

**FLUKE®**

# Fluke solar energy resources

**PV Designers, Electricians, Solar Technicians, Solar Installers,  
Solar Advisors and O&M Managers**



**Fluke™ Solar Tools**

# Solar end users



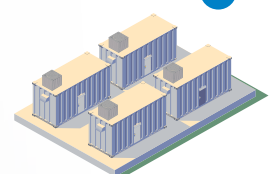
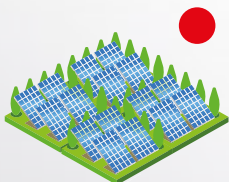
## PV Designer/Electrician

The PV Designer designs the wiring and installation of the PV system to ensure the system will be installed to produce reliable and consistent power levels. They also ensure that the system is installed in compliance to relevant electrical and building standards.



## Solar Technician/Installer

Solar Technicians are responsible for assembling, installing, and maintaining solar panel systems on rooftops and other structures. Technicians regularly service and maintain existing systems and troubleshoot equipment deficiencies and malfunctions.





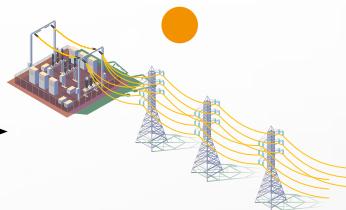
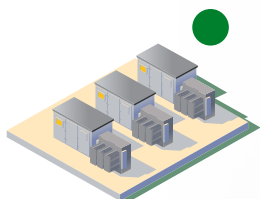
## Solar Advisor

The Solar Advisor undertakes research into the load profile of the site and environmental conditions such as Annual Power Usage & Solar Irradiance. They use all available information to design the capacity of the PV system to supply the load, confirm the environmental conditions support the load, and the PV system will be installed to produce reliable and consistent power levels.



## O&M Manager

The customer's representative, the Operations Manager will coordinate all maintenance activities and ensure the installed system is functional and producing reliable and consistent power levels.

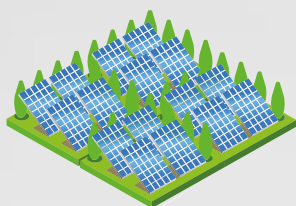


Fluke Solar Tools

# Solar application

## Solar panels

A single photovoltaic cell contains semiconductors that can convert sunlight into electricity. PV cells only generate a limited amount of energy, numerous cells are connected to create a single solar panel.



Working together, multiple solar cells generate higher currents, and therefore more energy. Photovoltaic cells are the primary component that makes up a solar panel, while solar panels are a vital component that makes up a solar system.

PV Designer/  
Electrician

O&M  
Manager

Solar Tech/  
Installer

Solar  
Advisor

## Combiner boxes

A solar combiner box combines the output of numerous strings of PV modules for connection to the inverter. Generally, it houses the input overcurrent protection fuse assemblies.



Amperage measurements and calculations are crucial to establishing whether the PV arrays are operating correctly.

PV Designer/  
Electrician

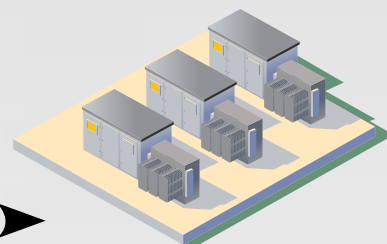
O&M  
Manager

Solar Tech/  
Installer

Solar  
Advisor

## Inverter boxes

Solar panels generate DC electricity, and solar inverters are required to convert the power from DC to AC in order to make a connection to the utility grid.



It is crucial to regularly check the inverter's operating DC input voltage and current level and, on the AC side, the inverter's output voltage and current levels, to ensure that the inverters are producing the correct output.

PV Designer/  
Electrician

O&M  
Manager

Solar Tech/  
Installer

Solar  
Advisor

## Battery storage

Healthy batteries should maintain a capacity above 90% of the manufacturer's rating. Most manufacturers recommend replacing the battery if its capacity falls below 80%.

