TECHNICAL DATA

Solar Tools Kit with 393 FC Clamp Meter, Irradiance Meter and Solar Test Leads

Key features

- Measure safely with CAT III 1500 V rated clamp meter
- Thin jaw for access to cables in crowded combiner boxes
- Work efficiently with dc power measurement, audio polarity and visual continuity
- Measure solar irradiance, ambient and PV module temperature, array orientation and tilt angles
- MC4 test lead sets are designed for use with solar clamp meters that accept 4mm banana plugs, rated to CAT III 1000 V / CAT IV 600 V

Product overview: Solar Tools Kit with 393 FC Clamp Meter, Irradiance Meter and Solar Test Leads

The 393 FC CAT III 1500 V True-rms Clamp Meter with iFlex is an industrial clamp meter designed for solar photovoltaic (PV) installation technicians and maintenance professionals who work in high voltage dc environments. Safely connect the MC4 test leads to the clamp meter to validate voltage and current from individual panels or a series of panels in a PV array. The inline capabilities of the MC4 PVLEAD3 leads allow the system to remain online and generating power while testing without needing to pierce the line. Use the IRR1-SOL to obtain the amount of solar irradiance necessary to calculate the IV curve of the power output. Validate that the panel or string of panels are outputting the correct voltage.

Key functions of the solar clamp meter, irradiance meter and MC4 test leads:

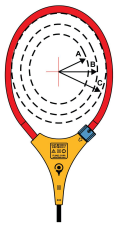
- View voltage and current simultaneously with the meter's dual display
- IP54 rated meter, ideal for work outdoors including PV panel testing

- DC power measurement, showing readings in kVA
- Logging and reporting of test results via Fluke Connect software
- Make instantaneous measurements to determine the watts per square meter solar irradiation, required by IEC 62446-1 standard
- MC4 leads comply to IEC / EN 61010-031

Specifications: Solar Tools Kit with 393 FC Clamp Meter, Irradiance Meter and Solar Test Leads

Specifications: Fluke 393 FC CAT III 1500 V True-rms Solar Clamp Meter

General			
Maximum voltage between any Terminal and Earth Ground			
AC	1000 V		
DC	1500 V		
Batteries	2 AA IEC LR6 alkaline		
Display	Dual display with backlight		
Automatic Power Off	20 minutes		
Electrical			
Accuracy			
Accuracy is specified for 1 year after calibration, at operating temperatures of 18 °C to 28 °C, relative humidity at 0 % to 75 %. Accuracy specifications take the form of: ±([% of Reading] + [Number of Least Significant Digits]).			
Temperature Coefficients	Add 0.1 x specified accuracy for each °C > 28 °C or < 18 °C		
AC Current: Jaw			
Range	999.9 A		
Resolution	0.1 A		
Accuracy	2 % + 5 digits (10 Hz to 100 Hz)		
	2.5 % + 5 digits (100 Hz to 500 Hz)		
Crest Factor (50/60 Hz)	2.5 @600.0 A		
	3.0 @500.0 A		
	1.42 @999.9 A		
	Add 2 % for C.F. >2		
AC Current: Flexible Current Probe			
Range	999.9 A		
	2500 A		
Resolution	0.1 A (≤999.9 A)		
	1 A (≤2500 A)		
Accuracy	3 % RD + 5 digits (10 Hz to 500 Hz)		
Crest Factor (50/60Hz)	2.5 @1400 A		
	3.0 @1100 A		
	1.42@2500 A		
	Add 2 % for C.F. >2		
Position Sensitivity			



