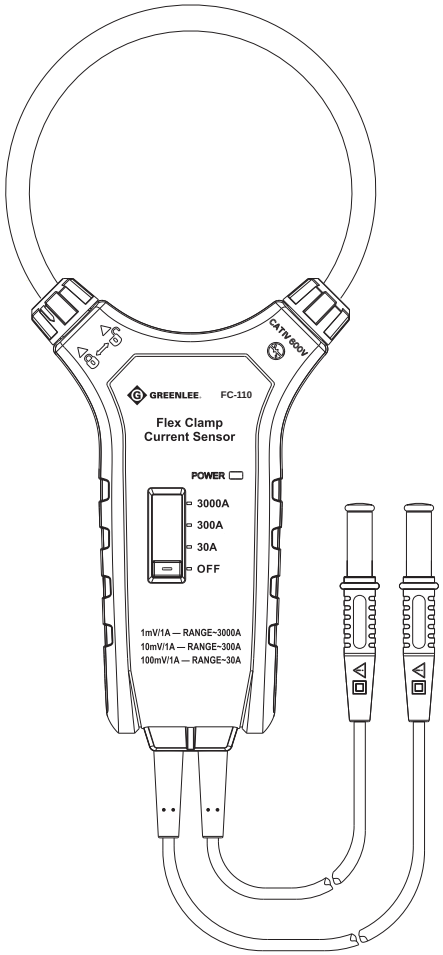
# INSTRUCTION MANUAL
# MANUAL DE INSTRUCCIONES
# MANUEL D'INSTRUCTIONS

GREENLEE®






# FC-110 and FC-118
# Flex Clamp Meters

**Read** and **understand** all of the instructions and safety information in this manual before operating or servicing this tool.

**Lea** y **entienda** todas las instrucciones y la información sobre seguridad que aparecen en este manual, antes de manejar estas herramientas o darles mantenimiento.

**Lire attentivement** et **bien comprendre** toutes les instructions et les informations sur la sécurité de ce manuel avant d'utiliser ou de procéder à l'entretien de cet outil.


52086133 REV1



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## Table of Contents



## Description

The Greenlee FC-110 and FC-118 Flex Clamp Meters are hand-held testing devices that measure AC current. 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!**

All specifications are nominal and may change as design improvements occur. Greenlee Tools, 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 Greenlee Tools, Inc.

***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, 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 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 leads or accessories not provided with the meter.
- Inspect the 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 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.

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

### ⚠WARNING

Electric shock hazard:

- Unless measuring current, shut off and lock out power. Make sure that all capacitors are discharged. Voltage must not be present.
- 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 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. Coil Support - Fixes coil to the clamp meter
4. Power Indicator – The LED will be illuminated when the clamp meter is powered on and in normal operation. The LED will flash when the batteries are low.
5. Range Switch – Select the appropriate current range for the application; Ranges are 30A, 300A and 3000A
6. Output Voltage Description – Lists the output voltage resolution for a given range. All voltages are AC.
7. Output Voltage Terminal – Outputs voltage to an AC voltage measuring device.

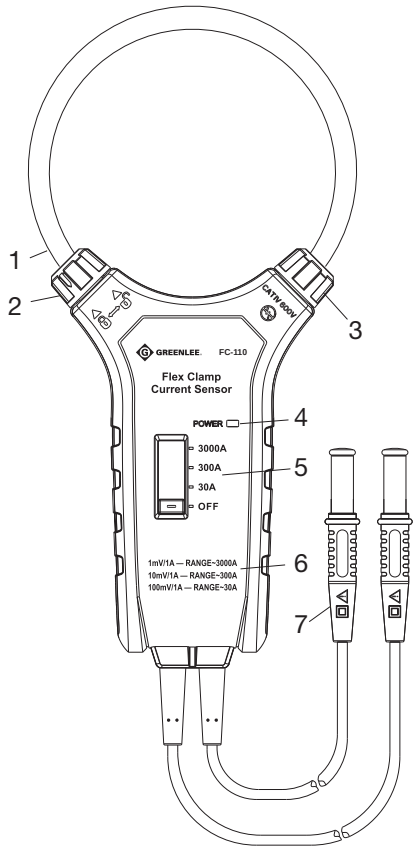


**Figure 1**

## Symbols on the Unit

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

## Operation

| | |
|---|---|
|  | **⚠WARNING**<br>Electric shock hazard:<br>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.

