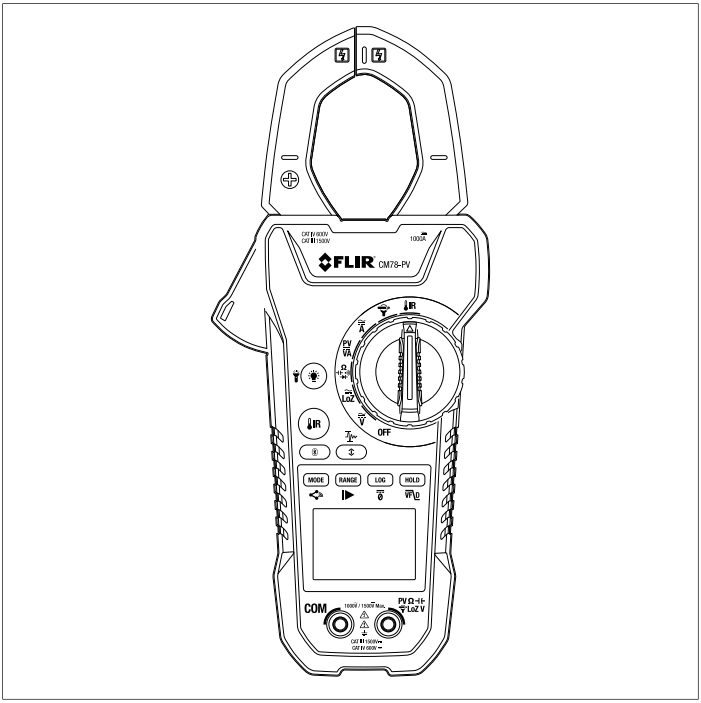
USER MANUAL

CAT III 1500 V Solar Clamp Meter

MODEL CM78–PV



USER MANUAL
CAT III 1500 V Solar Clamp Meter

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1 Advisories

1.1 Copyright

1.2 Quality Assurance

The Quality Management System under which these products are developed and manufactured has been certified in accordance with the ISO 9001 standard. FLIR Systems, Inc. is committed to a policy of continuous development; therefore, we reserve the right to make changes and improvements on any of the products without prior notice.

1.3 Documentation

To access the latest manuals and notifications, go to the Download tab at: https://support.flir.com. It only takes a few minutes to register online. In the download area you will also find the latest releases of manuals for our other products, as well as manuals for our historical and obsolete products.

1.4 Disposal of Electronic Waste

As with most electronic products, this equipment must be disposed of in an environmentally friendly way, and in accordance with existing regulations for electronic waste. Please contact your FLIR representative for more details.

2 Safety Information

NOTE

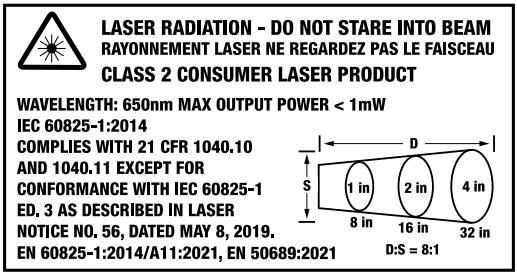
Before operating the device, you must read, understand, and follow all instructions, dangers, warnings, cautions, and notes.

FLIR Systems reserves the right to discontinue models, parts or accessories, and other items, or to change specifications at any time without prior notice.

Remove the batteries if the device is not to be used for an extended time period.

WARNING

- Do not operate the device if you do not have the correct knowledge. Formal qualifications and/or national legislation for electrical inspections can apply. Incorrect operation of the device can cause damage, shock, injury or death to persons.
- Before and after each use, verify proper operation of the device by testing equipment that is known to be working correctly, within the voltage rating of the meter.
- When using the device in an environment where it can come into contact with hazardous live conductors, additional protective equipment must be worn to prevent electric shock.
- Set the function switch to the appropriate position before measuring. Do not change to the current or resistance mode when measuring voltage. This can cause damage to the instrument and can cause injury to persons.
- Do not measure the current on a circuit when the voltage increases to more than 600 V. This can cause damage to the instrument and can cause injury to persons.
- You must disconnect the test leads from the circuit under test before you change the range. Otherwise, damage to the instrument and injury to persons can occur.
- Do not replace the batteries before you remove the test leads. This can cause damage to the instrument and can cause injury to persons.
- Do not use the laser pointer near explosive gases or in other potentially explosive areas. Injury to persons can occur.
- Do not look directly into the laser beam. The laser beam can cause eye irritation.



Laser light beam divergence	0.5 to 0.6 in. (12 to 15 mm) typical spot diameter at a distance of 32.8 ft. (10 m)

WARNING

- Do not use the device if the test leads and/or the device show signs of damage. Injury to persons can occur.
- Use caution when measuring voltages > 25 V AC RMS or 35 V DC. There is a risk of shock from these voltages. Injury to persons can occur.
- Do not perform diode, resistance or continuity tests before you have removed the power from capacitors and other devices under test. Injury to persons can occur.
- Do not use the device as a tool to identify live terminals. You must use the correct tools. Injury to persons can occur if you do not use the correct tools.
- Ensure that children do not have access to the device. The device contains dangerous objects and small parts that children can swallow. If a child swallows an object or a part, seek medical attention immediately. Injury to persons can occur.
- Do not let children play with the batteries and/or the packing material.
- Do not touch expired or damaged batteries without gloves. Injury to persons can occur.
- Do not cause a short-circuit of the batteries. This can cause damage to the instrument and can cause injury to persons. Do not put the batteries into a fire. Injury to persons can occur.

