

■ SIMPLE LOGGER

Model SL Series



ENGLISH

User Manual

 **AEMC**[®]
INSTRUMENTS
CHAUVIN ARNOUX GROUP

Statement of Compliance

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.

Serial #: _____
Catalog #: 2156.01, 2156.10, 2156.11, 2156.12, 2156.13,
2156.20, 2156.30, 2156.31, 2156.40 and 2156.50
Model #: SL01, SL10, SL11, SL12, SL13, SL20, SL30,
SL31, SL40, and SL50

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____








Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments
www.aemc.com

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Thank you for purchasing a Simple Logger (SL) Series instrument. For best results:

- **read** these operating instructions carefully
- **comply** with the precautions for use

	Information or useful tip.
	Battery.
	The product has been declared recyclable after analysis of its life cycle in accordance with the ISO14040 standard.
	Indicates conformity with European directives and with regulations covering EMC.
	Indicates that, in the European Union, the instrument must undergo selective disposal in compliance with Directive WEEE 2002/96/EC. This instrument must not be treated as household waste.

Precautions

This instrument is compliant with safety standard IEC 61010-2-030, for voltages up to $75V_{DC}$ between the input terminals. Failure to observe the following safety instructions may result in electric shock, fire, explosion, and damage to the instrument and/or the installation in which it is located.

- The operator and/or the responsible authority must carefully read and clearly understand all precautions to be taken prior to using the instrument. Thorough knowledge and awareness of electrical hazards are essential when using this instrument.
- Observe the conditions of use, including temperature, relative humidity, altitude, pollution degree, and location of use.
- Do not use the instrument if it appears damaged, incomplete, or improperly closed.
- Before each use, check the condition of the housing and accessories. Any item on which the insulation is deteriorated (even partially) must be set aside for repair or disposal.
- All troubleshooting and metrological checks must be done by accredited personnel.
- Measurement leads should not exceed 3' (1m) in length.

Definition of Measurement Categories (CAT)

CAT IV corresponds to measurements taken at the source of low-voltage installations.

Examples: power feeders, counters and protection devices.

CAT III corresponds to measurements on building installations.

Examples: distribution panel, circuit-breakers, machines or fixed industrial devices.

CAT II corresponds to measurements taken on circuits directly connected to low-voltage installations.

Examples: power supply to domestic electrical appliances and portable tools.

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.

Ordering Information

Simple Logger Model SL01 (voltage, 5V _{AC}).....	Cat. #2156.01
Simple Logger Model SL10 (voltage, 100mV _{DC}).....	Cat. #2156.10
Simple Logger Model SL11 (voltage, 1V _{DC}).....	Cat. #2156.11
Simple Logger Model SL12 (voltage, 10V _{DC}).....	Cat. #2156.12
Simple Logger Model SL13 (voltage, 50V _{DC}).....	Cat. #2156.13
Simple Logger Model SL20 (current, 4 to 20mA _{DC}).....	Cat. #2156.20
Simple Logger Model SL30 (pulse).....	Cat. #2156.30
Simple Logger Model SL31 (event).....	Cat. #2156.31
Simple Logger Model SL40 (temperature, RTD, PT1000).....	Cat. #2156.40
Simple Logger Model SL50 (temperature, thermocouple).....	Cat. #2156.50

All models include 2 AA batteries, USB cable, safety card, and quick start document

1. GETTING STARTED

The Simple Logger (SL) Series are easy-to-use single-channel data loggers designed for recording measurements over time. These instruments measure voltage ($5V_{AC}$ or 0.1, 1, 10, and $50V_{DC}$), current (4 to $20mA_{DC}$), or temperature, depending on model.

Measurements are recorded and saved in the instrument's internal flash memory. A single recording is stored at a time; to start a new recording you must download and delete the previous one if it exists. (Downloading is not strictly required, but we recommend it because otherwise the data will be lost.)

All models are configured from a computer running the dedicated Simple Logger Control Panel software, downloaded free from the AEMC web site. This program also enables you to connect to the instrument, view measurement data in real time, download a recording, print this data as a report, and export it as a Microsoft Excel-compatible spreadsheet.

