

■ 200A MICRO-OHMMETER

# 6290



ENGLISH

User Manual

 **AEMC**<sup>®</sup>  
INSTRUMENTS

# Statement of Compliance

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Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

**An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.**

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at [www.aemc.com](http://www.aemc.com).

**Serial #:** \_\_\_\_\_

**Catalog #:** 2129.82

**Model #:** 6290

Please fill in the appropriate date as indicated:

Date Received: \_\_\_\_\_

Date Calibration Due: \_\_\_\_\_



**AEMC**®  
INSTRUMENTS

Chauvin Arnoux®, Inc.  
d.b.a AEMC® Instruments  
[www.aemc.com](http://www.aemc.com)

# Table of Contents

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<b>1. INTRODUCTION</b>	<b>3</b>
1.1 International Electrical Symbols	4
1.2 Definition of Measurement Categories	4
1.3 Receiving Your Shipment	4
1.4 Ordering Information	5
1.4.1 Accessories and Replacement Parts	5
<b>2. PRODUCT FEATURES</b>	<b>6</b>
2.1 Description	6
2.2 Features	7
2.3 Applications	7
2.4 Control Features	8
2.5 Display	9
2.5.1 Analog Bargraph	9
2.5.2 Built-in Chronometer	9
2.5.3 Real-time Clock	9
2.5.4 Test Number	9
2.5.5 Model and Serial Number	9
2.6 Display Messages	10
<b>3. OPERATION</b>	<b>12</b>
3.1 Protection	12
3.1.1 Start with I = O	12
3.1.2 Temperature Protection	12
3.2 Use of Test Probes	12
3.3 Operating	13
3.4 Internal Memory	16
<b>4. MAINTENANCE</b>	<b>17</b>
4.1 Warning	17
4.2 Cleaning	17
4.3 Fuse Replacement	18

**5. SPECIFICATIONS..... 19**

Repair and Calibration.....20

Technical and Sales Assistance .....20

Limited Warranty .....21

Warranty Repairs.....21









## **INTRODUCTION**

### **WARNING**

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Do not attempt to perform any tests with this instrument until you have read the user manual.
- Tests are to be carried out on de-energized circuits only! Never connect the unit to a live circuit.
- The micro-ohmmeter must be connected to the earth/ground point, through the green terminal or the power cord.
- During a circuit breaker measurement its contacts must be closed and connected to an earth/ground point. The end connected to an earth/ground point must be connected to the “C-” terminal.
- Ensure the terminals are free of any voltage in relation to earth/ground point and between each other. Take into account that in a substation you will find, in disconnected points, high potential levels in relation to the earth/ground point. Those potentials are caused by presence of electromagnetic fields and can be minimized following the indications in the paragraph before.
- Make sure that the current connections are well connected, as well as the C clamp, to avoid undesirable heating.
- Be careful when manipulating the current terminals in the instrument. High temperatures may occur in the current connections.
- Never connect or disconnect the cables during a measurement. If a modification must be made, press the Stop button first.
- The micro-ohmmeter should never be used in an explosive environment (this includes poorly ventilated battery rooms and enclosures).
- The instrument, test leads and measuring wires must be free of defects and should be changed if there is any evidence of deterioration (insulation split, burnt, etc.).
- Never exceed the safety values indicated in the specifications.

## 1.1 International Electrical Symbols

	This symbol signifies that the instrument is protected by double or reinforced insulation.
	<b>CAUTION - Risk of Danger!</b> Indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument in all cases where this symbol is marked.
	Important instructions to read and understand completely.
	Important information to acknowledge.
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	Ground/Earth symbol
	Compliance with the Low Voltage & Electromagnetic Compatibility European directives (73/23/CEE & 89/336/CEE)
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components In accordance with directive WEEE 2002/96/EC

## 1.2 Definition of Measurement Categories

- CAT I:** For measurements on circuits not directly connected to the AC supply wall outlet such as protected secondaries, signal level, and limited energy circuits.
- CAT II:** For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.
- CAT III:** For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.
- CAT IV:** For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

