

TECHNICAL DATA

SMFT-1000 Multifunction PV Tester and Performance Analyzer, I-V Curve Tracer



All-in-one test solution to verify PV system performance and safety, expedite client reporting.

Test that PV systems are performing to their optimal power output as well as operating safely with the Fluke SMFT-1000 multifunction tester with I-V curve tracing. Designed for PV professionals that provide installation, commissioning and maintenance services to systems that operate at 1000 V DC or under, the SMFT-1000 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.

CRITICAL TESTING FEATURES FOR PERIODIC INSPECTION OF PV SYSTEMS

Full sequence safety testing –IEC 62446-1 Category 1:

- Equipotential bonding/lightning protection R_{L0}
- Voltage on open circuit, including polarity V_{OC}
- Short circuit current I_{SC}
- Insulation resistance R_{INS}

System performance testing –IEC 62446-1 Category 2:

- I-V Curve tracing and software analysis with TruTest™
- Irradiance, temperature, tilt, cardinal direction

Wireless Irradiance Meter

No leads required

To perform precise I-V curve measurements, real time irradiance and temperature data is needed. The included IRR2-BT irradiance meter wirelessly connects to the SMFT-1000 to communicate data in real time, providing the most accurate I-V curve measurements possible. If the wireless connection is interrupted for any reason, the IRR2-BT will continue recording data for up to 17 hours that can later be matched to tests taken with the SMFT-1000.



Keep the Leads™

Quick and accurate testing saves time and money

It's a hassle to change the configuration of test leads constantly while doing different tests. With Fluke's unique Keep the Leads™ system, less time is wasted on set-up, and less user errors occur while testing PV systems. Now you can get more testing done in the field in less time.



Color Screen with Integrated Interface

On-screen instructions provide any easy walkthrough of tests

Automatic testing saves time

Switch the SMFT-1000 to Auto Test Mode to perform an automatic sequence of tests in a variety of combinations:

- With insulation test or without insulation test
- IEC 62446-1 testing for Category 1 or Category 1 and 2
- IEC 62446-1 testing for Protection Class I or Protection Class II

On-location I-V curve results: compare manufacturer I-V curve data to measured data instantly

While taking an I-V curve reading in the field, the SMFT-1000 will display the curve as it loads in the test data, against the module specifications as defined by the manufacturer. This makes it easy to immediately confirm measurements without the use of a laptop or tablet. Run the I-V curve test on new installations to confirm they are working according to the site specifications, or to test if existing modules or strings are working to their expected performance levels.



Visual Inspection

To meet PV system IEC regulations for visual inspections, the SMFT-1000 features a convenient setting in which to record observations directly to the memory. Later, the information can be downloaded to the TruTest™ software and incorporated into the project report.



TruTest™ Solar Data Management Software

Spend less time processing test results and compiling reports

The reporting necessary to close out projects can be challenging and time-consuming. Cover all your certification and documentation needs through the modern, fast and reliable software platform of TruTest™. TruTest™ allows for solar asset management, data storage and reporting on a single platform. Whether you are analyzing panel efficiency through I-V curves, or safety testing the system through the Category 1 test regime in conformance to IEC 62446-1, proper data management is critical for producing easy-to-understand reports for clients. 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.

- Easily manage measurement data from solar site installation and commissioning testing
- Quickly create inspections and reports compliant with IEC 62446-1 and other directives
- I-V curve analysis with easy pass/fail visuals; see changes in I-V curve over multiple site visits
- Easily manage measurement data from solar site installation and commissioning testing
- 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.com. Purchase a software key to unlock the Lite or Advanced version.