SL Series models are powered by two non-rechargeable AA batteries. The instrument can also run on USB power when connected to a computer or power supply.

The basic setup and operation described in §1 through §2.4 apply to all SL Series instruments. Model-specific information is provided in §2.5, and model-specific specifications are listed in §3.

1.1. Battery Installation

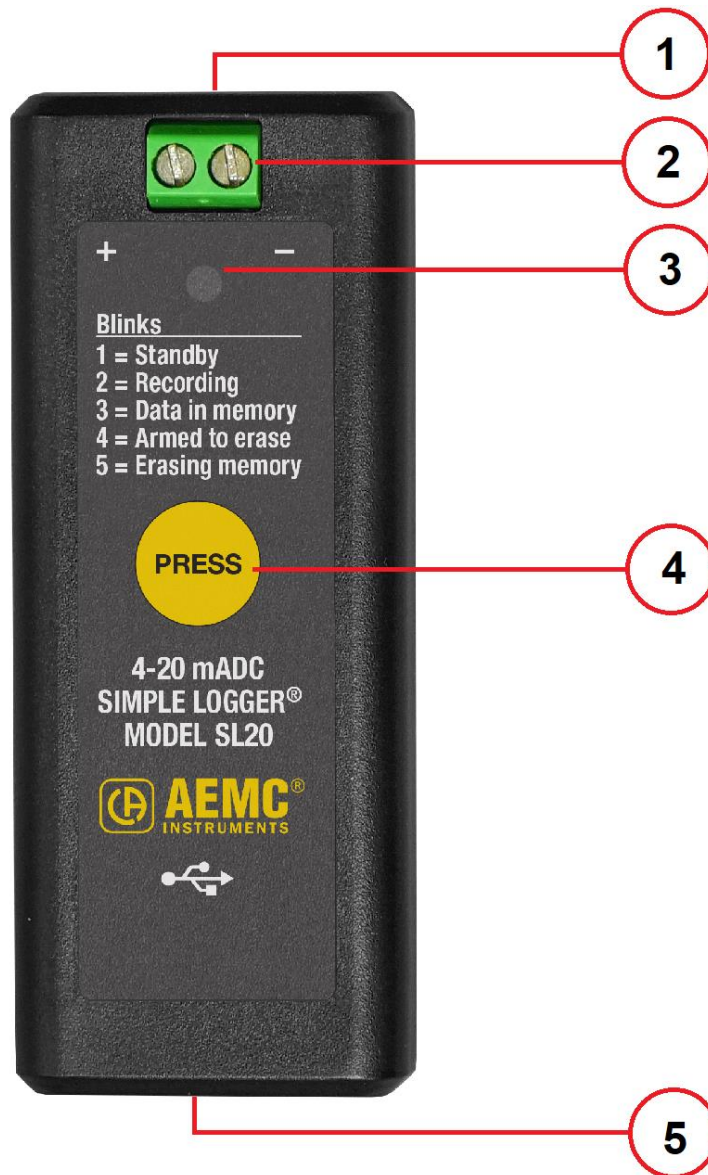


To install or change batteries:

1. Press the tab of the battery compartment cover and slide it down and off.
2. Insert two new AA batteries, ensuring correct polarity.
3. Replace the battery compartment cover; ensuring it clicks shut.
4. Before using the instrument, erase the instrument memory (see §2.2).

The instrument turns ON when you install batteries. The instrument remains ON until you remove the batteries, or until they run down and can no longer power the instrument.

1.2. Front Panel



1	<i>Input terminals</i>
2	<i>Terminal fastening screws</i>
3	<i>Indicator light</i>
4	<i>Function button</i>
5	<i>USB port</i>

1.3. Connecting Probes and Sensors



SL Series instruments accept test leads and sensors that measure voltage ($5V_{AC}$ or 0.1, 1, 10, and $50V_{DC}$), current (4 to $20mA_{DC}$), pulse, event, or temperature, depending on model. In addition, the SL40 RTD, PT1000 thermometer records temperature using an external sensor.

