

1. SOLAR I-Vw MAIN FEATURES

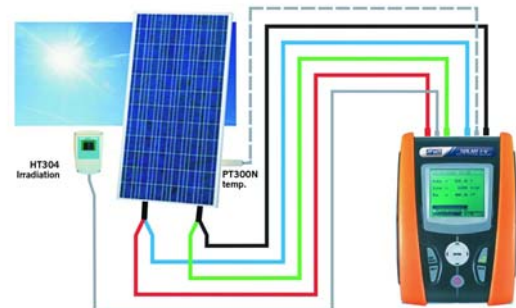


SOLAR I-Vw: use as PV certifier

SOLAR I-Vw performs all tests on Single phase PV plants by using SOLAR-02 remote unit which, after a preliminary synchronisation, saves independently the values of irradiance and temperature. Only at the end of testing the remote unit should be connected via wireless RF with the master to download the recorded data. **The saved data can be downloaded to PC also through WiFi connection**

SOLAR I-Vw: use as I-V curve checker

SOLAR I-Vw allows on field measurement of I-V curve as well as of main parameters of a single module and strings in a photovoltaic system **up to a maximum of 1000V and 15A**



SOLAR-02 remote unit permits also to display the irradiance and temperature values independently (ideal solution during a pre-test on installations) besides test/recording through SOLAR I-Vw

HT304N reference cell permits to perform solar irradiance measurements both on PV modules in Monocrystalline and Polycrystalline silicon material





2. ELECTRICAL SPECIFICATIONS

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

2.1. CERTIFIER OF SINGLE PHASE PV INSTALLATION

DC Voltage

| Range (V) | Resolution (V) | Accuracy |
|--------------|----------------|------------------------|
| 15.0 ÷ 999.9 | 0.1 | \pm (0.5%rdg + 2dgt) |

AC TRMS Voltage

| Range (V) | Resolution (V) | Accuracy |
|--------------|----------------|------------------------|
| 50.0 ÷ 265.0 | 0.1 | \pm (0.5%rdg + 2dgt) |

Max crest factor: 1.5

DC Current (by external transducer clamp)

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

The value of current is ALWAYS displayed with positive sign ; The value of current transduced in voltage less then 5mV is zeroed

AC TRMS Current (by external transducer clamp)

| Range (mA) | Resolution (mA) | Frequency (Hz) | Accuracy |
|------------|-----------------|----------------|-------------------------|
| 1 ÷ 1200 | 0.1 | 47.5 ÷ 63.0 | \pm (0.5%rdg + 0.6mV) |

Max crest factor: 2.0 ; The value of current transduced in voltage less then 5mV is zeroed

| FS DC & AC clamp (A) | Resolution (A) | Minimum read value (A) | |
|----------------------|----------------|------------------------|------|
| | | DC | AC |
| 1 < FS \leq 10 | 0.001 | 0.05 | 0.01 |
| 10 < FS \leq 100 | 0.01 | 0.5 | 0.1 |
| 100 < FS \leq 1000 | 0.1 | 5A | 1 |

DC Power (Vmeas > 150V)

| FS clamp (A) | Range (W) | Resolution (W) | Accuracy |
|----------------------|-----------------|----------------|---|
| 1 < FS \leq 10 | 0.000k ÷ 9.999k | 0.001k | \pm (0.7%rdg+3dgt) (I _{meas} < 10%FS) |
| | 10.00k ÷ 99.99k | 0.01k | |
| 10 < FS \leq 100 | 0.000k ÷ 9.999k | 0.001k | \pm 0.7%rdg (I _{meas} \geq 10%FS) |
| | 10.00k ÷ 99.99k | 0.01k | |
| 100 < FS \leq 1000 | 0.00k ÷ 99.99k | 0.01k | |
| | 100.0k ÷ 999.9k | 0.1k | |

V_{meas} = voltage correspondent to measured power

AC Single phase power (@ PF = 1, Vmeas > 200V)

| FS clamp (A) | Range (W) | Resolution (W) | Accuracy |
|----------------------|-----------------|----------------|---|
| 1 < FS \leq 10 | 0.000k ÷ 9.999k | 0.001k | \pm (0.7%rdg+3dgt) (I _{meas} < 10%FS) |
| | 10.00k ÷ 99.99k | 0.01k | |
| 10 < FS \leq 100 | 0.000k ÷ 9.999k | 0.001k | \pm 0.7%rdg (I _{meas} \geq 10%FS) |
| | 10.00k ÷ 99.99k | 0.01k | |
| 100 < FS \leq 1000 | 0.00k ÷ 99.99k | 0.01k | |
| | 100.0k ÷ 999.9k | 0.1k | |