TruTest

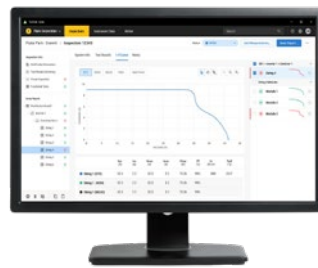
Function	Demo	Lite	Advanced
Maximum addable clients	1	10	Unlimited
Maximum addable site/client	2	5	Unlimited
Maximum addable strings	5	50	Unlimited
Maximum addable modules (per string)	50	50	Unlimited
Edit distribution board information		•	•
Edit circuit information		•	•
Edit inverter information		•	•
Edit combiner box information		•	•
Edit string information		•	•
Edit module information		•	•



Record Data



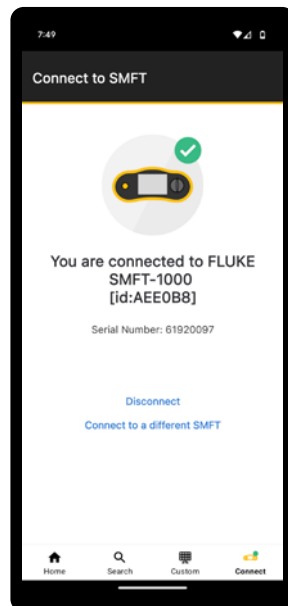
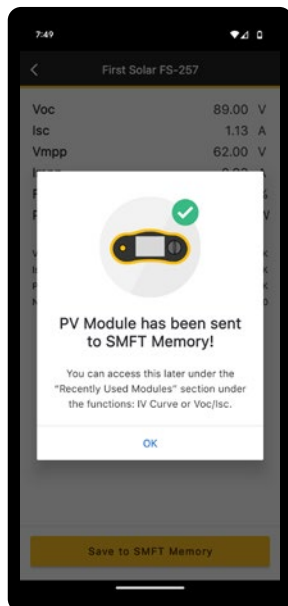
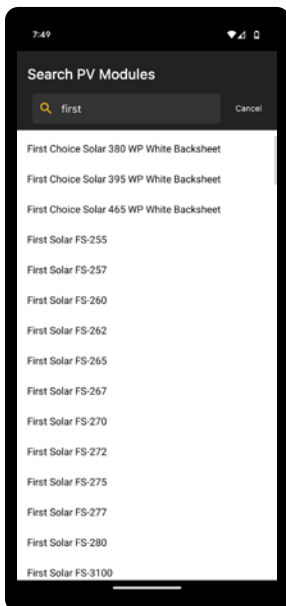
Export Data



Report Data

Fluke TruTest™ Solar Database App

Make testing easier and more efficient with the Fluke TruTest™ Solar Database App, designed for seamless collaboration with the SMFT-1000 Multifunction PV Tester. The app features an extensive solar panel database that allows for importing panel specifications directly into the analyzer, allowing access to over 85,000 different types of PV panels wherever you are and eliminating the need for manual input to significantly streamline the testing process. Available for download on the Google Play Store.