Each instrument has two input terminals for connecting 24 to 12 AWG leads. These are held in place by fastening screws (see the illustration on the left). Insert the leads into the terminals, observing the polarity indicated on the instrument front label, and tighten the screws to hold them in place.

To ensure optimal performance, we recommend using leads 3 feet (1m) or shorter.

1.4. Simple Logger Control Panel Download



Your computer must be connected to the internet to download the Simple Logger Control Panel.

1. Connect the instrument to your computer using the USB cable provided.
2. A popup Windows Explorer window appears on your desktop, containing the file INSTALL.URL. Double click this file to open the Simple Logger Control Panel download page in your web browser.
3. The download page lists English, Spanish, and French versions of two files: sl.exe and sl.zip. The .zip file contains a single file, sl.exe. If your network security prevents downloading .exe files, click sl.zip; otherwise click sl.exe.
4. Specify a location for the downloaded file. This must be one of your local drives (not a network drive). For example, you can download the file to your desktop and run it from there.
5. **If you downloaded sl.exe**, go to step 6 below.
If you downloaded sl.zip, unzip it to your desktop.
6. Double-click sl.exe to start the Simple Logger Control Panel (SL CP) program. The Control Panel automatically connects to the instrument when launched.
7. In the menu bar at the top of the screen, click **Help** to display the Help menu, and then click **Help Topics**. The SL CP will download the Help file from the AEMC web site and place a copy on your computer.
8. The Simple Logger Control Panel Help opens. This contains instructions for setting the instrument time and date, viewing real-time data, configuring recording sessions, downloading data, printing a report, exporting data to a spreadsheet, and all other Control Panel tasks. Consult the Help as needed when performing these tasks.

1.5. Firmware Check/Upgrade

AEMC may periodically upgrade the firmware that controls your instrument's operation. You can download firmware upgrades to ensure your instrument has the latest functionality.

To ensure your instrument is running the latest firmware:

1. With the instrument connected, open the Simple Logger Control Panel.
2. Click **Help** in the menu bar.
3. Select **Firmware Upgrade** to determine whether or not the connected instrument is running the latest firmware. If not, a dialog box appears asking whether or not you want to upgrade now; click Yes to upgrade. Otherwise, a message is displayed informing you that your instrument's firmware is up to date. (Note that by default, the SL CP checks for new software each time it opens, and new firmware each time it connects to an instrument.)

2. OPERATION

2.1. Indicator Light

The front indicator LED light blinks one or more times, pauses 5 seconds, then repeats the blink sequence. The number of blinks indicates the instrument status:

# of blinks	Status
1	(Standby): The instrument is in Standby mode, ready to start recording.
2	(Recording): An active recording is in progress on the instrument.
3	(Memory full): The instrument is in Standby and data is in the instrument's storage memory. You must download and delete this data before starting a new recording session (see § 2.2). Note that downloading is not strictly required, but we recommend it because otherwise the data will be lost
4	(Memory erase pending): The instrument is "armed" for erasing memory. This sequence only repeats twice, if the button is not pressed within 12 seconds the recording remains in memory (see § 2.2.1).
5	(Erasing memory): The instrument is actively erasing memory.

2.2. Erasing Memory

The instrument memory can be erased either manually via the instrument's button or through the Simple Logger Control Panel. **Note that when you change batteries, you must erase the memory before using the instrument.**

2.2.1. Button

1. With the instrument LED in the "3-blinks" (memory full) state, press the button and hold it down for at least one second, until the indicator light remains ON.
2. Release the button. The indicator light blinks 4 times, pauses for 5 seconds, and blinks 4 times again, indicating the instrument is "armed" for erasing memory. (This sequence takes about 12 seconds.)
3. If you do not press and hold the button within 12 seconds, the "armed" state ends and data remains in memory. If you press and hold the button for one second within 12 seconds, the instrument begins erasing memory. During this process (which takes several minutes) the indicator light blinks 5 times, pauses 5 seconds, and repeats this sequence until all data is erased.
4. When memory is clear, the light blinks once every 5 seconds, indicating the instrument is in Standby mode and is ready to record data.