CAUTION

- Do not use the device for a procedure for which it is not intended. This can cause damage to the protections provided by the device.
- Do not take measurements on conductors that are coated with harmful or corrosive substances. This can cause measurement inaccuracy and poses a safety risk.
- Do not use the device above the rated frequency.
- Do not use this device if the magnetic circuit under test reaches hazardous temperatures.

	This symbol, adjacent to another symbol or terminal, indicates that the user must refer to the manual for further information.
	This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present.
	Double insulation.
WARNING	Warnings indicate a potentially hazardous situation, which if not avoided, may result in death or serious injury.
CAUTION	Cautions indicate a potentially hazardous situation, which if not avoided, may result in damage to the product.
	Application around, and removal from, uninsulated hazardous live conductors is permitted.

CAT III	MEASUREMENT CATEGORY III is applicable to test and measure circuits connected to the distribution part of the building's low-voltage MAINS installation.
CAT IV	MEASUREMENT CATEGORY IV is applicable to test and measure circuits connected at the source of the building's low-voltage MAINS installation.
C ETL US LISTED Intertek 5029168	Conforms to UL STD. 61010–1, 61010–2–032. Certified to CSA STD. C22.2 No. 61010–1, 61010–2–032. This equipment conforms to EN 50689 (Safety of consumer laser products).

2.1 FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

⚠ **WARNING**
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2.2 Industry Canada Compliance

CAUTION

Exposure to Radio Frequency Radiation.

To comply with RSS 102 RF exposure compliance requirements, for mobile configurations, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be colocated or operating in conjunction with any other antenna or transmitter.

3 Introduction

Congratulations on your purchase of the FLIR CM78-PV CAT III 1500 V Solar Clamp Meter. This meter is designed for commercial and industrial electrical inspections. It supports solar photovoltaic (PV) DC measurements up to 1500 V using test leads, and up to 1000 A DC or AC using the clamp.

Advanced modes include inrush AC current capture, low pass filter for variable frequency drive (VFD) measurements, low impedance (LoZ) circuit for mitigating 'ghost' voltage issues, and a data logger for capturing and sharing measurement data.

The built-in non-contact infrared thermometer measures surface temperature and aids in troubleshooting panels, conduits, and motors.

The Bluetooth® METERLiNK® technology offers wireless connection to the METERLiNK app on mobile devices, for instant documentation, reporting, and data sharing.

Measurement functions include AC/DC voltage and current, resistance, capacitance, frequency, diode, continuity, DC power, external clamp adaptor, and non-contact IR temperature.

Proper use and care of this meter will provide many years of reliable service.

3.1 Key features

- Backlit display with Data Hold mode.
- True RMS AC current and voltage measurements.
- DC power measurements on solar panels up to 1500 VA.
- Integrated non-contact IR thermometer with laser pointer.
- VFD (low pass filter) mode eliminates high frequency noise.
- Low Impedance (LoZ) mode mitigates 'ghost' voltages.
- Inrush current capture for AC current measurements.
- DC zero function for DC current measurements.
- MAX-MIN recording mode.
- Data logger automatically records up to 999 readings.
- METERLiNK app mobile device integration for sharing data log files and reporting.
- CAT III 1500 V double moulded test leads and MC4 PV plugs included.
- 1.7 in. (42 mm) jaw opening, for conductors up to 2000 MCM.
- Battery operated (6 x AAA batteries included) with auto power off (APO).

4 Description

4.1 Meter parts

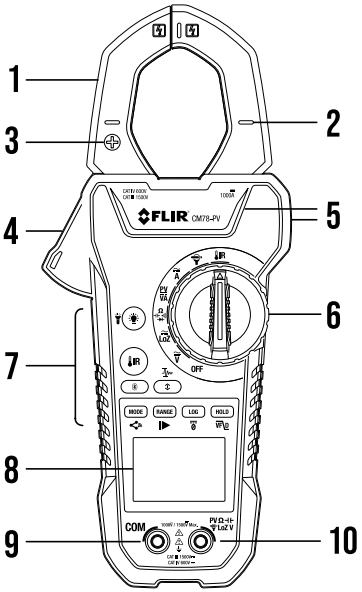


Figure 4.1 Meter front.

⚠ **CAUTION**
Do not operate the device above the physical barriers (5).

1. Clamp jaw.
2. Conductor alignment guides.
3. Polarity icon (current should flow through jaws front to back).
4. Jaw opening trigger.
5. Physical hand protection barriers.
6. Rotary function switch, see section 4.2, *Rotary Function Switch*.
7. Control buttons, see section 4.3, *Control Buttons*.
8. LCD display.
9. Negative (common) input terminal.
10. Positive input terminal.

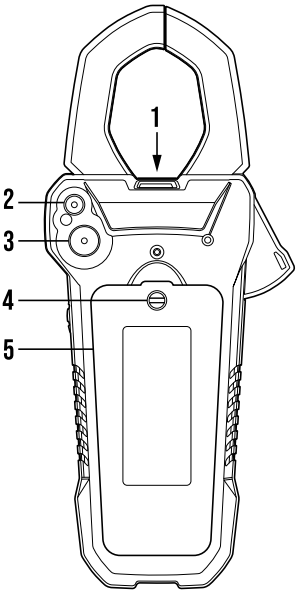


Figure 4.2 Meter back.

1. Work light.
2. Laser pointer diode.
3. IR thermal sensor.
4. Battery compartment lock.
5. Battery compartment.

4.2 Function switch

IR	The meter can measure IR temperature through the IR sensor.
	The meter can accept and display a signal from an external clamp adaptor. Use the *MODE* button to select the input range 1mV/A, 10mV/A, or 100mV/A.
A	The meter can measure AC or DC current through the clamp jaws. AC or DC is selected by the *MODE* button.
PV VA	The meter can measure DC voltage, current, and power on photovoltaic solar cells. The type of measurement is selected by the *MODE* button.
Ω	The meter can measure resistance through the probe inputs. The type of measurement is selected by the *MODE* button.