## 1.3 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

## 1.4 Ordering Information

**Micro-ohmmeter Model 6290 .....Cat. #2129.82**

*Includes meter in hard carrying case, one accessory case, set of two Kelvin leads (20ft) w/ C-clamps, one green ground lead w/ clamp, USB cable (5ft), power cord (110V), fuse (5x20, 12A), PC software, and user manual.*

### 1.4.1 Accessories and Replacement Parts

Lead – Set of 2, 50 ft Color-coded Kelvin leads (red/black)  
with attached C-Clamp .....**Cat. #2129.87**

Lead – Replacement, 10 ft Earth/Ground (green)  
with attached Clamp .....**Cat. #2129.88**

Lead – Replacement, Set of 2, 20 ft. Color-coded Kelvin  
leads (red/black) with attached C-Clamp.....**Cat. #2129.89**

Fuse – Replacement, Set of 5, 12A, 250V, 5x20mm .....**Cat. #2129.90**

Cable – 5 ft USB cable .....**Cat. #2140.46**

Power Cord, 110V US 3-Prong, 7 ft .....**Cat. #5000.40**

**Order Accessories and Replacement Parts Directly Online**  
*Check our Storefront at [www.aemc.com](http://www.aemc.com) for availability*

## **PRODUCT FEATURES**

### **2.1 Description**

The AEMC® high-current Micro-ohmmeter Model 6290 is a portable, microprocessor-controlled instrument. It has optimized filters and protection for measurements in electrical substations. The Model 6290 can be used to accurately measure very low contact resistances of high voltage circuit breakers, switches, busbars, etc., with test currents up to 200A. It employs the four-terminal Kelvin method to prevent errors caused by test leads and their contact resistances.

Measurement accuracy is guaranteed through a state-of-the-art signal amplification system, offset-free with high long-term stability. Resistance readings are shown in the alphanumeric display with up to 4½-digit resolution with display of measurement resistances up to 20mΩ, and resolution down to 0.1μΩ.

Test currents may be adjusted by the operator and are measured using an analog bargraph indicator and digital display.

The Model 6290 has an internal memory for storing up to 200 readings. The USB interface may be connected to a computer to download the stored values using the included application software.

The high-current generation system is based on modern technology that allows for a significant decrease in both weight, 24.25 lbs (11kg), and size. The case is made of hard plastic, making it highly resistant to impact and environmental conditions. Internal thermal sensors, in all sensitive components, prevent damage to the instrument caused by overheating.

This is a rugged but lightweight instrument, and may be easily carried by one person. It is water-resistant and can be used under severe weather conditions (IP54 with case closed) offering an excellent performance working both in the laboratory and out in the field.



## 2.2 Features

- Accurately measures low contact resistances with test currents up to 200A
- Measures resistances up to 20m $\Omega$
- Resolution of 0.1 $\mu\Omega$
- Analog bargraph indicator with digital display
- Stores up to 200 test results
- USB interface
- Direct printout using supplied software
- Rugged, light-weight and water-resistant

## 2.3 Applications

- Test switchgear contact resistance
- Test circuit breaker contact resistance
- Test air frame bonding
- Test rail bonding
- Test pipeline bonding

