Photovoltaic meter

PVM-1021

PVM-1021 Pro | index: WMGBPVM1021PRO
PVM-1021 | index: WMGBPVM1021

PVM-1021 IP54 CAT III 1000 V LoRa BLUETOOTH

IRM-1 IP65 LoRa LI-ION BATTERY

PVM-1021

reSYNC

automatic synchronization of STC parameters

Compact meter for photovoltaic systems up to 1000 V

Features

PVM-1021

- **It can be used for category 1 measurements according to EN 62446-1.**
- **AUTO mode for performing a sequence of measurements after one press of the START button.**
- **It converts measured parameters into STC conditions according to EN IEC 60891 by cooperation with the IRM-1 solar radiation and temperature meter.**
- **reSYNC function** – automatic completion of results with environmental parameters and their conversion to STC conditions after restoring connection with IRM-1.
- The built-in LoRa radio interface ensures cooperation with the IRM-1 meter over long distances.
- Built-in Bluetooth module for communication with a computer.
- Large measurement memory: 100 objects with 40 cells each.
- Backlit display and buttons.

IRM-1

- Measurement of solar radiation and temperature.
- The LoRa interface for communication with a master meter – offers a larger range than the Bluetooth technology!
- Automatic data synchronization with a master meter with reSYNC function.
- Built-in compass and inclination sensor.
- Built-in recorder that can be used to record solar radiation before constructing PV systems, as well as to measure the shading of existing systems.
- Large measurement memory: 999 cache memory cells and 5000 recorder records available (one-time recording) with the option of overwriting them (continuous recording).

Measured parameters

PVM-1021

- The open circuit voltage of the PV panel or a chain of panels, up to 1000V DC.
- RMS voltage of the AC network up to 600 V with frequency measurement.
- Short circuit current of a PV panel or chain of panels - up to 20 A DC.
- Insulation resistance of PV panels - measuring voltage of 250, 500 or 1000 V, simultaneous measurement of two values: R_{ISO+} and R_{ISO-}.
- Insulation resistance of AC circuits - measuring voltage 250, 500 or 1000 V.
- Resistance of protective conductors and equipotential bonding with ± 200 mA current. Low-current resistance measurement, audible and visual signalling.
- Measurement of PV panels operating current and AC current - all with external clamp.
- AC/DC power Measurement.
- Diode test with 200 mA current, automatic polarity detection. Test of blocking diodes with 1000V DC voltage.

IRM-1

- Solar radiation intensity (irradiance) in W/m^2 or BTU/ft^2h.
- PV panel temperature in °C or °F.
- Ambient temperature in °C or °F.
- Inclination angle of panels
- Orientation of the panels with the built-in compass.

PVM-1021: great capabilities in a small casing

The PVM-1021 is a compact photovoltaic system meter with a substantial number of measurement functions. The functions are selected with a rotary switch. Additional parameters are set with buttons located on the housing. All buttons and the graphic display are backlit, which greatly facilitates operation in shaded places, e.g. when taking measurements under ground-mounted PV systems. Large memory significantly shortens preparation of documents after the measurement.

IRM-1: simple and compact

IRM-1, small, but indispensable for testing PV systems. By measuring solar radiation values, as well as panel and ambient temperatures, it provides the necessary data to convert the results into STC conditions. A built-in recorder with a memory of 5000 records enables the instrument to be used as a tool in the PV plant design process, as well as to diagnose panel shading problems.

Tightness and durability

Light meters perform well in harsh environmental conditions. Protection against the ingress of dust and water is provided by the housing rated at **IP54** (PVM-1021) and **IP65** (IRM-1). This is especially important for measurements on photovoltaic systems, which are outdoor installations.

