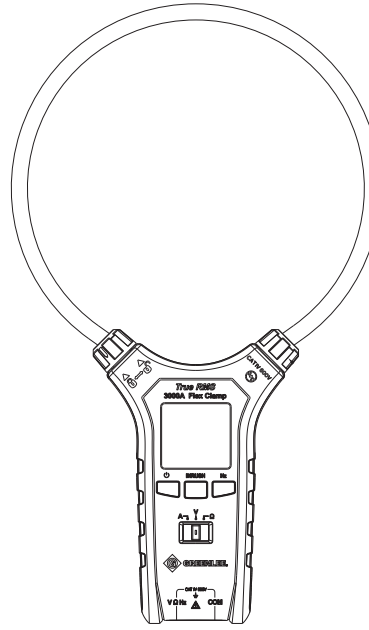
INSTRUCTION MANUAL

GREENLEE®

CMF-110

CMF-118



Flex Clamp Meters

Table of Contents

Description

The Greenlee CMF-110 and CMF-118 Flex Clamp Meters are hand-held testing devices that measure AC current, AC voltage, resistance, and frequency. These meters are designed to be placed on or removed from insulated or uninsulated conductors.

Safety

Safety is essential in the use and maintenance of Greenlee tools. 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.

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 could result in an accident causing serious injury or death.

⚠WARNING

Electric shock hazard:

Contact with live circuits could result in severe injury or death.

Do not discard this product or throw away!
For recycling information, go to www.greenlee.com.

KEEP THIS MANUAL

Important Safety Information (cont.)

⚠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 V 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 apply more than the rated voltage between any two input terminals, or between any input terminal and earth ground.
- 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.

⚠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.

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

Important Safety Information (cont.)

⚠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.

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. Rogowski Coil - The measurement coil of flex clamp meter
2. Clamp Lock - Turn the knob counter-clockwise to unlock the clamp; turn clockwise to lock the clamp.
3. LCD - Displays measurement data and function modes
4. "HOLD "/ ⏻ - Press to turn ON/OFF hold mode. Press and hold to turn the unit ON/OFF.
5. " 💡 " and " INRUSH " - Press to turn ON/OFF backlight. Press and hold for 2 seconds to turn ON/OFF inrush measurement mode
6. "RANGE" and "Hz" - Press to switch between 30.00A/300.0A/3000A/Auto; The Default is Auto
7. Power and Range Shift Switch: Set to A for current measurement, V for AC voltage measurement, and Ω for resistance measurement.
8. Voltage and Resistance Measurement Input:

   Maximum AC voltage measurement is 600V, maximum resistance is 60MΩ

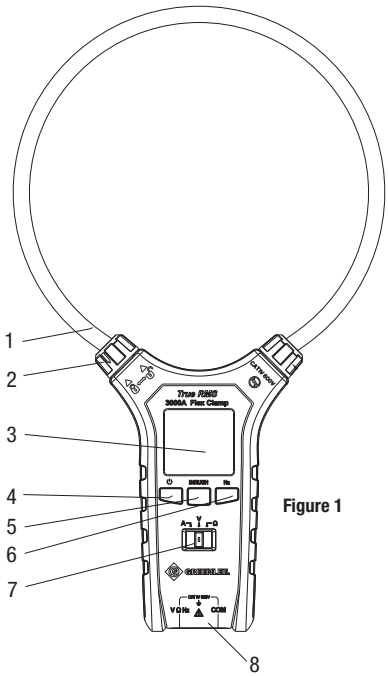


Figure 1

Symbols on the Unit

⧈	Double Insulation	▭	Low Battery
⏚	Grounding	⎓	AC/DC
⚠	Warning	⚡	High Voltage Danger
~	AC	CE	Complies with European Union Standards
⎓	DC	ETL	ETL Standard Certification

Display Icons

Symbol	Description	Symbol	Description
INRUSH	80 ms inrush measurement	Unit	A, Hz, V, Ω, kΩ, MΩ
•)))	Buzzer	APO	Auto Power Off
	Low Battery	H	Data hold

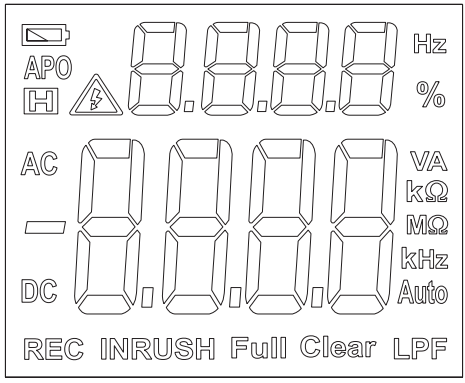


Figure 2

Operation

	**⚠WARNING** Electric shock hazard: Contact with live circuits could result in severe injury or death.

⚠CAUTION

Keep your hands away from the Rogowski coil and conductor to be measured.

