

# LD-200P

## 200 W Programmable Electronic Load

## User Manual



# Safety Summary

A **WARNING** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.

A **CAUTION** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.

The following safety precautions apply to both operating and maintenance personnel and must be followed during all phases of operation, service, and repair of this instrument.

## **WARNING**

Before applying power to this instrument:

- Read and understand the safety and operational information in this manual.
- Apply all the listed safety precautions.
- Verify that the voltage selector at the line power cord input is set to the correct line voltage. Operating the instrument at an incorrect line voltage will void the warranty.
- Make all connections to the instrument before applying power.
- Do not operate the instrument in ways not specified by this manual or by Global Specialties.

### ***Electrical Power***

This instrument is intended to be powered from a CATEGORY II mains power environment. The mains power should be 120 V RMS or 240 V RMS. Use only the power cord supplied with the instrument and ensure it is appropriate for your country of use.

## ***Ground the Instrument***

### **WARNING**

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical safety ground. This instrument is grounded through the ground conductor of the supplied, three-conductor AC line power cable. The power cable must be plugged into an approved three-conductor electrical outlet. The power jack and mating plug of the power cable meet IEC safety standards.

### **WARNING**

Do not alter or defeat the ground connection. Without the safety ground connection, all accessible conductive parts (including control knobs) may provide an electric shock. Failure to use a properly-grounded approved outlet and the recommended three-conductor AC line power cable may result in injury or death.

### **WARNING**

Unless otherwise stated, a ground connection on the instrument's front or rear panel is for a reference of potential only and is not to be used as a safety ground.

## ***Do not operate in an explosive or flammable atmosphere***

### **WARNING**

Do not operate the instrument in the presence of flammable gases or vapors, fumes, or finely divided particulates.

## ***Use only in office-type indoor setting***

### **WARNING**

The instrument is designed to be used in office-type indoor environments. Do not operate the instrument:

- In the presence of noxious, corrosive, or flammable fumes, gases, vapors, chemicals, or finely-divided particulates.

- In relative humidity conditions outside the instrument's specifications.
- In environments where there is a danger of any liquid being spilled on the instrument.
- In air temperatures exceeding the specified operating temperatures.
- In atmospheric pressures outside the specified altitude limits or where the surrounding gas is not air.
- In environments with restricted cooling air flow, even if the air temperatures are within specifications.
- In direct sunlight.

## **CAUTION**

This instrument is intended to be used in an indoor pollution degree 2 environment. The operating temperature range is 10 °C to 40 °C and the operating humidity range is up to 80% relative humidity with no condensation allowed. Measurements made by this instrument may be outside specifications if the instrument is used in non-office-type environments. Such environments may include rapid temperature or humidity changes, sunlight, vibration and/or mechanical shocks, acoustic noise, electrical noise, strong electric fields, or strong magnetic fields.

### ***Do not operate instrument if damaged***

If the instrument is damaged, appears to be damaged, or if any liquid, chemical, or other material gets on or inside the instrument, remove the instrument's power cord, remove the instrument from service, label it as not to be operated, and return the instrument to Global Specialties for repair. Notify Global Specialties of the nature of any contamination of the instrument.

### ***Clean the instrument only as instructed***

Do not clean the instrument, its switches, or its terminals with contact cleaners, abrasives, lubricants, solvents, acids/bases, or

other such chemicals. Clean the instrument only with a clean dry lint-free cloth or as instructed in this manual.

### ***Not for critical applications***

#### **WARNING**

This instrument is not authorized for use in contact with the human body or for use as a component in a life-support device or system.

### ***Do not touch live circuits***

#### **WARNING**

Instrument covers must not be removed by operating personnel. Component replacement and internal adjustments must be made by qualified service-trained maintenance personnel who are aware of the hazards involved when the instrument's covers and shields are removed. Under certain conditions, even with the power cord removed, dangerous voltages may exist when the covers are removed. To avoid injuries, always disconnect the power cord from the instrument, disconnect all other connections (for example, test leads, computer interface cables, etc.), discharge all circuits, and verify there are no hazardous voltages present on any conductors by measurements with a properly-operating voltage-sensing device before touching any internal parts. Verify the voltage-sensing device is working properly before and after making the measurements by testing with known-operating voltage sources and test for both DC and AC voltages. Do not attempt any service or adjustment unless another person capable of rendering first aid and resuscitation is present. Do not insert any object into an instrument's ventilation openings or other openings.

