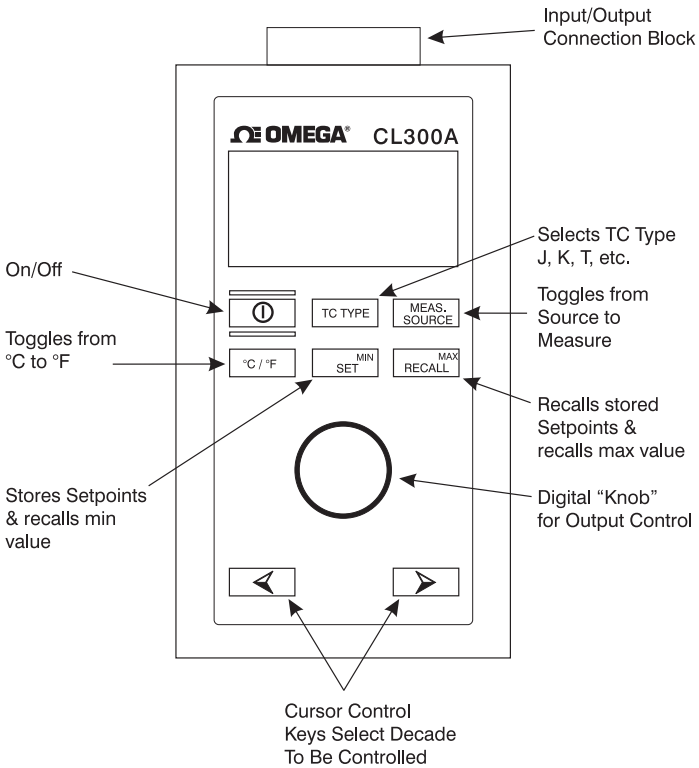
- Use the proper jacks, function, and range for your measurement or sourcing application.

## 2. Accessories

The following items are available for the CL300A calibrator.

<u>Item</u>	<u>P/N</u>
AC adapter/charger	PCL-ACA
9V NiCd battery (must use with above charger)	PCL422A-BATT

## 3. Set-Up Basic/Advanced



**FIGURE 1**

Before beginning, become familiar with the keypad layout and the configuration of the input/output jacks. See Figure 1.

In the basic or "as shipped" setup, the CL300A allows the user to step through all available T/C types (10 plus mV). In certain situations this may be confusing to infrequent users as to which type to use.

The optional advanced setup mode allows a supervisor through password control to “blank out” or disable unwanted T/C types so that only the proper T/C types can be selected. The following procedure outlines how this is done:

1. Hold down the **TC TYPE** key at power up.
2. The word **PASS** will be displayed and you need to introduce the password 123 as follows:  
Rotate the knob to 1, press **SET** key, rotate to 2, press **SET**, rotate to 3, press **SET**.
3. You can toggle through all the thermocouple types by pressing **TC TYPE** key.
4. Press **SET** key for the ones that you want to keep.
5. The last TC type is mV. By pressing **TC TYPE** key again, you'll exit from this mode and return to normal operation.
6. If you missed one, repeat the entire procedure again.

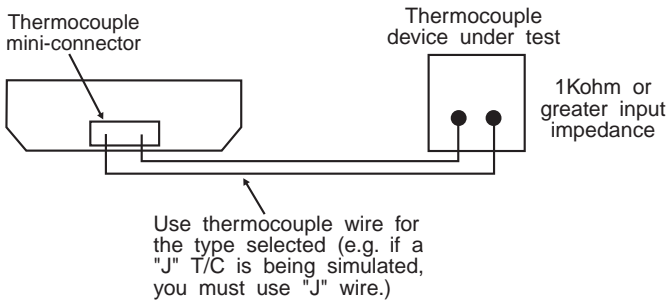
## 4. Operating Procedure

1. Turn on power and select the desired thermocouple type by depressing the T/C Select key. Once the desired T/C is selected, it will remain in memory until a new T/C type is selected.
2. Select either Input or Output mode depending on whether you want to read a thermocouple or simulate a thermocouple signal.
3. Connect the appropriate thermocouple to the mini-connector or screw terminals on the top of the CL300A. **Note:** for best accuracy, allow 3 to 5 minutes for the T/C connector (or wire) to stabilize to the same temperature as the connector block.
4. If you are using the CL300A in the output mode use the cursor control keys to select the decade to be controlled. Note that the cursor is the line under a specific digit.

## 5. Operating Connections and Precautions

1. When operating in the thermocouple output mode, the CL300A has the ability to simulate up to 10 T/C types plus mV into devices which measure thermocouples:

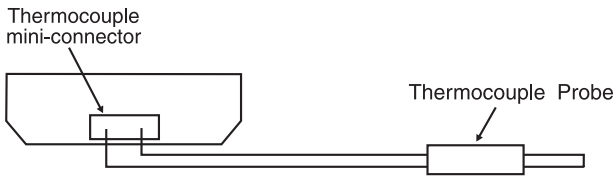
**NOTE:** If the CL300A is improperly connected to a low impedance load (either a short or near short) the display will flash.



**FIGURE 2**  
**SIMULATING A THERMOCOUPLE OUTPUT**

2. When operating in the thermocouple Measure Mode the CL300A can be used to read the temperature of a thermocouple probe.

In this mode, the CL300A will detect an open circuit should the thermocouple junction malfunction. In this case, the display will indicate "OL". It will also indicate "OL" if no probe is connected in the Input Mode.