⚠WARNING

Disconnect all power supplies from the device before measurement. When measuring uninsulated conductors, do not power on the wire to be tested until the meter has safely clamped the wire.

1. Turn off the clamp as well as the conductor being measured.
2. Unlock the clamp according to Figure 3
3. Use the measuring head to wrap around the conductor to be measured and lock it in place. (Only one wire can be tested at a time; See Figure 4)

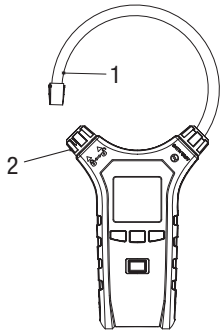


Figure 3

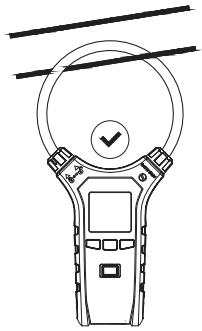


Figure 4

4. Turn on the clamp and adjust the slider to measure current, then turn on the conductor to be measured.
5. Read the value displayed on the LCD. If the current to be measured is over the range, OL appears on the LCD. Please select the appropriate range. (30.00A/300.0A/3000A)
6. Improper operation examples:
   a. Do not test more than one conductor at a time as shown in as shown in Figure 5
   b. Do not attempt to twist, bend, or wrap the coil of the CMF-110/118 as shown in Figures 6, 7, and 8.
   c. Do not attempt to pull on or apply a force to the coil of the CMF-110/118

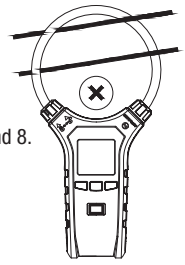


Figure 5

Operation (cont.)

Figure 6

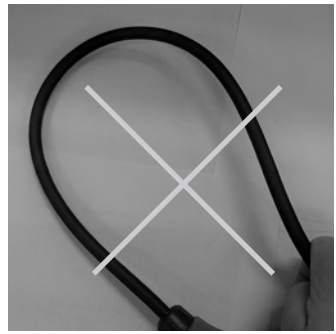


Figure 7

Figure 8

Operation (cont.)

AC Voltage and Frequency Measurement

1. Insert the black test lead to the COM jack, and the red test lead to the V jack.
2. Switch the functional switch to the V position
3. Press and hold RANGE to turn on frequency measurement mode, otherwise skip to step 4.
4. Connect the test leads to the voltage to be tested (Figure 9) and the meter will automatically select the range. The main display will show the AC voltage RMS and the auxiliary display will show the frequency value.

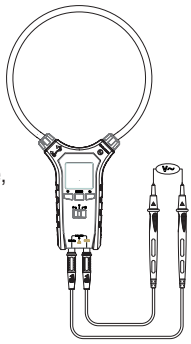


Figure 9

⚠WARNING

Do not input over AC 600V.

Resistance Measurement

1. Insert the black test lead to the COM jack and the red test lead to the V jack
2. Switch the functional switch to the Ω position
3. Connect the test leads to the resistance to be tested (Figure 10) and the meter will automatically select the range. The main display will show the resistance value.

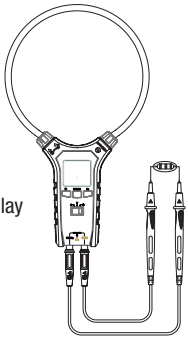


Figure 10

⚠WARNING

Before measuring, please disconnect the power supply and fully discharge all capacitors. The result will be more accurate if the resistor is separated from the whole circuit.

Auto Power Off

During measurement, if there is no operation within 10 minutes, the meter will power off automatically to save energy. Press the 💡 and RANGE buttons at the same time to turn ON/OFF the APO function. The APO function is active by default.

Typical Measurements and Accuracy

Electrical Accuracy Specifications

The Temperature Coefficient is 10% of accuracy per °C difference from 18 °C between 0 °C and 18 °C and from 28 °C between 28 °C and 50 °C.

