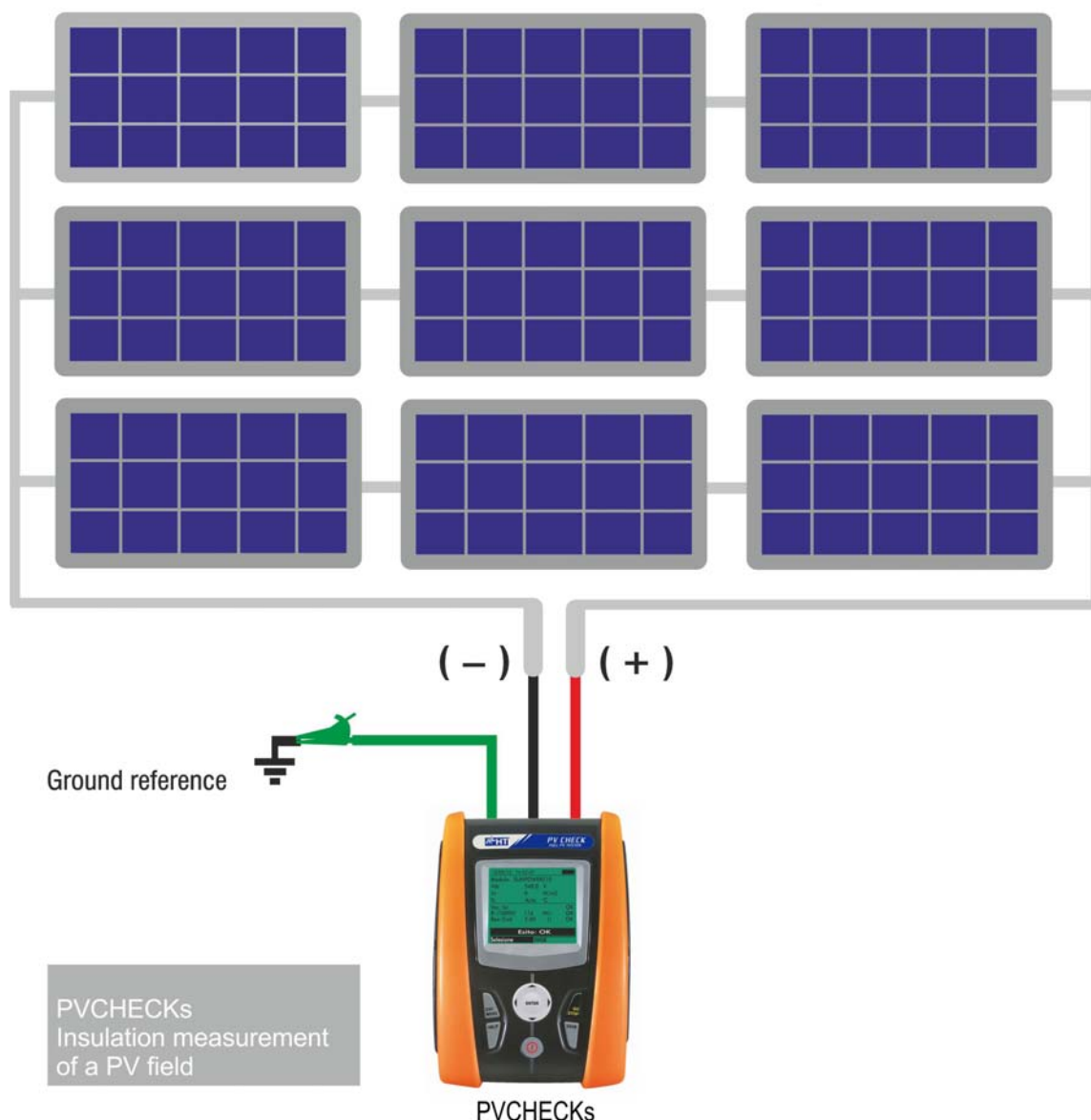


The multifunction instrument PVCHECKs performs prompt and safe electrical checks required for a PV system (DC section) and controls of the functionality of modules / strings in accordance with IEC/EN62446 guidelines.

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.

