

# Point-to-Point Continuity Tester Model CA 6011



## GROUND TESTING

Measure Up  
WITH AEMC INSTRUMENTS<sup>®</sup>





# Statement of Compliance

Chauvin Arnoux<sup>®</sup>, Inc. d.b.a. AEMC<sup>®</sup> 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 the instrument's 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.

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

**Catalog #:** 2135.62 / 2135.63

**Model #:** 6011

Please fill in the appropriate date as indicated:

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






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



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


# 1. INTRODUCTION

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Thank you for purchasing an AEMC® Instruments **Point-to-Point Continuity Tester Model 6011**.

For best results from your instrument and for your safety, read the enclosed operating instructions carefully and comply with the precautions for use. Only qualified and trained operators should use this product.

## 1.1 INTERNATIONAL ELECTRICAL SYMBOLS

	Signifies that the instrument is protected by double or reinforced insulation.
	<b>CAUTION - Risk of Danger!</b> Indicates a <b>WARNING</b> . Whenever this symbol is present, the operator must refer to the user manual before operation.
	Indicates important information to acknowledge.
	This product complies with the Low Voltage & Electromagnetic Compatibility European directives.
	The product has been declared recyclable.
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components in accordance with directive WEEE 2012/19/EU.
	Ground/Earth
	Battery
	Chauvin Arnoux® and AEMC® Instruments have adopted an Eco-Design approach to design this instrument. Analysis of the complete lifecycle has enabled us to control and optimize the effects of the product on the environment. In particular this instrument exceeds regulation requirements with respect to recycling and reuse.

## 1.2 DEFINITION OF MEASUREMENT CATEGORIES (CAT)

- CAT IV:** Corresponds to measurements performed at primary electrical supply (< 1000 V).  
*Example: primary overcurrent protection devices, ripple control units, and meters.*
- CAT III:** Corresponds to measurements performed in the building installation at the distribution level.  
*Example: hardwired equipment in fixed installation and circuit breakers.*
- CAT II:** Corresponds to measurements performed on circuits directly connected to the electrical distribution system.  
*Example: measurements on household appliances and portable tools.*

## 1.3 PRECAUTIONS FOR USE

This instrument is compliant with safety standard IEC 61010-2-030, and the accessories are compliant with IEC 61010-031, for voltages up to 300 V with respect to earth in measurement CAT IV.

Failure to observe the safety instructions may result in electric shock, fire, explosion, and destruction of the instrument and of the installations.

- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use. Sound knowledge and a keen awareness of electrical hazards are essential when using this instrument.
- Do not use the instrument on networks of which the voltage exceeds those mentioned.
- Never exceed the protection limits stated in the specifications.
- Observe the conditions of use, namely the temperature, the relative humidity, the altitude, the degree of pollution, and the place of use.
- Do not use the instrument if it seems to be damaged, incomplete, or poorly closed.
- Before each use, check the condition of the insulation on the leads, housing, and accessories. Any item of which the insulation is deteriorated (even partially) must be set aside for repair or scrapping.
- Use connection accessories of which the measurement category and operating voltage are greater than or equal to those of the measuring instrument (300 V CAT IV).
- When handling the leads, the probe tips, and alligator clips, keep your fingers behind the physical guards.
- Use suitable means of protection.
- All troubleshooting and metrological checks must be done by competent, accredited personnel.

## 1.4 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.

## 1.5 ORDERING INFORMATION

**Point-to-Point Continuity Tester Model CA 6011 ..... Cat. #2135.62**

*Includes Meter w/ elastic wrist strap, (4) AA batteries in small white box with sleeve, safety sheet and user manual.*

**Point-to-Point Continuity Testing Kit Model CA 6011..... Cat. #2135.63**

*Includes Meter w/ elastic wrist strap, (4) AA batteries, small classic tool bag, (1) 5 ft red lead (straight/straight), (1) 5 ft black lead (straight/straight), (1) black test probe, (1) 150 ft red lead on spool, (1) continuity probe set, safety sheet and user manual.*