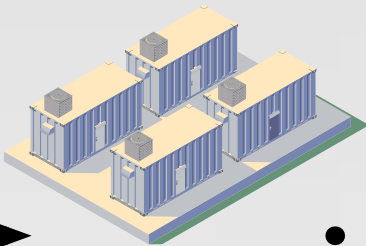
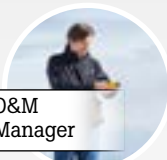


Plate degradation, sustained high temperatures or an increase in resistance of more than 20% compared to the baseline or previous measurement are key signs of failure and require regular testing to ensure optimal performance and prevent downtime.



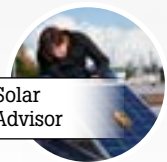
PV Designer/  
Electrician



O&M  
Manager



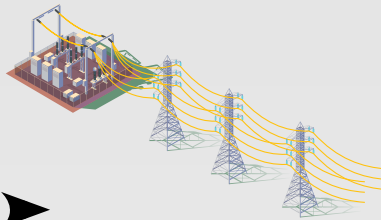
Solar Tech/  
Installer



Solar  
Advisor

## Substation and transmission

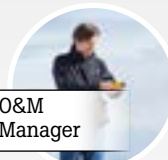
The electrical substation is the key interface between the utility grid and renewable installations.



All substations require a comprehensive maintenance program including the testing of transformers, circuit breakers, batteries and chargers, relays and isolating circuit switches.



PV Designer/  
Electrician



O&M  
Manager



Fluke Solar Tools

Test that PV systems are performing to their optimal power output as well as operating safely. Designed for PV professionals that provide installation, commissioning and maintenance services to systems that operate at 1000 V DC or under, the **Fluke SMFT-1000 Multifunction Tester** provides a complete PV testing solution that conforms to IEC 62446-1 standards. Through Fluke's TruTest™ Software, measurement data from solar site installation and commissioning testing can be easily imported, organized and analyzed for effortless reporting without having to bring a laptop on-site.

- All-in-one PV system test solution meeting IEC 62446-1 standards for Category 1 and Category 2 testing regimes
- Open-circuit voltage (VOC) measurement at the PV module/string up to 1000 V DC, operating and short-circuit current up to 20 A DC
- On-location I-V curve results compares manufacturer I-V curve data to measured data on the analyzer screen instantly
- Color screen with integrated interface: on-screen instructions provide any easy walkthrough of tests
- Compatible with Fluke TruTest™ data management software
- Fluke SMFT-1000/KIT Multifunction PV Analyzer is also available with Advanced TruTest Software and MC4 as SMFT-1000/PRO

Best suited for solar panel inverters



## 7 Fluke Corporation Fluke energy resources

**NEW**



Article nr: 5265304 - TruTest-lite  
Article nr: 5265319 - TruTest-adv

## Fluke TruTest™ Solar Data Management and Reporting Software

Cover all your certification and documentation needs through the modern, fast and reliable software platform of TruTest™. Compatible with the Fluke SMFT-1000 Multifunction PV Tester and Performance Analyzer, TruTest™ Software allows you to quickly and easily import measurement results directly from your solar multifunction tester to computer, organize and analyze the data, compare individual asset data against previous measurements imported and provide a comprehensive and visual client report.

- Quickly create inspections and reports compliant with IEC 62446-1 and other standards
- I-V curve analysis with easy pass/fail visuals; see changes in I-V curve over multiple site visits
- Compare site data to previous site data to see changes over time
- A free 60-day demo version of TruTest™ is available for download on [fluke.co.uk/trutest](http://fluke.co.uk/trutest) ([fluke.com/en/trutest](http://fluke.com/en/trutest) or [fluke.ie/trutest](http://fluke.ie/trutest)). Purchase a software key to unlock the Lite or Advanced version.