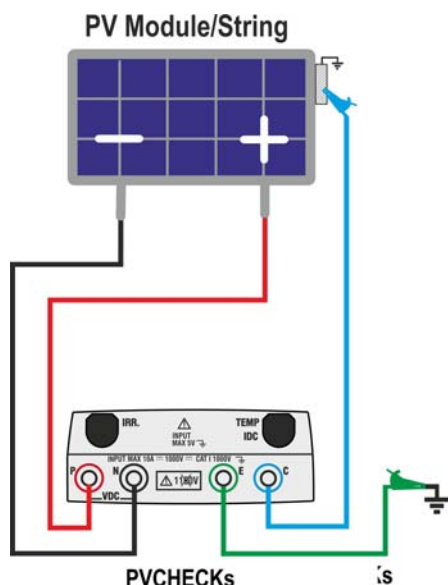
PV field not connected to ground



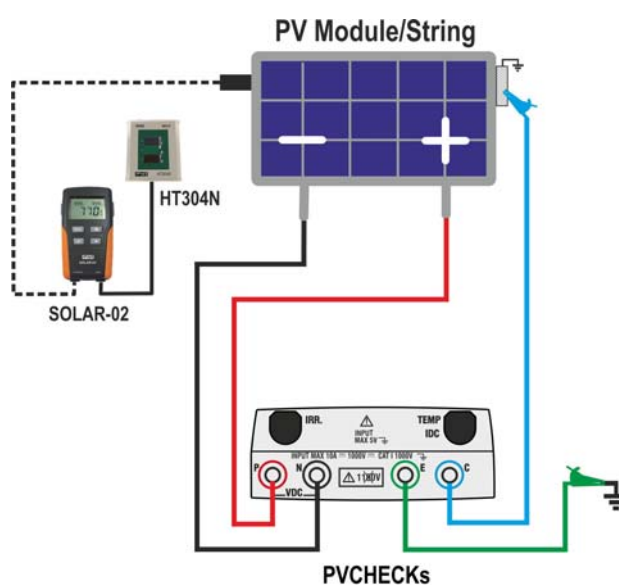
Direct measurement of insulation resistance on a PV Field not connected to ground

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.



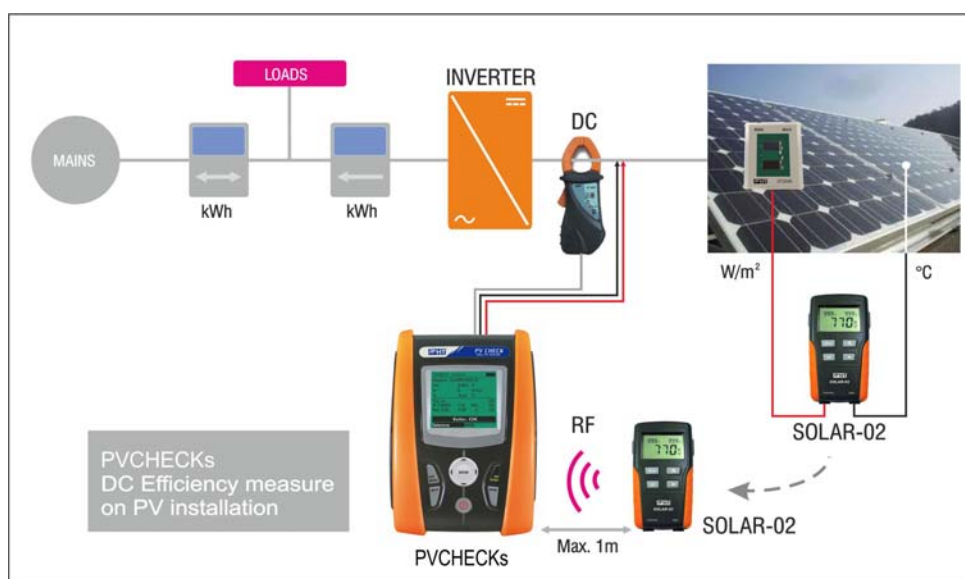
Test IVCK – Automatic measurement of Voc, Isc + Insulation + Continuity on a PV Module/String without irradiance measurement



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 $\pm [\% \text{ readings} + (\text{no. of digits}) * \text{resolution}]$ at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, relative humidity $<80\% \text{HR}$

2.1. PERFORMANCE TEST

DC Voltage

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

DC current (by mean external clamp)

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

DC current is always positive ;DC current zeroed if the related voltage value is $< 5 \text{mV}$

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

DC Power ($V_{\text{meas}} > 150 \text{V}$)

Clamp FS (A)	Range (W)	Resolution (W)	Uncertainty
$1 < \text{FS} \leq 10$	$0.000 \text{k} \div 9.999 \text{k}$	0.001k	$\pm (1.5\% \text{rdg} + 3 \text{dgt})$ $(I_{\text{meas}} < 10\% \text{FS})$ $\pm (1.5\% \text{rdg})$ $(I_{\text{meas}} \geq 10\% \text{FS})$
$10 < \text{FS} \leq 100$	$0.00 \text{k} \div 99.99 \text{k}$	0.01k	
$100 < \text{FS} \leq 1000$	$0.0 \text{k} \div 999.9 \text{k}$	0.1k	

Irradiance (by mean HT304N)

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

Temperature (by mean PT300N)

Range ($^{\circ}\text{C}$)	Resolution ($^{\circ}\text{C}$)	Uncertainty
-20.0 ÷ 100.0	0.1	$\pm (1.0\% \text{rdg} + 1^{\circ}\text{C})$

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 VPV 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: $< 1.25 \times \text{nominal test voltage}$

Short circuit current: $< 15mA$ (peak) for all test voltages

Generated voltage: Resolution 1V, uncertainty $\pm(5.0\%rdg + 5dgt)$ @ $R_{mis} > 0.5\% FS$

Test current: $> 1mA$ with load = $1k\Omega \times V_{nom}$

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: $< 1.25 \times \text{nominal test voltage}$

Short circuit current: $< 15mA$ (peak) for each test voltage

Generated voltage: resolution 1V, accuracy $\pm(5.0\%reading + 5digits)$ @ $R_{mis} > 0.5\% FS$

Rated current measured: $> 1mA$ with $1k\Omega$ @ V_{nom}

(***) 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: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
Working temperature: $0^{\circ} \div 40^{\circ}\text{C}$
Working humidity: <80%HR
Storage temperature (remove the batteries): $-10 \div 60^{\circ}\text{C}$
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