## 2.4 Control Features

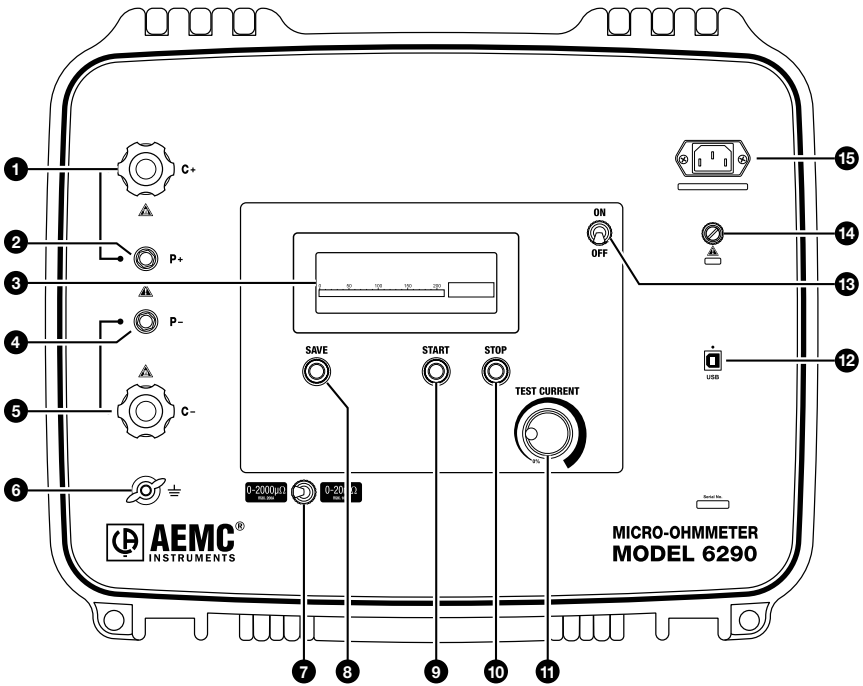


Figure 2-1

- |                                    |                               |
|------------------------------------|-------------------------------|
| 1. Current output terminal (C+)    | 9. Start button               |
| 2. Potential terminal (P+)         | 10. Stop button               |
| 3. Alphanumeric display            | 11. Test current control knob |
| 4. Potential terminal (P-)         | 12. USB interface             |
| 5. Current output terminal (C-)    | 13. ON/OFF Switch             |
| 6. Ground terminal                 | 14. Fuse                      |
| 7. Range and test current selector | 15. Power cord connector      |
| 8. Save button                     |                               |

## 2.5 Display

The alphanumeric LCD display indicates the measurement result, the corresponding measuring unit, the elapsed time since the measurement started, the analog bargraph and digital indication of test current, and any messages to the operator.

Messages to the operator  
Test number  
Measurement results

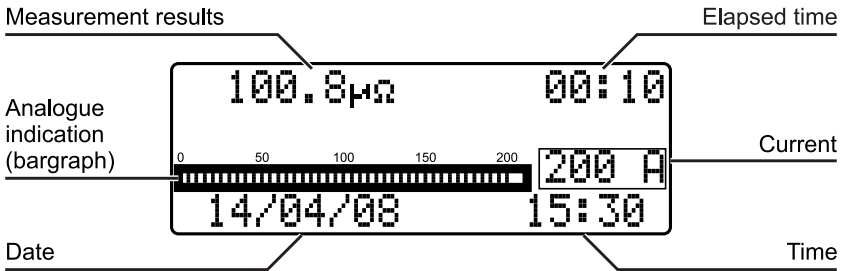


Figure 2-2

### 2.5.1 Analog Bargraph

The instrument indicates the test current value on the bargraph and digital display.

### 2.5.2 Built-in Chronometer

Displays the elapsed time (in minutes and seconds) since the test current was applied.

### 2.5.3 Real-time Clock

Displays date, hours and minutes, to assist in the identification of tests recorded in memory.

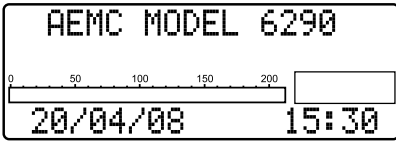
### 2.5.4 Test Number

Tests are automatically numbered and stored with the test results.

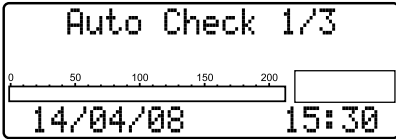
### 2.5.5 Model and Serial Number

At the beginning of each test, the instrument model and serial number are registered, making it possible to log the test results with their respective instrument Calibration Certificate.

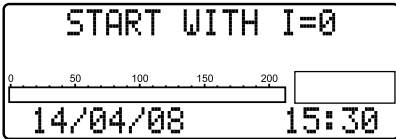
## 2.6 Display Messages



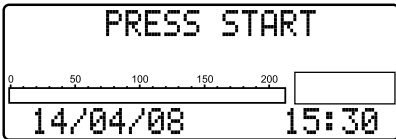
The introduction screen appears momentarily when the instrument is turned on.



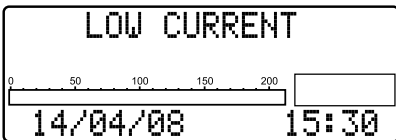
Next, the instrument will display a functional check message while performing initial start up.



