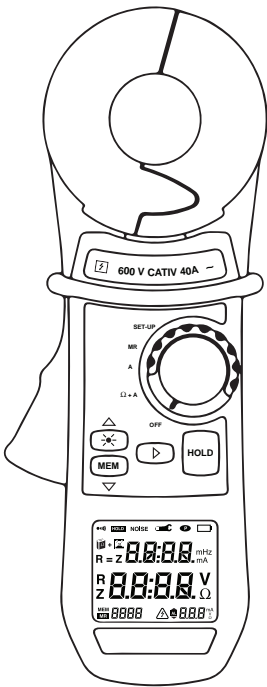


INSTRUCTION MANUAL



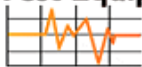
GREENLEE®

A Textron Company



CMGRT-100A CLAMP-ON GROUND RESISTANCE TESTER

**Test Equipment
Depot**
1-800-517-8431



99 Washington Street
Melrose, MA 02176
Phone 781-665-1400
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Description

The Greenlee CMGRT-100A Clamp-On Ground Resistance Tester is a hand-held testing device intended to evaluate grounding systems. It has two modes:

- **Standard Mode:** Standard Loop Resistance & Leakage Current Measurements
- **Advanced Mode:** Refine Measurements to find Impedance at the Selected Frequency & to compute Contact Voltage

Furthermore, it can also give an idea about the integrity of the ground systems, the quality of connections or bonds within the system.

The tester can measure Loop Resistance in the range of 0.01 Ω to 1500 Ω as well as leakage current in the range of 0.2 mA to 40A. It comes with a data storage function, that can log up to 300 measurements (Both Ω and/or A). Furthermore, the meter also allows the user to select test frequency between 50, 60, 128, or 2083 Hz.

Safety


Safety is essential in the use and maintenance of Greenlee tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

Purpose

This instruction manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the Greenlee CMGRT-100A Clamp-On Ground Resistance Tester.

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge.

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Do not discard this product or throw away!

For recycling information, go to www.greenlee.com.

All specifications are nominal and may change as design improvements occur. Greenlee Textron Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

® Registered: The color green for electrical test instruments is a registered trademark of Textron Innovations Inc.

KEEP THIS MANUAL

Important Safety Information



SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

DANGER

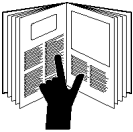
Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

WARNING

Hazards which, if not avoided, **COULD** result in severe injury or death.

CAUTION

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



WARNING

Read and understand this material before operating or servicing this equipment. Failure to understand how to safely operate this tool can result in an accident causing serious injury or death.



WARNING

Electric shock hazard:
Contact with live circuits can result in severe injury or death.

Important Safety Information

WARNING

Electric shock and fire hazard:

- Do not expose this unit to rain or moisture.
- Do not use the unit if it is wet or damaged.
- Clamp meter, test leads or any other clamp accessory, when used to make a measurement, create a System. The System is rated for CAT IV 600 VAC when using the test leads or accessories provided with the meter. The System CAT and voltage rating is limited by the lowest rated component in the System when using test leads or accessories not provided with the meter.
- Inspect the test leads or accessory before use. They must be clean and dry, and the insulation must be in good condition. Do not use the test lead if the contrasting inner layer of insulation is visible.
- Use this unit for the manufacturer's intended purpose only, as described in this manual. Any other use can impair the protection provided by the unit.

Failure to observe these warnings could result in severe injury or death.

WARNING

Electric shock hazard:

- Do not operate with the case open.
- Before opening the case, remove the test leads from the circuit and shut off the unit.
- Keep hands and fingers below the barriers on the test leads and the clamp meter body.

Failure to observe these warnings could result in severe injury or death.

Important Safety Information

WARNING

Electric shock hazard:

- Unless measuring voltage, current, or frequency, shut off and lock out power. Make sure that all capacitors are discharged. Voltage must not be present.
- Set the selector and connect the test leads so that they correspond to the intended measurement. Incorrect settings or connections can result in incorrect measurements or damage to the unit.
- Using this unit near equipment that generates electromagnetic interference can result in unstable or inaccurate readings.

Failure to observe these warnings could result in severe injury or death.

CAUTION

Electric shock hazard:

- Do not change the measurement function while the test leads are connected to a component or circuit.
- Do not clamp the jaw around a conductor carrying a frequency greater than 400 Hz. The magnetic circuitry may reach a hazardous temperature if this frequency is exceeded.

Failure to observe these precautions may result in injury and can damage the unit.

CAUTION

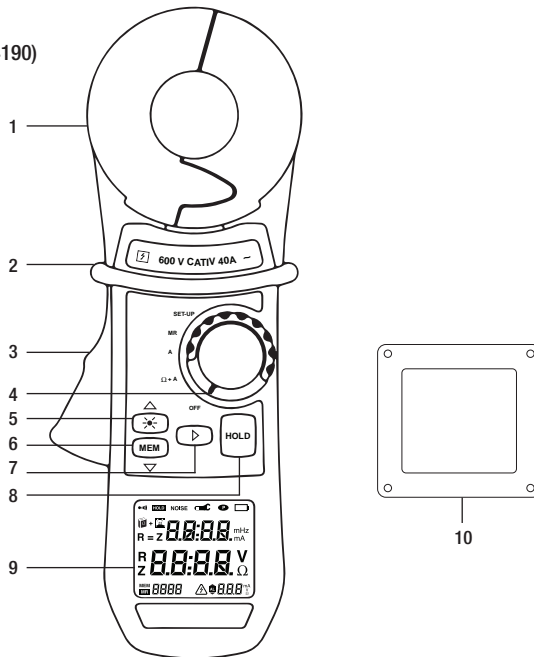
Electric shock hazard:

- Do not attempt to repair this unit. It contains no user-serviceable parts.
- Do not expose the unit to extremes in temperature or high humidity. Refer to “Specifications.”

Failure to observe these precautions may result in injury and can damage the unit.