**Best suited for PV system analysis**

**NEW**


Article nr: 5218288

## Fluke IRR2-BT Irradiance Meter Pro, Solar Site Surveyor

This meter communicates wirelessly with the SMFT-1000 Multifunction to produce a highly accurate I-V curve instantly, making it easy to determine if a PV system is operating as designed **Fluke IRR2-BT Irradiance Meter Pro** also includes a convenient mounting bracket to secure the meter to the edge of a panel.

- Measure solar irradiance, ambient and PV module temperature, array orientation and tilt angles
- Make instantaneous measurements to determine the watts per square meter solar irradiation, required by IEC 62446-1 standard
- High contrast LCD with large numbers for easy readability in direct sunlight
- Includes mounting bracket for accurate irradiance and temperature readings at the panel

**Best suited for solar panels**



**Fluke** Solar Tools

# Solar tools



Article nr: 4947332

## Fluke Ti480 PRO Thermal Imager

When conducting preventative maintenance routines in harsh conditions there is no margin for error. The **Fluke Ti480 PRO Infrared Camera** is designed for use in the toughest industries, with heightened resolution and thermal sensitivity to ensure you get accurate results the first time.

- Increased sensitivity to visualize temperature differences
- Get 4x the pixel data with SuperResolution, which captures multiple images and combines them to create a 1280 x 960 image
- Quickly and easily take notes in the field with IR-PhotoNotes™ and voice annotations
- Save time by wirelessly syncing images directly from your camera to the Fluke Connect® system for easy readability in direct sunlight

**Best suited for solar panels, combiner and inverterboxes, battery storage, electrical substation and transmission**

## Fluke 393 FC Clamp Meter

If you need to conduct measurements in high voltage DC environments, such as with solar arrays and uninterruptible power supplies, the **Fluke 393 FC Clamp Meter** is the tool for you.

- Measure safely with this CAT III 1500 V certified clamp meter
- Thin jaw for access to cables in crowded combiner boxes
- Sturdy IP54 rating for outdoor use
- Work efficiently with DC power measurement, audio polarity, and visual continuity

**Best suited for solar panels, combiner boxes, inverter boxes**



Article nr: 5274900



Fluke TL1500DC Insulated Test Leads CAT III 1500 V CAT IV 600 V with protective cap / CAT II 1500 V without protective cap. Compatible with most Fluke clamp meters and multimeters

Model nr: PVLEAD3  
Article nr: 5301195



## Fluke 87V MAX Industrial Multimeter



Article nr: 5140033

The **Fluke 87V MAX Industrial Multimeter** is the preferred troubleshooting solution for professional technicians worldwide, providing the features you need to troubleshoot and repair electrical systems with unparalleled reliability, accuracy, and the ruggedness you expect from Fluke.

- Identify complex signal problems fast with analog bar graph
- Captures intermittents as fast as 250  $\mu$ s with Peak Capture
- Supports accurate measurements on VFDs using a low-pass filter
- Built to highest safety standards

**Best suited for combiner boxes, inverter boxes, battery storage**



## Amprobe HD160C Heavy Duty TRMS Multimeter with Temperature

The **Amprobe HD160C Heavy Duty Multimeter** is designed for professional use in harsh environments. Its made using waterproof construction to prevent dirt, grime and moisture from entering the case and causing inaccurate readings or damaging shorts. It has an extended voltage measurement capability of 1500 V DC and 1000 V AC, unmatched by any other line of digital multimeters. The extended voltage ranges can withstand transients up to 12 kV, and it also measures temperature.

- Highest voltage capability, measuring to 1500 V DC and 1000 V AC
- Special sealing for environment and water resistance: IP67 rated
- Sturdy IP54 rating for outdoor use
- Superior 10,000 count resolution with bar graph

**Best suited for solar panels, combiner boxes, inverter boxes**



Article nr: 2670787



# Solar tools

## Fluke 1748 Three-Phase Power Quality Logger



Article nr: 4920767

The **Fluke 1748 Three-Phase Power Quality Logger** is the best tool to troubleshoot, quantify energy usage, and analyze power distribution systems in a fast, easy, and safe way.