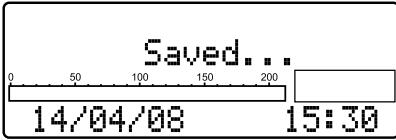
“Start with I=0” warns the operator that to start a test, the Test Current control knob must be at the zero position (fully counter-clockwise). Otherwise the Start button will be inhibited.



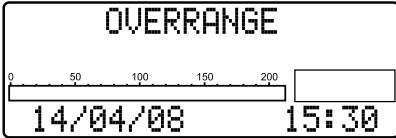
Indicates that the instrument is ready to start a measurement, by pressing the Start button.



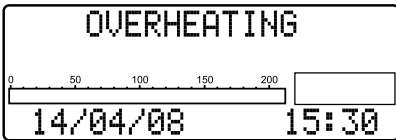
Indicates that the test current is too low to carry out the measurement. It appears at the beginning of each test and remains until the Test Current control knob is adjusted in a clockwise direction to an acceptable level.



When pressing the Save button this message will be displayed, indicating that the measured value was saved in internal memory.



Indicates that the measured resistance is higher than the maximum value readable in the selected range.



Indicates that some part of the instrument has reached critical temperature and thus the system will disable test current generation.

## **OPERATION**

### **3.1 Protection**

#### **3.1.1 Start with I = 0**

Quick variations of current may cause damage to sensitive components. To prevent this, the instrument has a built-in protection that requires the test to start at zero current. Only start the measurement if the Test Current control knob is at the start (fully counter-clockwise) position. If not, the Start button will be disabled and the display will read **START WITH I=0**. If the operator increases the test current by quickly turning the Test Current control knob clockwise, the instrument will automatically implement a slow current increase, to the selected value.

#### **3.1.2 Temperature Protection**

The Model 6290 test time for continuous use is limited by thermal conditions. Internal sensors measure the temperature of sensitive components and trigger the protection that will stop the test current, if they exceed the temperature limit, preventing any damage. The **OVERHEATING** message will appear in the display. Under these conditions, measurements will be inhibited until the temperature decreases sufficiently.

### **3.2 Use of Test Probes**



**WARNING:** Only use the test leads supplied with the instrument, for measurement and calibration procedure.

---

- Make sure that the current connections are securely connected, as well as the C-clamps, to avoid undesirable heating.
- Pay attention when adjusting the current terminals of the instrument. High temperatures may occur in the current connections.
- Make sure that the leads are not coiled during the measurement to avoid overheating.

### 3.3 Operating



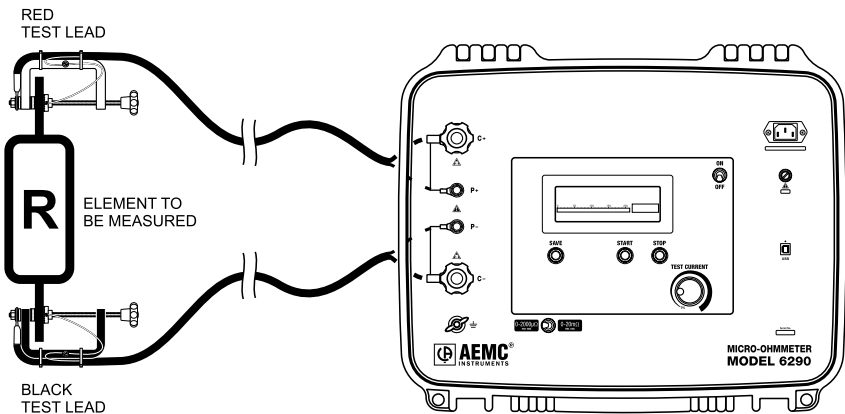
**WARNING:** Before using this instrument read the user manual and safety warnings on page 3. Safety procedures and rules for working near high voltage energized systems must be observed during the use of this instrument. The generated voltages and currents may be dangerous.

The Micro-ohmmeter Model 6290 uses the four-terminal Kelvin method to prevent test lead resistance error during measurement. Test current may be chosen by the operator and the reading is obtained by comparison through internal high-stability standards. The measurement result appears in the alpha-numeric display.