#### **WARNING**

Hazardous voltages may be present in unexpected locations in circuitry being tested when a fault condition in the circuit exists.

### ***Fuse replacement***

#### **WARNING**

Fuse replacement must be done by qualified service-trained maintenance personnel who are aware of the instrument's fuse requirements and safe replacement procedures. Disconnect the instrument from the power line before replacing fuses. Replace fuses only with new fuses of the fuse types, voltage ratings, and current ratings specified in this manual or on the back of the instrument. Failure to do so may damage the instrument, lead to a safety hazard, or cause a fire. Failure to use the specified fuses will void the warranty.

### ***Servicing***

#### **CAUTION**

Do not substitute parts that are not approved by Global Specialties or modify this instrument. Return the instrument to Global Specialties for service and repair to ensure that safety and performance features are maintained.

### ***Cooling fans***

#### **CAUTION**

This instrument contains one or more cooling fans. For continued safe operation of the instrument, the air inlet and exhaust openings for these fans must not be blocked nor must accumulated dust or other debris be allowed to reduce air flow. Maintain at least 25 mm clearance around the sides of the instrument that contain air inlet and exhaust ports. If mounted in a rack, position power devices in the rack above the instrument to minimize instrument heating while rack mounted. Do not continue to operate the instrument if you cannot verify the fan is operating (note some fans may have intermittent duty cycles). Do not insert any object into the fan's inlet or outlet.

### ***Use correctly sized wires***

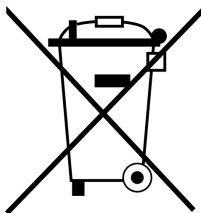
#### **WARNING**

To connect a load to the power supply, use a wire diameter large enough to handle the maximum continuous output short-circuit current of the power supply without the wire overheating.

### ***For continued safe use of the instrument***

- Do not place heavy objects on the instrument.
- Do not obstruct cooling air flow to the instrument.
- Do not place a hot soldering iron on the instrument.
- Do not pull the instrument with the power cord, connected probe, or connected test lead.
- Do not move the instrument when a probe is connected.

## **Compliance Statements**



### ***Disposal of Old Electrical & Electronic Equipment***

(Applicable in the European Union and other European countries with separate collection systems). This product is subject to Directive 2012/19/EU of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions adopting that Directive, is marked as

being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and otherwise observe all applicable requirements.

***The LD-200P is CE compliant.***

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# 1 General Information

## 1.1 Product Overview

The LD-200P is a programmable high resolution load with digital button control for ease of operation. With a voltage range of 1-63 V and current range of 10 mA to 15 A, the LD-200P is the perfect all-round electronic load. The LD-200P can operate in constant current (CC), constant voltage (CV), constant resistance (CR), and constant power (CW) mode and has a standard USB interface for remote communication.

## 1.2 Features

- High resolution (20 mV, 1 mA, 0.1 W, 0.1  $\Omega$ )
- 9 sets of programmable memory
- 4-digit LED display
- Voltage range: 1 - 63 V
- Current range: 10 mA - 15 A
- Maximum power: 200 W
- Operation modes: constant voltage (CV), constant current (CC), constant power (CP), and constant resistance (CR)
- Built in USB interface
- Over Voltage (OVP) & Over Current Protection (OCP)

## 1.3 Package Contents

Please inspect the instrument mechanically and electrically upon receiving it. Unpack all items from the shipping carton, and check for any obvious signs of physical damage that may have occurred during transportation. Report any damage to the shipping agent immediately. Save the original packing carton for possible future reshipment.

The 1415 power supply is shipped with the following contents:

- LD-200P Electronic Load
- Power Cord
- User Manual
- Banana Plug to Alligator Clip Lead Wires (2 Black & 2 Red)

