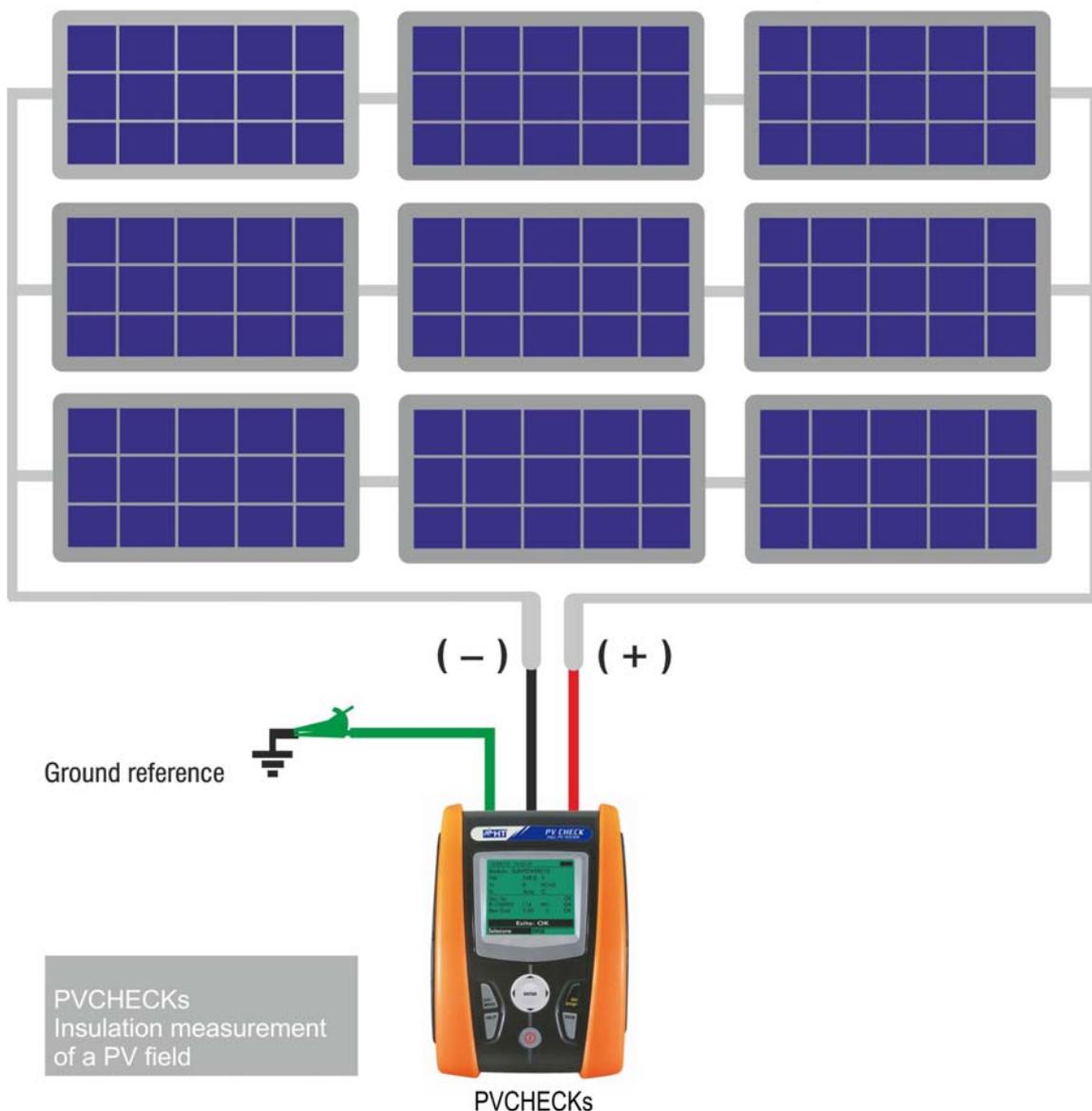


The multifunction instrument PVCHECKS performs prompt and safe electrical checks required for a PV system (DC section) and controls of the functionality of modules / strings in accordance with IEC/EN62446 guidelines.