V_{meas} = voltage correspondent to measured power



Frequency

| Range (Hz) | Resolution (Hz) | Accuracy |
|---------------|-----------------|----------------------|
| 47.5 ÷ 63.0Hz | 0.1 | $\pm(0.2\%rdg+1dgt)$ |

Irradiance (by reference cell)

| Range (mV) | Resolution (mV) | Accuracy |
|-------------|-----------------|------------------------|
| 1.0 ÷ 100.0 | 0.1 | $\pm(1.0\%rdg + 5dgt)$ |

Temperature (by external probe PT1000)

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

**2.2. I-V CURVE and IVCK MEASUREMENTS****VDC Voltage @ OPC**

| Range (V) (***) | Resolution (V) | Accuracy |
|-----------------|----------------|-----------------|
| 5.0 ÷ 999.9 | 0.1 | ±(1.0%rdg+2dgt) |

(***) The I-V curve and Rs measurements start for VDC > 15V and the accuracy is defined for VDC > 20V

IDC Current @ OPC

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

Max Power @ OPC (Vmpp >30V, Impp >2A)

| Range (W) (*, **) | Resolution (W) | Accuracy |
|-------------------|----------------|-----------------|
| 50 ÷ 9999 | 1 | ±(1.0%rdg+6dgt) |

Vmpp = Maximum power voltage, Impp = Maximum Power Current

(*) Max measurable value of Power must include FF value (~ 0.7) → Pmax = 1000V x 10A x 0.7 = 7000W

(**) Test is stopped and the message "Thermal instability" occurs if the instrument detects Voltage > 700V and Current I > 3A, I > -0.038V + 37.24 - 0.5

VDC Voltage (@ STC and OPC), IVCK

| Range (V) (***) | Resolution (V) | Accuracy (*, **) |
|-----------------|----------------|------------------|
| 5.0 ÷ 999.9 | 0.1 | ±(4.0%rdg+2dgt) |

IDC Current (@ STC and OPC), IVCK

| Range (A) | Resolution (A) | Accuracy (**) |
|--------------|----------------|-----------------|
| 0.10 ÷ 15.00 | 0.01 | ±(4.0%rdg+2dgt) |

Max Power @ STC (Vmpp >30V, Impp >2A)

| Range (W) (*, **) | Resolution (W) | Global accuracy (**) |
|-------------------|----------------|----------------------|
| 50 ÷ 9999 | 1 | ±(5.0%rdg+1dgt) |

Vmpp = Maximum power voltage, Impp = Maximum Power Current

(*) Measurements start for VDC > 15V and the accuracy is defined for VDC > 20V

(**) Test conditions:

- > Test cond.: Steady Irrad. ≥ 700W/m², spectrum AM 1.5, solar incidence vs perpendicular. ≤ ± 25°, Cells Temp. [15..65°C]
- > Global accuracy include contribute of solar sensor and its measuring circuit

Irradiance (with reference cell)

| Range (mV) | Resolution (mV) | Accuracy |
|-------------|-----------------|-----------------|
| 1.0 ÷ 100.0 | 0.1 | ±(1.0%rdg+5dgt) |

Temperature of module (with auxiliary PT1000 probe)

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



3. GENERAL SPECIFICATIONS

DISPLAY AND MEMORY:

| | |
|------------------|---|
| Features: | 128x128pxl custom LCD with backlight |
| Memory capacity: | 256kbytes |
| Saved data: | max 99 yield test ; 249 curves (I-V curve test), 999 IVCK |

POWER SUPPLY:

| | |
|--|--|
| SOLAR I-Vw internal power supply: | 6x1.5V alkaline batteries type LR6, AA, AM3, MN 1500 |
| Autonomy of SOLAR I-Vw: | > 249 curve (I-V curve test), 999 IVCK test approx 120 hours (yield 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 and WiFi |
| Interface with SOLAR-02 : | wireless RF communication (max distance 1m) |

MECHANICAL FEATURES

| | |
|------------------------------|------------------|
| Dimensions (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 (batt. not included): | -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 |
| I-V curve measurement: | IEC/EN60891 (I-V curve test) IEC/EN60904-5 (Temperature measurement) |
| Insulation: | double insulation |
| Pollution degree: | 2 |
| Overvoltage category: | CAT II 1000V DC, CAT III 300V AC to ground Max 1000V among inputs P1, P2, C1, c2 |
| Max altitude 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