**FIGURE 3**  
**READING A THERMOCOUPLE PROBE**

## 6. Battery Save Feature

The CL300A incorporates an Auto Shut Off or Battery Save feature that will automatically turn off the CL300A after a preset amount of time (up to 30 minutes) The factory default setting is 30 minutes, but can be changed or disabled by completing the following steps:

- 1) Turn on the CL300A. Closely watch the display during power up.
- 2) The display will indicate the amount of time the battery save feature is set for (off to 30 minutes). Immediately adjust the knob to change the time period or disable the function.

## 7. Setpoint Feature

The CL300A allows the user to program up to 3 setpoints for each TC type (including mV). to set the setpoints complete the following procedure:

- 1) Turn on the CL300A and select the Source Mode.
- 2) Select the TC type to be simulated and correct units (either °C or °F).
- 3) Press  to see what is currently stored in each of the 3 setpoints.
- 4) To store a new value adjust the output to the desired value then press the  key.
- 5) Repeat steps 3 & 4 until all 3 setpoints are stored.
- 6) Once the setpoints are stored, press the  key to recall the newly stored setpoints.
- 7) Each press of the  key will increment to the next stored setpoint.

**Note:** Setpoints are non-volatile and will remain in memory until changed.

## 8. Min/Max Datalogging

When the CL300A is in the measure mode it will continuously monitor and store the minimum and maximum values for that particular input. To operate the datalogging feature use the following procedure:

- 1) Place the CL300A in the measure mode.
- 2) Connect a thermocouple (or probe).

- 3) Clear the min/max memory by pressing both keys (min and max) simultaneously. The LCD will display "CLR" when the memory is cleared.
  - 4) Allow the unit to log min. and max. for as long as required.
- Warning:** You may want to disable the Battery Save feature before using the Datalogging Mode to prevent the CL300A from turning off prematurely.
- 5) At any time press the min. or max. to display the value stored.
  - 6) Turning off the CL300A or changing modes will clear the memory. Be sure to record your data before turning off the unit.

## 9. Maintenance

### A. Battery Selection

The CL300A operates on a standard 9V alkaline battery or an optional rechargeable 9V Ni-Cd battery. For most applications the 9V alkaline battery will suffice; however, in heavy use applications the 9V Ni-Cd may be a better choice. The 9V Ni-Cd battery supplied by Omega will offer approximately 7 hours of continuous use on a full charge (the alkaline battery will yield about 25 hours). The optional 1001-9V charger supplied by Omega will provide an overnight charge rate (10-12 hours) and will also power the CL300A for bench use while maintaining a float charge on the Ni-Cd battery.

**Warning:** Never connect the AC adapter/ charger with the 9V alkaline battery installed.

To order the 9V Ni-Cd battery or AC adapter/charger contact Omega Engineering at 800-TO-OMEGA.

### B. Input Protection

The CL300A incorporates a fuseless input protection and will tolerate most misconnections up to 250 VAC or 250 VDC for up to 30 seconds duration. Because of this protection no fuse is required.

### C. Calibration

The CL300A is designed to hold its rated accuracy for a minimum of one (1) year. This instrument is tested to and meets published specifications. After final calibration our products are stored in a controlled stock room and considered bonded storage. Depending on environment and severity of use factory calibration is recommended every one to three years after initial installation. Contact Omega Engineering's Customer Service Department for re-calibration information at 1-800-622-2378 or [cservice@omega.com](mailto:cservice@omega.com)

# 10. Specifications

(1 year at 23°C ±5°C; % of reading unless otherwise noted)

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## Output Voltage

Range	-10 to +75.000 mV
Resolution	1 mV
Accuracy	±0.007 % of reading, ±5 μV
Output Impedance	>1 Ohm

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## Input Voltage

Range	-10 to +75.000 mV
Resolution	1 mV
Accuracy	±0.007 % of reading, ±5 μV
Input Impedance	> 1 MegOhm

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## Thermocouple Source/Measure

Types	J, K, T, E, R, S, B, L, U, C, mV
Resolution	
Source	±0.1°C or °F
Measure	±0.01°C or °F
Accuracy	
J	±0.5 °C; -210 °C to -100 °C ±0.25 °C; -100 °C to +1,200 °C
K	±0.6 °C; -200 °C to -100 °C ±0.3 °C; -100 °C to +1,000 °C ±0.5 °C; +1,000 °C to +1,372 °C
T	±0.7 °C; -200 °C to -150 °C ±0.3 °C; -150 °C to +400 °C
E	±0.5 °C; -200 °C to -100 °C ±0.2 °C; -100 °C to +1,000 °C
R	±1.8 °C; 0 °C to 250 °C ±1.0 °C; 250 °C to +1,767 °C
S	±1.8 °C; 0 °C to 250 °C ±1.0 °C; 250 °C to +1,767 °C
B	±1.7 °C; 600 °C to 1,000 °C ±1.2 °C; 1,000 °C to 1,820 °C
L	±0.5 °C; -200 °C to -100 °C ±0.4 °C; -100 °C to +900 °C
U	±0.7 °C; -200 °C to 0 °C ±0.3 °C; 0 °C to +600 °C
C	±0.4 °C; 0 to °C 1,000 °C ±0.7 °C; 1,000 °C to +1,800 °C ±1.2 °C; +1,800 °C to +2,316 °C

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## CJC Temperature Offset

±0.05 °C/°C outside of 23±5 °C

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## Warm-up Time

1 minute to specification

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## Environmental

Operating	-10 °C to +55 °C
Storage	-20 °C to +70 °C

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## Power Requirements

Battery	9 Volt alkaline; 006P/ IEC 6F22/ NEDA1604 Optional NiCad Optional AC adapter/charger
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## Mechanical Dimensions

5.7" x 3.15" x 1.43"  
(14.47 cm x 8.00 cm x 3.63 cm)

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## Weight

12 ounces (340 grams)

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Notes: 1.Temperature standard ITS-90.



## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal one (1) 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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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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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