Accuracy	± (%reading+a fixed amount)
Temperature	23° C±5° C
Humidity	≤ 80% RH
Temperature Coefficient	0.1 x (accuracy)/°C

(1) CMF-110/118 AC Current Measurement

Range	Resolution	Accuracy (At Centered Position)	Overload Protection
30.00A	0.01A	±(3%+0.05A)	Accuracy when measuring in centered position. Please refer to Figure 12.
300.0A	0.1A	±(3%+0.5A)	
3000A	1A	±(3%+5A)	
Inrush Current Measurement	Measurement Range:0.50A-3000A	Only for reference	–
Frequency Response	45Hz-500Hz	–	–

Accuracy (CMF-110)

Decreased accuracy when measuring outside of optimal measurement location (when no other electric or magnetic fields are present)	Center for optimal measurement	± (3%+5)	√	 Figure 11
	15mm (0.6") away from center	Add 2.0%	Region A	
	25mm (1.0") away from center	Add 2.5%	Region B	
	35mm (1.4") away from center	Add 3.0%	Region C	

Accuracy (CMF-118)

Decreased accuracy when measuring outside of optimal measurement location (when no other electrical or magnetic fields are present)	Center for optimal measurement	± (3%+5)	√	 Figure 12
	35mm (1.4 inches)	Add 1.0%	Region A	
	50mm (2.0 inches)	Add 1.5%	Region B	
	60mm (2.4 inches)	Add 2.0%	Region C	

2) CMF-110/118 AC Voltage Measurement

Range	Resolution	Accuracy	Description
6.000V	0.001V	±(1.2%+0.003V)	600 VAC
60.00V	0.01V	±(1.2%+0.03V)	
600.0V	0.1V	±(1.2%+0.3V)	
Frequency Response	45Hz-500Hz	–	–

Input Impedance ⩾ 10MΩ

Typical Measurements and Accuracy (cont.)

3) CMF-110/118 Resistance Measurement (Ω)

Range	Resolution	Accuracy	Overload Protection
6.000kΩ	0.001kΩ	±(1.2%+3Ω)	600 VAC
60.00kΩ	0.01kΩ	±(1.2%+30Ω)	
600.0kΩ	0.1kΩ	±(1.2%+300Ω)	
6.000MΩ	0.001MΩ	±(1.2%+3kΩ)	
60.00MΩ	0.01MΩ	±(1.2%+30kΩ)	

4) CMF-110/118 Frequency Measurement (Hz)

Range	Resolution	Accuracy	Overload Protection
20Hz-30kHz	0.1Hz	±1%+0.2Hz	600 VAC

Specifications

LCD: Display maximum is 3000

Overload Indication: "OL" or "-OL" will be displayed

Low Battery Indication: 

Sampling Rate: 3 times per second

Sensor Type: Rogowski Coil

Impact strength: The meter can be dropped from 2 meter's height

Clamp size: The CMF-110 has a coil size of 25.4cm (10 inches). The CMF-118 has a coil size of 45.7cm (18 inches)

Electromagnetic field effect: When electromagnetic interference exists, the meter may show an incorrect reading

Power Supply: 3 AAA 1.5V batteries

Auto power off: 10 minutes

Environmental Limitations

Operating Environment: Indoor use

Maximum height: 2000m

Safety: IEC61010-1, IEC61010-031, IEC61010-2-032, IEC61010-2-033, CAT IV 600V

Pollution level: 2

Working temperature and humidity: 0° C- 30° C (≤ 80%RH), 30° C - 40° C (≤ 75%RH), 40° C- 50° C (≤ 45%RH)

Storage temperature and humidity: -20%° C - 60° C (≤ 80%RH)

Measurement Categories

These definitions were derived from the international safety standard for insulation coordination as it applies to measurement, control, and laboratory equipment. These measurement categories are explained in more detail by the International Electrotechnical Commission; refer to either of their publications: IEC 61010-1 or IEC 60664.

Measurement Category II

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

Measurement 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.

Measurement 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.

Statement of Conformity

Greenlee Tools, 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).

Maintenance

⚠WARNING

Electric shock hazard:

Before opening the battery cover or case, remove the test leads from the circuit and shut off the unit.

Failure to observe this warning could result in severe injury or death.

a. The repair and service of the meter should be accomplished by Greenlee professional maintenance personnel or authorized departments.

b. Clean the meter case by using dry cloth periodically. Grinding agent and solvent should not be used.

Battery Installation and Replacement

This product uses 3 AAA 1.5V batteries. Please install or replace the batteries by following the procedure below:

a. Turn off the meter and remove the probes

b. Remove the screws from the battery cover, remove the battery cover, and replace the batteries.

c. After installing the batteries, replace the battery cover and secure with screws.