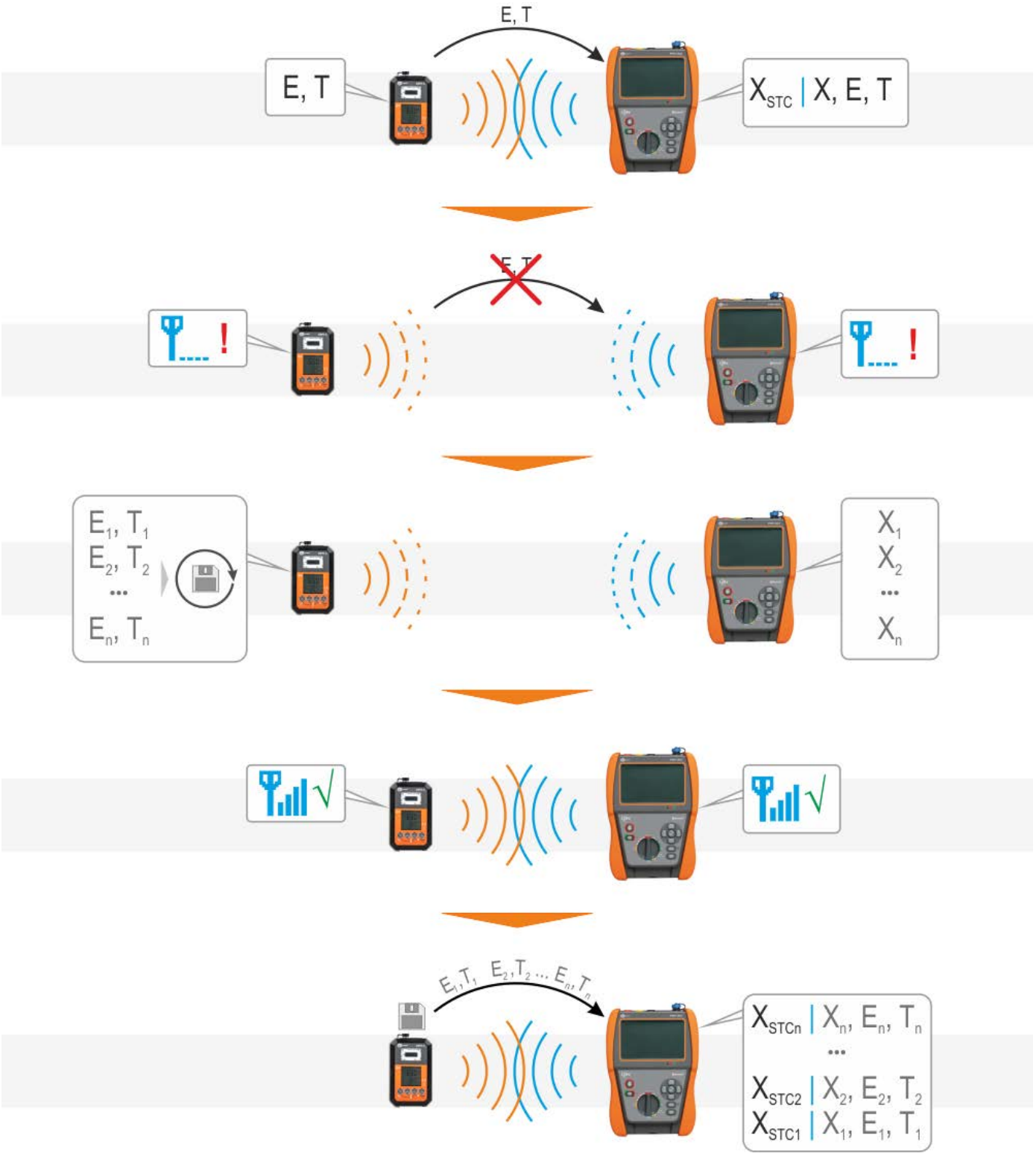
Communication and software

Measurement data from the IRM-1 can be transferred to a computer via the USB port. In addition, the device has a built-in wireless **LoRa interface** (Long Range) for automatic data exchange with the master meter – even over long distances.

Measurement data from the PVM-1021 can be transferred to a computer via Bluetooth wireless communication. Saving the downloaded data to popular formats and printing ensured by **Sonel Reader**. In order to generate a report on electric shock protection use the optional software: **Sonel Reports PLUS**.

PVM-1021: trouble? reSYNC!

It may happen that in the course of measurements the master meter moves away from the IRM-1 so far, that communication between them is lost. If the measurements are continued, then after the connection is restored, the results will be automatically **supplemented with environmental parameters**, which in the meantime were recorded by the IRM-1 in its **temporary memory**, and converted into STC conditions.



Specifications

Parameter	Measurement range	Display range	Resolution	Accuracy ±(% m.v. + digits)
Voltage				
AC voltage	0.0 V...600.0 V	0.0 V...600.0 V	0.1 V	±(2% m.v. + 2 digits)
DC voltage	0.0 V...1000.0 V	0.0 V...1000.0 V	0.1 V	±(0.5% m.v. + 2 digits)
Short circuit current I_{sc}	0.00...20.00 A	0.00...20.00 A	0.01 A	±(1% m.v. + 2 digits)
Insulation resistance				
Insulation resistance at AC side				
Measuring voltage 250 V	250.0 kΩ...2.000 GΩ acc. to EN IEC 61557-2	0.0 kΩ...2.000 GΩ	from 0.1 kΩ	±(3% m.v. + 8 digits)
Measuring voltage 500 V	250.0 kΩ...5.000 GΩ acc. to EN IEC 61557-2	0.0 kΩ...5.000 GΩ	from 0.1 kΩ	from ±(3% m.v. + 8 digits)
Measuring voltage 1000 V	500.0 kΩ...9.999 GΩ acc. to EN IEC 61557-2	0.0 kΩ...9.999 GΩ	from 0.1 kΩ	from ±(3% m.v. + 8 digits)
Insulation resistance at DC side				
Measuring voltage 250 V / 500 V / 1000 V	250.0 kΩ...300.0 MΩ acc. to EN IEC 61557-2	0.0 kΩ...300.0 MΩ	from 0.1 kΩ	±(8% m.v. + 8 digits)
Resistance of protective conductors and equipotential bondings				
Measurement of resistance of protective conductors and equipotential bondings with ±200 mA current	0.11 Ω...1999 Ω acc. to EN IEC 61557-4	0.00 Ω...1999 Ω	from 0.01 Ω	from ±(2% m.v. + 3 digits)
Measurement of resistance with low current	0.0 Ω...1999 Ω	0.0 Ω...1999 Ω	from 0.1 Ω	±(3% m.v. + 3 digits)
Current measurement	0.0 A...400.0 A	0.0 A...400.0 A	0.1 A	from ±(5% m.v. + 2 digits)
Power measurement	0.00 kW...100.00 kW	0.00 kW...100.00 kW	0.01 kW	±(6% m.v. + 5 digits)