## 1.4 Front Panel Overview

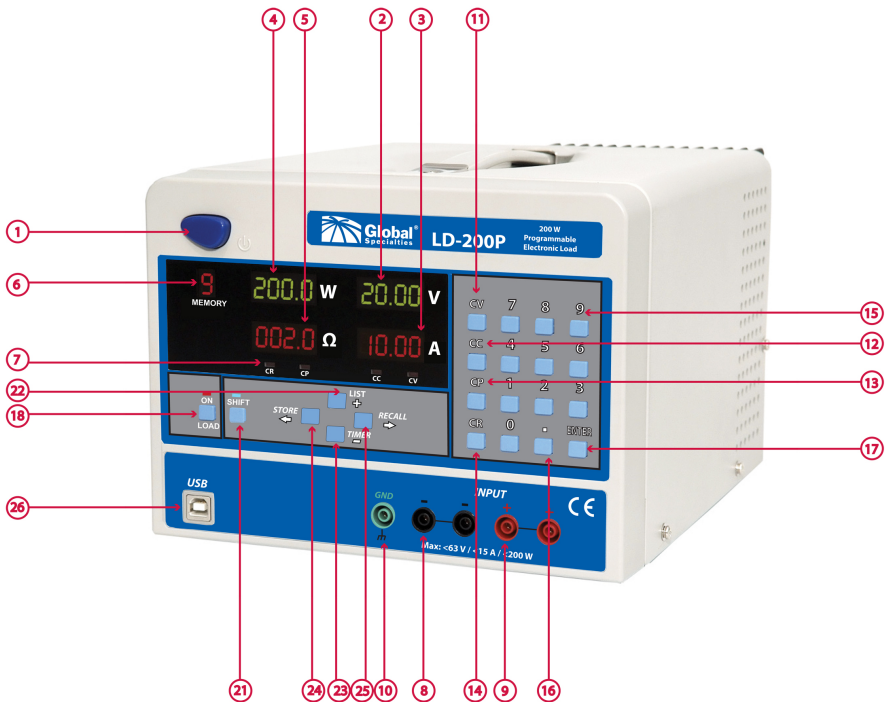


Figure 1: Front Panel

## Front Panel

1.	Power button: Power On/Off.
2.	V display: Indicates voltage limit or testing voltage value
3.	C display: Indicates current setting or testing current value.
4.	W display: Indicates power setting or testing power value.
5.	$\Omega$ display: Indicates resistance setting or testing resistance value.
6.	Memory display: Indicates the present memory location.
7.	Status display: Indicates the operational mode.
8.	– Input 4mm safety banana jack connector: Negative input terminal.
9.	+ Input 4mm safety banana jack connector: Positive input terminal.
10.	GND 4mm safety banana jack connector: Ground terminal.
11.	CV: Select constant voltage mode.
12.	CC: Select constant current mode.
13.	CP: Select constant power mode.
14.	CR: Select constant resistance mode.
15.	0 - 9: Data input.
16.	“ • ”: Decimal pont.
17.	ENTER: Activate the input.
18.	LOAD button. Push to activate load and LED. Push again to turn off.
21.	SHIFT button: Push to access the secondary functions.
22.	+ (LIST): + : Increase the setting value. LIST: Push [SHIFT][LIST] to ENTER to List Mode.
23.	- (TIMER): - : Decrease the setting value. TIMER: Push [SHIFT][TIMER] to change to time duration for List Mode.
24.	⇐ (STORE): ⇐ : Change digit to the left. STORE: Push [SHIFT][STORE] to change to save settings.
25.	⇒ (RECALL): ⇒ : Change digit to the right. RECALL: Push [SHIFT][RECALL] to view saved settings.
26.	USB connection

## 1.5 Rear Panel Description

Rear Panel	
27.	Heat sink: Heat dissipation for power transistor.
28.	Ventilation fan: 8" 24 V DC fan.
29.	Power input socket.
30.	▲ The input power voltage indicator.
31.	Fuse holder and input voltage selector.



**Figure 2: Rear Panel**

## 2 Getting Started

### 2.1 Input Power and Fuse Requirements

The load has a selectable AC input that accepts line voltage input within:

- Voltage: 115 V or 230 V ( $\pm 10\%$ )
- Frequency: 47 Hz – 63 Hz

Before connecting to an AC outlet or external power source, be sure that the power switch is in the OFF position and verify that the AC power cord, including the extension line, is compatible with the rated voltage/current and that there is sufficient circuit capacity for the power supply. Once verified, connect the cable firmly.

#### **WARNING**

The included AC power cord is safety certified for this instrument operating in rated range. To change a cable or add an extension cable, be sure that it can meet the required power ratings for this instrument. Any misuse with wrong or unsafe cables will void the warranty.

