SOLAR I-V
MULTIFUNCTION INSTRUMENT FOR TESTING AND VERYFYING SINGLE-PHASE PHOTOVOLTAIC INSTALLATIONS

SOLAR I-V has been designed to meet any requirement of photovoltaic installation specialists. Further to providing the possibility of measuring and recording the efficiency of single-string and single-phase photovoltaic systems, SOLAR I-V also measures the I-V characteristic both of a single module and of module strings.Thanks to SOLAR I-V, the operator can test the photovoltaic system and, should it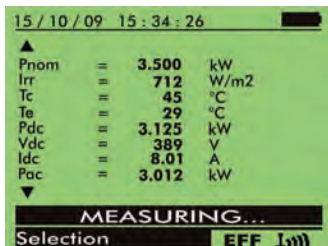 give a negative result, immediately identify the problems of the system in order to promptly solve them. SOLAR I-V is provided with the remote unit SOLAR-02 which permits the remote measuring of irradiation and temperature with preliminary automatic synchronization between main unit and remote unit. SOLAR-02 is positioned next to the photovoltaic modules and it is connected to the probes for measuring environmental parameters. The synchronization between the two units guarantees the necessary contemporaneity of measurements. In the case of PV efficiency recordings, this grants the right efficiency calculation. For I-V curve measurements, the synchronization permits to extrapolate the I-V curve at STC without using long extension cords cable. SOLAR I-V allows carrying out efficiency recordings over time with programmable integration period from 5 seconds to 60 minutes. Each value is automatically saved in the internal memory and can be downloaded onto the PC for subsequent analyses. The measured I-V characteristic is not affected by the resistance of the measurement cables, as the measurement is carried out with the 4-terminal measuring method. SOLAR I-V also manages a database of photovoltaic modules, which can be updated at any time. The measured values, correctly reported at standard test conditions, are immediately compared with the values declared by the manufacturer to give the OK / NO result of the test. The operator must not do any calculation, the instrument carries out the comparison rapidly and automatically. The instrument can be interfaced with accessory MPP 300, which extends the characteristics of SOLAR I-V by enabling recordings on single-phase and three-phase, single-string and multi-string (up to three strings), single-inverter and multi-inverter photovoltaic systems (therefore also in three-phase systems provided with three single-phase inverters).

FUNCTIONS

Photovoltaic installation testing

Measurement of DC/AC TRMS voltage and current

Measurement of DC/AC powers on single-phase systems

Measurement of solar irradiation [W/m^2] with reference cell

Measurement of environmental and module temperature by means of external probe

Synchronization with remote unit SOLAR-02

Display of real-time irradiation and temperature

Use of PDC compensation ratios according to environmental and module temperature

Three-phase up to three strings PV systems (with MPP300)

Recording of parameters with programmable IP (5s – 60min)

I-V characteristic measurement

Meas. of output voltage from module/string up to 1000V DC

Meas. of output current from module/string up to 10A DC

Measurement of solar irradiation [W/m^2] with reference cell

Measurement of module temperature, automatic or by means of external probe

Meas. of output DC and nominal power from module/string

Synchronization with remote unit SOLAR-02

Numerical and graphical display of I-V characteristic

Measurement of the resistance of photovoltaic module series

Mechanical inclinometer for the detection of the incidence angle of solar irradiation

4-terminal measuring method

Extrapolation to standard test conditions (STC)

Evaluation of testing result: OK / NO

Management of up to 30 types of photovoltaic modules in the internal database

Common characteristics

Internal memory for data saving

Recalling results on the display

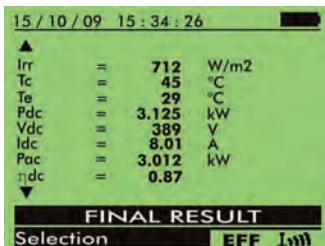Optical/USB port for PC connection

Help on line on the display

GENERAL CHARACTERISTICS

Display:	LCD custom, 128x128pxl, backlit
Power supply:	6x1.5V alkaline bat. type AA LR06
Auto power off:	after 5 minutes in stand-by
PV testing duration:	1.5 hours (@IP=5s); 8 days (@IP=10min)
Curves which can be saved:	> 200 curves
PC interface:	optoisolated optical/USB port
Safety:	IEC/EN61010-1
Measuring accessory safety:	IEC/EN61010-031, IEC/EN61010-032
Measures on PV modules:	IEC/EN60891
Insulation	double insulation
Pollution degree:	2
Measurement category:	CAT II 1000V DC, CAT III 300V (to earth) Max 1000V between inputs
Dimensions:	235x165x75mm
Weight (batteries included):	1.3kg