Identification

1. Jaw
2. Guard
3. Lever
4. Rotary Switch
5. Display Backlight ON/OFF
6. Stores Measurements in Memory
7. Navigate/Validate Measurement Displays
8. HOLD Button
9. OLED Display
10. Calibration Loop (52084190)



Symbols on the Unit



Warning—Read the instruction manual



Warning—Risk of Electric Shock



Double insulation











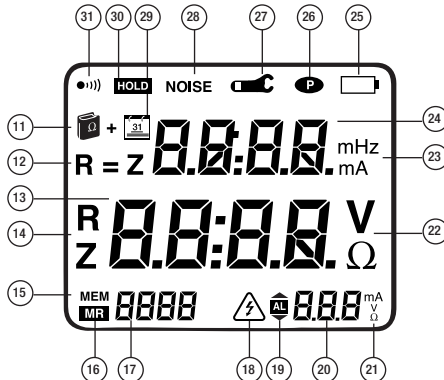
Application around or removal from hazardous live conductors is permitted



Recyclable in accordance with ISO 14040 standard

Display Icons

11.  Advance Mode
12. **R = Z** Inductive Component = Resistive Component (Advanced Mode)
13. **00:00** Main Display. Displays OR (Out of Range) when the measured resistance is over 1500 Ω or/and when the measured current is over 40A
14. **R
Z** Resistance/Impedance (Advanced Mode)
15. **MEM** Storage Mode
16. **MR** Memory Recall Mode
17. **8888** Memory Location
18.  Hazardous Voltage (Blinks when Voltage exceeds 50V)
19.  Alarm Threshold High/Low Indicator
20. **888** Alarm Threshold Display
21. **mA
V
 Ω** Units of Alarm Displayed
22. **V
 Ω** Units of Main Display
23. **mHz
mA** Units of Top Display (Loop Inductance/ Current)
24. **00:00** Top Display (Advanced Mode)
25.  Low Battery
26.  Auto Power Off Disabled
27.  Open Jaw
28. **NOISE** Presence of Stray Noise (Current) In Loop (Measurements not valid)
29.  Main Display Indicates Date When Lit
30. **HOLD** Freeze Measurement
31.  Speaker Enabled



Product Features

Rotary Switch Positions:

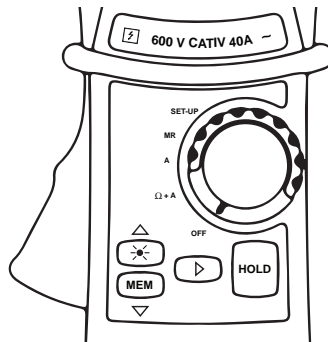
OFF – Instrument Powered Off

$\Omega + A$ – Measure Loop Impedance & Leakage Current

A – Measure Current

MR – Display Stored Data

SET-UP – Access to Instrument settings & Data Selection



Alarm Feature:

There are four distinct patterns of audio signal being employed for various warnings and instrument operations. They can be disabled if required. The different pattern and their purposes are listed below:

Low – pitched with short intervals:

Normal instrument operations

Low – pitched with a permanent signal:

Alarm thresholds triggered for either Ω or A

High – pitched with a short intervals:

Irregular occurrence which may include OR in measurements or a full memory

High – pitched with a permanent signal:

Alarm threshold for V triggered

Thresholds are user defined values. The alarm is enabled with a user defined threshold when  or when  icons are displayed.

 – Alarm Enabled for measurement above defined threshold

 – Alarm Enabled for measurement below defined threshold

Product Features (cont'd)

Instrument SET-UP

There are twelve accessible menus in the SET-UP position of the rotary switch that allows user defined parameters to configure the instrument.

No.	Function
1	Erase stored data.
2	Enables/ disable audible alarm.
3	Enables/disables Auto Power OFF
4	Sets the impedance alarm threshold (Ω)
5	Sets the voltage alarm threshold (V)
6	Sets the current alarm threshold (I)
7	Sets the date.
8	Sets the time.
9	Selects the Standard or Advanced operating mode.
10	Selects the test frequency for the impedance.
11	Enables/disables the AUTO-HOLD mode.
12	Displays the version number.
13	Not used.

Navigation

Navigating through the features is made possible using the following buttons on the instrument:

- ▲ – Move up in the menu tree
- ▼ – Move down in the menu tree
- ▶ – Select menu or return to previous menu

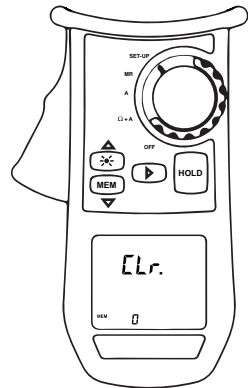
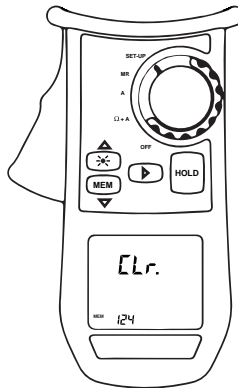
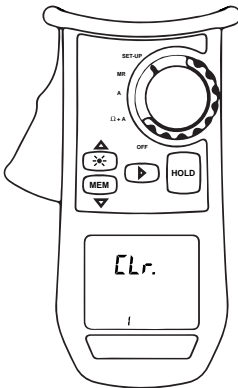
When the user enters the menu tree, the selected menu starts blinking, indicating the state of the menu.

Product Features (cont'd)

SET-UP Menus

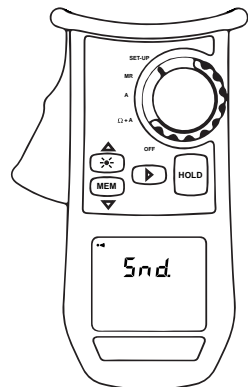
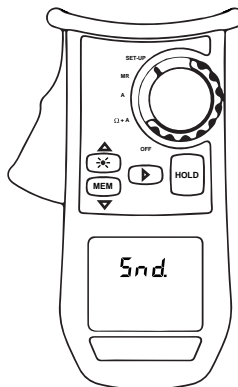
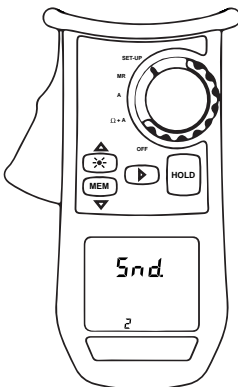
1. *CLr* – Erase Stored Data

- Enter menu by ►. *CLr* blinks.
- Hold ▲ and ▼ buttons simultaneously for 6 seconds to erase all recorded data. The meter indicates *MEM 0*.
- Return to the previous menu by ►.