#### **WARNING**

The power cord provides a chassis ground through a third conductor. Verify that your power outlet is of the three-conductor type with the correct pin connected to earth ground.

### 2.2 Fuse Requirements

An AC input fuse is necessary when powering the instrument. The below table shows the fuse required for all models operating with either 120 VAC or 240 VAC input.

Selector	Line Voltage	Fuse
120 V	114 - 126 V, 50/60 Hz	1.0 A
240 V	228 - 252 V, 50/60 Hz	0.6 A

## 2.3 Line Voltage Selection

The LD-200P can be selected to operate with 110 V input or 220 V input. To ensure that your instrument is properly configured to operate at the desired AC line voltage, please follow the steps below.

### **WARNING**

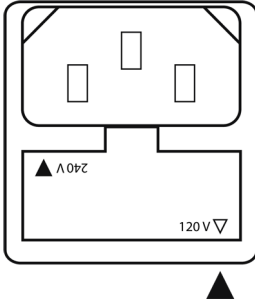
For safety, no power should be applied to the instrument while changing line voltage operation. Disconnect all cables connected to the instrument before proceeding.

#### 2.3.1 Check and/or Change Fuse

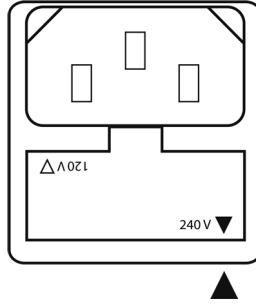
- Locate the fuse box next to the AC input connector in the rear panel (see Figure 2).
- With a small flat blade screwdriver, insert into the fuse box slit to pull and slide out the fuse box as indicated below.
- Check and replace fuse (if necessary) for the desired line voltage operation (see section 2.2).

#### 2.3.2 Check and/or Change Line Voltage Switch

The input power voltage indicator is a black arrow  $\nabla$  on the rear panel near the AC input connector. See Figure 2, #30. The fuse holder (Figure 2, #31, has a both a smaller white arrow  $\nabla$  (120 V) and a smaller black arrow (240 V) on it. The fuse holder should be rotated so that the fuse holder arrow of the appropriate voltage is pointing to the larger black input power voltage indicator arrow. See Figures 3 & 4 below.



*Figure 3: 120 V Setup*



*Figure 4: 240 V Setup*

## **CAUTION**

Do not connect power to the instrument until the line voltage selection is setup correctly. Applying an incorrect line voltage or configuring the line voltage selection improperly may damage the instrument and void all warranty.

### 2.4 Ventilation

## **CAUTION**

Also make sure the ventilation holes are not blocked. Ensure the ventilation fan is working well (it should turn on at power-on). Do not load the output if fan is not working otherwise it may cause overheating.

## 3 Operating the Electronic Load

### 3.1 Constant Voltage Setting

Push **[CV]**, key in the voltage, and hit the **ENTER** key to set the input voltage value. For example, to set the input voltage value to 10.5 V:

Push **[CV] [1] [0] [.] [5] ENTER**

## 3.2 Constant Current Setting

Push **[CC]**, key in the current, and hit the **ENTER** key to set the input current value. For example, to set the input current value to 3.05 A:

Push **[CC][3][.][0][5] ENTER**

If the input current is less than the set current value, the LD-200P will pull down the input voltage until input current equals the set value or input power reaches 200 W.

## 3.3 Constant Power Setting

Push **[CP]**, key in the power value, and hit the **ENTER** key to set the input power value. For example, to set the input power value to 110 W:

Push **[CP][1][1][0] ENTER**

## 3.4 Constant Resistance Setting

Push **[CR]**, key in the resistance value, and hit the **ENTER** key to set load resistance value. For example, to set the load resistance value at 510  $\Omega$ :

Push **[CR][5][1][0] ENTER**

## 3.5 List Mode

The LD-200P has List Mode which allows you to playback the settings saved in memory locations 1-9.

### 3.5.3 Storing the Settings

Push **[SHIFT][STORE]**, number key, **ENTER** key to save settings to the target memory location. For example, to save settings to memory location 5:

Push **[SHIFT][STORE][5] ENTER**

### 3.5.4 Data Recall

Push **[SHIFT][RECALL]**, number key, **ENTER** key to recall all setting values from target memory location. For example, to recall values from memory location 2:

Push **[SHIFT][RECALL][2] ENTER**

### 3.5.5 List Timing

Use the **TIMER** function to set how long the load will run the settings from a memory location. For example to have memory location 2 run for 30 seconds, set the timer to 30 seconds and save this in location 2.

