Datos técnicos

PVA-1500HE2 I-V Curve Tracer Thermography Kit


shoals

Características principales

- Measures and displays I-V curves up to 1500V and 30A, including on high efficiency modules
- Advanced built-in PV model provides immediate PV performance checking
- Wireless interfaces for faster setup, safer work environment, and freedom of movement during PV troubleshooting
- Automates data management, analysis, and reporting
- Identify hotspots that may indicate damaged or underperforming cells

Descripción general del producto: PVA-1500HE2 I-V Curve Tracer Thermography Kit

Training

Fluke offers a variety of training related to PV test and measurement. Training can either be delivered as a virtual on-demand course or as a live online presentation/discussion format with a product expert (may differ regionally).

Discover PVA-1500 Training

Featuring the PVA-1500HE2 I-V Curve Tracer and the TiS75+ Thermal Camera, this toolkit is designed to streamline the inspection process and ensure optimal performance of solar arrays. The PVA-1500HE2 offers an array of advanced features, including high throughput I-V curve tracing, providing quick and detailed performance data. Its intuitive user interface enables easy navigation and real-time analysis, allowing for immediate identification of potential issues.

Complementing this, the TiS75+ Thermal Camera provides precise thermal imaging to detect anomalies like hot spots and faulty connections. From commissioning and troubleshooting to routine inspections and performance optimization, this toolkit empowers solar professionals to maximize the efficiency and reliability of solar installations.

Using a thermal camera such as the Fluke TiS75+ at a solar PV site can help improve system performance, reduce maintenance costs, and extend the life of the solar panels and related components. Thermal inspections with the Ti75+ can assist in:

- Locating hotspots on solar panels indicating damage or underperformance
- Identifying electrical issues such as loose or corroded connections
- Preventing critical issues and extending system life
- Ensuring proper installation and safe operation
- Monitoring system performance and identify degradation or anomalies
- Assessing shading issues that impact energy production

Measure your solar PV system performance

The PVA-1500HE2 is a cutting-edge I-V curve tracer kit designed to measure PV system performance. With this high precision testing equipment, you can reliably assess the health and performance of solar modules and arrays, making informed decisions to enhance their output and longevity.

The PVA-1500HE2 kit offers an array of advanced features, including high throughput I-V curve tracing, providing quick and detailed performance data. Its intuitive user interface enables easy navigation and real-time analysis, allowing for immediate identification of potential issues. By pinpointing problems early, you can maximize your solar energy production and minimize downtime.

Comprehensive measurements and efficient analysis

For commissioning, operations, maintenance, and troubleshooting of PV arrays, I-V curve testing is the most complete solar module performance measurement. Quick analysis of curve datasets aids in detecting outliers, and the stored data functions as a baseline for future performance inquiries.

Accurate I-V curve tracing

The PVA measures the I-V (current versus voltage) curve of a PV string or module using a capacitive load. The measurement is typically performed at the string level by connecting directly to the string or at a combiner box using the fuses to select the string under test. The number of I-V curve points can be selected at 100 or 500. Additionally, the PVA generates the P-V (power versus voltage) curve, Isc, Voc, Imp, Vmp, Pmax, fill factor, and performance factor (the ratio of measured to expected maximum power).

Time-saving interface

With a tablet or laptop (Windows only) as the user interface, perform more tests per hour and display the data in multiple, easy to read formats. Save your measurements by touching your customized array tree at the branch you are measuring. The software automatically calculates the expected I-V curve and displays the performance factor.

Advanced High Efficiency PV Testing Capabilities

Accurate measurement of high efficiency modules up to 30A: Highly efficient modules (>19% module efficiency) possess high
capacitance, posing a challenge for some I-V curve tracers that may not be able to measure them. The PVA-1500HE2 is

uniquely
designed to measure all string types, even those with high efficiency modules, up to 30A.
Rapid performance in high temperature environments: The PVA-1500HE2 operates with a swift sweep-to-sweep delay of 9 seconds (at Voc<1350V). This results in the ability to measure 3.5 MW within an hour, even in high-temperature settings where standard curve tracers often fail due to overheating.