- Measure key power quality parameters including harmonics and inter-harmonics, unbalance, flicker, and rapid voltage changes
- Measure with premium accuracy to the rigorous IEC 61000-4-30 Class A Edition 3 standard
- One-touch reporting to create standardized reports using the included Fluke Energy Analyze Plus Software

**Best suited for inverter boxes, battery storage, electrical substation and transmission**

## Fluke 125B Industrial ScopeMeter

Automatically capture, view, and analyze complex waveforms with the **Fluke 125B Industrial ScopeMeter**. One truly integrated tool, putting the functions of an oscilloscope, multimeter and high-speed recorder into one, easy-to-use instrument.

- Dual-input digital oscilloscope and multimeter in a ScopeMeter® test tool
- Features Connect-and-View™ trigger simplicity for hands-off operation
- Includes IntellaSet™ technology to automatically and intelligently adjust numerical readouts based on measured signals
- Provides a dual-input waveform and meter reading recorder for trending data over extended periods



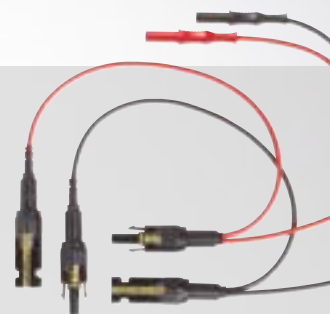
Article nr: 4755818



### PVLEAD1

- IEC / EN 61010-031 CAT III 1000V / CAT IV 600V, 20 amp rated
- Set of black and red solar PV MC4 to 4mm Banana Plug Test Leads
- Allows for connections to test tools that accept 4mm sheathed banana plugs
- Ensures safe current and voltage measurements of PhotoVoltaic (PV) modules and systems
- Connect measuring devices to PV power plants, for use in regular tests, measurements, and troubleshooting of solar PV panels

Article nr: 5301188



### PVLEAD3

- IEC / EN 61010-031 CAT III 1000V / CAT IV 600V, 20 amp rated
- Set of black and red solar PV MC4 Solar Clamp Meter Test Leads
- Designed for use with Clamp Meters that accept 4mm sheathed banana plugs
- Creates connection between Solar Panels and Inverter for measuring with a Clamp Meter
- Ensures safe DC power measurements on PhotoVoltaic (PV) modules and systems
- Allows user to monitor solar PV circuits during operation for troubleshooting and maintenance of PV systems

Article nr: 5301195

## Fluke 1777 Power Quality Analyzer

With **Fluke 1777**, you'll never miss a critical power quality event—from fast transients up to 8 kV, harmonics up to 30 kHz, dips and swells, as well as the voltage, current, and power measurements that enable you to characterize your electrical system.

- High-speed voltage transient capture
- Included full power quality and electrical energy analyzer functionality
- At-a-glance "Advanced Power Quality Health" summary screen with graphical representation
- Highest safety rating in the industry: 1000 V CAT III/ 600 V CAT IV

**Best suited for inverter boxes, battery storage, electrical substation and transmission**



Article nr: 5126630



**Fluke Solar Tools**



Article nr: 4325162

## Fluke 1625-2 Earth Ground Tester

The **Fluke 1625-2 Earth Ground Tester** measures loop resistance using only clamps or stakes or one of each. The stakeless method eliminates the dangerous and time-consuming job of disconnecting parallel grounds and finding suitable locations for auxiliary ground stakes so earth ground tests can be performed even in places without access to soil.

- Perform testing with or without stakes
- Use the stakeless method to test earth ground resistance anywhere
- Features automatic frequency control to minimize the effect of interference

**Best suited for Inverter Boxes, Battery Storage, Electrical Substation and Transmission**

## Fluke 1555 FC Insulation Tester

Perform preventative maintenance tasks faster, easier and safer than ever before with the **Fluke 1555 FC Insulation Resistance Tester's** remote testing capabilities.