2. *Snd* – Enable/Disable Audible Alarm

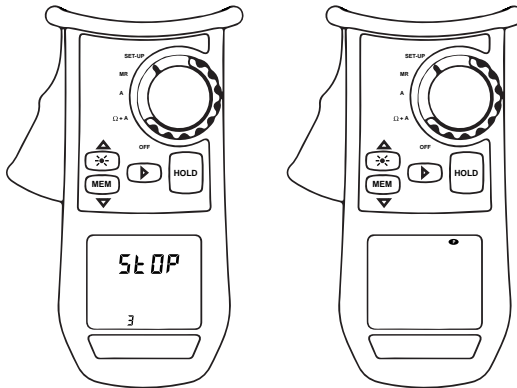
- Enter menu by ►. *Snd* blinks.
- Press ▲ or ▼ to enable/disable alarm sound.
- Alarm enabled when ●))) icon is visible and disabled when it is masked.
- Return to the previous menu by ►.



Product Features (cont'd)

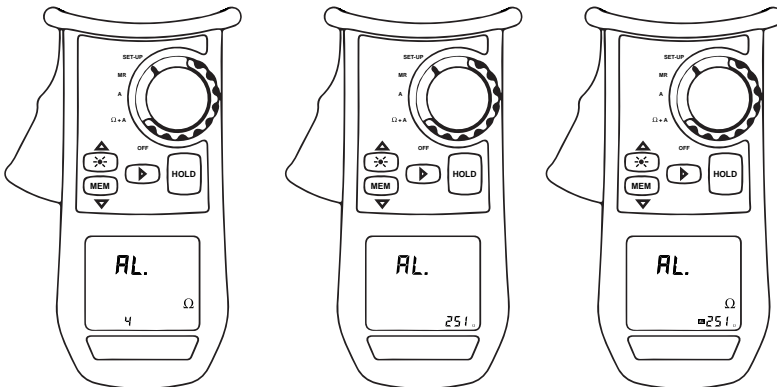
3. *stOP* – Enable/Disable Auto Power OFF

- Enter menu by ►. *stOP* blinks.
- Press ▲ or ▼ to enable/disable Auto Power OFF.
- Auto Power OFF deactivated when **P** icon is displayed.
- Return to the previous menu by ►.



4. *AL. Ω* – Impedance Alarm Threshold

- Enter menu by ►. *AL. Ω* blinks.
- Press ▲ or ▼ to select state of the alarm:
 - **AL** Disabled
 - **AL** Enabled for a measurement exceeding the threshold
 - **AL** Enabled for a measurement below the threshold
- Validate by ►.

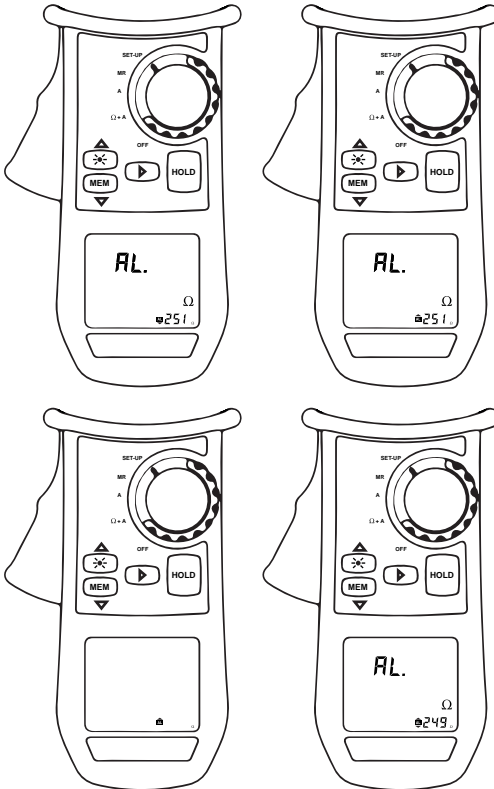


Product Features (cont'd)

4. AL. Ω – Impedance Alarm Threshold (cont'd)

Setting the Alarm Value:

- Press \blacktriangle or \blacktriangledown to select the impedance alarm threshold
- Validate by \blacktriangleright .



Product Features (cont'd)

5. AL. V – Voltage Alarm Threshold

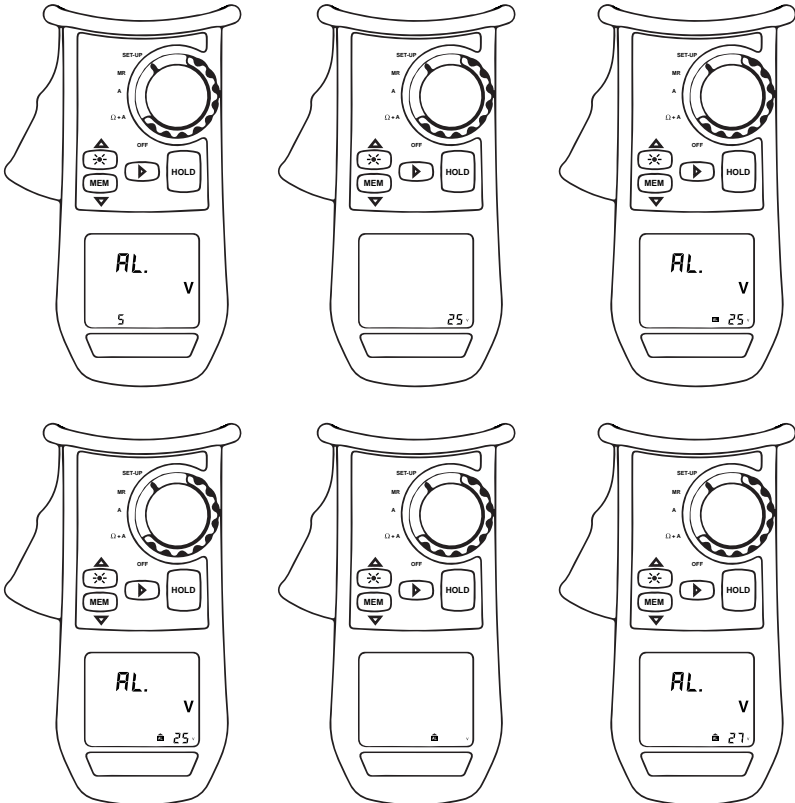
- Enter menu by ►. *AL. V* blinks.
- Press ▲ or ▼ to select state of the alarm:
 - **AL** Disabled
 - **AL** Enabled for a measurement exceeding the threshold
- Validate by ►.

Note: Voltage Alarm can only be triggered for measurements exceeding threshold

- Enter the menu tree further to select an alarm threshold and return to main menu

Setting the Alarm Value:

- Press ▲ or ▼ to select the impedance alarm threshold
- Validate by ►.