Specifications

Equipotential bonding/lightning protection R_{L0}			
Display range	Measuring range	Resolution	Accuracy
0.00 Ω - 19.99 Ω	0.20 Ω - 19.99 Ω	0.01 Ω	\pm (2 % + 2 Digit)
20.0 Ω - 199.9 Ω	20.0 Ω - 199.9 Ω	0.1 Ω	\pm (2 % + 2 Digit)
200 Ω - 2000 Ω	200 Ω - 2000 Ω	1 Ω	\pm (5 % + 2 Digit)
Test current	\geq 200 mA (\leq 2 Ω + Rcomp)		
Test voltage	4 V DC ... 10 V DC		
Polarity reversing	Yes		
Test lead zero (Rcomp)	Up to 3 Ω		
PV module/PV string, open-circuit voltage (V_{oc})			
Display range	Measuring range	Resolution	Accuracy
0.0 V - 99.9 V	5.0 V - 99.9 V	0.1 V	\pm (0.5 % + 2 Digit)
100 V - 1000 V	100 V - 1000 V	1 V	\pm (0.5 % + 2 Digit)
Polarity test	Yes		
PV module/PV string, short-circuit current ($I_{s/c}$)			
Display range	Measuring range	Resolution	Accuracy
0.0 A - 20.0 A	0.2 A - 20.0 A	0.1 A	\pm (1 % + 2 Digit)
Live circuit detection	Inhibits test if terminal voltage >5 V ac (typical) detected prior to initiation of test		
Maximum voltage	up to 1000 V maximum		
Insulation resistance R_{INS}			
Display range	Measuring range	Resolution	Accuracy
0.00 M Ω - 99.99 M Ω	0.20 M Ω - 99.99 M Ω	0.01 M Ω	\pm (5 % + 5 Digit)
100.0 M Ω - 199.9 M Ω	100.0 M Ω - 199.9 M Ω	0.1 M Ω	\pm (10 % + 5 Digit)
200 M Ω - 999 M Ω	200 M Ω - 999 M Ω	1 M Ω	\pm (20 % + 5 Digit)
Test voltage @ no load	50 V / 100 V / 250 V up to 199.9 M Ω 500 V / 1000 V up to 999 M Ω	1 V	0 % to + 25 %
Testing current	Min. 1 mA (@ 250 k Ω / 500 k Ω / 1 M Ω) Max. 1.5 mA (short circuit)		
Overvoltage protective devices (BV)			
Display range	Measuring range	Resolution	Accuracy
0 V DC - 1000 V DC	50 V DC - 1000 V DC	1 V DC	\pm (10 % + 5 Digit)
AC/DC voltage measurement via 4 mm test sockets			
Display range	Measuring range	Resolution	Accuracy
0.0 V AC - 99.9 V AC	5.0 V AC - 99.9 V AC	0.1 V	\pm (2.5 % + 2 Digit)
100 V AC - 700 V AC	100 V AC - 700 V AC	1 V	\pm (2.5 % + 2 Digit)
0.0 V DC - 99.9 V DC	5.0 V DC - 99.9 V DC	0.1 V	\pm (2.5 % + 2 Digit)
100 V DC - 1000 V DC	100 V DC - 1000 V DC	1 V	\pm (2.5 % + 2 Digit)
Detection AC/DC	Yes (Automatic)		
+ / - polarity check	Yes		

Specifications continued

AC/DC current with i100 clamp

Display range	Measuring range	Resolution	Accuracy (DC, AC 50 Hz/60 Hz)
0.0 A DC – 100 A DC	1.0 A DC – 100 A DC	0.1 A	± (5 % + 2 Digit) *
0.0 A AC – 100 A AC TRMS	1.0 A AC – 100 A AC TRMS		± (5 % + 2 Digit) *

* i100 clamp tolerances not inclusive

i100 Clamp Tolerances

Display range	Measuring range	Output signal	Accuracy (DC, AC 50 Hz/60 Hz)
N/A	1 A - 100 A DC or AC < 1 kHz	10 mV/A AC/DC	± (1.5 % + 0.1 A)

AC/DC Power measurement (with i100 clamp)

Display range	Measuring range	Resolution	Accuracy (DC, AC 50 Hz/60 Hz)
0.0 V AC - 700 V AC 0.0 V DC - 1000 V DC	5.0 V AC - 700 V AC 5.0 V DC - 1000 V DC	0.1 V	± (2.5 % + 2 Digit)
0 A AC/DC - 100 A AC/DC	1 A AC/DC - 100 A AC/DC	0.1 A	± (6.5 % + 3 Digit)
0 kW/kVA - 100 kW/kVA	5 kW/kVA - 100 kW/kVA	1 kW/kVA	± (10 % + 4 Digit)

Blocking Diode Check (V_{BD})

Display range	Measuring range	Resolution	Accuracy
0.0 V DC - 6.00 V DC	0.50 V DC - 6.00 V DC	0.01 V DC	± (5 % + 10 Digit)
Live circuit detection	Inhibits test if terminal voltage >50 V AC/DC (typical) detected prior to initiation of test.		