SolSensor™ Wireless PV Reference Sensor

The SolSensor™ provides irradiance, module temperature, and array tilt data to the PV model. The model uses this information to predict the I-V curve shape at these operating conditions and to translate the measured curve to standard test conditions. The SolSensor™ clamps to the module frame, automatically orienting the irradiance sensor to the plane-of-array.

The spectral response of the silicon photodiode sensor in the SolSensor™ is corrected for the PV technology under test. Special
factors are provided for multi- and mono-crystalline cells as well as cadmium telluride (CdTe) and other thin film technologies. The
sensor is temperature compensated and the angular response of each unit is calibrated for rotation and elevation. As a result, the SolSensor™ is accurate over a broad range of technologies, sky conditions, and sun angles, allowing I-V curve measurements earlier and later in the day.

The SolSensor™ provides two external thermocouple inputs for measuring module backside temperatures. Effective cell temperature can also be calculated directly from the measured I-V curve per IEC 60904-5. The PVA's SmartTemp™ feature, optionally, blends these two methods for best accuracy.

The PVA and SolSensor™ communicate wirelessly with your PC via WiFi with a line-of-sight wireless range of 100m. That means no wires underfoot, quick setup, the ability to move around while troubleshooting strings, and flexibility to measure multiple combiner boxes with a single SolSensor™ setup.

Turn PVA data into key insights, visualizations, and customizable reports

Capture data in the field with the PVA Application and validate the results with the Data Analysis Tool (DAT), a Microsoft Excel™-based solution streamlining the analysis of PVA I-V curve data. It presents analysis results in multiple formats. It compiles key PV parameters in a string table, flags non-conforming strings, and delivers a statistical overview of the entire array. Additionally, it visually combines string I-V curves at the combiner box level, offering a clear depiction of consistency and identifying atypical strings. The tool also generates histograms for PV parameters across the string population, and this data can be added to a customizable report exported as a PDF. The Data Analysis Tool (DAT) can be downloaded for free use with any PVA.
Supported languages: English, French, Spanish, German, Italian, Traditional Chinese, Simplified Chinese, and Brazilian Portuguese.

Download the PVA Application and Data Analysis Tool

Especificaciones: PVA-1500HE2 I-V Curve Tracer Thermography Kit

PVA-1500 Specifications		

	PVA-1500T2	PVA-1500HE2
Voltage Range (Voc)	20 to 1500V DC	
Maximum Current Range (Isc)		
Module Efficiency <19%	0 to 30A DC	
Module Efficiency 19%	0 to 10A DC	0 to 30A DC
Voltage Accuracy (0 °C to 45 °C)	±(0.5% ±0.25V)	
Current Accuracy (0 °C to 45 °C)	±(0.5% ±0.04A)	
Power Accuracy (0 °C to 45 °C)	±(1.7 % + 1.0 W) (current 3 A, module efficiency <19 %)	
Voltage Resolution	25 mV	
Current Resolution	2 mA	
Measurement Throughput		
Sweep-to-sweep delay (@VOC 1350V)	<9 seconds	
Max number of I-V sweeps per hour (@VOC 1350V)	400 sweeps/hr	
Max megawas measured per hour	3.5 MW/hr	
Thermal Capacity		
# sweeps at 18 s sweep-to-sweep delay	unlimited (25 °C, 77 °F ambient) 550 (45 °C, 113 °F ambient)	
# sweeps at 9s sweep-to-sweep delay	unlimited (25 °C, 77 °F ambient) 330 (45 °C, 113 °F ambient)	
I-V Trace Points	100 or 500 (selectable)	
I-V Sweep Duration	0.05 to 2 seconds (typically 0.2 seconds for PV strings)	
Operating Temperature Range	0 °C to 45 °C, 32 °F to 113 °F	
Storage Temperature Range	-20 °C to 65 °C, -4 °F to 149 °F	
Operating Humidity	<90 % RH, non-condensing. Avoid exposing a cold instrument to warm and humid air as condensation will result. Store the instrument in the same conditions in which the instrument will be used.	
Altitude	2000 m max	
Baery Charging Time	6 hr	
Baery Run Time	Approx. 8 hr	Approx. 7 hr
Safety and Regulatory	CAT III 1500V IEC 61010-1: Pollution Degree 2	
Waing Features	Over-voltage, over-current, over-temperature, reverse polarity	
PV Connector	Staubli MC4-EVO2	Banana Jacks
Charging/Charged LED	Yes	
In-the-field firmware update-ready	Yes	
Interface to Tablet/Laptop	Wi-Fi interface between user tablet or laptop, I-V unit and SolSensor™	
Weight	6.6 kg, 14.55 lb	7.3 kg, 16.09 lb
Height	43.2 cm, 1.41 ft (including test lead and strain reliefs)	53.3 cm, 1.74 ft
Width	21.6 cm, 8.50 in	
Depth	15.2 cm, 5.98 in	