Product Features (cont'd)

6. AL. A – Current Alarm Threshold

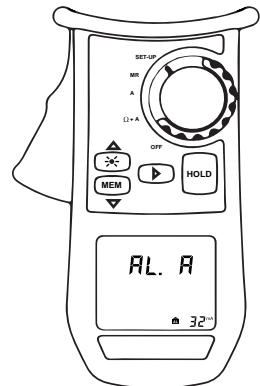
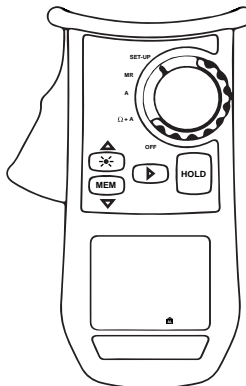
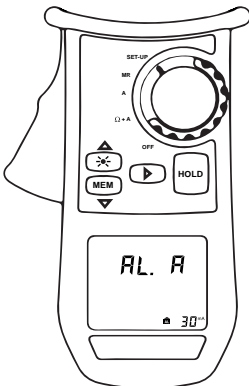
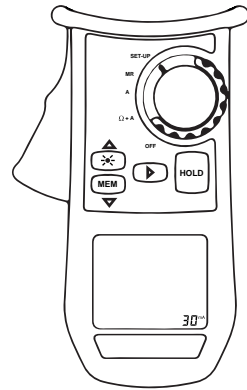
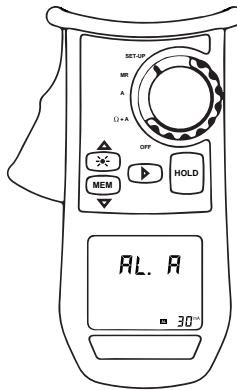
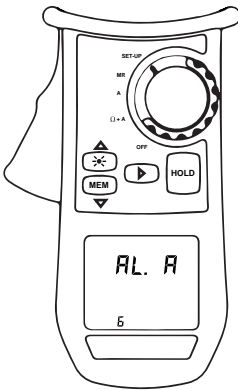
- Enter menu by ►. AL. A blinks.
- Press ▲ or ▼ to select state of the alarm:
 - AL Disabled
 - AL Enabled for a measurement exceeding the threshold
- Validate by ►.

Setting the Alarm Value:

- Press ▲ or ▼ to select the impedance alarm threshold
- Validate by ►.

Note: Current Alarm can only be triggered for measurements exceeding threshold

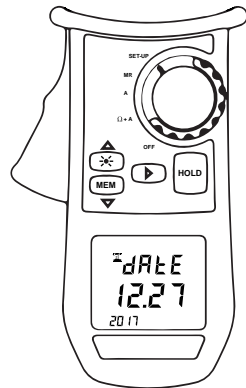
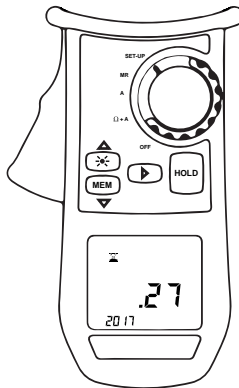
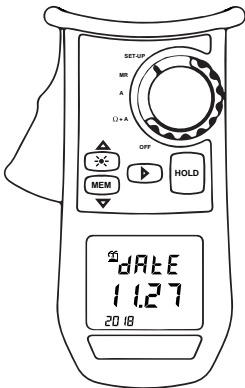
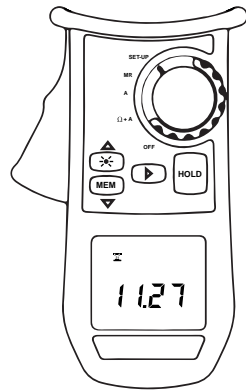
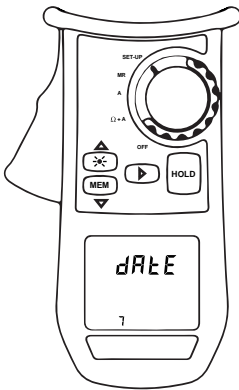
- Enter the menu tree further to select an alarm threshold and return to main menu



Product Features (cont'd)

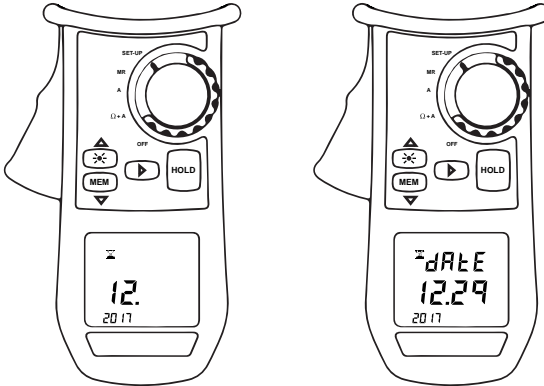
7. *dAtE* – Set Date

- Enter menu by ►. *dAtE* blinks.
- Press ▲ or ▼ to select a year and validate by ►.
- Press ▲ or ▼ to select the month and validate by ►.
- Press ▲ or ▼ to select the date.
- Validate and return to the previous menu by ►.



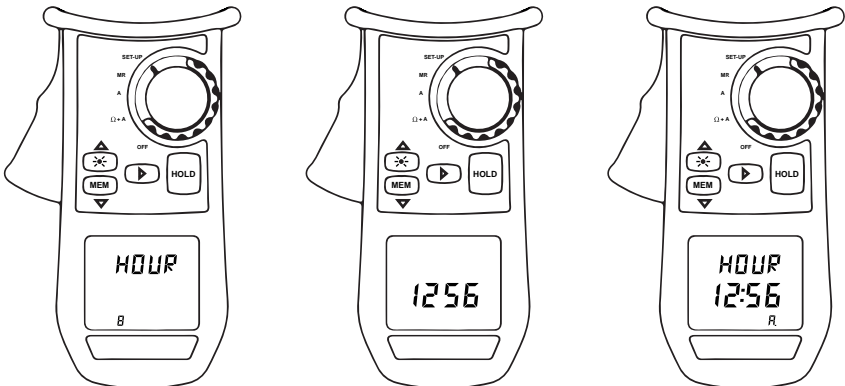
Product Features (cont'd)

7. *DATE* – Set Date (cont'd)