### 1.5.1 Accessories and Replacement Parts

Continuity Probe Set ..... **Cat. #2138.54**

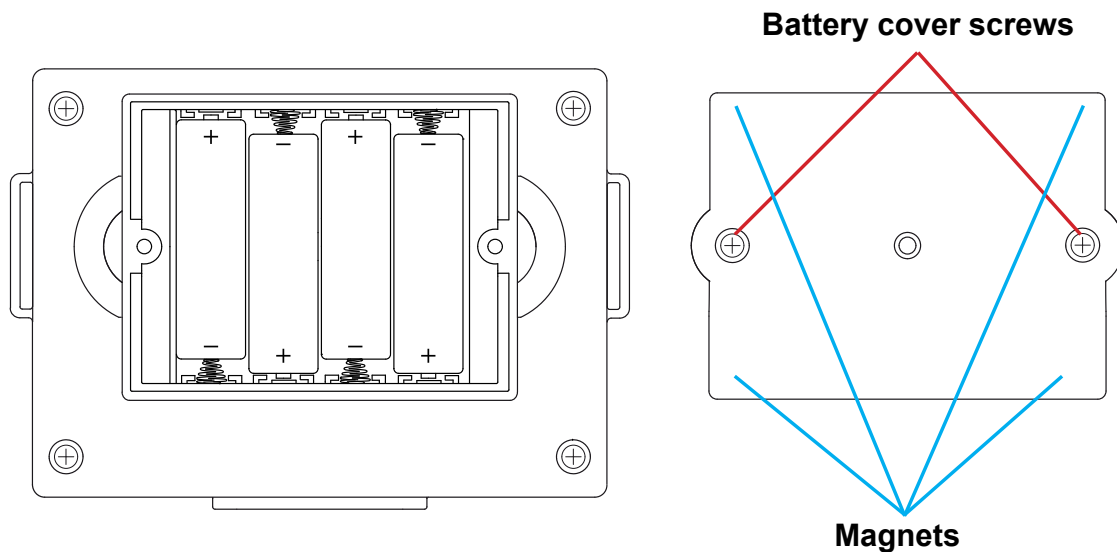
Probe - Black Test Probe (Rated 1000 V CAT IV, 15 A, UL V2) ..... **Cat. #5000.97**

Wire - Red (150 ft) on Reel..... **Cat. #5000.04**

Small Classic Tool Bag ..... **Cat. #2133.72**

## 1.6 INSTALLING BATTERIES

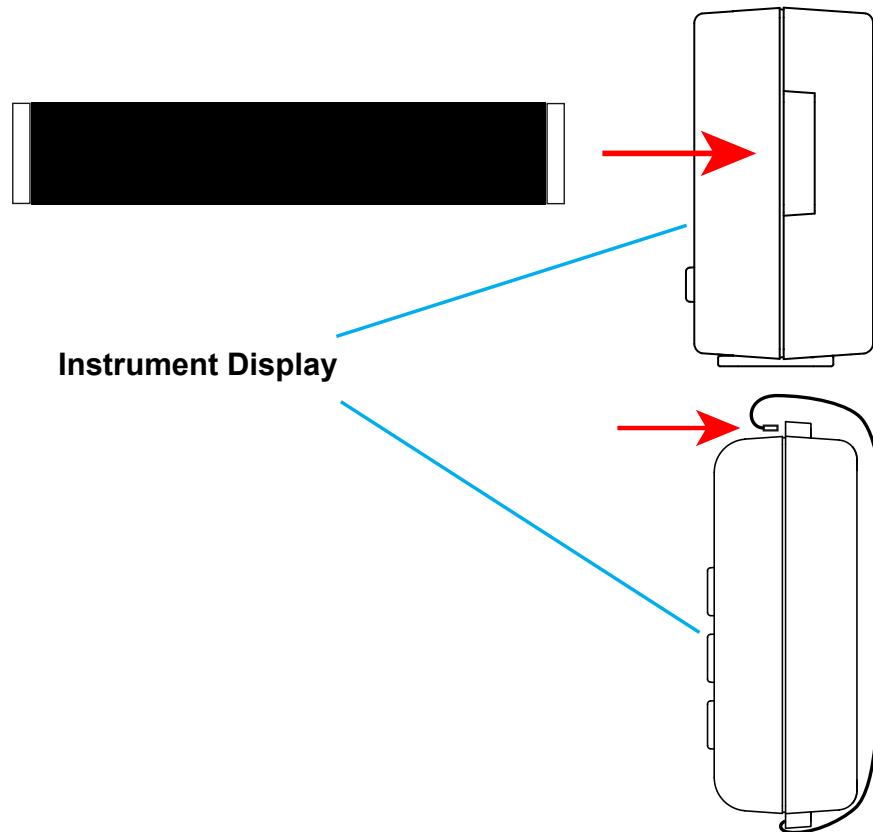
1. Use a screwdriver to unscrew the (2) screws of the battery compartment cover.
2. Remove the battery compartment cover.