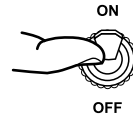
**WARNING:** Before performing measurements, verify that the device under test is not energized.

1. Connect the instrument to an AC power supply.
2. Before turning the instrument on, connect the test probes to the device to be tested and to the front panel terminals.



**WARNING:** Do not connect or disconnect the test leads during a measurement.

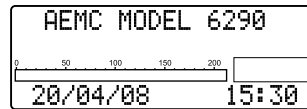
1. Turn the instrument **ON** using the **On/Off** switch.



2. Use the **Range selector** switch to choose the measurement range and test current.

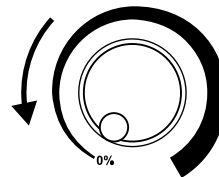


3. An introduction message appears momentarily and then the instrument will make functional checks.

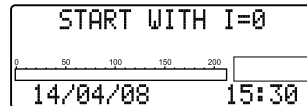


4. Be sure that the **Test Current** control knob is at the start position (counter-clockwise position). Otherwise the Start button will be inhibited and the display will show the **START WITH I=0** message.

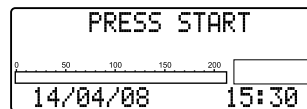
make sure knob is in the start position:



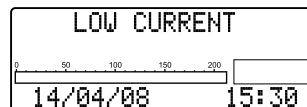
or the display will show this message:



5. The **PRESS START** message will then appear showing that a measurement can be started.

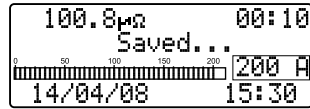
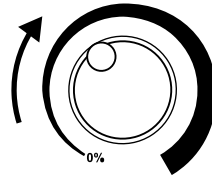


6. Press the green **Start** button. The **LOW CURRENT** message will appear.





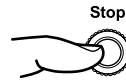
7. Turn the **Test Current** control knob clockwise, increasing the current until the desired current is reached.



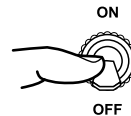
8. The lowest test current is nominally 10% of the range. It is important to consider that measurement errors increase while test current decreases.
9. The measurement results can be stored in the internal memory by pressing the blue **Save** button.



10. Press the red **Stop** button to complete the measurement.

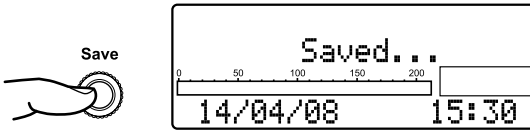


11. Finally, when finished turn the instrument off using the **On/Off** switch.



### 3.4 Internal Memory

The Model 6290 can store up to 200 measured values in internal memory. During a measurement, press the **Save** button to store a value.



The instruments' model and serial number, test number, date and time, elapsed test time, test current and measured value will be stored.

# MAINTENANCE

Use only factory specified replacement parts. AEMC® will not be held responsible for any accident, incident, or malfunction following a repair done other than by its service center or by an approved repair center.

## 4.1 Warning

- To avoid electrical shock, do not attempt to perform any servicing unless you are qualified to do so.
- Do not perform any service while the micro-ohmmeter is on any circuit.
- To avoid electrical shock and/or damage to the instrument, do not get water or other foreign agents into the electronic module.
- We recommend recharging the micro-ohmmeter every month to ensure a full battery charge when used.
- When replacing fuses, install only fuses which are direct replacements.

## 4.2 Cleaning



**WARNING:** Disconnect the instrument from any source of electricity.

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- If the case needs cleaning, do not use any alcohol or oil based cleaners. Preferably use soapy water with a damp cloth or sponge.
- Dry immediately after cleaning. Avoid water penetration into the electronic module.
- Make sure the micro-ohmmeter and all leads are dry before further use.

## 4.3 Fuse Replacement



**NOTE:** Make sure that no terminals are connected and that the switch is in the OFF position before replacing the fuse.

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To replace the fuse, proceed as follows:

- Set the switch to **OFF**.
- Disconnect the measurement leads from the input terminals.
- Using a screwdriver, unscrew the fuse cover from the faceplate.
- Remove the blown fuse using a screwdriver.
- Insert a new fuse (5x20, 12A), then screw the cover back onto the faceplate.