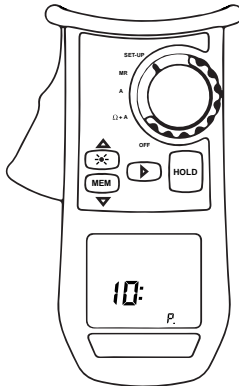
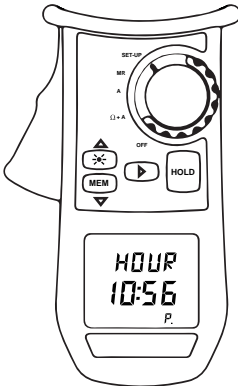
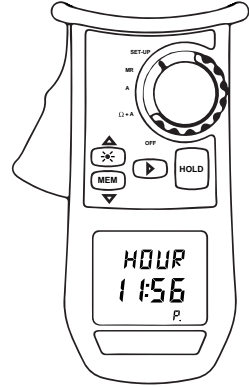
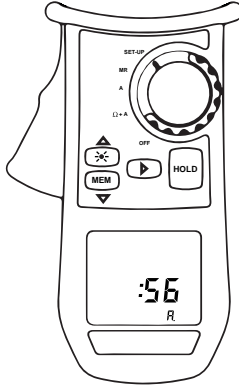
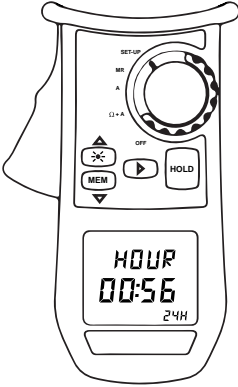
8. *HOURL* – Set Time

- Enter menu by ►. *HOURL* blinks.
- Press ▲ or ▼ to select AM/PM or a 24-hour display mode (24H), which blinks. Validate by ►.
- Press ▲ or ▼ to select the hour, which blinks. Validate by ►.
- Press ▲ or ▼ to select the minutes value, which blinks. Validate by ►.
- Validate and return to the previous menu by ►.




Product Features (cont'd)

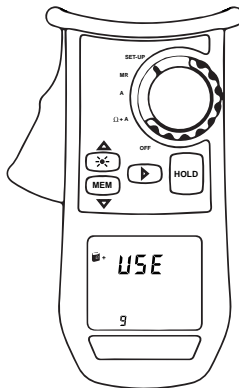
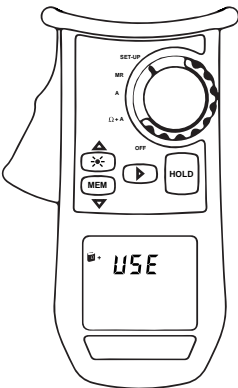
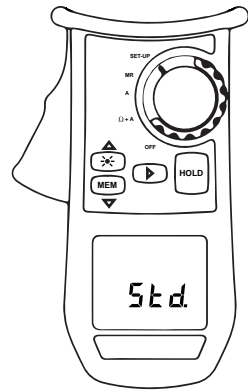
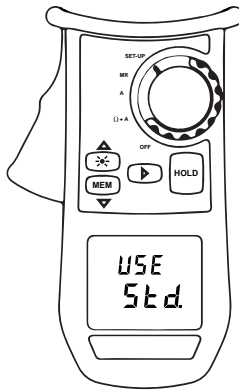
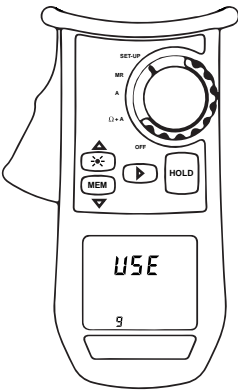
8. HOUR – Set Time (cont'd)



Product Features (cont'd)

9. *USE* – Select Standard/Advanced Mode

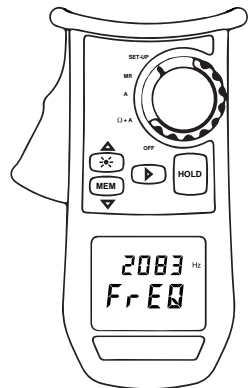
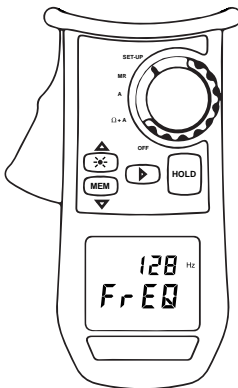
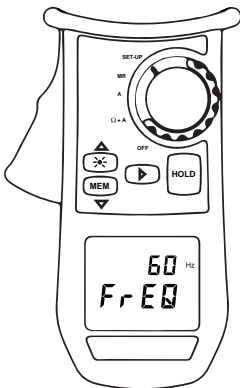
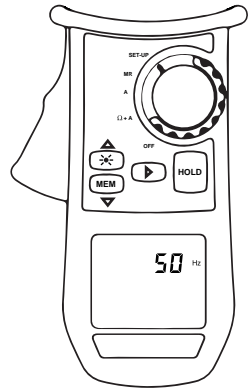
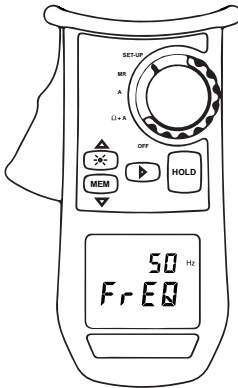
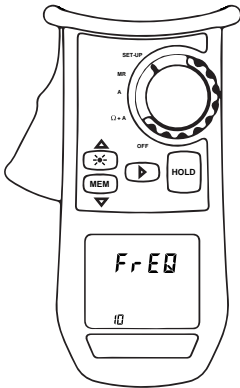
- Enter menu by ►. *USE* blinks.
- Press ▲ or ▼ to select between Standard or Advanced Mode.
 - **Advanced Mode:** The  + icon is displayed
 - **Standard Mode:** *Std* is displayed
- Validate and return to the previous menu by ►.



Product Features (cont'd)

10. *FrEQ* – Select Test Frequency

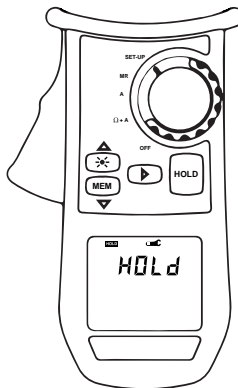
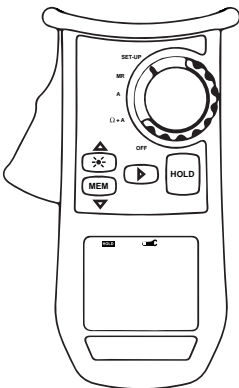
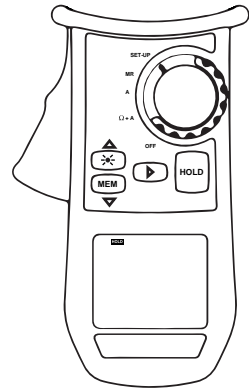
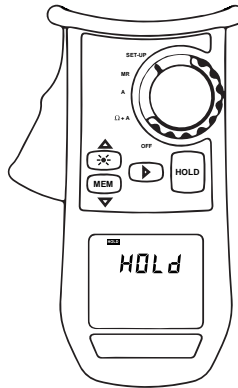
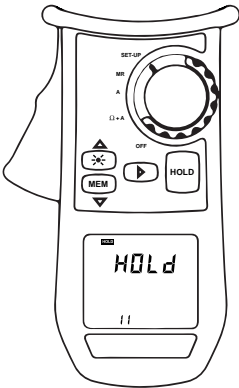
- Enter menu by ►. *FrEQ* blinks.
- Press ▲ or ▼ to select among the four available transposition frequencies for measured impedance
- Validate and return to the previous menu by ►.