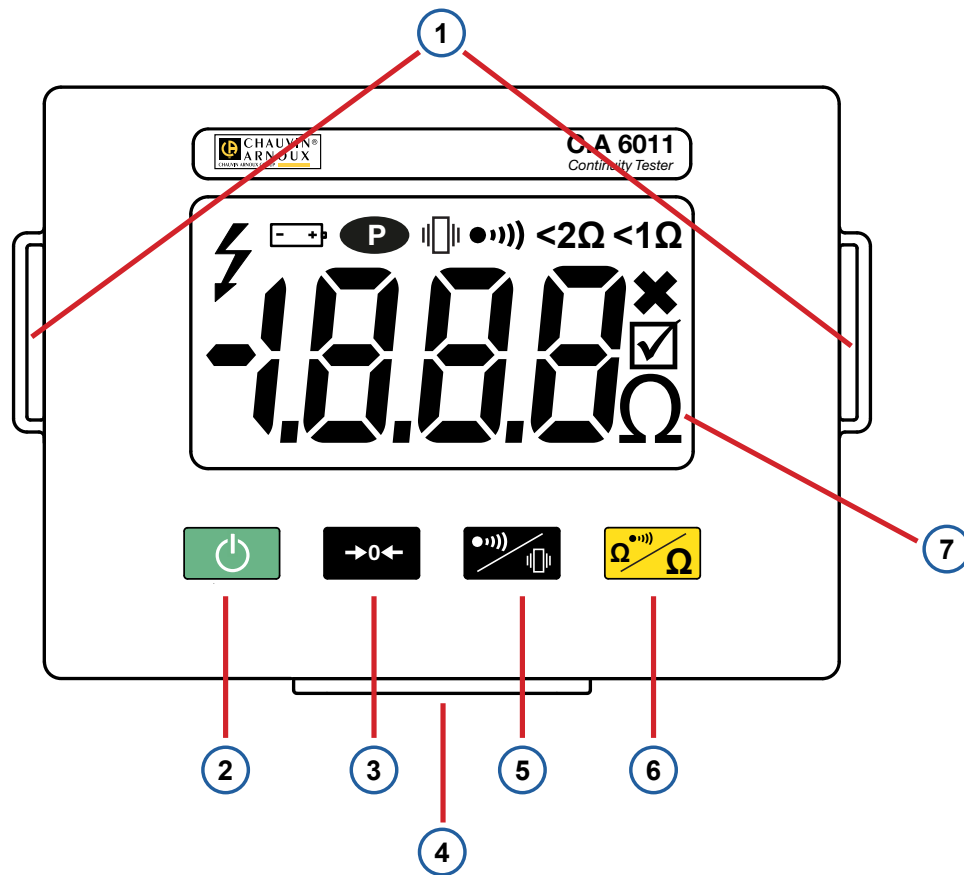
3. Insert the new batteries, paying attention to the polarity.
4. Close the battery compartment by re-installing the (2) screws. Make certain the cover is completely and securely closed.

## 1.7 CONNECTING WRIST STRAP TO INSTRUMENT

Insert the metallic part of the strap into one of the instrument's belt loops. Run the strap under the instrument, then insert the other metallic part into the opposite belt loop.



## 2. PRODUCT FEATURES



<b>1</b>	Belt Loops for Wrist Straps
<b>2</b>	ON/OFF Button
<b>3</b>	Leads Compensation Button
<b>4</b>	Measurement Terminals
<b>5</b>	Buzzer/Vibration Button
<b>6</b>	Continuity/Resistance Button
<b>7</b>	Backlit LCD Display

## 2.1 DESCRIPTION

The Model 6011 Continuity Tester is a portable measuring instrument intended to verify the electrical continuity of a ground system and perform resistance measurements. It is protected against accidental overvoltages and is powered by batteries.

The Model 6011 is used to make continuity measurements at 200 mA. It reverses the current and calculates the average automatically.

### 2.1.1 Continuity Mode

In **Continuity Mode**:










- The instrument incorporates compensation of the leads for more accurate measurements. The instrument will store the lead resistance until it is disabled, compensation of the leads is cleared, or batteries are depleted.
- The instrument can report that continuity has been established between the instrument's terminals through the following methods:
  - by the display
  - by the color of the backlighting
  - by an audible signal
  - by a vibration

### 2.1.2 Resistance Mode

In **Resistance Mode**:

The instrument can perform general resistance measurements from (1 to 199)  $\Omega$ .

## 2.2 DISPLAY

	Indicates that a voltage is present on the terminals.
	Indicates that the battery voltage is low, but you can still make 1000 measurements.
	Indicates that AUTO OFF is deactivated: the instrument operates in Permanent Mode.
	Indicates that the vibrator is active.
	Indicates that the buzzer is active.
	Indicates that the instrument is in continuity Measurement Mode and that the threshold is 2 $\Omega$ .
	Indicates that the instrument is in continuity Measurement Mode and that the threshold is 1 $\Omega$ .
	Indicates that the measurement is above the continuity threshold.
	Indicates that the measurement is below the continuity threshold.