2.2.2. Simple Logger Control Panel

Ensure the instrument is connected to the computer via USB cable. Then do the following:

1. In the Simple Logger Control Panel, select the instrument in the navigation frame. Then check the Connection Status in the Real-Time Data frame. If the connection status is Disconnected, click **Instrument** in the menu bar and click **Connect**.
2. Click **Instrument** to display the Instrument menu. If the instrument is not actively recording and there is a recording in memory, the **Erase Memory** option is active.
3. If the **Erase Memory** option is active, select it. A message appears asking you to confirm the deletion.
4. Select **Yes** to erase the instrument's memory.

2.3. Instrument Date/Time

Although setting the instrument clock is not required to run a recording (the time and date can be adjusted after the recording is downloaded), as a good practice we recommend keeping the instrument's date and time accurate.

1. In the Simple Logger Control Panel, click **Instrument** in the menu bar and select **Set Clock**.
2. Complete the fields for the instrument's date and time and press **OK**. You can also click **Synchronize with PC Clock** to set the instrument to the computer's current date and time, and close the Date/Time dialog box.

2.4. Recording Data

A recording session can be started and stopped either from the instrument or through the Simple Logger Control Panel. Note that the Control Panel is required to schedule and configure the recording. A standalone recording must be started manually (using the instrument's current configuration settings) and stops after approximately 45 days, or if one of the following occurs:

- The button is pressed
- Memory becomes full
- Batteries lose power



Instrument memory must be empty to start a recording session (see § 2.2). Only one recording can reside in memory at a time.

2.4.1. Standalone Recording

Ensure the indicator light blinks once every 5 seconds, indicating the instrument is in Standby mode. Then do the following:

1. Press the button for at least one second until the indicator light remains ON.
2. Release the button. The indicator light blinks twice and pauses 5 seconds, indicating a recording is in progress. (This "2-blink" sequence repeats throughout the recording session.)
3. To stop the recording, press the button for at least one second until the indicator light remains ON. Then release the button. The instrument light blinks 3 times and pauses 5 seconds, indicating a recording is stored in memory.

Recording sessions end automatically after approximately 45 days elapse or batteries lose power.

2.4.2. Recording via the Simple Logger Control Panel

Ensure the instrument is in Standby mode (indicator light blinks once every 5 seconds) and connected to the computer. If it is in "3-blink" (memory full) mode, erase the recording now (§ 2.2). Then do the following:

1. In the Simple Logger Control Panel, select the instrument in the navigation frame. Then check the Connection Status in the Real-Time Data frame. If the connection status is Disconnected, click **Instrument** in the menu bar and click **Connect**.
2. Click **Instrument** and select **Configure**. The Configure Instrument dialog box appears.
3. Complete the fields of this dialog box as instructed by the Control Panel Help. These fields determine when the recording starts and ends. Depending on instrument model, there are options to define scaling and other settings that affect how recorded data is displayed (see § 2.5).
4. Click **OK** to write the settings to the instrument.

Recorded data can be downloaded to the computer, viewed on the screen, printed as a report, and exported to a Microsoft Excel-compatible spreadsheet. See the Control Panel Help for details.



If you schedule a recording, you can still manually start a recording on the instrument until the scheduled recording starts. A manual recording will cancel a scheduled one.

2.5. Simple Logger SL Series Models

SL Series instruments measure voltage (five models), current, and temperature.

Voltage	Current	Temperature
SL01 (5V _{AC}) SL10 (100mV _{DC}) SL11 (1V _{DC}) SL12 (10V _{DC}) SL13 (50V _{DC})	SL20 (4-20mA _{DC})	SL40 (RTD) SL50 (thermocouple type J, K, N, T, E, R, or S)

The Simple Logger Control Panel allows you to configure how data measured by these instruments is recorded and displayed. The available settings depend on which model instrument is connected. The following table shows which configuration options are available for each model.

Feature	SL01	SL10	SL11	SL12	SL13	SL20	SL30	SL31	SL40	SL50
Set up recording	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Define units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set instrument clock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Erase instrument memory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Scaling	✓	✓	✓	✓	✓	✓	✓			
Filtering	✓	✓	✓	✓	✓	✓			✓	✓
Thermocouple type										✓
Cold Junction Compensation										✓
Rising/Falling events								✓		

For details, consult the Simple Logger Control Panel Help.

