

PVM-1020



IP65

CAT IV

300 V

CAT III

600 V

CAT II

1000 V DC



LoRa



BLUETOOTH

IRM-1



IP65



LoRa



**LI-ION
BATTERY**



PVM-1020

reSYNC

automatic
synchronization of
STC parameters

Probably the world's most handy meters for photovoltaic systems

Features

PVM-1020

- It can be used for category 1 measurements according to IEC 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 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 the PVM-1020 meter - offers a larger range than the Bluetooth technology!
- Automatic data synchronization with the PVM-1020 meter.
- 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-1020

- 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 $^{\circ}C$ or $^{\circ}F$.
- Ambient temperature in $^{\circ}C$ or $^{\circ}F$.
- Inclination angle of panels
- Orientation of the panels with the built-in compass.



PVM-1020: great capabilities in a small casing

PVM-1020 meter is probably the world's smallest photovoltaic system meter with such 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 **IP65**. This is especially important for measurements on photovoltaic systems, which are outdoor installations.



Communication and software

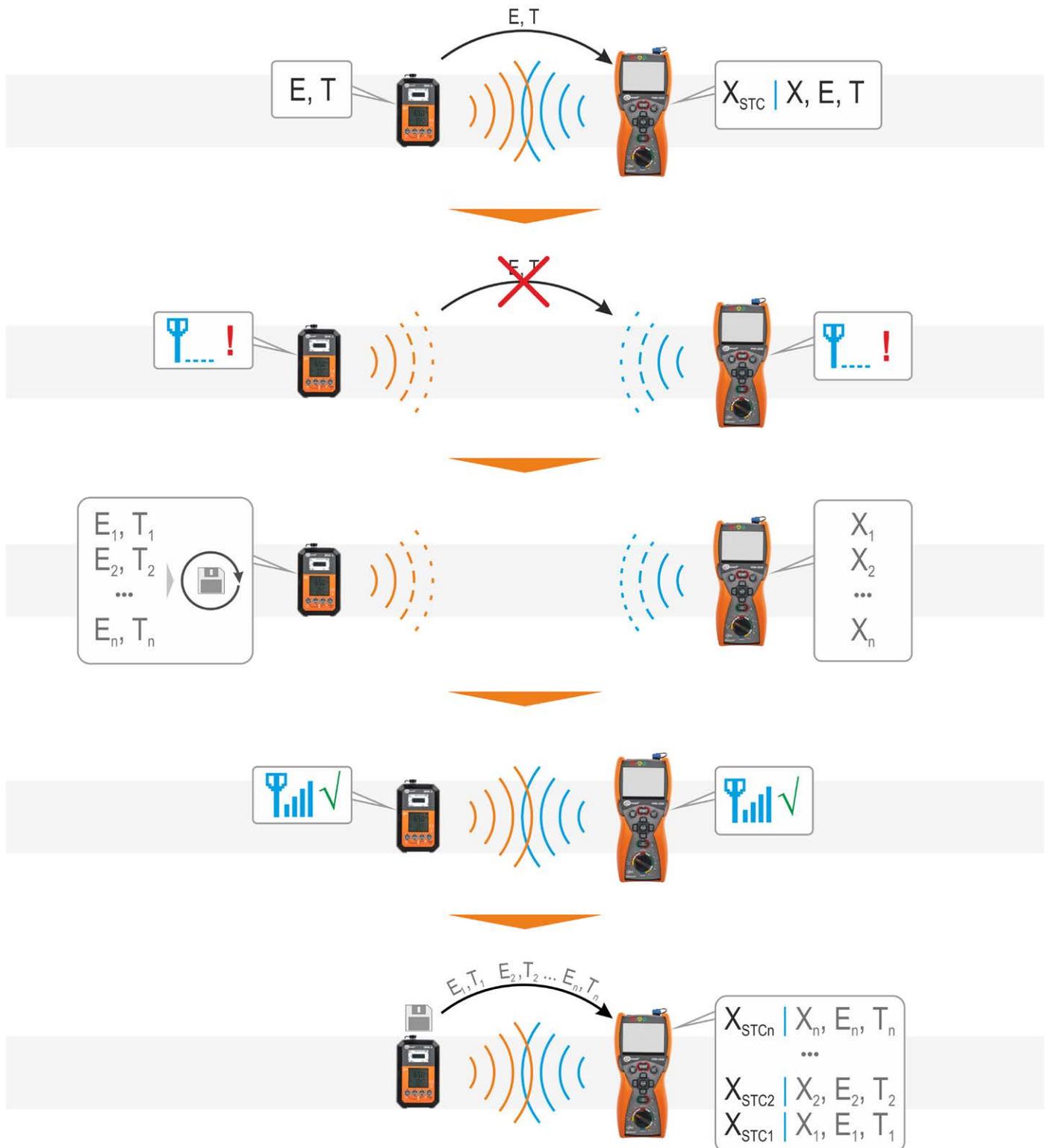
Measurement data from the IRM-1 can be transferred to a computer via the USB port. In addition, the device has a built-in wireless **LoRa interface** (Long Range) for automatic data exchange with the PVM-1020 meter - even over long distances.