- Remote configuration and test setup, remote start/stop, and remote data download
- Real-time trending gives you easy-to-see visual cues
- Drag and drop report creation with Fluke Connect™ saves you time and makes it easy for everyone to understand

**Best suited for electrical substation and transmission**



Article nr: 4977519



Article nr: 4829532

## Fluke 1630-2 Earth Ground Clamp

The **Fluke 1630-2 FC Earth Ground Clamp** measures loop resistance for multi-grounded systems using the dual-clamp jaw, eliminating the need to disconnect parallel grounds or find suitable locations for auxiliary test stakes. Ground tests can be performed inside buildings, on power pylons, or anywhere you don't have access to soil to place auxiliary test stakes.

- Earth ground AC leakage current measurement
- Use the stakeless method to test earth ground resistance anywhere
- Logging measurements
- Alarm threshold
- Band-pass filter
- Fluke Connect wireless system

**Best suited for Inverter Boxes, Battery Storage, Electrical Substation and Transmission**

## Fluke 1587 FC Insulation Multimeter

The **Fluke 1587 FC Insulation Multimeter** performs fast and accurate insulation tests with advanced functions including ramp voltage, polarity index, dielectric absorption ratio and dielectric discharge testing.

- Automatically calculate Polarity index (PI) and Dielectric absorption ratio (DAR)
- Safety first: connect the insulation tester, then monitor test measurements remotely
- Document the job quickly by seeing and sharing insulation resistance test results wirelessly via your smartphonecomprehensive reports

**Best suited for Combiner Boxes, Inverter Boxes**



Article nr: 4691215



**Fluke Solar Tools**



Article nr: 4489996

## Fluke BT521 Battery Analyzer

Ideal for troubleshooting, maintenance, and performance of individual stationary batteries and battery banks used in critical back-up applications.

- Key measurements include internal battery resistance, DC and AC voltage, DC and AC current, ripple voltage, frequency, and temperature
- Sequence measurement mode allows for automatic or manual sequence testing of battery strings with automatic measurement storage without requiring a button press to save each time
- Comprehensive logging automatically captures all measured values for on-the-go analysis
- Intuitive user interface, compact design, and rugged construction for optimum performance, test results, and reliability

**Best suited for battery storage**



Article nr: 5233904

## Fluke ii910 Acoustic Imager

With an expanded frequency detection of range up to 100 kHz the **Fluke ii910 Precision Acoustic Imager** enables you to visually see partial discharge problems, even in their earliest stages. Spot problems before they occur to minimize downtime, save on energy costs, and prevent catastrophic failures.

- Safely detect PD from up to 120 m in distance
- Use the built-in PDQ mode to capture, track, and analyze the severity and type of partial discharge
- Capture images and videos with one button for easy reporting. Combine with PDQ data to generate comprehensive reports

**Best suited for electrical substation and transmission**



Fluke Solar Tools

# Clean energy resources




**FLUKE®**

**Solar – Utility Scale**

Solar energy is becoming one of the world's fastest-growing sources of power—making the first time that solar energy's growth has surpassed that of all other fuels. Solar technology is improving, and the cost of going solar is dropping rapidly. Solar technicians and managers need to be able to install and service equipment quickly, safely and efficiently.

Fluke tools perform like champions in the most challenging utility-scale solar environments. You can depend on Fluke tools to keep your world up and running.

Solar-Utility Scale



**FLUKE®**

**Solar – Commercial and Residential**

Solar energy is becoming one of the world's fastest-growing sources of power – making the first time that solar energy's growth has surpassed that of all other fuels. Solar technology is improving, and the cost of going solar is dropping rapidly. Solar technicians and managers need to be able to install and service equipment quickly, safely and efficiently for both residential and commercial clients.

Fluke tools perform like champions in the most challenging commercial and residential solar environments.

You can depend on Fluke tools to keep your world up and running.

Solar-Commercial and Residential



**Fluke.** *Keeping your world up and running.®*

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