2.5.1. Scaling (Models SL01, SL10, SL11, SL12, SL13, SL20, SL30)

Scaling includes settings that determine how the recorded data “scales” to units of measure.

- **Low** defines the value when the instrument measures its lowest input.
- **High** defines the value when the instrument measures its highest input.
- **Units** defines the units of measure. If you leave this setting blank, the instrument's default unit of measure is used.

For example, the Model SL13 can be connected to sensors that measure flow rate in liters per second. If you set Low to 0, High to 100, and Units to L/S, the following will be in effect:

- When sensor input = 0 (the SL13's lowest input), the measurement will appear as 0 L/S.
- When sensor input = 50V (the SL13's highest input), the measurement will appear as 100L/S.
- Measurements between the Low and High readings will be automatically calculated and displayed in accordance with this scale.

2.5.2. Filtering (Models SL01, SL10, SL11, SL12, SL13, SL20, SL40, SL50)

The **Filter** setting defines a sliding "window" of measurements over which each reading is averaged. This helps smooth the graph and reduce the effects of electrical noise. For example, if Filter is set to 10, each data point in the graph is calculated and displayed as the average of its measured value and the previous nine measurements. Options are 1 (the default) through 10. A setting of 1 results in no measurement filtering.

Note that the Scaling and Filter settings do not change how "raw" data is recorded, only how it is displayed. All measurements are stored as originally recorded by the instrument, and can be restored to their original values by changing the Scaling and Filter settings at any time after download.

2.5.3. Thermocouple Type (Model SL50)

The **TC Type** setting lets you select among the thermocouple types supported by an SL50 instrument. Options are J (the default), K, N, T, E, R, and S.

2.5.4. Cold Junction Compensation (Model SL50)

Selecting the **Enable CJC compensation** option enables the use of a secondary measurement of the reference junction temperature of the instrument's thermocouple. This temperature reading is then used to correct for the voltage generated between the instrument's input and the thermocouple connector. By default, this option is set to the last configuration written to the instrument. This option can be changed at any time after download. The required data is always recorded.

2.5.5. Rising/Falling Events (Model SL31)

Events can be defined as either **Rising** (starts when the instrument measurement transitions from a normal reading to a high reading) or **Falling** (starts when the measurement goes from normal to low). By default, this option is set to the last configuration written to the instrument. This can be changed by de-selecting the option **Events start with a rising value**. This option can be changed at any time after download.

3. SPECIFICATIONS

3.1. Reference Conditions

Quantity of influence	Reference values
Temperature	73 ± 3.6°F (23 ± 3°C)
Relative humidity	30% to 50%
Battery voltage	3V ± 10%

3.2. Physical

Quantity	Value
Dimensions	3.6 x 1.44 x 1.32" (91.44 x 36.58 x 33.5mm)
Weight (with batteries)	3.5 oz. (99 grams)
Case	UL94 HB
Vibration	IEC 68-2-6 (1.5mm, 10 to 55Hz)
Shock	IEC 68-2-27 (30G)
Drop	IEC 68-2-32 (3' [1m])
Operating position	Any position

3.3. Electrical

3.3.1. Models SL01, SL10, SL11, SL12, SL13, SL20, SL30, SL31

Model	Voltage					Current	Pulse	Event
	SL01	SL10	SL11	SL12	SL13	SL20	SL30	SL31
Range	0 to 5V _{AC}	±100mV _{DC}	±1V _{DC}	±10V _{DC}	±50V _{DC}	±20mA	Contact closure, 0 to 5V _{DC}	Contact closure, 0 to 5V _{DC}
Resolution	10mV	0.1mV	1mV	10mV	50mV	0.02mA	n/a	
Accuracy	±(0.5% of reading + 50mV)*	±(0.5% of reading + 0.5mV)*	±(0.5% of reading + 5mV)*	±(0.5% of reading + 50mV)*	±(0.5% of reading + 250mV)*	±(0.5% of reading + 0.1mA)*	n/a	
Maximum input	60V _{DC}					25mA _{DC}	10V _{DC}	
Input impedance	800KΩ					49Ω	800KΩ	
Power source	Internal: Two 1.5V AA non-rechargeable batteries External: USB 2.0 (computer or other power source) When powered by USB, the battery is automatically disconnected.							
Power consumption	Internal power: 1mA (average) External power: 100mW							

*Accuracy is specified with the 10-point filter selected to reduce noise.