Measurement data from the PVM-1020 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-1020: trouble? reSYNC!

It may happen that in the course of measurements the PVM-1020 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.



PVM-1020 | 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 kΩ...2.000 GΩ acc. to IEC 61557-2	0.0 kΩ...2.000 GΩ	from 0.1 kΩ	±(3% m.v. + 8 digits)
Measuring voltage 500 V	250 kΩ...5.000 GΩ acc. to IEC 61557-2	0.0 kΩ...5.000 GΩ	from 0.1 kΩ	±(3% m.v. + 8 digits)
Measuring voltage 1000 V	500 kΩ...9.999 GΩ acc. to IEC 61557-2	0.0 kΩ...9.999 GΩ	from 0.1 kΩ	±(3% m.v. + 8 digits)
Insulation resistance at DC side				
Measuring voltage 250 V / 500 V / 1000 V	250 kΩ...1.000 GΩ acc. to IEC 61557-2	0.0 kΩ...1.000 GΩ	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	0.10 Ω...1999 Ω acc. to IEC 61557-4	0.00 Ω...1999 Ω	from 0.01 Ω	±(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	±(5% m.v. + 2 digits)
Power measurement	0.0 kW...100.0 kW	0.0 kW...100.0 kW	0.1 kW	±(6% m.v. + 5 digits)

IRM-1 | Specifications

Parameter	Measurement range	Display range	Resolution	Accuracy ±(% m.v. + digits)
Irradiance				
Measurement in W/m ²	100 W/m ² ...1400 W/m ²	0 W/m ² ...1400 W/m ²	1 W/m ²	±(5% m.v. + 2 digits)
Measurement in BTU/ft ² h	32 BTU/ft ² h...444 BTU/ft ² h	0 BTU/ft ² h...444 BTU/ft ² h	1 BTU/ft ² h	±(5% m.v. + 2 digits)
PV and ambient temperature				
Measurement in °C	-20.0°C...100.0°C	-20.0°C...100.0°C	0.1°C	±(1% m.v. + 5 digits)
Measurement in °F	-4.0°F...212.0°F	-4.0°F...212.0°F	0.1°F	±(1% m.v. + 5 digits)
Inclination angle	-90°...+90°	-90°...+90°	1°	±4°
Position direction - compass	0°...360°	0°...360°	1°	±7°

"m.v." – measured value

PVM-1020 | Other technical data

Safety and work conditions

Measuring category according to EN 61010	IV 300 V, III 600 V, II 1000 V DC
Ingress protection	IP65
Type of insulation according to EN 61010-1 and IEC 61557	double
Power supply	4x Ni-MH AA 1.2 V rechargeable battery 4x AA 1.5 V battery
Dimensions	220 x 98 x 58 mm
Weight	ca. 1.0 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	IEC 61326-1 IEC 61326-2-2
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IRM-1 | Other technical data

Safety and work conditions

Ingress protection	IP65
Power supply	Li-Ion 3.7 V 1.3 Ah rechargeable battery
Dimensions	134 x 79 x 28 mm
Weight	ca. 0.2 kg
Operating temperature	-10...+50°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	user measurement memory: 999 records recorder: 5000 records
Data transmission	USB
Communication with PVM-1020	LoRa

Other information

Quality standard – development, design and production	IEC 61010-1
The product meets the EMC (emission for industrial environment) requirements according to standards	IEC 61326-1