First, if you are showing a different memory location, push **[SHIFT][RECALL][2] ENTER** to go to memory location 2. Then push **[SHIFT][TIMER][3][0] ENTER**. Finally, push **[SHIFT][STORE][3] ENTER** [to save].

### 3.5.6 Run the List

Push **[SHIFT][LIST] ENTER** key **ENTER** List Mode and automatically run through the settings of locations 1-9. For example, say that you have already set location 1 at 5 V with a delay time of 10 seconds. Location 2 has been set to 60 V with a delay time of 15 seconds. Location 3-9 all have 0 V for 0 seconds. Now to activate the list:

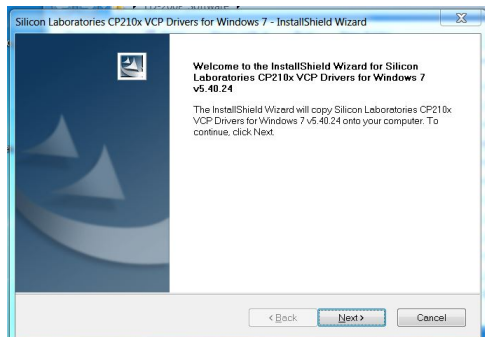
Push **[SHIFT][LIST][LOAD]**.

The load will now show location 1 and display the testing voltage (up to the limit of 5 V) and after 10 seconds it will change to location 2 with a limit of 60 V.

List Mode will run continuously through your 9 programs starting at location 1. Each location must be set to the same mode such as CC or CV otherwise the program will stop at the first location with a different mode.

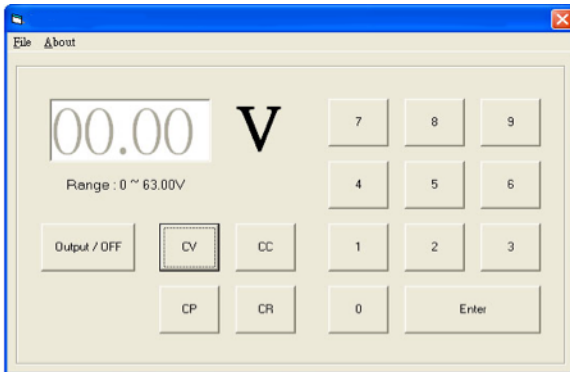
### 3.6 Control from a PC

1. The LD-200P Software is compatible with the following operating systems: Windows 9X, Windows ME, and Windows XP, Windows 7 (32-bit only).
2. Download the software from the LD-200P page on our website: [globalspecialties.com](http://globalspecialties.com). See the “DOWNLOADS” tab.
3. Browse to the copy of the software on your computer.
4. Double click on the “Setup.exe” file. Follow the instructions on the screen to install the LD-200P Software.
5. Browse to the Driver folder. Use **CP210x\_VCP\_Win2K\_XP\_S2K3** for Windows ME, 2000 or XP. Use **CP210x\_VCP\_Win7** for Windows 7. Double click on the appropriate driver. Follow the instructions on the screen to install the driver.



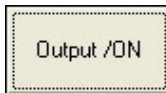
**Figure 5: Driver Installation**

6. Connect the LD-200P to your computer via a USB cable.
7. Open the LD-200P Software.
8. The LD-200P program will confirm the COM port. The software only recognizes COM ports 1-5, so your LD-200P should be assigned to one of those. For help with COM ports, see the “Help with COM ports” document on the LD-200P web page (DOWNLOADS).
9. The computer will display the image shown below. You can now control the LD-200P by your PC or on the front panel of LD-200P.



*Figure 6: PC Control*

10. The output by default is set **OFF**. It will be reset to **OFF** on each startup. Click the **Output/ON** to switch on the output.



11. Click **CV**, **CP**, **CC**, **CR** to select the operation mode.
12. Click the number panel to input the voltage you need (0 – 63.00V).
13. Click **ENTER** to activate the desired voltage on the LD-200P.



# Specifications

All specifications apply to the unit after a temperature stabilization time of 15 minutes over an ambient temperature range of  $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ .

<b>LD-200P Electronic Load</b>	
<b>Input Ratings</b>	
Input Voltage	63 V
Input Current	15 A
Input Power	200 W
<b>CV Mode</b>	
Range	1-63 V
Resolution	20 mV
Accuracy	$\pm(1\%+20\text{ mV})$
<b>CC Mode</b>	
Range	10 mA – 15 A
Resolution: 10 mA – 1 A 1 A – 15 A	1 mA 10 mA
Accuracy : 10 mA – 1 A 1 A – 6 A 6 A – 15 A	$\pm(0.5\%+1\text{ mA})$ $\pm(0.5\%+10\text{ mA})$ $\pm(1\%+100\text{ mA})$
<b>CP Mode</b>	
Range	1 – 200 W
Resolution	0.1 W
Accuracy	$\pm(1\%+0.2\text{ W})$
<b>CR Mode</b>	
Range	0.5-999 $\Omega$
Resolution	0.1 $\Omega$
Accuracy	$\pm(1\%+0.2\text{ } \Omega)$
<b>List Mode</b>	
Memory Locations	1-9
Timer Range	1-999999 sec
Timer Resolution	1 sec
<b>Readback Voltage</b>	
Resolution	20 mV
Accuracy	$\pm(1\%+50\text{ mV})$
<b>Readback Current</b>	
Resolution	10 mA
Accuracy	$\pm(1\%+10\text{ mA})$
<b>General</b>	

Remote Interface	USB
Protection	OVP & OCP
Operating Temperature	50 °F to 104 °F (10 °C to 40 °C)
Operating Humidity	80% R.H.
AC Line Input	VAC 115/230 ±10%, 50/60 Hz (Selectable)
Fuse	120 V, 1.0 A or 240 V, 0.6 A
Dimensions (W x H x D)	9 x 6.75 x 12 in (228 x 171 x 305 mm)
Weight	10 lbs (4.5 kg)
Warranty	One-year warranty

Specifications are subject to change without notice. To ensure the most current version of this manual, please download the current version from our website: [globalspecialties.com](http://globalspecialties.com).

## 4 Maintenance

### 4.1 Preventative Steps

Please follow these preventive steps to ensure the proper operation of your instrument.

- Never place heavy objects on the instrument.
- Never place a hot soldering iron on or near the instrument.
- Never insert wires, pins, or other metal objects into ventilation fan.
- Never move or pull the instrument with power cord or output lead. More importantly, never move the instrument when the power cord or output lead is connected.
- Do not obstruct the ventilation holes in the rear panel as this will increase the internal temperature.
- Do not operate the instrument with the cover removed unless you are a qualified service technician.
- Clean and recalibrate the instrument on a regular basis to keep the instrument looking nice and working well.

- Remove any dirt, dust, and grime whenever they become noticeable on the outside cover using a soft cloth moistened with a mild cleaning solution.

## 4.2 When the Unit is Not Turning On

Check if the power ON/OFF switch is turned ON. Check for blown fuse. If not, then check the power cord. Please make sure that the power cord is properly connected to the unit. Please also check the main switch and ensure that the AC supply at your site is the same as the one mentioned at the rear chassis of the unit.

## 4.3 Fuse Replacement

If the fuse blows, the LED will not light and the instrument will not operate. Replace only with the correct value fuse. See sections 2.2 and 2.3.

# 5 Service and Warranty Information

## 5.1 Limited One-Year Warranty

Cal Test Electronics warrants this product to be free from defective material or workmanship for a period of 1 year from the date of original purchase. Under this warranty, Cal Test Electronics is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within the warranty period.

Units returned to Cal Test Electronics that have been subject to abuse, misuse, damage or accident, or have been connected, installed or adjusted contrary to the instructions furnished by Cal Test Electronics, or that have been repaired by unauthorized persons, will not be covered by this warranty.

Cal Test Electronics reserves the right to discontinue models, change specifications, price, or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Cal Test Electronics is authorized to assume any other obligation in connection with the sale and purchase of this device.

## 5.2 Calibration and Repair

If you have a need for any calibration or repair services, please visit us on the web at: [globalspecialties.com](http://globalspecialties.com). See the “Service” tab. Or contact us via the “Contact” tab. You may also contact us at:

Global Specialties®  
(A Cal Test Electronics Company)  
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