	The meter can measure continuity through the probe inputs. The type of measurement is selected by the *MODE* button.
	The meter can measure diode polarity through the probe inputs. The type of measurement is selected by the *MODE* button.
	The meter can measure capacitance through the probe inputs. The type of measurement is selected by the *MODE* button.
LoZ	The meter can measure voltage with a low impedance circuit (to minimize 'ghost' voltage). Short press *MODE* to manually select AC or DC (or allow Auto-Select to make the selection).
V	The meter can measure DC or AC voltage and frequency through the probe inputs. The type of measurement is selected by the *MODE* button.
OFF	The meter is in full power-saving mode.

4.3 Control buttons

	Short press this button to enable/disable the display backlight. Long press this button to switch ON/OFF the work light.
IR	Press and hold this button to activate the laser pointer and thermal sensor.
	Press this button to enable/disable Bluetooth communication.
	Use this button to step through the MAX and MIN readings, and then back to the normal operating mode, see section 5.13 *Maximum (MAX), Minimum (MIN) Mode*.
	Short press this button to engage/disengage the in-rush current circuit when measuring AC current, see section 5.3.2 *Inrush AC Current Capture*.
MODE	Press this button to change the operating mode for the currently selected function. For example, when measuring voltage, use this button to select DC, AC, or frequency (Hz).
	With Bluetooth and data log mode engaged, long press this button to share data log readings with a mobile device running METERLiNK. See section 5.15 *Sharing Data Log Files using Bluetooth and METERLiNK*.
RANGE	Use the button to select Auto range or Manual range mode, see section 5.2 *Auto/Manual Range*. In Manual range mode, press this button to change the range (scale). Long press to return to Auto range mode.

LOG	Press this button to put the data logger in ready mode (standby). The LOG display icon will appear. See section 5.14 *Data Logging*.
▶‖	Press this button to start and stop the data logger. The LOG display icon blinks when data logger is running. See section 5.14 *Data Logging*.
⎓ Ø	Long press this button to activate the DC Zero function when measuring DC current.
HOLD	Press the button to toggle normal and Data Hold mode. In Data Hold mode, the display freezes the reading.
VF D	Long press this button to engage the low pass filter. Use this mode for measuring variable speed drives (VFD) and other devices that generate high frequency electrical noise.

4.4 Display icons and indicators

	Indicates that the meter is in the external clamp adaptor mode.
	Indicates that Bluetooth communication is active.
LOG	When solid, it indicates that the data logger is in standby mode. When blinking, the data logger is running.
	Indicates that the laser pointer is active.
A	Indicates that the meter is in Auto range mode.
↑	Indicates that the meter is displaying the maximum reading.
↓	Indicates that the meter is displaying the minimum reading.
H	Indicates that the meter is in Data Hold mode.
	Indicates that the battery voltage is low.
~	Indicates that the meter is measuring AC current or voltage.
⎓	Indicates that the meter is measuring DC current or voltage.
⎓ Ø	indicates that the DC Zero mode is engaged for DC current measurements.
⎓ PV	Indicates that the meter is in the photovoltaic measurement mode.
	Indicates that the continuity function is active.

	Indicates that the diode function is active.
	Indicates that the auto power off function is enabled.
	Indicates that the in-rush current circuit is enabled for AC current measurements.

4.4.1 Out-of-range warning

If the input is out-of-range, *OL* is displayed on the main display.

5 Operation

NOTE

When the meter is not in use, the function switch should be set to the **OFF** position.

NOTE

When connecting the probe leads to the device under test, connect the negative lead before connecting the positive lead. When removing the probe leads, remove the positive lead before removing the negative lead.

5.1 Powering the meter

1. Set the function switch to any position to switch ON the meter.
2. If the low battery icon appears or if the meter does not power on, replace the batteries. See section 6.2 *Battery Replacement*.

5.1.1 Auto power off

By default, the meter switches OFF after 25 minutes of inactivity. To switch ON again, set the function switch to *OFF* and then to any position. The APO timer is then reset.

To disable APO, press and hold the *MODE* button while switching the meter ON (setting the function switch from *OFF* to any position). APO will be disabled and the APO icon will switch OFF. Note that APO is re-enabled the next time the meter is switched OFF.

5.2 Auto/Manual range

In Auto range mode, the meter automatically selects the optimum measurement scale. In Manual range mode, the desired range (scale) is set manually.

Auto range is the default method of operation. When a function is selected with the function switch, the starting mode is Auto range, and the **A** indicator is displayed.

To enter Manual range mode, press the *RANGE* button. To change the range, press the *RANGE* button repeatedly until the desired range is displayed.

To return to Auto range mode, long press the *RANGE* button until the **A** indicator is displayed.

5.3 Current measurements

When measuring current using the clamp jaws, only one conductor should be enclosed by the jaws, refer to Figure 5.1.

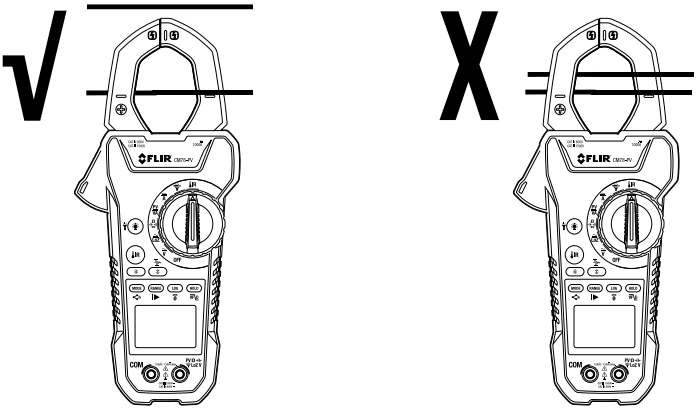


Figure 5.1 Clamp only one conductor. Correct (left) and incorrect (right) clamping.