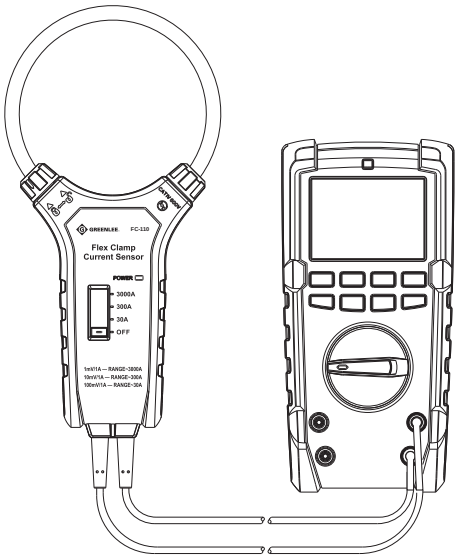


**Figure 2**

1. Turn off the clamp meter 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)

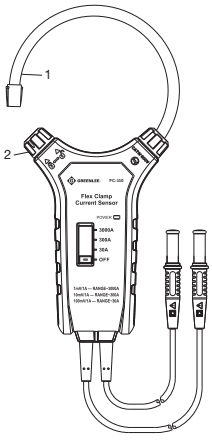


**Figure 3**

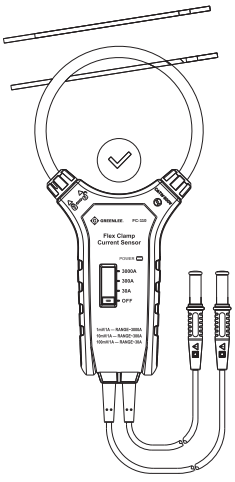


**Figure 4**

## Operation (cont.)

4. Turn on the clamp, then turn on the conductor.
5. Connect the clamp meter to an AC Voltage measuring device with a resolution of at least 1mV.
6. Read the value displayed on the AC voltage measuring device. If the current to be measured is over the range, a value greater than 3V will display on the AC voltage measuring device. Please select the appropriate range. (30.00A/300.0A/3000A)
7. 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

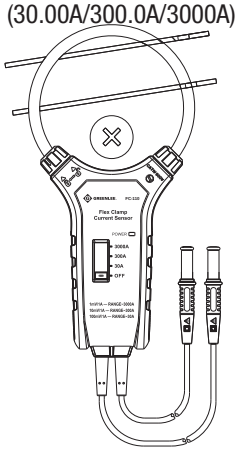


**Figure 5**

**Figure 6**

**Figure 7**

**Figure 8**

# Typical Measurements and Accuracy

### Electrical Accuracy Specifications

The Temperature Coefficient is 20% 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) |
| Temperature | 23° C±5° C |
| Humidity | ≤ 80% RH |
| Temperature Coefficient | 0.2 x (accuracy)/°C |

### (1) FC-110/118 AC Current Measurement

| Range | Resolution | Accuracy (At Centered Position) | Cable Position |
|---|---|---|---|
| 30.0A | 0.1A | ±(3%+0.5A) | Accuracy when measuring in centered position. Please refer to figures 9 and 10. |
| 300A | 1A | ±(3%+5A) | |
| 3000A | 10A | ±(3%+50A) | |
| Frequency Response | 45Hz-500Hz | – | – |

### FC-118 Accuracy

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

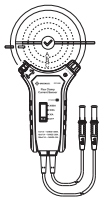

**Figure 9**

### FC-110 Accuracy

| | | | |
|---|---|---|---|
| Additional accuracy range when measuring outside of optimum location (When no other electrical or magnetic fields are present) | Central optimum measurement location | ±(3%+5) | √ |
| | 15mm (0.6”) away from center | Additional 2.0% | Region A |
| | 25mm (1.0”) away from center | Additional 2.5% | Region B |
| | 35mm (1.4”) away from center | Additional 3.0% | Region C |

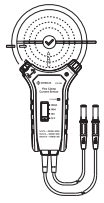

**Figure 10**

## Specifications

Overload Indication: Greater than 3V will be displayed on the AC voltage measuring device

Low Battery Indication: Power Indicator flashes

Sensor Type: Rogowski Coil

Impact strength: The meter can be dropped from 1 meter's height

Clamp size: The FC-110 has a coil size of 25.4cm (10 inches). The FC-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

### Environmental Limitations

Operating Environment: Indoor use

Maximum height: 2000m

Safety: IEC61010-1, IEC61010-031, IEC61010-2-032, 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 leads from external devices 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.