PVCHECKS: safety checks

PVCHECKS verifies continuity of protective conductors (and associated connections) and measures insulation resistance of the active conductors on a module, a string, or a photovoltaic field in accordance with IEC/EN62446 guidelines, so avoiding to use any external switch to short-circuit positive and negative terminals.

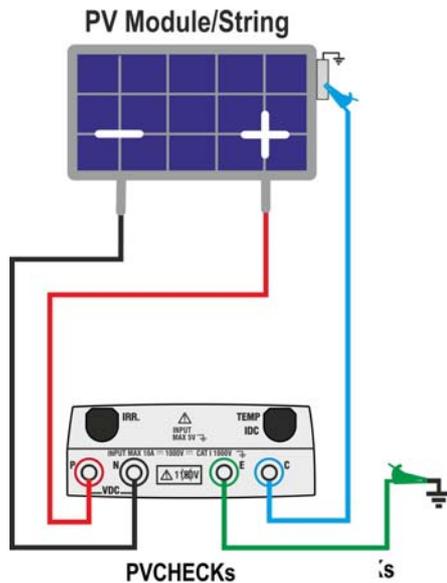
PV field not connected to ground



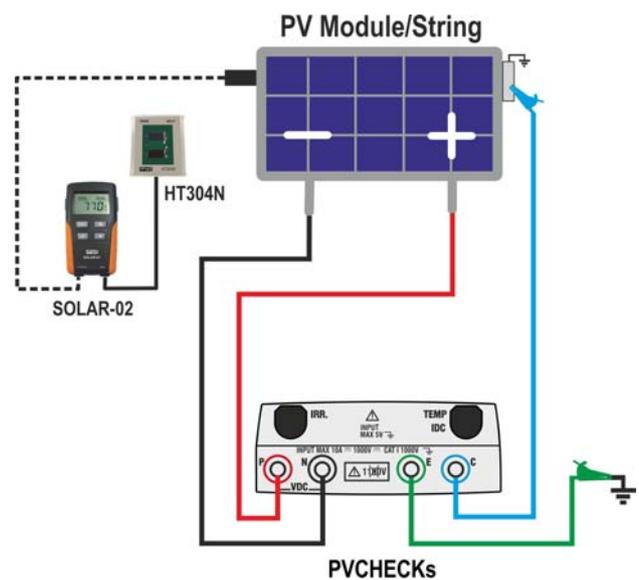
Direct measurement of insulation resistance on a PV Field not connected to ground

PVCHECKs: functionality checks

PVCHECKs verifies functionality of a PV string in accordance with the IEC/EN62446 guidelines by measuring open circuit voltage and short-circuit current under operating conditions **up to 15A** and extrapolating the results referred to the STC (by measuring the solar radiation). Finally, it displays measurements as well as comparison with the PV strings previously tested.



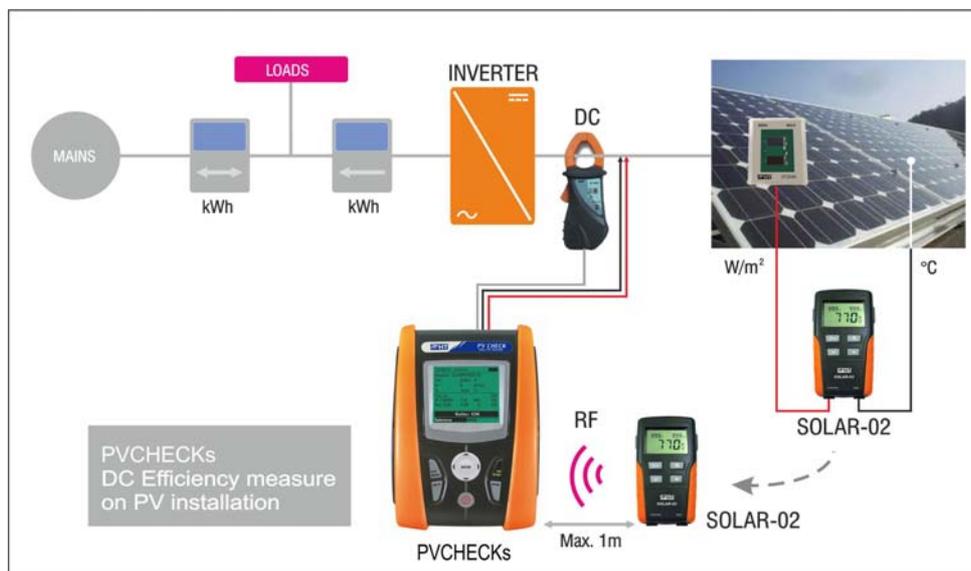
Test IVCK – Automatic measurement of Voc, Isc + Insulation + Continuity on a PV Module/String without irradiance measurement