## 2.2.1 Continuity Mode

In **Continuity Mode**, the backlighting color of the LCD display is:

- blue when the measurement is  $< 2 \Omega$  (or  $< 1 \Omega$  if selected as a threshold)
- red when the measurement is  $\geq 2 \Omega$  (or  $< 1 \Omega$  if selected as a threshold)

## 2.2.2 Resistance Mode

In **Resistance Mode**, the color of the backlighting of the LCD display is:

- blue when the measurement is  $< 200 \Omega$ . It is off when the measurement is  $\geq 200 \Omega$

## 2.3 KEYPAD

### 2.3.1 On/Off Button

A short **PRESS** on the **ON/OFF** button turns the instrument ON or OFF.

A long **PRESS** on the **ON/OFF** button activates or deactivates AUTO OFF (**P** symbol displayed).

When the instrument has not been used for 10 min, it automatically switches itself to standby, unless AUTO OFF has been deactivated (**P** symbol displayed).

The ON/OFF button does not protrude from the front panel of the instrument, which protects it from unintentional presses.

### 2.3.2 Continuity/Resistance Button

A short **PRESS** on the **continuity/resistance** button:

- toggles the Measurement Mode: either the continuity (**<2Ω** or **<1Ω**) symbol is displayed or resistance

A long **PRESS** on the **continuity/resistance** button:

- toggles the threshold when in **Continuity Mode**:  $1 \Omega$  (**<1Ω**) or  $2 \Omega$  (**<2Ω**)
- has no reaction when in **Resistance Mode**

### 2.3.3 Leads Compensation Button

In **Continuity Mode**, a long **PRESS** on the **leads compensation button** subtracts the resistance of the leads from the measured value.

### 2.3.4 Buzzer/Vibrator Button

In **Continuity Mode**, **PRESSING** the **buzzer/vibrator** button selects the type of signal when the measurement is below the threshold. Each of the signal types will display the measurement and color of the backlighting.

- audible signal and display
- vibration and display
- audible signal accompanied by a vibration and display
- display only

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## 3. OPERATION

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### WARNING:






- Do not make a measurement on live objects.
  - In the presence of parallel impedances or stray currents, measurements may be less accurate.
  - Do not use the instrument in an explosive atmosphere or in the presence of flammable gases or vapors.
- 

### 3.1 CHECKING THE INSTRUMENT

To ensure the validity of the measurements, the proper operation of the instrument must be checked regularly.

- Turn the instrument ON by **PRESSING** the  button. Check that all segments of the LCD light for one second. The instrument then displays **OL**.
- If the  symbol is lit, you can still make 1000 measurements. But plan to replace the batteries (see § 5.2).
- Short-circuit the terminals; the instrument should display a measurement close to zero.






### 3.2 PREPARING FOR MEASUREMENTS

- Turn the instrument ON by **PRESSING** the  button.
  - Go to **Continuity Mode** by **PRESSING** the  button. The **<2Ω** symbol is displayed.
  - The measurement is displayed. If it is  $< 2 \Omega$ , the backlighting of the display turns blue, and you can execute a compensation of the leads. Compensation is possible for a longer lead or an additional lead in series if the leads resistance is  $< 5 \Omega$  and is fully unspooled in a manner that minimizes coiling the lead.
  - Compensation is done by a long PRESS on the  button. The value displayed changes to 0. This compensation is recorded, and this operation will not have to be repeated until you change accessories.
- 



**NOTE:** For the most accurate measurement, the user should unspool the entire 150 ft red lead before performing lead compensation.

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- Choose your alarm mode by **PRESSING** the  button.
  - Choose the continuity threshold (1  $\Omega$  or 2  $\Omega$ ) by a long **PRESS** on the  button.
  - Deactivate AUTO OFF; otherwise, the instrument will turn off at the end of 10 min. Long **PRESS** the  button. The  symbol  is displayed.
-

## 3.3 CONTINUITY MEASUREMENT

### 3.3.1 Grounding System

- Connect the Mueller clip from the red reel to ground conductor, a ground bus, ground electrode, or on the main bonding jumper.

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**i** **NOTE:** Concerning the correct way to make the measurements, always refer to the applicable standard.