Distance from Optimum	i2500-10 Flex	i2500-18 Flex	Error
A	0.5 in (12.7 mm)	1.4 in (35.6 mm)	±0.5 %
B	0.8 in (20.3 mm)	2.0 in (50.8 mm)	±1.0 %
C	1.4 in (35.6 mm)	2.5 in (63.5 mm)	±2.0 %
Measurement uncertainty assumes centralized primary conductor at optimum position, no external electrical or magnetic field, and within operating temperature range.			
DC Current			
Range	999.9 A		
Resolution	0.1 A		
Accuracy	2 % RD + 5 digits[1]		
	[1] When using the ZERO (B) function to compensate for offsets.		
AC Voltage			
Range	600.0 V		
	1000 V		
Resolution	0.1 V (≤600.0 V)		
	1 V (≤1000 V)		
Accuracy	1 % RD + 5 digits (20 Hz to 500 Hz)		
DC Voltage			
Range	600.0 V		
	1500 V		
Resolution	0.1 V (≤600.0 V)		
	1 V (≤1500 V)		
Accuracy	1 % RD + 5 digits		
mV dc			
Range	500.0 mV		
Resolution	0.1 mV		
Accuracy	1 % RD + 5 digits		
Amps Frequency: Jaw			
Range	5.0 Hz to 500.0 Hz		
Resolution	0.1 Hz		
Accuracy	0.5 % RD + 5 digits		
Trigger Level	5 Hz to 10 Hz, ≥10 A		
	10 Hz to 100 Hz, ≥5 A		
	100 Hz to 500 Hz, ≥10 A		
Amps Frequency: Flexible Current Probe			
Range	5.0 Hz to 500.0 Hz		
Resolution	0.1 Hz		
Accuracy	0.5 % RD + 5 digits		
Trigger Level	5 Hz to 20 Hz, ≥25 A		
	20 Hz to 100 Hz, ≥20 A		
	100 Hz to 500 Hz, ≥25 A		

Voltage Frequency			
Range	5.0 Hz to 500.0 Hz		
Resolution	0.1 Hz		
Accuracy	0.5 % RD + 5 digits		
Trigger Level	5 Hz to 20 Hz, ≥5 V		
	20 Hz to 100 Hz, ≥5 V		
	100 Hz to 500 Hz, ≥10 V		
DC Power			
Range	600.0 kVA (600.0 V dc range)		
	1500 kVA (1500 V dc range)		
Resolution	0.1 kVA		
	1 kVA		
Accuracy	2 % RD + 2.0 kVA		
	2 % RD + 20 kVA		
Resistance			
Range	600.0 Ω		
	6000 Ω		
	60.00 kΩ		
Resolution	0.1 Ω (≤600.0 Ω)		
	1 Ω (≤6000 Ω)		
	0.01 kΩ (≤60.00 kΩ)		
Accuracy	1 % RD + 5 digits		
Capacitance			
Range	100.0 µF		
	1000 µF		
Resolution	0.1 µF (≤100.0 µF)		
	1 µF (≤1000 µF)		
Accuracy	1 % RD + 5 digits		
Inrush Trigger Level	5 A		
Mechanical			
Size (L x W x H)	281 mm x 84 mm x 49 mm		
Weight (with batteries)	520 g		
Jaw Opening	34 mm		
Flexible Current Probe Diameter	7.5 mm		
Flexible Current Probe Cable Length			
(head to electronics connector)	1.8 m		
Environmental			
Operating Temperature	-10 °C to 50 °C		
Storage Temperature	-40 °C to 60 °C		
Operating Humidity	Non condensing (<10°C)		
	≤90 % RH (at 10 °C to 30 °C)		
	≤75 % RH (at 30 °C to 40 °C)		
	≤45 % RH (at 40 °C to 50 °C)		
Operating Altitude	2000 m		
Storage Altitude	12 000 m		
Ingress Protection (IP) Rating	IEC 60529: IP54 non-operating		
Electromagnetic Compatibility (EMC)			