1. Ensure that the probe leads are disconnected from the meter.
2. Set the function switch to the $\tilde{\underline{\underline{A}}}$ position. Use the *MODE* button to select AC or DC.
3. Press the trigger to open the clamp jaws. Fully enclose one conductor, refer to Figure 5.1. For optimum results, centre the conductor in the jaws.
4. Read the current value on the display.

5.3.1 DC Zero

The DC Zero feature removes offset values and improves the accuracy of DC current measurements.

1. Set the function switch to the $\tilde{\underline{\underline{A}}}$ position. Use the *MODE* button to select DC.
2. Ensure that there is no conductor in the clamp jaws.
3. Long press the $\overline{\overline{0}}$ button to enter the DC Zero mode and store the offset value. The $\overline{\overline{0}}$ indicator is displayed.
4. To exit the DC Zero mode, long press the $\overline{\overline{0}}$ button. The $\overline{\overline{0}}$ indicator disappears.

5.3.2 Inrush AC Current Capture

The meter can capture inrush current using a 100 ms sampling window. The sampling window opens only when the threshold current (see below) is detected. When detecting an input current, ±50 digits of the selected range, the meter will calculate the RMS values for a 100 mS period and display this value. Refer to Figure 5.2, below.

• For the 1000 A range the minimum triggering current threshold is 20 A

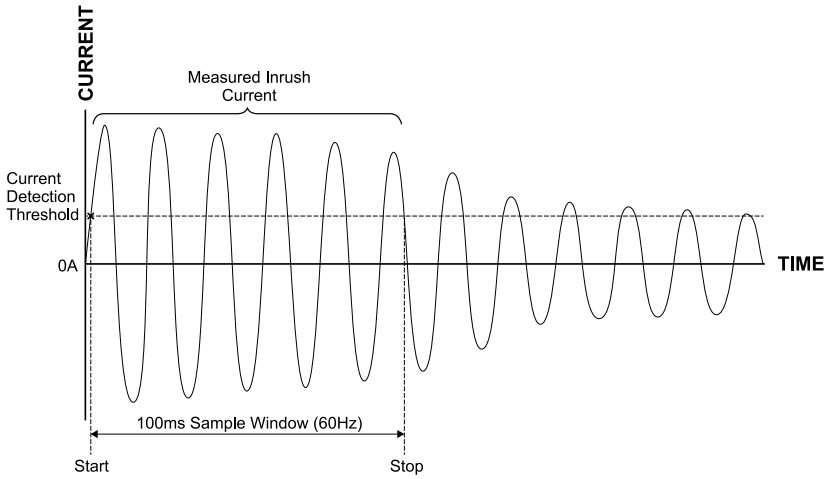


Figure 5.2 Inrush current operation.

1. Ensure that the probe leads are disconnected from the meter.
2. Remove power to the circuit under test.
3. Set the function switch to the A position.
4. Short press the button to engage the capture circuit. The display icon will appear.
5. Clamp on one conductor.
6. Apply power to the circuit under test, and read the captured inrush current on the display.

5.3.3 External AC Clamp Adaptor measurements

⚠ CAUTION
The external AC clamp adaptor should meet the IEC 61010-2-032 standard and the CM78-PV's category.

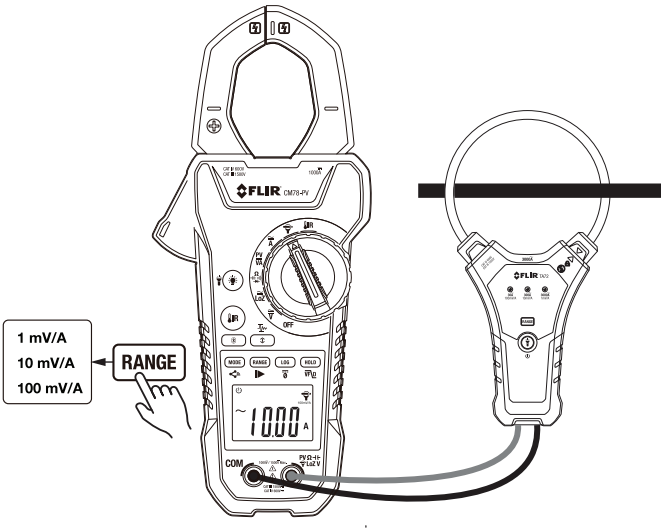


Figure 5.3 External Clamp Adaptor setup.

The meter can accept an AC signal from an external clamp adaptor and can display the current measurement.

1. Disconnect the external clamp adaptor from any circuit or conductor and remove power to the circuit that will be tested.
2. Connect the external clamp test leads to the input terminals of the CM78–PV observing correct polarity.
3. Set the function switch to the external clamp position .
4. Use the *RANGE* button to select the linear scale (100mV/A, 10mV/A, or 1mV/A).
5. With the power to conductor to be tested switched OFF, clamp the external adaptor onto the conductor to be tested.
6. Apply power to the conductor under test, and read the current measurement on the CM78–PV display. Use the *RANGE* button to adjust the range.

5.4 Voltage, Frequency, and LoZ measurements

⚠ CAUTION
The test leads should meet the IEC 61010-031 standard and the CM78-PV's category.