Product Features (cont'd)

11. **HOLD** – Enable/Disable AUTO-HOLD

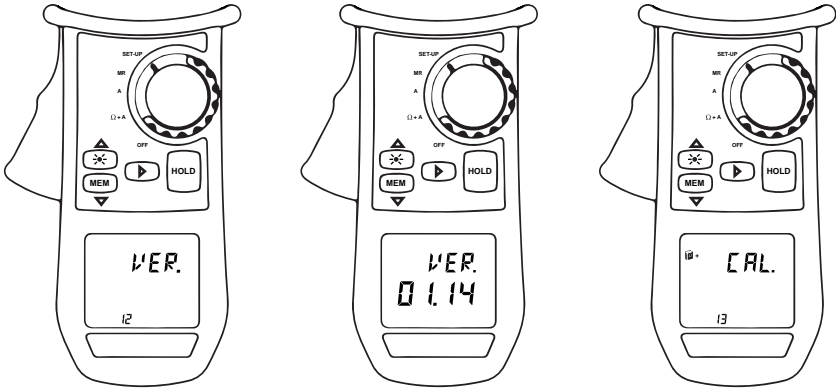
- Enter menu
- Use movement buttons to enable or disable AUTO-HOLD. It is enabled when  icon is displayed



Product Features (cont'd)

12. *VER* – Display Version Number

- Enter menu and the version number is displayed



13. *CAL* – Reserved for Factory Use

Memory:

The instrument can store up to 300 measurements. A full memory is represented by **FULL**. A data can be stored by pressing the **MEM** button. Storage is confirmed with an audible sound.

Switch rotary switch to **MR** to display stored data.

Auto Power OFF:

Auto Power OFF can be enabled/disabled in SET-UP. If enabled the instrument remains powered on for exactly 5 minutes, when inactive, until it automatically powers off to save/extend battery life.

Measurement Modes:

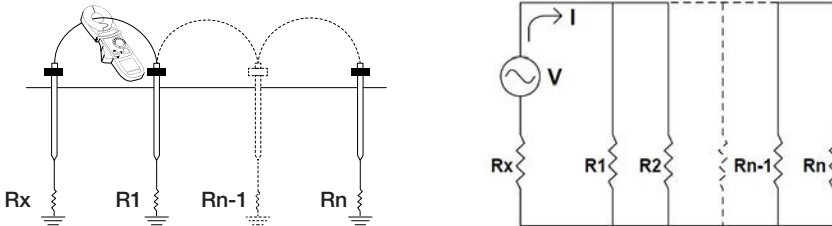
- 1. Standard Mode** – Only one measurement screen is available. The loop impedance and the leakage current is displayed. Measurement frequency is 2083 Hz.
- 2. Advanced Mode** – Three measurements screens are available.
 - Screen 1 displays the same as Standard Mode. However, the loop impedance at the other frequencies can be displayed using SET-UP.
 - Screen 2 displays the contact voltage calculated using the loop impedance and current measurement.
 - Screen 3 displays loop resistance (R) and loop inductance (L) In case of a negligible inductive component, the symbol R=L is displayed

Theory of Operation

The CMGRT-100A performs two measurements: resistance and current. It measures resistance by applying a voltage at 2.403 kHz and indirectly measuring the resulting current. It measures current indirectly by measuring the electromagnetic field around a conductor, which is proportional to the current flowing through the conductor.

The following illustration and schematic diagram represent a typical multiple ground rod system. The ground electrodes are represented by R (R1, R2, R3 ... Rn), and the CMGRT-100A is represented by ~V.

The CMGRT-100A induces a voltage (V) into the system and measures the resulting current (I). The CMGRT-100A then divides the voltage by the current to derive the resistance (V/I = R). The equation for the resistance of Rx is shown below.



$$\frac{V}{I} = R_x + \frac{1}{\sum_{i=1}^n \frac{1}{R_i}} \quad \text{where, usually} \quad R_x + \frac{1}{\sum_{i=1}^n \frac{1}{R_i}}$$

The equation shown above is the standard equation for finding the resistance of one leg of a parallel circuit. However, the CMGRT-100A uses a simplified equation (V/I = Rx) since the rightmost section of the formula ($\frac{1}{\sum_{i=1}^n \frac{1}{R_i}}$) is a very small amount of resistance if “n” is sufficiently large. This is shown mathematically in the example below.

Example: A grid with 101 ground electrodes, each with a resistance of 25 Ω.

The measured resistance, Rx, would equal the resistance of Rx in series with the parallel resistance of the other 100 ground rods:

$$R_x = 25 \Omega + \frac{1}{\sum_{i=1}^n \frac{1}{R_i}} \quad R_x = 25 \Omega + 0.25 \Omega \quad R_x = 25.25 \Omega$$

Note, however, that most grounded systems have more than 100 ground electrodes. Therefore, the parallel resistance is negligible. It is practical to simplify the equation and the calculation to V/I = Rx.

Operation

1. See Features.
2. Turn the unit on, selecting the appropriate features (turn the speaker on or off, change the alarm setpoint, etc).
3. See Typical Applications for specific measurement instructions.
4. Test the unit on a known functioning circuit or the test resistance loop. To use the test resistance loop, clamp the CMGRT-100A around the loop. It should read between 4.9 Ω and 5.1 Ω .

Note: This value is for ambient temperature between 20 °C and 25 °C (68 °F and 78 °F). It may differ a few counts below or above this temperature.