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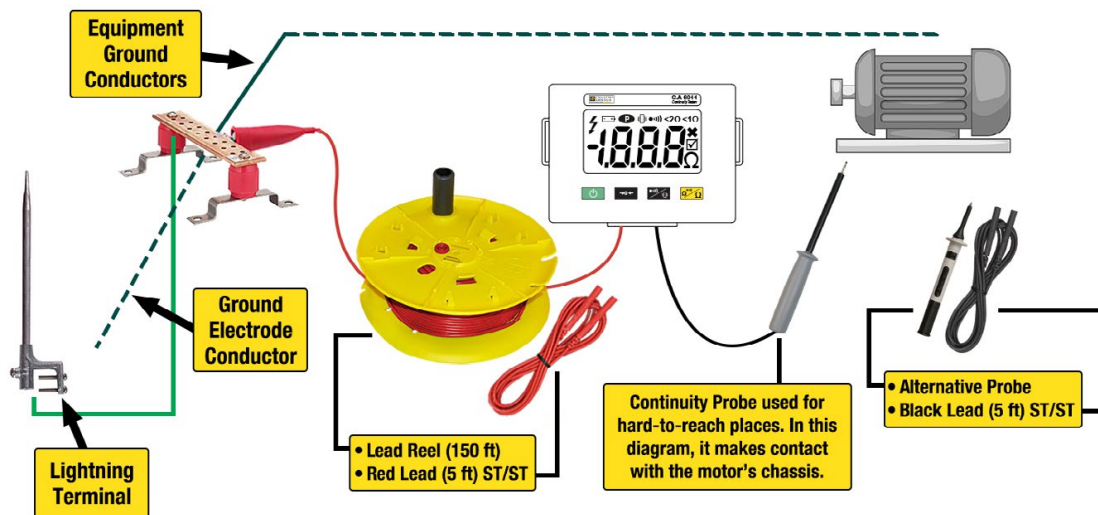
- Carry lead reel to desired locations for testing.

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**i** **NOTE:** It is recommended to clear any surface contaminants from the conductor or apparatus under test. Paint and other protective coatings should be avoided for testing as they will increase the measured resistance.

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- Use a continuity probe or black test probe to contact conductive parts of the system under test that may be hard to reach.
- Then place the probe tip on the object to be tested. The instrument makes one measurement with a current of +200 mA and one measurement with a current of -200 mA, then calculates and displays the average of the two measurements.










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**i** **NOTE:** Do not make a measurement on a live object. If the instrument detects a voltage  $> 6$  V on the object to be measured, measurement is disabled. The ⚡ symbol is displayed, the backlighting blinks red, and the instrument emits an audible signal and vibrates.

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- Check the measurement by reading on the display, or by observing the color of the backlighting, or by using the audible signal, or by feeling the vibration. See § 3.5 Errors, for examples.

### 3.4 RESISTANCE MEASUREMENT


- Turn the instrument on by **PRESSING** the  button.
- Switch to resistance measurement by **PRESSING** the  button.  
The  $<1\Omega$ ,  $<2\Omega$ , , , ,  and  symbols disappear. If lead compensation was used in **Continuity Mode**, leads will continue to be compensated for in **Resistance Mode**.

#### 3.4.1 Clearing Lead Compensation

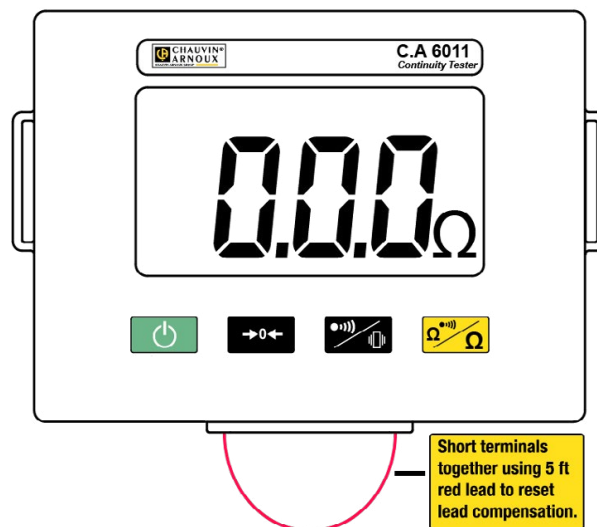
When utilizing leads different from those used for continuity measurements, it is necessary to reset the lead compensation function.

First, short the instrument terminals together with the red 5 ft lead.