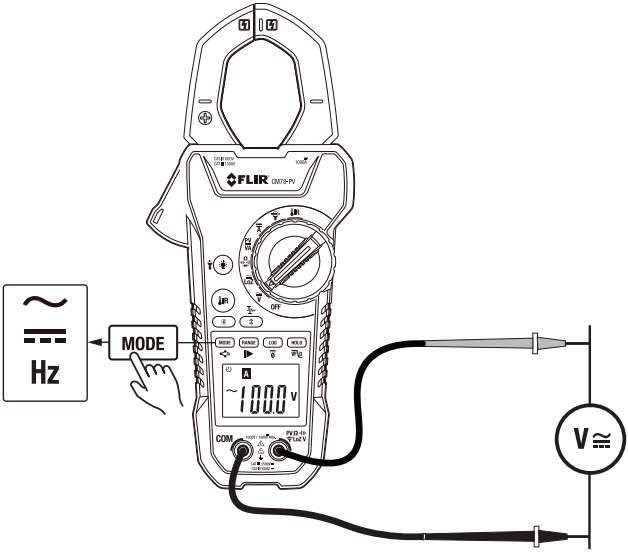


Figure 5.4 Voltage measurements

1. Set the function switch to the $\tilde{\tilde{\mathbf{V}}}$ position for standard input impedance or to the **LoZ** position if low impedance is required (3kΩ approx.). LoZ is useful for eliminating 'ghost' voltages.
2. Insert the black probe lead into the negative COM terminal and the red probe lead into the positive **V** terminal.
3. Use the *MODE* button to select AC, DC, or Hz (frequency).
4. Connect the probe leads in parallel to the part under test.
5. Read the voltage or frequency value on the display.

5.5 VFD mode

When measuring equipment that generates high frequency electrical noise, engage the low pass filter VFD filter. The VFD mode is available for AC current and voltage measurements.

To engage the filter, long press the VFD button, the VFD icon will appear on the display. Long press the button to exit this mode.

5.6 Resistance measurements

⚠	**WARNING**
Remove power to the device under test before proceeding.	

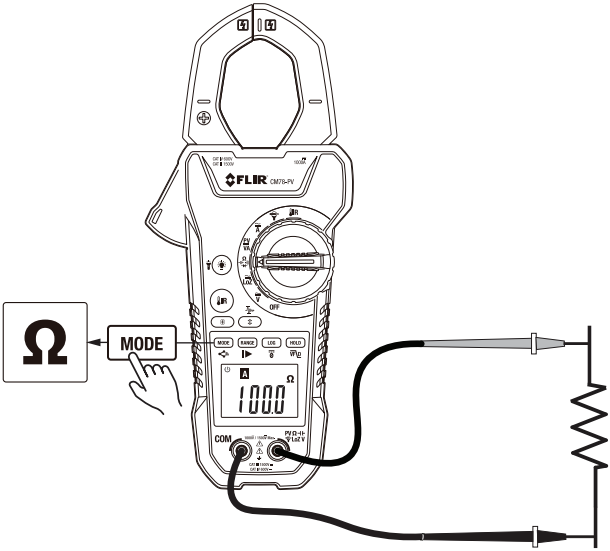


Figure 5.5 Resistance measurements

1. Set the function switch to the **Ω** position.
2. Insert the black probe lead into the negative COM terminal and the red probe lead into the positive Ω terminal.
3. Touch the tips of the probe across the circuit or component under test.
4. Read the resistance value on the display.

5.7 Continuity

⚠ WARNING
Remove power to the device under test before proceeding.

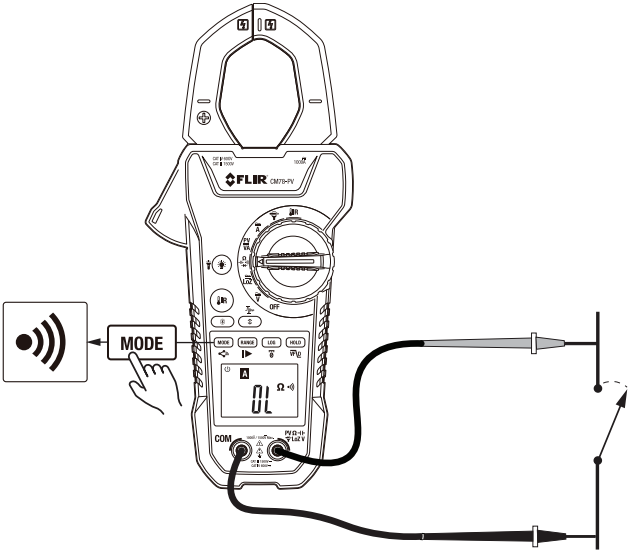


Figure 5.6 Continuity measurements

1. Set the function switch to the •)) position.
2. Insert the black probe lead into the negative COM terminal and the red probe lead into the positive Ω terminal.
3. Use the *MODE* button to select continuity measurement. The •)) indicator should be displayed.
4. Touch the tips of the probe across the circuit or component under test.
5. If the resistance is < 50 Ω, the meter beeps continuously.

5.8 Capacitance measurements

WARNING

Remove power to the device under test before proceeding.

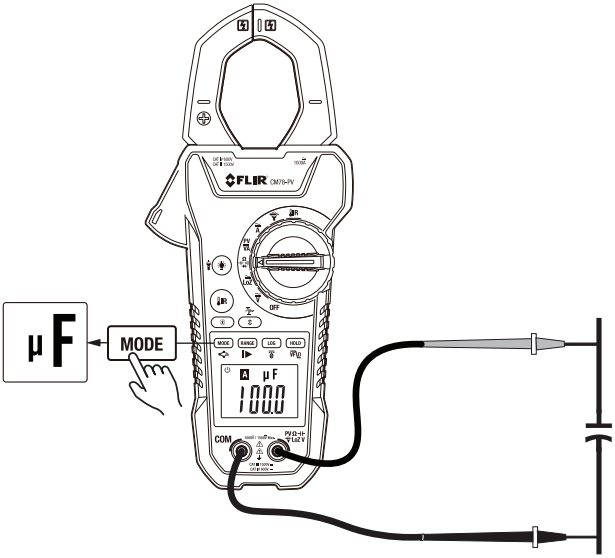


Figure 5.7 Capacitance measurements

1. Remove power to the component or circuit under test and set the function switch to the ⊣⊢ position.
2. Insert the black probe lead into the negative COM terminal and the red probe lead into the positive ⊣⊢ terminal.
3. Touch the tips of the probe across the part under test.
4. Read the capacitance value on the display.