Test IVCK – Automatic measurement of Voc, Isc + Insulation + Continuity on a PV Module/String with irradiance measurement with optional accessories SOLAR-02 and HT304N

PVCHECKs: performance checks

PVCHECKs analyses the performance of a PV array (DC) under the operating conditions (connected to the inverter) displaying the generated power and the efficiency of the PV plant in accordance with IEC/EN62446.



2. ELECTRICAL SPECIFICATIONS

Accuracy is calculated as \pm [% readings + (no. of digits) * resolution] at 23°C \pm 5°C, relative humidity <80%HR

2.1. PERFORMANCE TEST

DC Voltage

Range (V)	Resolution (V)	Uncertainty
5.0 ÷ 199.9	0.1	\pm (1.0%rdg + 2dgt)
200.0 ÷ 999.9	0.5	

DC current (by mean external clamp)

Range (mV)	Resolution (mV)	Uncertainty
-1100 ÷ -5	0.1	\pm (0.5%rdg + 0.6mV)
5 ÷ 1100		

DC current is always positive ;DC current zeroed if the related voltage value is < 5mV

FS DC clamp [A]	Resolution [A]	Minimum read value [A]
1 < FS \leq 10	0.001	0.05
10 < FS \leq 100	0.01	0.5
100 < FS \leq 1000	0.1	5

DC Power (Vmeas > 150V)

Clamp FS (A)	Range (W)	Resolution (W)	Uncertainty
1 < FS \leq 10	0.000k ÷ 9.999k	0.001k	\pm (1.5%rdg + 3dgt) (Imeas < 10%FS)
10 < FS \leq 100	0.00k ÷ 99.99k	0.01k	
100 < FS \leq 1000	0.0k ÷ 999.9k	0.1k	\pm (1.5%rdg) (Imeas \geq 10%FS)

Irradiance (by mean HT304N)

Range (mV)	Resolution (mV)	Uncertainty
1 ÷ 40.0	0.02	\pm (1.0%rdg + 0.1mV)

Temperature (by mean PT300N)

Range (°C)	Resolution (°C)	Uncertainty
-20.0 ÷ 100.0	0.1	\pm (1.0%rdg + 1°C)



2.2. FUNCTIONALITY TEST

DC Voltage @ OPC

Range (V)	Resolution (V)	Uncertainty
5.0 ÷ 199.9	0.1	±(1.0%rdg+2dgt)
200 ÷ 999	1	

Minimum VPN voltage to start the test: 15V

DC Current @ OPC

Range (A)	Resolution (A)	Uncertainty
0.10 ÷ 15.00	0.01	±(1.0%rdg+2dgt)

DC Voltage @ STC

Range (V)	Resolution (V)	Uncertainty
5.0 ÷ 199.9	0.1	±(4.0%rdg+2dgt)
200 ÷ 999	1	

DC Current @ STC

Range (A)	Resolution (A)	Uncertainty
0.10 ÷ 15.00	0.01	±(4.0%rdg+2dgt)

Irradiance (by mean HT304N)

Range (mV)	Resolution (mV)	Uncertainty
1 ÷ 40.0	0.02	±(1.0%rdg + 0.1mV)

Temperature (by mean PT300N)

Range (°C)	Resolution (°C)	Uncertainty
-20.0 ÷ 100.0	0.1	± (1.0%rdg +1°C)

2.3. SAFETY TEST

Continuity Test (LOW Ω)