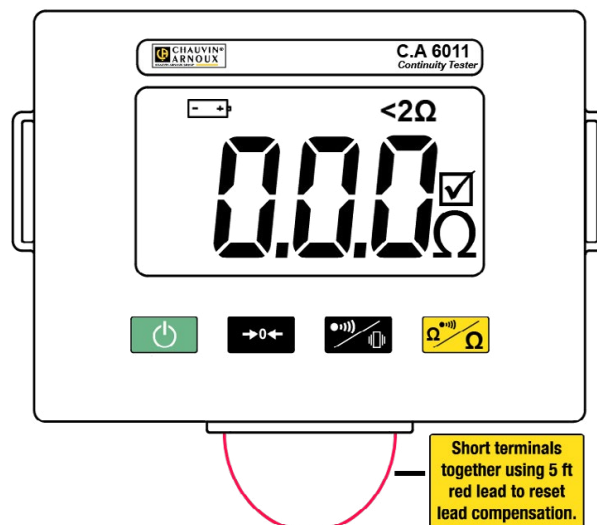
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 **NOTE:** Meter is in **Resistance Mode**.

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Then, from **Continuity Mode**, perform lead compensation again. This will allow for an accurate resistance measurement to be taken.

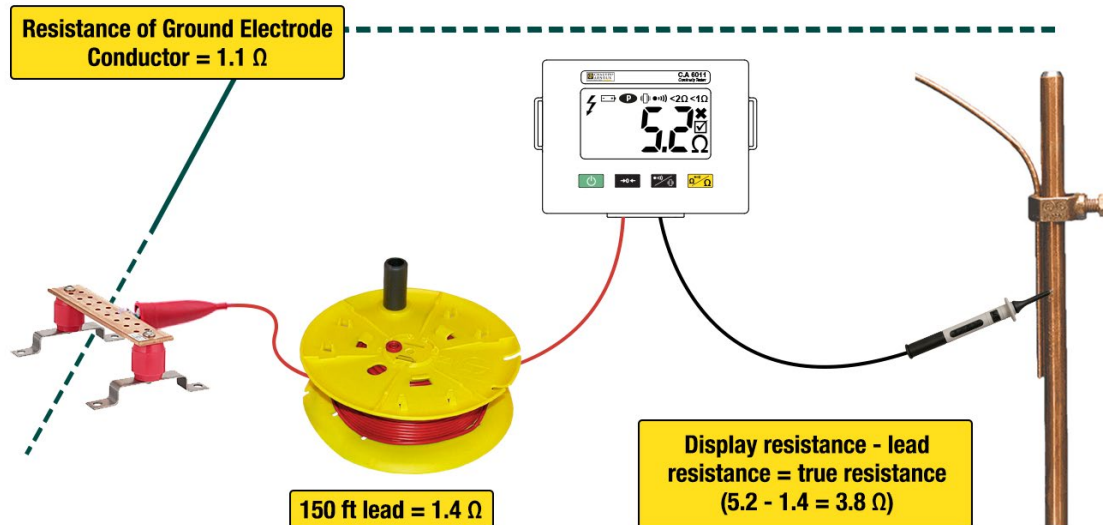


### 3.4.2 Measuring Using Longer Leads with Resistance > 2 Ω

Determine the lead resistance by shorting the reel clip to the probe while both are connected to the instrument's terminals. Then, measure the equipment under test. Calculate the true resistance by subtracting the lead resistance from the displayed resistance.



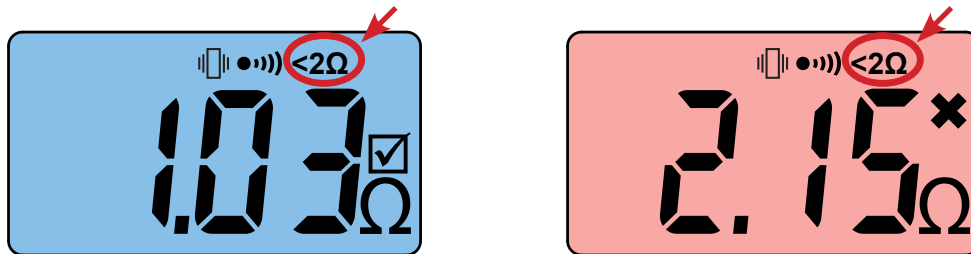
**NOTE: For accurate results, unspool the lead reel before measuring its resistance.** It is recommended that the lead resistance is to be measured each time it is used to avoid measurement errors.