NOTE

For very large capacitance values, it may take several minutes for the measurement to settle and the final reading to stabilize.

5.9 Diode test

⚠	**WARNING**
Remove power to the device under test before proceeding.	

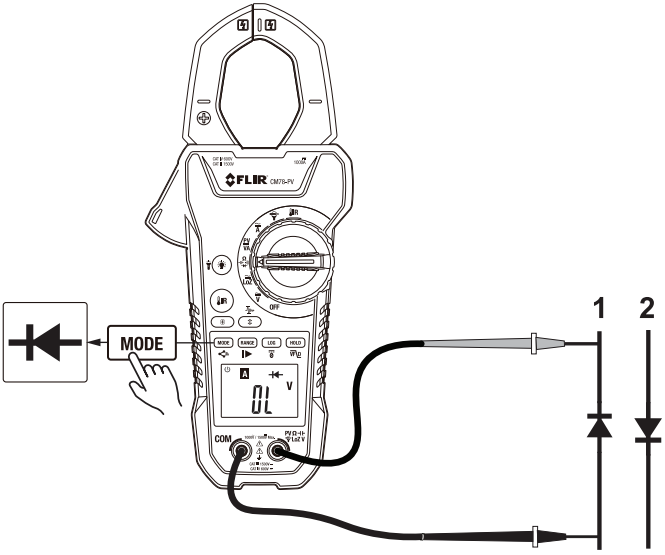


Figure 5.8 Diode testing

1. Set the function switch to the ⊣◀ position.
2. Insert the black probe lead into the negative COM terminal and the red probe lead into the positive Ω terminal.
3. Use the *MODE* button to select the diode test function. The ⊣◀ indicator should be displayed.
4. Touch the tips of the probe across the diode or semiconductor junction under test. Make a note of the value on the display.
5. Reverse the red and black test lead positions to reverse the test polarity.
6. Touch the tips of the probe across the diode or semiconductor junction under test. Make a note of the new value on the display.

7. The diode or semiconductor junction can be evaluated as follows:
   - If one of the readings displays a value (typically 0.400 V to 0.900 V) and the other reading displays ***OL***, the component is good.
   - If both readings display ***OL***, the component is open.
   - If both readings are very small or **0**, the component is shorted.

5.10 IR temperature measurements

The meter makes non-contact surface temperature measurements using its built-in IR thermal sensor. The built-in laser pointer is used to target objects and surfaces.

The target of the measurement should be larger than the size of the laser beam spot, as the distance from an object increases, the spot size of the area measured by the meter becomes larger.

The meter's field of view ratio is 8:1, if the meter is 8 cm from the target, the diameter (spot) of the object under test must be at least 1 cm. Refer to Figure 5.9.

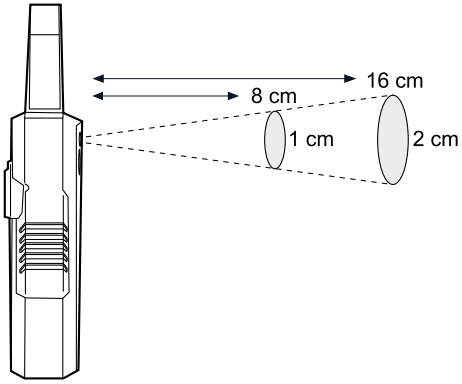


Figure 5.9 IR spot-to-distance ratio (8:1)

1. Set the function switch to the IR position to activate the IR measurement sensor.
2. Press and hold the IR button to enable the laser pointer diode.
3. Aim the laser pointer at the surface to be measured. Read the IR temperature measurement on the display in ℃ or ℉.

IR measurement notes:

- The object under test should be larger than the size of the laser beam spot.
- If the surface of the object under test is covered with frost, oil, grime, etc., clean the surface before measuring.
- If the surface of the object is highly reflective, apply masking tape or flat black paint to the surface before measuring.

- The meter may not make accurate measurements through transparent surfaces such as glass.
- Steam, dust, smoke, etc., may obscure measurements.
- To find a hot spot, aim the meter outside the area of interest, then scan across (in an up and down motion) until the hot spot is located.

NOTE

The unit of measure switch is located in the battery compartment. To change the temperature unit, see section 5.11 *Temperature Units*.

5.11 Temperature units

The meter displays temperatures in °C or °F. The temperature unit switch is located in the battery compartment.

1. To avoid electrical shock, first disconnect the meter from any circuit, remove the probe leads from the terminals, and set the function switch to the **OFF** position.
2. Loosen the battery compartment screw, remove the compartment cover, and remove the batteries.
3. Set the temperature unit switch to the desired position.
4. Install the batteries, observing correct polarity, and secure the battery compartment cover.

5.12 Photovoltaic Solar Panel measurements

This meter measures voltage, current, and power on solar cells to help determine the efficiency and performance of solar panel arrays.