- If the unit does not function as expected on a known functioning circuit or the test resistance loop, replace the battery.
 - If the unit still does not function as expected, send the unit to Greenlee for repair. See the address shown under Warranty.
5. Take the reading(s) from the circuit or component to be tested.
 - If the ground current exceeds 5 A or if the noise exceeds 50 V, the CMGRT-100A will not measure the resistance accurately. Make a note of the location for maintenance and proceed to the next test location.
 - A reading of < 0.01 may indicate that the cable is part of a closed loop; for example; when two bonding conductors are connected to the same enclosure and ground rod.
 - A high resistance reading or OR (Out of Range) may indicate any of the following:
 - The cable is not grounded at both ends (a lack of a ground, or a lack of a path back to the system neutral).
 - The ground rod is in poor condition.
 - The ground circuit is broken, or open.
 - The bonds on the rod or splices are of poor quality. Check for buried split butts, clamps, and hammered-on connections.
 - A component in the circuit is causing high leakage.
 6. After taking the measurements, make a written record of the data, if necessary (date, location, resistance measurement, and current measurement).

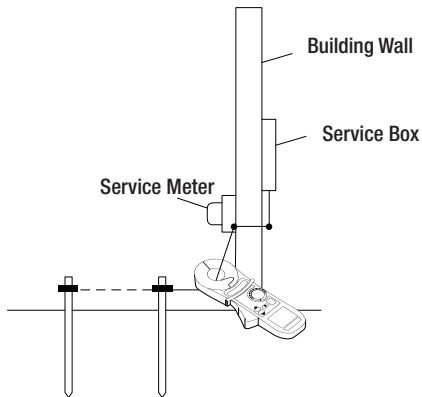
Typical Applications

General procedures for all applications:

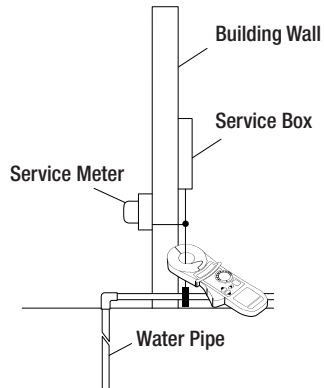
1. Remove any molding from the ground conductor so that the jaws can close completely around the conductor.
2. Center the conductor in the jaw for highest accuracy.
3. Take the reading.
4. Replace the molding.

Service Entrance or Meter

Multiple Ground Rods



Water Pipe Ground



Note: Clamp onto the conductor between the service neutral and both grounded points.

Typical Applications (cont'd)

Central Office Locations

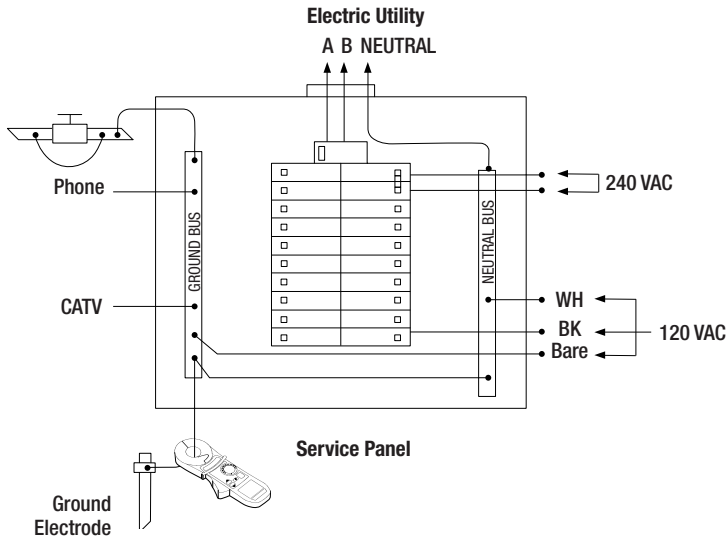
The main ground conductor from a ground window or a ground plane is usually the location to clamp the unit. Due to the wiring practices within the central office, there are many locations at which you can look at the water pipe or counterpoise from within the building. An effective location is usually at the ground bus in the power room or near the backup generator.

By measuring resistance and current at several points and comparing the readings, you can identify neutral loops, utility grounds, and central office grounds. The test is effective and accurate when the ground window is connected to the utility ground at only one point.

Service Panel

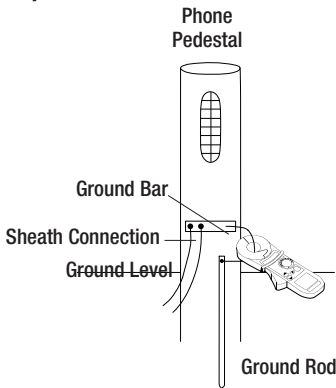
At a service panel, several sources may be grounded at a single grounding point. As shown in the following illustration, those sources could be electric neutral, telephone, CATV, and water.

The primary return path should be electric neutral. After taking the first measurement, disconnect one source and take a new measurement. Continue in this manner until all other sources have been disconnected. Any higher measurement may indicate that the electric neutral is defective or open.

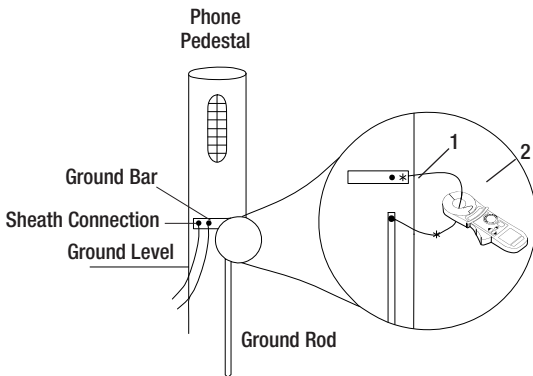


Typical Applications (cont'd)

Telephone Pedestal

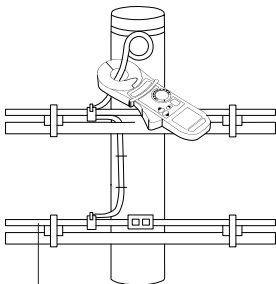


Note: Clamp onto the ground conductor (as shown) or onto the ground rod.



1. Remove ground bar connection to pedestal rod.
2. Extend pedestal rod lead to the ground bar using a temporary jumper.

Above Telephone Space



Note: Clamp onto the ground conductor (as shown). The reading will indicate the connection between the telephone circuit ground and the power utility ground.