PVM-1020 KIT | Standard accessories



PVM-1020
photovoltaic meter

WMGBPVM1020



IRM-1 solar
radiation and
temperature meter

WMGBIRM1



**Solar radiation
meter mounting
kit for PV panels +
probe for measuring
the temperature of
PV panels and the
ambient temperature**

WASONTPVKPL



**Test lead 1.2 m
(banana plugs) black
/ blue / yellow**

WAPRZ1X2BLBB
WAPRZ1X2REBB
WAPRZ1X2YEBB



**Crocodile clip
1 kV 20 A black
/ red / yellow**

WAKROBL20K01
WAKRORE20K02
WAKROYE20K02



**Pin probe 1 kV
(banana socket) red**

WASONREOGB1



**MC4-banana
sockets adapter
(set of 2 pcs.)**

WAADAMC4



C-PV clamp

WACEGCPVOKR



**5 V power supply
with USB 2.0 output
and a detachable
micro-USB cable**

WAZASZ24



M1 hanging straps

WAPOZSZE4



L4 carrying case

WAFUTL4



4x AA 1.5 V battery

2x AAA 1.5 V battery



**Factory calibra-
tion certificate
- PVM-1020**



**Factory calibration
certificate - IRM-1**

PVM-1020 KIT | Optional accessories



**Solar radiation
meter mounting
kit for PV panels**

WAPOZUCHPV



**Clamp for mounting
the solar radia-
tion meter to the
solar panels**

WAZACPV



**Probe for measuring
the temperature of
PV panels and the
ambient temperature**

WASONTPV



**Pin probe 1 kV
(banana socket)
black / yellow**

WASONBLOGB1
WASONYE0GB1



**MC4 splitter for
power measure-
ment in PV systems
(set of 2 pcs.)**

WAADAMC4SKPL



**Three-phase socket
adapter 16 A / 32 A**
WAADAAGT16P
WAADAAGT32P

**Three-phase socket
adapter 63 A**
WAADAAGT63P



**M1 hanging
hook straps**

WAPOZUCH1



**Sonel Reports
PLUS software**

WAPROREPORTPLUS



**• Calibration cer-
tificate without
accreditation
- PVM-1020**
**• Calibration certif-
icate without ac-
creditation - IRM-1**

PVM-1020 | Standard accessories



PVM-1020
photovoltaic meter

WMGBPVM1020



Test lead 1.2 m
(banana plugs) black
/ blue / yellow

WAPRZ1X2BLBB
WAPRZ1X2REBB
WAPRZ1X2YEBB



Crocodile clip
1 kV 20 A black
/ red / yellow

WAKROBL20K01
WAKRORE20K02
WAKROYE20K02



Pin probe 1 kV
(banana socket) red

WASONREOGB1



MC4-banana
sockets adapter
(set of 2 pcs.)

WAADAMC4



C-PV clamp

WACEGCPVOKR



M1 hanging straps
WAPOZSZE4

M6 carrying case
WAFUTM6



4x AA 1.5 V battery

2x AAA 1.5 V battery



Factory calibration
certificate

PVM-1020 | Optional accessories



MC4 splitter for
power measurement
in PV systems
(set of 2 pcs.)

WAADAMC4SKPL



M1 hanging hook
straps for PVM-1020

WAPOZUCH1



Pin probe 1 kV
(banana socket)
black / yellow

WASONBLOGB1
WASONYEOGB1



Three-phase socket
adapter 16 A / 32 A
WAADAAGT16P
WAADAAGT32P

Three-phase socket
adapter 63 A
WAADAAGT63P



Sonel Reports
PLUS software

WAPROREPORTSPUS



Calibration certificate
without
accreditation



IRM-1 | Standard accessories



IRM-1 solar radiation and temperature meter

WMGBIRM1



Solar radiation meter mounting kit for PV panels + probe for measuring the temperature of PV panels and the ambient temperature

WASONTPVKPL



5 V power supply with USB 2.0 output and a detachable micro-USB cable

WAZASZ24



M14 carrying case

WAFUTM14



Factory calibration certificate

IRM-1 | Optional accessories



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

WASONTPV



Calibration certificate without accreditation