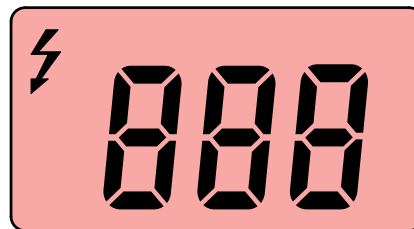
### 3.5 ERRORS

- If the measurement is  $\geq 20 \Omega$  in continuity or  $\geq 200 \Omega$  in resistance, the instrument displays **OL**.
- In **Continuity Mode**:
  - If the measurement displayed is negative, repeat the leads compensation procedure.
  - If the resistance of the leads to be compensated is  $> 5 \Omega$ , compensation is not possible.
    - **Spooled or coiled leads** with a resistance  $> 2 \Omega$  should be **fully uncoiled** prior to the lead compensation process.
- If there is a voltage  $> 6 \text{ V}$  on the equipment under test to be measured, measurement is disabled. The ⚡ symbol is displayed, the backlighting blinks red, and the instrument emits an audible signal and vibrates.

Below are illustrations of the display in **Continuity Mode**. In the first instance, the measurement is **OK** (blue backlighting and display of the  symbol); in the second instance, it is **NOT OK** (red backlighting and display of the ✕ symbol).




Below is an illustration of the display in the instance of presence of the voltage  $> 6\text{ V}$  in Resistance Measurement Mode (⚡).



### 3.6 DISCONNECTING

At the end of the measurements, disconnect the leads, then press the

power button  to turn the instrument OFF.

## 4. SPECIFICATIONS

### 4.1 REFERENCE CONDITIONS

Quantities of Influence	Reference Values
Temperature	23 ± 2 °C
Relative Humidity	(45 to 75) % RH
Supply Voltage	5.8 V ± 0.2 V
Electric Field	< 1 V/m
Magnetic Field	< 40 A/m
Warm up Time	≥ 5 min

The intrinsic uncertainty is the error defined under the conditions of reference.

This is expressed in % of the reading (R) and in number of display counts (ct): ± (a % R + b.ct)

### 4.2 ELECTRICAL SPECIFICATIONS

#### 4.2.1 Continuity and Resistance Measurements

##### Particular conditions of reference

External Voltage on the terminals: zero.

Resistance of the leads compensated.

Measurement Range	Continuity			Resistance
	(0.02 - 0.49) Ω	(0.05 - 1.99) Ω	(2.00 - 19.99) Ω	(1.0 - 199.9) Ω
Resolution	10 mΩ	10 mΩ	10 mΩ	100 mΩ
Measurement Current	at least +200 mA/-200 mA		at least +20 mA/-20 mA	+10 mA
Intrinsic Uncertainty	± 6 cts	± (10 % R + 7 cts)		± (5 % R + 7 cts)
Open-circuit Voltage	± (4 V <sub>DC</sub> < U < 6 V <sub>DC</sub> )			

The instrument is protected against external voltages up to 300 V. Above 6 V, measurements are impossible.

##### Maximum compensation of the leads:

- < 2 Ω when leads are partially spooled
- < 5 Ω when leads are fully unspooled
- > 5 Ω, compensation of the leads not possible


## 4.2.2 Environment of use Variations


Quantities of Influence	Limits of Range of Use	Variation of Measurement	
		Typical	Maximum
Temperature	(-10 to +50) °C	$\pm (1 \% R + 1 \text{ ct}) / 10 \text{ }^\circ\text{C}$	$\pm (2 \% R + 2 \text{ cts}) / 10 \text{ }^\circ\text{C}$
Relative Humidity	(10 to 90) % RH without condensation	$\pm (0.25 \% R + 2 \text{ cts})$	$\pm (0.5 \% R + 2 \text{ cts})$
Supply Voltage	(4.1 to 6.4) V	$\pm 1 \text{ ct}$	$\pm 10 \text{ cts}$
AC Voltage (50 Hz) in Series	(0 to 250) mV	0.4 % / mV	0.6 % / mV
DC Voltage in Series	(0 to 250) mV	1 ct	5 cts
AC Voltage in Common Mode	230 V at 50 Hz	1 ct	2 cts

## 4.3 POWER SUPPLY

The instrument is powered by (4) 1.5 V AA batteries (LR6 alkaline batteries). You can also use lithium batteries.

The nominal operating voltage lies between (4.1 and 6.4) V. Below 4.1 V, the instrument cannot be turned ON.

The average battery life is 30,000 0.8-second measurements every 10 seconds, and 1000 measurements after the  symbol lights. Or, 4500 5-second measurements every 25 seconds per standard IEC-61557-4.

The batteries can be replaced by NiMH rechargeable storage batteries of the same size. However, because the voltage of the rechargeable batteries is lower than that of the primary batteries, the  symbol will be displayed at all times.