Range [Ω]	Resolution [Ω]	Uncertainty
0.00 ÷ 1.99	0.01	$\pm(2.0\%rdg + 2dgt)$
2.0 ÷ 19.9	0.1	
20 ÷ 199	1	

Test current >200mA DC up to 2 Ω (test leads included), Resolution 1mA, Uncertainty $\pm(5.0\%rdg + 5dgt)$
 Open loop voltage $4 < V_o < 10V$

Insulation Test (M Ω) – Mode TIMER

Test voltage [V]	Range [M Ω]	Resolution [M Ω]	Uncertainty
250, 500, 1000	0.01 ÷ 1.99	0.01	$\pm(5.0\%rdg + 5dgt)$
	2.0 ÷ 19.9	0.1	
	20 ÷ 199	1	

Open voltage: < 1.25 * nominal test voltage
 Short circuit current: <15mA (peak) for all test voltages
 Generated voltage: Resolution 1V, uncertainty $\pm(5.0\%rdg + 5dgt)$ @ Rmis > 0.5% FS
 Test current: > 1mA with load = 1k Ω x Vnom

Insulation Test (M Ω) – Mode FIELD (*), STRING (**)

Test voltage [V]	Range [M Ω]	Resolution [M Ω]	Uncertainty (***)
250	0.1 ÷ 1.9	0.1	$\pm(20.0\%rdg + 5dgt)$
	2 ÷ 99	1	
500	0.1 ÷ 1.9	0.1	
	2 ÷ 99	1	
1000	0.1 ÷ 1.9	0.1	
	2 ÷ 99	1	

(*) For FIELD mode: if VPN >1V the minimum voltage VEP and VEN for the calculation of Ri(+) and Ri(-) is 1V
 (**) For STRING mode: minimum VPN voltage to start the test: 15V
 Open voltage: <1.25 x nominal test voltage
 Short circuit current: < 15mA (peak) for each test voltage
 Generated voltage: resolution 1V, accuracy $\pm(5.0\%rdg + 5dgt)$ @ Rmis > 0.5% FS
 Rated current measured: > 1mA with 1k Ω @ Vnom

(***) For FIELD mode: add 5 dgts to the accuracy if
$$\frac{\max\{R^+, R^-\}}{\min\{R^+, R^-\}} \geq 100$$



3. GENERAL SPECIFICATIONS

DISPLAY AND MEMORY:

Features: 128x128pxl custom LCD with backlight
Memory: max 999 test

POWER SUPPLY:

PVCHECK internal power supply: 6x1.5V alkaline batteries type LR6, AA, AM3, MN 1500
Battery life: approx. 120 hours (DC efficiency test)
SOLAR-02 power supply: 4x1.5V alkaline batteries type AAA LR03
SOLAR-02 max recording time (@ IP=5s): approx. 1.5h

OUTPUT INTERFACE

PC communication port: optical/USB
Interface with SOLAR-02: wireless RF communication (max distance 1m)

MECHANICAL FEATURES

Size (L x W x H): 235 x 165 x 75mm
Weight (batteries included): 1.2kg

ENVIRONMENTAL CONDITIONS:

Reference temperature: 23°C ± 5°C
Working temperature: 0° ÷ 40°C
Working humidity: <80%HR
Storage temperature (remove the batteries): -10 ÷ 60°C
Storage humidity: <80%HR

GENERAL REFERENCE STANDARDS:

Safety: IEC/EN61010-1
EMC: IEC/EN61326-1
Safety of measurement accessories: IEC/EN61010-031
Measurements: IEC/EN62446 (PV performance, IVCK)
IEC/EN 61557-1, 2, -4 (LOW Ω , M Ω)
Insulation: double insulation
Pollution degree: 2
Overvoltage category: CAT III 300V to ground
Max 1000V DC among inputs P, N, E, C
Max height of use: 2000m

This instrument complies with the requirements of the European Low Voltage Directives 2006/95/EC (LVD) and EMC 2004/108/EC

This instrument satisfies the requirements of 2011/65/EU (RoHS) directive and 2012/19/EU (WEEE) directive