Other technical data

Safety and work conditions	
Measuring category according to EN IEC 61010-2-030	CAT III 1000 V
Ingress protection	IP54
Type of insulation according to EN 61010-1 and EN IEC 61557	double
Power supply	4x AA 1.5 V battery 4x Ni-MH AA 1.2 V rechargeable battery
Dimensions	244 x 169 x 71 mm
Weight	ca. 1.3 kg
Operating temperature	-10...+40°C
Storage temperature	-20...+60°C
Humidity	20...80%
Nominal temperature	23 ± 2°C
Reference humidity	40%...60%
Memory and communication	
Memory of measurement results	4 059 records
Data transmission	Bluetooth
Communication with IRM-1	LoRa
Other information	
The product meets the EMC (emission for industrial environment) requirements according to standards	EN IEC 61326-1 EN IEC 61326-2-2

"m.v." – measured value

Standard accessories

		PVM-1021 Pro WMGBPVM1021PRO	PVM-1021 WMGBPVM1021
	**PVM-1021 photovoltaic meter** WMGBPVM1021	1	1
	**IRM-1 solar radiation and temperature meter** WMGBIRM1	1	
	**Solar radiation meter mounting kit for PV panels + probe for measuring the temperature of PV panels and the ambient temperature** WASONTPVCKPL	1	
	**Test lead 1.2 m (banana plugs) black / blue / yellow** WAPRZ1X2BLBB / WAPRZ1X2REBB / WAPRZ1X2YEBB	1 / 1 / 1	1 / 1 / 1
	**Crocodile clip 1 kV 20 A black / red / yellow** WAKROBL20K01 / WAKRORE20K02 / WAKROYE20K02	1 / 1 / 1	1 / 1 / 1
	**Pin probe 1 kV (banana socket) red** WASONREOGB1	1	1
	**MC4-banana sockets adapter (set of 2 pcs.)** WAADAMC4	1	1
	**C-PV clamp** WACEGCPVOKR	1	1
	**5 V power supply with USB 2.0 output and a detachable micro-USB cable** WAZASZ24	1	
	**Strap** WAPOZPAS6	1	1
	**L4 carrying case** WAFUTL4	1	1
	**AA 1.5 V battery**	4	4
	**AAA 1.5 V battery**	2	2
	**Factory calibration certificate - PVM-1021**	1	1
	**Factory calibration certificate - IRM-1**	1	

Optional accessories

		PVM-1021 Pro WMGBPVM1021PRO	PVM-1021 WMGBPVM1021
	**IRM-1 solar radiation and temperature meter** WMGBIRM1		√
	**Solar radiation meter mounting kit for PV panels** WAPOZUCHPV	√	
	**Clamp for mounting the solar radiation meter to the solar panels** WAZACPV	√	
	**Probe for measuring the temperature of PV panels and the ambient temperature** WASONTPVC	√	
	**MC4 splitter for power measurement in PV systems (set of 2 pcs.)** WAADAMC4SKPL	√	√
	**Key for MC4 connectors** WAPOZKEYMC4	√	√
	**AC-16 line splitter (facilitates current measurements)** WAADAAC16	√	√
	**Industrial socket adapter 16 A / 32 A** WAADAAGT16T / WAADAAGT32T	√	√
	**Three-phase socket adapter 16 A / 32 A** WAADAAGT16P / WAADAAGT32P	√	√
	**Three-phase socket adapter 63 A** WAADAAGT63P	√	√
	**Pin probe 1 kV (banana socket) black / yellow** WASONBLOGB1 / WASONYEOGB1	√	√
	**Sonel Reader software** WAPROREADER	√	√
	**Sonel Reports PLUS software** WAPROREPORTSPLUS	√	√
	**Calibration certificate with accreditation - PVM-1021**	√	√
	**Calibration certificate without accreditation - IRM-1**	√	