PVA-1500 Test Lead and Clip Specifications	
Voltage Range	0 to 1500V DC

Current Range	0 to 30A DC
Temperature	0 °C to 45 °C, 32 °F to 113 °F
Humidity	Maximum relative humidity of 80% for temperatures up to 31 °C (87.8 °F) decreasing linearly to 50% relative humidity at 40 °C (104 °F)
Pollution Degree	2
Altitude	2000 m, 6561 ft maximum
Lead Length	152 cm, 59.84 in
Lead Colors	Positive=red, negative=black
Manufacturer (Test Leads and Alligator Clips)	Staubli
Note: Use only test leads and clips provided by Fluke for the PVA-1500.	

SolSensor™ Specifications	
Irradiance	
Sensor Type	Silicon photodiode with corrections for temperature, spectral, and angular effects
Measurement Range	100 W/m^2 to 1500 W/m^2
Accuracy	±2 % when used to predict the performance of well characterized poly- and monocrystalline PV modules with direct irradiance >600W/m^2
Resolution	1 W/m^2
Measurement Interval	Typically, 3.5 s
Temperature	
Sensor Type	Type K thermocouple, two inputs
Measurement Range	0 °C to 100 °C, 32 °F to 212 °F
Accuracy	±2 °C, 35.6 °F (not including limits of error of thermocouple)
Resolution	0.1 °C, 32.18 °F
Measurement Interval	Typically, 3.5 s
Tilt	
Sensor Type	Electronic
Measurement Range	0 to 90° from horizontal
Accuracy	±2° typical (0 to 45°)
General	

Measurement Cynchronization with I-V Curve	Typically, <1 s
Wireless Range (open line of sight)	100 m, 328 ft
Operating Temperature Range	0 °C to 45 °C, 32 °F to 113 °F
Storage Temperature Range	-20 °C to 65 °C, -4 °F to 149 °F
Operating Humidity	<90% RH, non-condensing. Avoid exposing a cold instrument to warm and humid air as condensation will result. Store the instrument in the same conditions in which the instrument will be used.
Baery Charging Time	6 hr
Baery Run Time	>16 hr typical use

Key Features	**TiS75+**
Infrared resolution	384 x 288 (110,592 pixels)
IFOV	1.91 mRad
Field of view	42° x 30°
Minimum focus distance	0.15 m
Focus system	Manual focus
Wireless connectivity	Yes, to PC, iPhone® and iPad® (iOS 4s and later), Android™ 4.3 and up, and WiFi and LAN (where available)
Fluke Connect app compatible	Yes*, connect your camera to your smartphone, and images taken automatically upload to the Fluke Connect app for saving and sharing
Fluke Connect Assets optional software	Yes*, assign images to assets and create work orders. Easily compare measurement types - whether mechanical, electrical or infrared images - in one location
Asset Tagging	Scan a QR code to automatically organize and file thermal images with Fluke Connect™
IR-Fusion technology	AutoBlend continuous 0 % to 100 %. Adds the context of the visible details to your infrared image
Picture-InPicture (PIP)	Yes
Display	3.5" (8.9 cm landscape) touchscreen 640 x 480 LCD
Ergonomic design	Designed for one-handed use
Thermal sensitivity	40mk
Level and span	Smooth auto and manual scaling
Fast auto-rescale in manual mode	Yes
Minimum span (in manual mode)	3° °C (4.5 °F)
Minimum span (In auto mode)	5°C (9.0 °F)
Built-in digital camera (visible light)	640 x 480