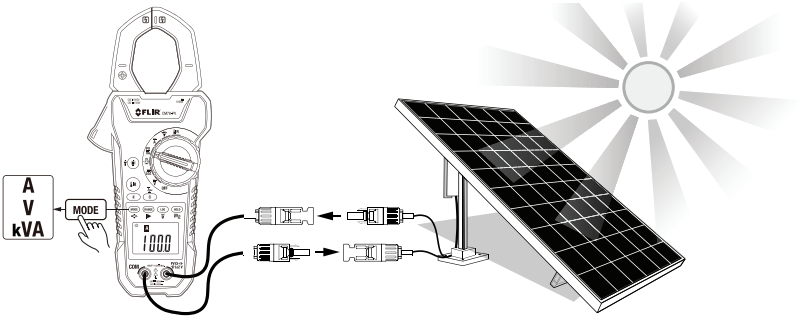


Figure 5.10 Connecting meter to PV panel using supplied MC4 connectors

1. Set the function switch to the PV VA position.
2. Use the *MODE* button to select power (kVA), current (A), or voltage (V) measurements.
3. To measure voltage, use the supplied MC4 plugs to connect to the panels, if the panels have matching connectors, or use probe leads to connect directly to panel circuitry if matching connectors are not available.
4. To measure current, use the clamp to attach to the conductor under test.
5. To measure power, connect the probe leads to the panels and clamp onto the conductor under test.
6. Read the measurement on the display.

5.13 Maximum (MAX), Minimum (MIN) mode

The MAX/MIN mode is available for these modes: AC/DC voltage & current, resistance, capacitance, PV, and IR temperature.

1. Press the ⇳ button to activate the MAX/MIN recording mode; the up arrow ↑ will appear. The meter will display and hold the maximum reading and will update only when a new maximum reading is registered.
2. Press the ⇳ button again and the down arrow ↓ will appear. The meter will now display and hold the minimum reading and will update only when a new minimum reading is registered.
3. To exit MAX/MIN mode, long press the ⇳ button; the arrow indicator will switch OFF.

5.14 Data logging

This meter can automatically store up to 999 readings at the rate of one reading per second (fixed). Data log files can be shared with mobile devices, as explained in the next section. The data logger is available in all measurement modes. Note that the data logger will not function if the battery voltage is very low.

1. Short press the *LOG* button to put the data logger in ready (standby) mode.
2. Short press the ▶ button to start logging readings. The **LOG** display icon will begin flashing as readings are recorded. Short press the ▶ button to pause/stop the logger, the **LOG** icon will stop flashing. The data logger will automatically stop when 999 readings have been logged.
3. Short press the *LOG* button to exit the data logger mode, the **LOG** icon will switch OFF. Note that the file can be share but cannot be deleted, the file is overwritten on next logging session.

5.15 Sharing Data Log Files using Bluetooth and METERLiNK

5.15.1 Communication Overview

When paired with a mobile device, running the METERLiNK mobile application, the meter uses Bluetooth to share data log readings.

The Bluetooth range is 10 m (32 ft.) maximum.

5.15.2 Download METERLiNK

Download METERLiNK to your mobile device from Google Play™ (Android) or the App Store® (iOS).

5.15.3 Setting up METERLiNK

1. Switch the meter's Bluetooth function ON by pressing the Bluetooth button. The Bluetooth icon will appear, flashing, on the display.
2. Switch ON the mobile device and open the METERLiNK app.
3. METERLiNK will search for the meter (the meter must be ON, with Bluetooth enabled).
4. Tap the image of the CM78–PV when METERLiNK finds it.

Complete instructions are included in the METERLiNK app, including contextual help and a user manual.

5.15.4 Sharing Data Log File with Mobile Device

The data log file is in *.csv text format which is convenient for opening and viewing in a spreadsheet after you have shared the file. A log file can contain up to 999 records. Data logging automatically stops when 999 records have been logged.

1. Pair the meter with the mobile device.
2. Short press the LOG button, the LOG icon will appear.
3. Short press the Bluetooth button, the Bluetooth icon will appear.
4. Long press the transmit button, the icon will appear.
5. The display will show the transmission progress (1, 25, 50, 75, and 100%).
6. When transfer is complete, the icon will stop flashing and meter will indicate **100%**.
7. Press the LOG button to exit the mode.

Note that if there is no log file in the meter, if the battery voltage is low, or if Bluetooth is not switched ON before transmission, the meter will indicate **ERR** (error).

5.15.5 Using the FLIR Ignite® Cloud

Ignite is secure backup solution offered by FLIR. Upload your METERLiNK files to the Ignite cloud and enjoy access to your files from anywhere. Ignite also allows you to organize, collaborate, and create reports.

Ignite is available from within the METERLiNK app. There you can create an account and begin using the service immediately.

6 Maintenance

6.1 Cleaning and storage

Clean the meter with a damp cloth and mild detergent; do not use abrasives or solvents.

If the meter is not to be used for an extended period, remove the batteries and store them separately.

6.2 Battery replacement

1. To avoid electrical shock, disconnect the meter if connected to a circuit, remove the probe leads from the terminals, and set the function switch to the **OFF** position before attempting to replace the batteries.
2. Unscrew and remove the battery compartment cover.
3. Replace the six standard AAA batteries, observing correct polarity.
4. Secure the battery compartment cover.

 Do not dispose of used batteries or rechargeable batteries in household waste.