International	IEC 61326-1: Portable, Electromagnetic Environment, IEC 61326-2-2 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.	
Korea (KCC)	Class A equipment (Industrial Broadcast & Communications Equipment)
	Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.
Safety	
General	IEC 61010-1, Pollution Degree 2
Measurement	IEC 61010-2-032: CAT III 1500 V / CAT IV 600 V
	IEC 61010-2-033: CAT III 1500 V / CAT IV 600 V
Wireless Radio	
Radio frequency certification	FCC ID: T68-FBLE, IC: 6627A-FBLE
Wireless Radio Frequency Range	2400 MHz to 2483.5 MHz
Output Power	<100 mW
SIMPLIFIED EU DECLARATION OF CONFORMITY	
Hereby, Fluke declares that the radio equipment contained in this Product is in compliance with Directive 2014/53/EU.	
The full text of the EU declaration is available at the following Internet address:	
www.fluke.com/en-us/declaration-of-conformity	

Specifications: Fluke Solar Irradiance Meter

Irradiance	
Measuring Range	0 to 1400 W/m²
Resolution	1 W/m²
Measuring Accuracy	± (5 % + 5 Digit)
Temperature Measurement	
Measuring range (°C)	-22 °F to 212 °F (-30 °C to 100 °C)
Resolution	0.2 °F (0.1 °C) / 1 °F @>100 °F
Measuring Accuracy	±2 °F (±1 °C) @ 14 °F to 167 °F (-10 °C to 75 °C), ±4 °F (±2 °C) @ -22 °F to 14 °F (-30 °C to -10 °C) and 167 °F to 212 °F (75 °C to 100 °C)
Note: Temperature measurement response time: ~30 sec.	
Inclination Angle	
Measuring Range	-90° to +90°
Resolution	0.1°
Measuring Accuracy	± 1.5°@ -50° to +50°, ±2.5° @ -85° to -50° and +50° to +85°, ±3.5° @ -90° to -85° and +85° to +90°
Compass	
Measuring Range	0° to 360°

Resolution	1°
Measuring Accuracy	±7°
Note: *a) Measurements valid for device inclination between -20° and +20° to horizontal. Outside that range on LCD will be shown "---".* *b) Result is referred to magnetic north.*	

Temperature	
Operating Temperature IRR1-SOL	-20 °C to 50 °C (humidity <80%), noncondensing
Operating Temperature 80PR-IRR	-30 °C to +100 °C
Storage Temperature	-30 °C to 60 °C (humidity <80%)
Altitude	0 m to max. 2000 m

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 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.
Korea (KCC)	Class A Equipment (Industrial Broadcasting & Communication Equipment)
	Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

Protection	
IP Protection	IP40

Power Supply & Battery Life	
Batteries	4 AA Alkaline Batteries
Battery Life (typical)	50 hours (≤9000 readings)
Auto Power Off	30 minutes

Dimensions	
L x W x H	5.90 x 3.14 x 1.37 in (150 x 80 x 35 mm)
Weight	0.5 lb (231 g)

Specifications: Pomona PVLEAD1 and PVLEAD3 MC4 Solar Clamp Test Lead Set

	PVLEAD1	PVLEAD3
	MC4 to 4mm Test Lead Set	MC4 Solar Clamp Meter Test Lead Set

Contact	Brass, Nickel Plated	Brass, Nickel Plated
Length	60”	36”, 12”
Voltage	CAT III 1000V,	CAT III 1000V,
	CAT IV 600V	CAT IV 600V
Current	20 amp	20 amp
Standards	IEC 61010-031	IEC 61010-031

Ordering information

FLK-393-IRR-PVLEAD

Includes:

- Fluke 393 FC CAT III 1500 V TRMS clamp meter
- Test leads, CAT III 1500 V rated, right angle plugs, with safety caps
- iFlex 18 inch flexible current probe
- TPAK magnetic hanging strap
- Premium carrying case
- 3-year warranty
- FLK-IRR1-SOL Solar Irradiance Meter
- FLK80PR-IRR External Temperature Probe with Suction Cup
- C250 Carrying Case with Shoulder Strap
- (4) AA Alkaline Batteries (installed)
- User Manual
- Pomona PVLEAD1 MC4 to 4 mm Test Lead Set
- Pomona PVLEAD3 MC4 Solar Clamp Test Lead Set

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