ACCESSORIES

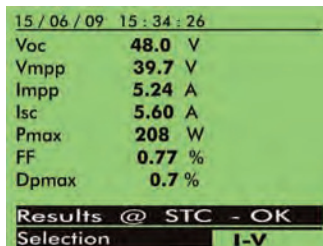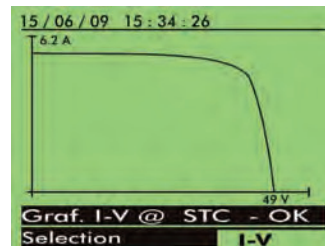| ACCESSORIES	Code
Standard	
Series accessories	
Remote unit to record irradiation and temperature	SOLAR-02
Kit of 4 cables with 4mm banana plugs + 4 alligator clips	KITGSC4
Kit of 2 adapters with MC3 compatible connectors	KITPVMC3
Kit of 2 adapters with MC4 compatible connectors	KITPVMC4
Transducer for AC 0÷200A, diameter 40mm	HT4005K
Transducer for AC/DC currents 0÷10 - 0÷100A, diameter 32mm	HT4004N
Reference cell for irradiation measurement	HT304
Probe PT1000 for environmental and module temperature	PT300N
Mechanical inclinometer	M304
Windows software + optical/USB cable C2006	TOPVIEW2006
Transport bag	BORSA2051
User manual on CD-ROM	
Calibration certificate ISO9000	
Rapid user guide	
Opzional	
Multi-string three-phase adaptor	MPP300
Unbatteried transducer for AC/DC currents 0÷10A, 0÷100A, max. diameter 32mm*	HT4004P
Transducer for AC currents 0÷5 - 0÷100 A, diameter 20mm	HT4005N
Rigid clamp AC 1-100-1000A/1V, diameter 54mm	HT96U
Rigid clamp AC 10-100-1000A/1V, diameter 54mm	HT97U
Rigid clamp DC 1000A/1V, diameter 50mm	HT98U
Kit of belts for slinging the instrument over one's shoulder	SP-0400
KIt of 2 cables banana 4mm, green/black, 25m	KITPVEXT25M
Rigid transport suitcase	VA400
Connector with magnetic tip	606-IECN

(*) to be used with MPP 300 only

15 / 10 / 09 15 : 34 : 26		
Pnom	= 3.500	kW
Irr	= 712	W/m2
Tc	= 45	°C
Te	= 29	°C
Pdc	= 3.125	kW
Vdc	= 389	V
Idc	= 8.01	A
Pac	= 3.012	kW

MEASURING...

| Selection | | EFF I.ıll |

Testing / Recording in progress

15 / 10 / 09 15 : 34 : 26		
Irr	= 712	W/m2
Tc	= 45	°C
Te	= 29	°C
Pdc	= 3.125	kW
Vdc	= 389	V
Idc	= 8.01	A
Pac	= 3.012	kW
ηdc	= 0.87	

FINAL RESULT

| Selection | | EFF I.ıll |

Testing result of photovoltaic system

15 / 06 / 09 15 : 34 : 26		
Voc	48.0	V
Vmpp	39.7	V
Impp	5.24	A
Isc	5.60	A
Pmax	208	W
FF	0.77	%
Dpmax	0.7	%

Results @ STC - OK

| Selection | | I-V |

Numerical display of results with OK result

15 / 06 / 09   15 : 34 : 26
6.2 A

49 V

Graf. I-V @ STC - OK

| Selection | | I-V |

Graphical display of an I-V curve with OK result

Direct measurement of I-V curve on a string of PV modules

SOLAR I-V

SOLAR-02

INVERTER

Detection of I-V curve on a string of PV modules with remote irradiance/temperature measurements

SOLAR I-V

Connection scheme (single-phase plant)