I-V Curve Graph

Area Curve shows the range of the min-to-max values of the Nominal Curve based on the Nominal values ±5 % (Pass Criteria = 5 %)

Product specifications

SMFT-1000 PV Tester, and Performance Analyze, I-V Curve Tracer	
SMFT-1000 size	10 cm x 25.0 cm x 12.5 cm (3.8 in x 9.8 in x 4.9 in)
SMFT-1000 weight	1.4 kg (3.09 lb)
Battery	6 AA IEC LR6
Operating temperature	0 °C to 50 °C (32 °F to 122 °F)
Storage temperature	-30 °C to 60 °C (-22 °F to 140 °F) batteries removed
Operating altitude	up to 2000 m
Storage altitude	up to 2000 m
Safety	
SMFT-1000 PV Analyzer	IEC 61010-1 Pollution Degree 2 IEC 61010-2-034 CAT III 1000 V dc, CAT III 700 V AC
i100 Current Clamp	IEC 61010-2-032, Type D (for insulated conductors), 1000 V
Accessories	IEC 61010-031
TL 1000-MC4	CAT III 1500 V, 20 A
TP1000 Remote Probe (with cap)	CAT IV 600 V, CAT III 1000 V, 10 A
TP1000 Remote Probe (without cap)	CAT II 1000 V, 10 A
TL 1000 Test Leads	CAT III 1000 V, 10 A
TL 1000/30M Test Leads	CAT III 1000 V, CAT IV 600 V, 5 A (on reel) 10 A (fully extended)
TP74 Test Probes (with cap)	CAT III 1000 V, 10 A
TP74 Test Probes (without cap)	CAT II 1000 V, 10 A
AC285 Alligator Clip	CAT III 1000 V, 10 A
Performance	IEC 61557-1, IEC 61557-2, IEC 61557-4, IEC 61557-10
Electromagnetic Compatibility (EMC)	
International	IEC 61326-1: Portable Electromagnetic Environment, CISPR 11: Group 1, Class A Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself. Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances. Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.
Wireless Radio Module	
Frequency range	2.402 GHz to 2.480 GHz
Output power	8 dBm

Ordering information

Fluke SMFT-1000/KIT Multifunction PV Analyzer

What's included

- Fluke SMFT-1000-BP Professional Tool Backpack
- SMFT-1000 Multifunction PV Analyzer
- Carry strap
- Fuse pack
- Adapter Cable IRDA Optical-to-USB
- Zero adapter
- IRR2-BT Wireless Solar Irradiance Meter Pro
 - 80PR-IRR External Temperature Probe
 - Mounting Bracket for solar panel
 - Carry Case
- i100 AC/DC Current Clamp 100 A
 - TPAK Magnet Set
- TP1000 Test Probe with Remote Test Button
- TL1000 Test Lead Set
- TL1000-MC4 Test Lead Set
- TL1000/30M Test Lead on Reel
- Coupler set
- (6) AA Batteries

The SMFT-1000 is compatible with the Fluke portfolio of test and measurement tools and is an integral part of your total PV system testing solution.

Available in several additional kits:

- **PRO kit:** Includes advanced TruTest™ Software and MC4 Solar Clamp Test Lead Set in addition to everything in the base kit
- **LITE kit:** Includes the SMFT-1000 multifunction PV analyzer as well as the TL1000 and two sets of solar PV test leads in a hard carrying case

Recommended tools for use with the SMFT-1000

- TruTest™ Data Management and Reporting Software
- 393 FC CAT III 1500 V Solar Clamp Meter
- 87V MAX True-rms Digital Multimeter
- 1587 FC Insulation Multimeter
- Ti480 PRO Infrared Camera
- 1625-2 GEO Earth Ground Tester
- 500 Series Battery Analyzers
- Pomona PVLEAD3 Solar Clamp Test Lead Set

SMFT-1000/KIT



SMFT-1000/PRO



SMFT-1000/LITE



Visit www.fluke.com to get complete details on these products or ask your local Fluke sales representative.