Ground wire doubled under ground clamp

Frequently Asked Questions

- Q: Does the ground electrode have to be disconnected and isolated as is required when using the “Fall-Of-Potential” test with auxiliary electrodes?
- A: No. Actually the electrode must be connected to the system to provide the path for test signal injection as well as to provide the background impedance necessary as the reference. Additionally, if the tested rod is poorly bonded to the ground connector, a high reading will be present.
- Q: Does this mean I am not able to test an independent electrode?
- A: No. However, as soon as the connection is made to a multiple electrode system, usually provided by the connection to the system neutral, you can clamp on and make a measurement.
- Q: Must the unit be clamped directly on the electrode?
- A: No. The unit provides valid measurement results when clamped onto the electrode or the conductor leading to the ground electrode. The reading through the conductor verifies not only the ground electrode resistance, but also the connections of the ground wire to the rest of the system.
- Q: Does the system under test have to be energized or de-energized to perform the test?
- A: We are measuring the grounding network. The only requirements are that ground connections be made to the system under test and that the voltage-to-ground at the tested point not exceed the instrument rating.
- Q: How does clamp-on ground testing compare with the standard “Fall-Of-Potential” test?
- A: Empirical testing has validated that when performed correctly, both methods provide accurate and repeatable readings for ground electrode resistance.
- Q: How large a conductor can the jaw accommodate?
- A: The inner diameter of the jaw is 35 mm (1.38") and can accommodate cables up to 1000 MCM.

Accuracy

Accuracy is specified as \pm (a percentage of the reading + a fixed amount) within the following parameters:

- Temperature: $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$)
- Relative humidity: $50\% \text{ RH} \pm 10\%$
- Conductor location: Centered in jaw
- Battery charge: $6\text{ V} \pm 0.2\text{ V}$
- External magnetic field: $< 40\text{ A/m}$
- External electrical field: $< 1\text{ V/m}$
- Loop resistance: Non-inductive

Ground Resistance

Range	Resolution	Accuracy
0.010 to 0.10 Ω	0.001 Ω	$\pm (1.5\% + 0.01 \Omega)$
0.10 to 1.00 Ω	0.01 Ω	$\pm (1.5\% + 0.02 \Omega)$
1.0 to 50.0 Ω	0.1 Ω	$\pm (1.5\% + 0.1 \Omega)$
50.0 to 100.0 Ω	0.5 Ω	$\pm (2.0\% + 0.5 \Omega)$
100 to 200 Ω	1 Ω	$\pm (3.0\% + 1 \Omega)$
200 to 400 Ω	5 Ω	$\pm (5.0\% + 5 \Omega)$
400 to 600 Ω	10 Ω	$\pm (10.0\% + 10 \Omega)$
600 to 1200 Ω	50 Ω	$\pm 20\%$ (approximately)
1200 to 1500 Ω	50 Ω	$\pm 25\%$ (approximately)

Ground or Leakage Current

Measurement Range	Resolution	Accuracy
0.1 to 1.000mA	0.1 μ A	$\pm 2\% \pm 50\mu$ A
1.000 to 3.000mA 3.00 to 10.00mA	10 μ A	$\pm 2\% \pm 50\mu$ A
10.00 to 30.00mA 30.0 to 100.0mA	100 μ A	$\pm 2\% \pm 100\mu$ A
100.0 to 300.0mA 0.300 to 1.000A	1mA	$\pm 2\% \pm 1$ mA
1.000 to 3.000A 3.00 to 39.99A	10mA	$\pm 2\% \pm 10$ mA

Contact Voltage

Measurement Range	Resolution	Accuracy
0.1 to 5.0V	0.1V	$\pm 5\% \pm 0.1$ V
5.0 to 50.0V	0.5V	$\pm 5\% \pm 0.5$ V
50.0 to 75.0V	1V	$\pm 10\% \pm 1$ V

Specifications

Display: 3-3/4–digit OLED (4000 counts)

Jaw Opening: 35 mm (1.38")

Resistance Measurement Frequency: 2083 Hz

Current Measurement Frequency: 47 Hz to 800 Hz

Automatic Power-Off: After 5 minutes of inactivity

Overvoltage Protection Categories:

Category IV, 600 VAC, Pollution Degree 2

Operating Conditions:

–20 °C to 55 °C (–4 °F to 131 °F), 10% to 90% relative humidity

Storage Conditions: –40 °C to 70 °C (–40 °F to 158 °F), 10 to 75% relative humidity

Remove battery

Battery: 4 x 1.5V LR6 (AA) alkaline or 4 NiMH batteries

Statement of Conformity

Greenlee Textron Inc. is certified in accordance with ISO 9001 (2000) for our Quality Management Systems.

The instrument enclosed has been checked and/or calibrated using equipment that is traceable to the National Institute for Standards and Technology (NIST).

Overvoltage Installation Categories

These definitions were derived from the international safety standard for insulation coordination as it applies to measurement, control, and laboratory equipment. These overvoltage categories are explained in more detail by the International Electrotechnical Commission; refer to either of their publications: IEC 1010-1 or IEC 60664.

Overvoltage Category I

Signal level. Electronic and telecommunication equipment, or parts thereof. Some examples include transient-protected electronic circuits inside photocopiers and modems.

Overvoltage Category II

Local level. Appliances, portable equipment, and the circuits they are plugged into. Some examples include light fixtures, televisions, and long branch circuits.

Overvoltage Category III

Distribution level. Permanently installed machines and the circuits they are hard-wired to. Some examples include conveyor systems and the main circuit breaker panels of a building's electrical system.

Overvoltage Category IV

Primary supply level. Overhead lines and other cable systems. Some examples include cables, meters, transformers, and other exterior equipment owned by the power utility.

Maintenance

⚠ CAUTION

- Do not attempt to repair this unit. It contains no user-serviceable parts.
 - Do not expose the unit to extremes in temperature or high humidity. See Specifications.
- Failure to observe these precautions can result in injury and can damage the unit.

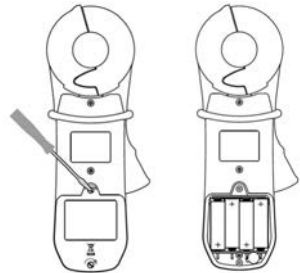
Battery Replacement

⚠ WARNING

Before opening the case, remove the jaw from the circuit and shut off the unit.
Failure to observe these warnings can result in severe injury or death.

The Model CMGRT-100A is powered by four 1.5V batteries. The battery replacement indicator will blink when battery voltage is low and will display continuously when battery replacement is required.

1. Unclamp the instrument and set rotary switch to OFF
2. Use a Phillips head screwdriver to remove the two screws to uncover the batteries
3. Replace batteries as per specifications while observing polarities
4. Cover the battery Compartment and re-screw it before validating instrument operation



Cleaning

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter will not be used for periods longer than 60 days, remove the batteries and store them separately.