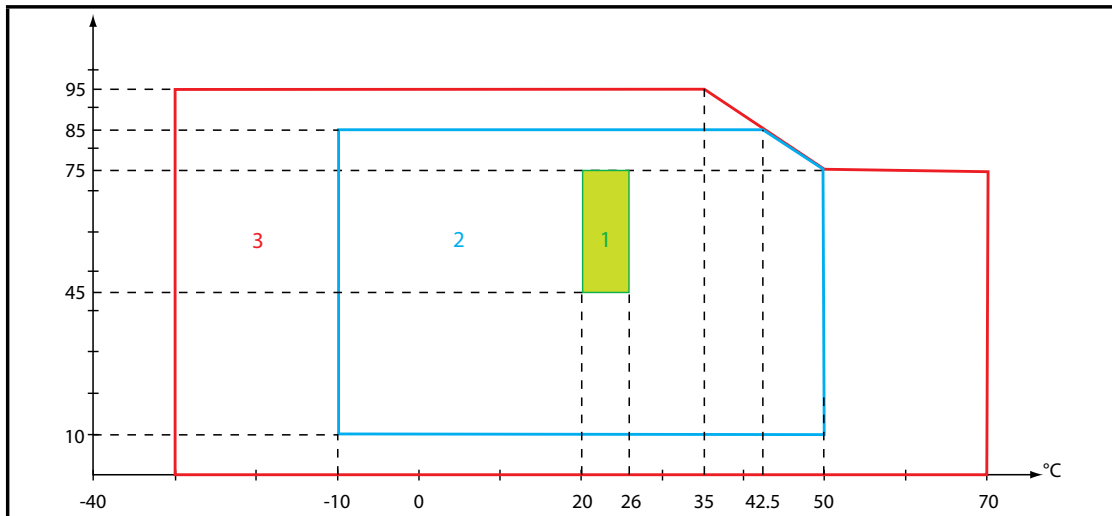
## 4.4 ENVIRONMENTAL CONDITIONS

The instrument must be used in the following environmental conditions.

### Temperature and Relative Humidity:

1 =	<b>Reference Temperature:</b> (68 to 78.8) °F (20 to 26) °C from (45 to 75) % RH
2 =	<b>Operating Temperature:</b> (14 to 108.5) °F (-10 to 42.5) °C from (10 to 85) % RH (14 to 122) °F (-10 to 50) °C from (10 to 75) % RH
3 =	<b>Storage Temperature (without batteries):</b> (-22 to 95) °F (-30 to 35) °C from (0 to 95) % RH (-22 to 158) °F (-30 to 70) °C from (0 to 75) % RH

% RH



For indoor use, outdoor use without rain.

Altitude: < 2000 m

Pollution degree 2

## 4.5 MECHANICAL SPECIFICATIONS

**Dimensions (L x W x H):** (8.86 x 7.28 x 5.31) in (225 x 185 x 135) mm

**Weight of instrument:** 12.3 oz (350 g)

**Weight of complete kit:** 5.95 lbs (2698.88 g)

**Ingress protection:** IP40 with the leads connected per IEC-60529  
IP20 without the leads per IEC-60529

**Drop test:** per IEC 61010-1

## 4.6 COMPLIANCE WITH INTERNATIONAL STANDARDS

The instrument is compliant with IEC 61557, parts 1 and 4.

The instrument is compliant with IEC 61010-1 and IEC 61010-2-030, 300 V, CAT IV.

The accessories are compliant with IEC 61010-031, CAT IV 300 V or higher.

## 4.7 ELECTROMAGNETIC COMPATIBILITY (CEM)

The instrument is compliant with standard IEC 61326-1.

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## 5. MAINTENANCE

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**WARNING:** Except for the batteries, the instrument contains no parts likely to be replaced by personnel who are not specially trained and accredited. Any unauthorized repair or replacement of a part by an equivalent part may gravely impair safety.

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### 5.1 CLEANING THE INSTRUMENT

- Disconnect everything connected to the instrument.
- Turn instrument OFF.
- Wipe instrument gently with a soft cloth dampened with soapy water.
- Rinse with a damp cloth.
- Dry rapidly with a dry cloth or forced air.
- Do not use alcohol, solvents, or hydrocarbons.
- Do not submerge in water.

### 5.2 BATTERY REPLACEMENT

When the instrument cannot be turned on, you must replace all of the batteries.

- Disconnect everything connected to the instrument.
- Turn instrument OFF.
- Push the wrist strap clear of the battery compartment cover.
- Refer to § 1.6 for the replacement procedure.



**NOTE:** Do not treat spent batteries as ordinary household waste. Take them to the appropriate collection facility for recycling.

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- Secure the wrist strap back into place.
- Check that the instrument is working properly (see § 3.1 Checking the Instrument).

### 5.3 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.



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

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## 5.5 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 unit has been tampered with, abused, or if the defect is related to service not performed by AEMC® Instruments.

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



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

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