NEW
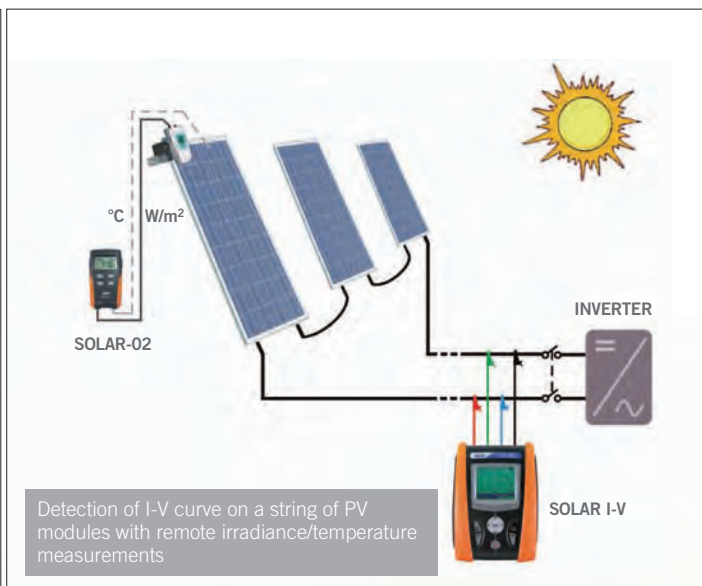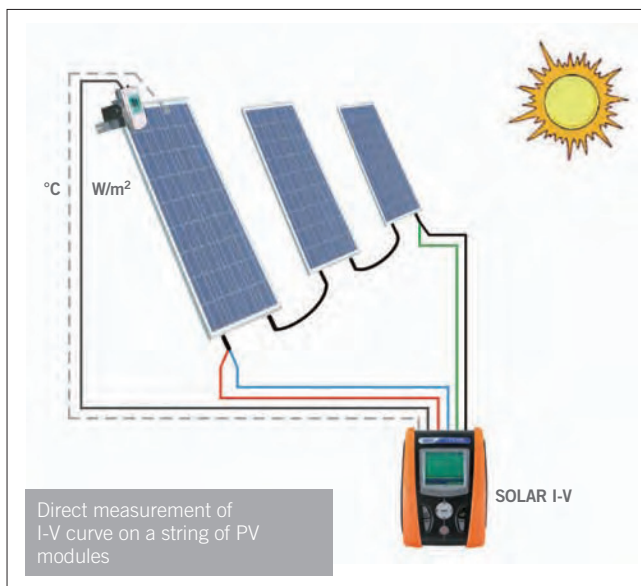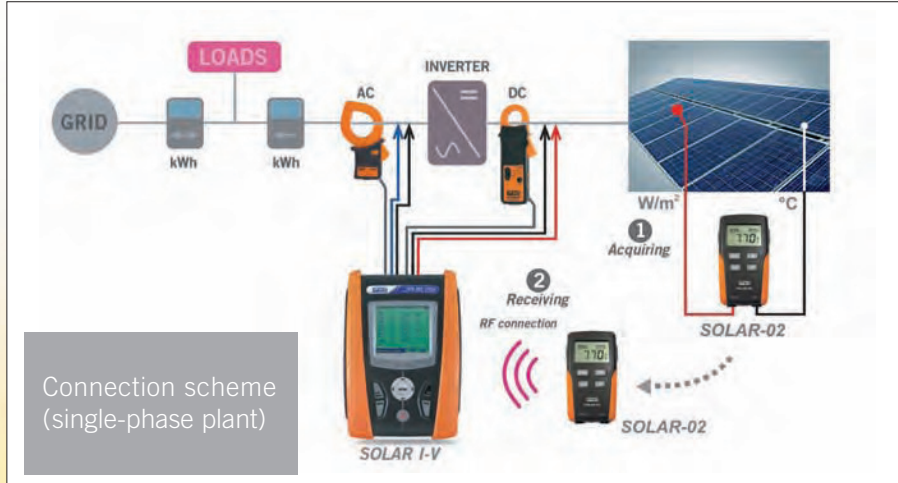
Some standard accessories

| HT4004N | HT4005K | SOLAR-02 | HT304 | M304 |

SOLAR I-V
HV0000IV