7 Specifications

7.1 General specifications

Display	Backlit LCD
Controls	Eight (8) position rotary switch and eight (8) control buttons
Work light	White LED array
Sample rate	3 readings per second, nominal
Power supply	6 × AAA (LR–03) batteries
Battery life	50 hours, using alkaline batteries
Auto power off (APO)	After 25 minutes of inactivity (can be disabled)
APO quiescent current	50 µA maximum
Over-current protection	Protection does not include fuse
Operating temperature	14 to 122°F (–10 to 50°C)
Storage temperature	–14 to 140°F (–25 to 60°C)
Operating humidity	< 85% from 14 to 86°F (-10 to 30°C) < 75% from 86 to 104°F (30 to 40°C) < 45% from 104 to 122°F (40 to 50°C)
Storage humidity	90% maximum
Altitude	7000 ft. (2000 m)
Drop test	4.9 ft. (1.5 m)
Dimensions	10.1 x 4.3 x 2.0 in. (257 x 110 x 50 mm)
Weight	1.4 lbs. (0.63 kg)
Bluetooth range	33 ft. (10 m) maximum
Certifications	ETL, CE, FCC, FDA, RCM
Safety standards	UL 61010–1/–2, EN IEC 61010–1/–2, CAT IV 600 V, CAT III 1500 V
EMC standards	EN 61326–1/–2–2, EN 300328, EN 301489–1/–17, EN 62479, FCC Part 15B/C
Pollution degree	2
Over-voltage Safety	Meter and test leads: CAT IV 600 V, CAT III 1500 V

7.2 Electrical Range Specifications

Valid for ambient temperature conditions: 64.4 to 82.4 °F (18 to 28 °C)

7.2.1 AC Measurement Specifications

Function	Range	Resolution	Accuracy (of reading)
AC Current	600.0 A	0.1 A	±(2.0% + 5 digits)
	1000 A	1 A	±(2.8% + 5 digits)
AC Current (VFD)	600 A	1 A	±(5.0% + 5 digits)
	1000 A	1 A	±(5.0% + 5 digits)
AC Current (Inrush)	600 A	1 A	±(3.0% + 5 digits)
	1000 A	1 A	
AC Current (external clamp adaptor)	30.00 A (100mv/A)	0.01 A	±(3.0%)
	300.0 A (10mv/A)	0.1 A	
	3000 A (1mv/A)	1 A	
AC Voltage	6.000 V	0.001 V	±(1.0% + 5 digits)
	60.00 V	0.01 V	
	600.0 V	0.1 V	
	1000 V	1 V	
AC Voltage (VFD)	600 V	1 V	±(2.0% + 5 digits)
	1000 V	1 V	
AC Voltage (LoZ)	6.000 V	0.001 V	±(1.5% + 8 digits)
	60.00 V	0.01 V	
	600.0 V	0.1 V	
	1000 V	1 V	

AC Measurement Notes:

All AC measurements are True RMS

All AC Voltage ranges are specified from 5% to 100% of the range.

AC Voltage bandwidth: 45 to 400 Hz (45 to 65 Hz in VFD mode)

AC Current bandwidth: 45 to 65 Hz

Input impedance: 10 MΩ (V AC); 3 kΩ, approx. in LoZ mode.

Crest factor ≤ 3 at full scale up to 500 V, decreasing linearly to ≤ 1.5 at 1000 V.

7.2.2 DC Measurement Specifications

Function	Range	Resolution	Accuracy (of reading)
DC Voltage	600.0 mV	0.1 mV	±(1.0% + 5 digits)
	6.000 V	0.001 V	
	60.00 V	0.01 V	
	600.0 V	0.1 V	
	1500 V	1 V	±(2.0% + 5 digits)
DC Voltage (PV)	1500 V	1 V	±(2.0%)
DC Current	600.0 A	0.1 A	±(2.0% + 5 digits)
	1000 A	1 A	±(2.8% + 5 digits)
DC Power (PV)	900 kW	1 kW	±(2.0%)
DC Measurement Notes: Input impedance: 10 MΩ (V DC).			

7.2.3 Resistance Specifications

Function	Range	Resolution	Accuracy (of reading)
Resistance	600.0 Ω	0.1 Ω	±(1.0% + 5 digits)
	6.000 kΩ	0.001 kΩ	±(1.2% + 5 digits)
	60.00 kΩ	0.01 kΩ	
	600.0 kΩ	0.1 kΩ	
	6.000 MΩ	0.001 MΩ	±(2.0% + 5 digits)
	60.00 MΩ	0.01 MΩ	±(2.5% + 5 digits)
Continuity	Threshold: 50 Ω. Visual and audible alert.		

7.2.4 Diode Specifications

Function	Range
Diode	0.400 to 0.900 V

7.2.5 Capacitance Measurements

Function	Range	Resolution	Accuracy (of reading)
Capacitance	60.0 nF	0.01 nF	±(3.5% + 10 digits)
	600.0 nF	0.1 nF	±(3.0% + 5 digits)
	6.000 µF	0.001 µF	
	60.00 µF	0.01 µF	
	600.0 µF	0.1 µF	
	6000 µF	1 µF	±(3.5% + 5 digits)

7.2.6 Frequency Measurements

Function	Range	Resolution	Accuracy (of reading)
Frequency	10.00 Hz	0.01	±(1.0% + 5 digits)
	100.0 Hz	0.1	
	1000 Hz	1	
	10.00 kHz	0.01	
	60.00 kHz	0.01	
Frequency Sensitivity: 100 V (< 50 Hz) 50 V (50 to 400 Hz) 5 V (401 Hz to 60 kHz)			

7.3 Thermal Sensor Specifications

Function	IR range	Accuracy (of reading)
IR temperature	–22 to –4°F (–30 to –20°C)	±9°F (±5°C)
	–4 to 518°F (–20 to 270°C)	±2.0% reading or ±4°F (±2°C) (whichever is greater)
Distance to spot ratio: 8 to 1		
Temperature coefficient: 0.2 × (specified accuracy)/°C, < 64.4°F (18°C), > 82.4°F (28°C)		

7.4 Maximum Input Specifications

Function	Maximum input
AC voltage	1000 V
DC voltage	1500 V
Resistance, capacitance, frequency, diode test	1500 V DC

8 Customer Support

Customer Support Telephone List	https://support.flir.com/contact
Repair, Calibration, and Technical Support	https://support.flir.com

9 Warranty

This product is protected by FLIR's Limited Lifetime Warranty. Visit www.flir.com/testwarranty to read the warranty document.

Website
http://www.flir.com

Customer support
http://support.flir.com

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