3.3.2. Model SL40 and SL50

		Temperature					
Model	SL40	SL50					
		TC Type:					
		J	K	N	T	E	R
Range	-94 to 1022°F (-70 to 550°C)	-346 to 2192°F (-210 to 1200°C)	-328 to 2502°F (-200 to 1372°C)	-328 to 2372°F (-200 to 1300°C)	-328 to 752°F (-200 to 400°C)	-328 to 1832°F (-200 to 1000°C)	32 to 3200°F (0 to 1760°C)
Accuracy	±(1% of reading + 1.8°F [1°C])*	Below -148°F (-100°C): ±(0.4% of reading + 9°F [5°C])*				32 to 212°F (0° to +100°C): ±(0.3% of reading + 18°F [10°C])*	
		-148 to 212°F (-100° to 100°C): ±(0.3% of reading + 7.2°F [4°C])*				Above 212°F (100°C): ±(0.2% of reading + 14°F [8°C])*	
		Above 212°F (100°C): ±(0.2% of reading + 5.4°F [3°C])*					
Resolution	0.1°C	0.1°C					
Maximum input voltage	n/a	1V					
Input impedance	n/a	800KΩ					
Power source	Internal: Two 1.5V AA non-rechargeable batteries External: USB 2.0 (computer or other power source) When powered by USB, the battery is automatically disconnected.						
Power consumption	Internal power: 1mA (average) External power: 100mW						

*Accuracy is specified with the 10-point filter selected to reduce noise.

3.4. Data Storage

	Voltage		Current SL20	Pulse SL30	Event SL31	Temperature	
	SL01	SL10, SL11, SL12, SL13				SL40	SL50
Sample rate	256/s	16/s	16/s	Maximum 8 pulses per second	Maximum 8 events per second	16/s	
Storage rate	1s					1s	2s
Storage mode	Stop when full						
Recording length	Approximately 45 days						
Memory	8MB flash memory 4 million measurements (2 million for SL50)*						

* Recorded data is stored in non-volatile memory and will be retained even if the battery is low or removed.

3.5. Environmental

Quantity	Value
Operating temperature	14° to 122°F (-10° to 50°C)
Storage temperature	-4° to 140°F (-20° to 60°C)
Relative humidity	Up to 85% @ 95°F (35°C), Non-condensing
Altitude	6500' (2000m)
Emissions	Complies with IEC 61326-1 for class A equipment.
Immunity	Complies with EN61326-1.

3.6. Safety

Safety: 50V Cat. III, EN61010-1; Pollution Degree 2

Environmental: IP40

REPAIR AND CALIBRATION

To ensure that your instrument meets factory specifications, we recommend that it be sent 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

(Or contact your authorized distributor)

Cost 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
15 Faraday Drive
Dover, NH 03820 USA
Phone: (800) 343-1391 (Ext. 351)
Fax: (603) 742-2346
E-mail: techsupport@aemc.com
www.aemc.com

LIMITED WARRANTY

The instrument is warranted to the owner for a period of two years 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 instrument has been tampered with or abused, or if the defect is related to service not performed by AEMC® Instruments.

The warranty does not apply in the following cases:

- Inappropriate use of the equipment or use with incompatible equipment.
- Modifications made to the equipment without the explicit permission of the manufacturer's technical staff.
- Work done on the device by a person not approved by the manufacturer.
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in this user's manual.
- Damage caused by shocks, falls, or floods.

Full warranty coverage and product registration is available on our website at 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 warranty 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:
www.aemc.com

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:

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

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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Chauvin Arnoux[®], Inc. d.b.a. AEMC[®] Instruments
15 Faraday Drive • Dover, NH 03820 USA • Phone: (603) 749-6434 • Fax: (603) 742-2346
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