## CHAPTER 5

# SPECIFICATIONS

<b>ELECTRICAL</b>	
Test Current Range	100A, 200A (True DC); Adjustable from 0 to 100%
Resistance Range	0 to 1999 $\mu\Omega$ (test current: up to 200A) 0 to 19.99m $\Omega$ (test current: up to 100A)
Accuracy	$\pm 0.5\%$ of Reading $\pm 2$ cts
Resolution	0.1 $\mu\Omega$ for R < 200 $\mu\Omega$ 1 $\mu\Omega$ for R < 2000 $\mu\Omega$ 10 $\mu\Omega$ for R < 20m $\Omega$
Output Voltage	3.5Vdc @ 200A; 4.5Vdc @ 100A 5.8Vdc (no load)
Max. Load Resistance	10m $\Omega$ @ 200A; 30m $\Omega$ @ 100A
Measurement Method	Four-terminal, Kelvin-type
Operation Time	Up to 1 minute of continuous use at 200A before thermal protection activates; Up to 15 minutes use at 100A before thermal protection activates
Thermal Protection	Protects all sensitive components, preventing any damage due to overheating
Memory	Stores up to 200 measurements
Interface	USB
Communication Software	Supplied
Power Supply	100 to 130Vac, 60Hz
<b>MECHANICAL</b>	
Dimensions	19.76 x 15.51 x 7.48" (502 x 394 x 190mm)
Weight	Approx. 24.25 lbs (11kg)
<b>ENVIRONMENTAL</b>	
Operating Temperature	23° to 122°F (-5° to 50°C)
Storage Temperature	-13° to 149°F (-25° to 65°C)
Humidity	95% RH (non-condensing)
<b>SAFETY</b>	
Safety Rating	IEC61010-1
Environmental Protection	IP54 with closed lid
CE Mark	Pending

\*Specifications are subject to change without notice

## **Repair and Calibration**

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

### **For instrument repair and calibration:**

You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

**Ship To:** Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments  
15 Faraday Drive  
Dover, NH 03820 USA  
Phone: (800) 945-2362 (Ext. 360)  
(603) 749-6434 (Ext. 360)  
Fax: (603) 742-2346 or (603) 749-6309  
E-mail: [repair@aemc.com](mailto:repair@aemc.com)

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

**NOTE: You must obtain a CSA# before returning any instrument.**

## **Technical and Sales Assistance**

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, mail, fax or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments  
200 Foxborough Boulevard  
Foxborough, MA 02035 USA  
Phone: (800) 343-1391  
(508) 698-2115  
Fax: (508) 698-2118  
E-mail: [techsupport@aemc.com](mailto:techsupport@aemc.com)  
[www.aemc.com](http://www.aemc.com)

**NOTE: Do not ship Instruments to our Foxborough, MA address.**

## **Limited Warranty**

The Micro-ohmmeter Model 6290 is warranted to the owner for a period of one year from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

**Full warranty coverage and product registration is available on our website at [www.aemc.com/warranty.html](http://www.aemc.com/warranty.html).**

**Please print the online Warranty Coverage Information for your records.**

### **What AEMC® Instruments will do:**

If a malfunction occurs within the one-year period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

**REGISTER ONLINE AT:**

## **Warranty Repairs**

### **What you must do to return an Instrument for Warranty Repair:**

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

**Ship To:** Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments  
15 Faraday Drive • Dover, NH 03820 USA  
Phone: (800) 945-2362 (Ext. 360)  
(603) 749-6434 (Ext. 360)  
Fax: (603) 742-2346 or (603) 749-6309  
E-mail: [repair@aemc.com](mailto:repair@aemc.com)

**Caution:** To protect yourself against in-transit loss, we recommend you insure your returned material.

**NOTE:** You must obtain a CSA# before returning any instrument.

### **Notes:**

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06/12

99-MAN 100362 v2

**Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments**

15 Faraday Drive • Dover, NH 03820 USA • Phone: (603) 749-6434 • Fax: (603) 742-2346

[www.aemc.com](http://www.aemc.com)