Frame rate	9 Hz or 27 Hz models
Dew point calculation	Yes
Data storage and image capture	
Inteal memory	500 images
Exteal memory	4 GB SD card (>1000 images)
Image capture, review, save mechanism	One-handed image capture, review, and save capability
Image file formats	Non-radiometric BMP or JPEG or fully-radiometric is2
Memory review	Yes
Software	Fluke Connect software—full analysis and reporting software with access to the Fluke Connect
Analyze and store radiometric data on a PC	Yes
Export file formats with Fluke Connect software	is2, BMP, GIF, JPEG, PNG, TIFF
Voice annotation	Yes, 60 second maximum audio recording via Bluetooth Audio Headset Profile (HSP) connection to exteal device.
IR-PhotoNotes	Yes. Up to 3 extra user-selectable visible light image capture to be included in IS2 file.
Text annotations	After IS2 capture, user can type in a note using on-screen keyboard.
Video recording and formats	Standard and radiometric video. Up to 5 minute recording length. avi and is3
Remote cool operations	No
Auto capture (temperature and interval)	Yes. User-selectable time interval for capturing IS2 or Jpeg files.
Baery	
Baeries (field-replaceable, rechargeable)	Lithium-ion rechargeable baery
Baery life	3.5 hours continuous without WiFi (Actual life depends on seings and usage)
Baery charging time	2.5 hours to full charge
Baery charging system	Ti SBC3B Two-Bay Baery Charger or in-Imager charging.
AC operation	AC operation with included power supply, universal adapters included Output: 15 VDC, 2 A
Power saving	User-selectable sleep and power off
Temperature measurement	
Temperature range (not calibrated below -10 °C)	-20 °C to 550°C (not calibrated below -10 °C)
Accuracy	±2 °C or 2 % (whichever is greater) at 25 °C ambient temperature
On-screen emissivity correction	Yes, “top ten” material list plus numerical adjustment between 0.01 and 1.00
Color palees	
Standard palees	6

General specifications	
Color alarms	Yes. User-selectable hot and cold point and inteal/exteal range color alarms. Modifies paleization of IR image by limiting which pixels are drawn using palee colors based on the pixel temperature.
Infrared spectral band	~8-14µm
Operating temperature	-10 °C to 50 °C (14 °F to 122 °F)
Storage temperature	-20 °C to 50 °C (-4 °F to 122 °F) without baeries
Relative humidity	10 % to 95 % non-condensing
Spot temperature	Center spot (unmovable)
User-definable spot markers	Yes, 5 user-adjustable spot markers for a single pixel each. Position is adjustable. Temperature value for marker shown on screen. User can choose to switch display on/off for each marker.
User defined measurement boxes	Yes, 5 user-adjustable rectangles. Size and position are adjustable. Rectangle statistics shown on screen: Min, Max, Average temperature. User can choose to switch display on/off for each marker.
Hard case	Rugged hard carrying case with soft transport bag, including adjustable strap
Safety standards	IEC 61010-1: Pollution Degree 2
Electromagnetic combability	IEC 61326-1: Portable Electromagnetic Environment; IEC 61326-2-2 CISPR 11: Group 1, Class A
Australian RCM	RCM IEC 61326-1
US FCC	47 CFR 15 Subpart C Sections 15.207, 15.209, 15.249
Vibration	10 Hz to 150 Hz, 0.15 mm, IEC 60068-2-6
Shock	30 g, 11 ms, IEC 60068-2-27
Drop	Engineered to withstand 2m drop
Sized (H x W x L)	(26.7 cm x 10.1 cm x 14.5 cm) (10.5 in x 4.0 in x 5.7 in)
Weight (baery included)	0.885 kg (1.95 lbs)
Enclosure rating	IP54
Warranty	Two-years (standard)
Recommended calibration cycle	Two-years (assumes normal operation and normal aging)
Supported languages	Czech, Dutch, English, Finnish, French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Swedish, Traditional Chinese, and Turkish
RoHS compliant	Yes

Fluke. *Manteniendo su mundo en marcha.*

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