

2024



**PV-BLOCKS**

# PV-MON-LV/HV

MANUAL (RR-1723)

V1.2

RERA SOLUTIONS B.V.

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## PV-MON (RR-1723)

This user manual targets the PV-MON (RR-1723). Please read this manual carefully before using the device.

### Risk of electric shock



**High Voltage Warning**

**Dangerous voltages can be present within the PV-MON. To avoid injuries, always disconnect power, discharge circuits, and remove external voltage sources before touching components.**

**Never connect/disconnect PV-systems under load.**

## Introduction

Congratulations on purchasing the PV-MON. With this DC measurement device, you have a unique high voltage PV monitoring tool.

### Overview

The PV-MON is used to measure the DC current and voltage of PV strings. It is equipped with two analog inputs to measure a 3-wire Pt100 temperature sensor and a 0-100mV analog irradiance sensor.



Figure 1: PV-MON

## What is in the box?

When you open the box make sure following items are included:

- PV-MON-LV or PV-MON-HV
- 5 connector endcaps (already mounted)

When anything is missing, make sure you contact your supplier.

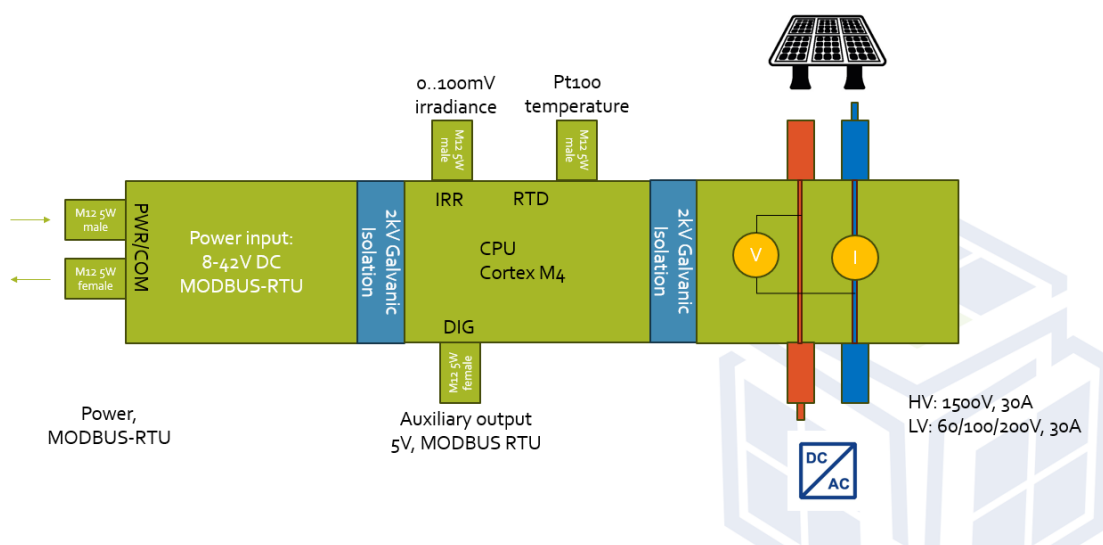
## Models

There are 2 models of the PV-MON:

**RR-1723-HV (or PV-MON-HV):** High Voltage (1500V, 30A DC)

**RR-1723-LV (or PV-MON-LV):** Low Voltage (60/100/200V, 30A, DC)

When your PV-MON is customized for different voltage and/or current ranges this is indicated on the instrument label between brackets [Vmax/Imax]:



## Mounting

The PV-MON needs to be mounted close to the PV-string. The device is suitable for outdoor usage. **However, protect it always from direct rain, sand and direct sunlight.**

- The communication connectors need to be facing downward.

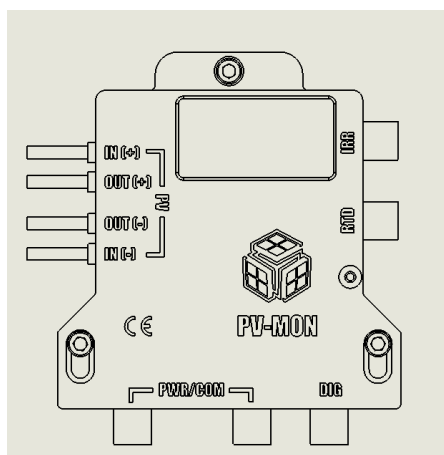


Figure 2: correct mounting of the PV-MON, the communication connectors (PWR/COM) should point downwards.

The dimensions can be found in appendix A.

## Wiring

The PV-string or PV-Module should be connected to the short red and black cables with MC-4 connectors, these are labelled 'IN'. The Inverter is connected to long red and black cables with MC-4 connectors, these are labelled 'OUT'.

All connectors used are A-coded M12.

The PWR/COM labeled connectors are two 5 pin M12 A-coded connectors for power and communication. The male connector must be used to power the device.

The female connector can be used to connect a second PV-MON unit. When the second connector is not used, make sure the weather protective cap is installed.

The pinout of the communication connector is shown in Table 1:

Pin	Function	Standard cable color
1	DC Power positive 9 – 40V	Brown
2	DC Power ground	White
3	RS485-A (+)	Blue
4	RS485-B (-)	Black
5	Not connected	Gray

Table 1: PWR/COM pinout

On the PV-MON, you find 3 more connectors:

- **DIG:** Do not use!
- **RTD:** Connect to an Pt100 RTD element
- **IRR:** Connect to an analog irradiance sensor (0..100mV)

The pinout of both female M12 RTD and IRR connectors can be found in Table 2 and Table 3. Please note that the 3-wire Pt100 connections on both connectors are interconnected. Only one Pt100 sensor is supported.

Pin	Function	Standard cable color
1	N.C.	White
2	PT100-A	Green
3	PT100-B	Yellow
4	PT100-B	Gray
5	N.C.	Brown
6	Analog ground (do not use)	Pink
7	N.C.	Blue
8	N.C.	Red

Table 2: RTD connector pinout

Pin	Function	Standard cable color
1	N.C.	White
2	PT100-A	Green
3	PT100-B	Yellow
4	PT100-B	Gray
5	N.C.	Brown
6	Analog ground (do not use)	Pink
7	Positive input (0...100mV)	Blue
8	Negative input (0...100mV)	Red

Table 3: IRR connector pinout

## Operation

The PV-MON is controlled by means of MODBUS-RTU. The Modbus address of the unit is fixed and equal to the last two digits of the serial number.



Figure 3: Modbus address is equal to the last 2 digits of the serial number. In this case '85'

Communication parameters are default set to:

Baudrate: 9600, No Parity, 1 Stopbit

## MODBUS Registers

The Modbus registers that are used in the PV-MON can be found in Appendix B.



## Specifications

The specifications of the PV-MON are shown in Table 4.

<b>Operating Temperature</b>	-20°C ... +60°C
<b>Input power</b>	8..42V DC (24VDC nominal)
<b>Galvanic isolation</b>	2 kV
<b>Interface</b>	Isolated RS485 (MODBUS-RTU)
<b>Serial Baudrate</b>	9600, 19200, 38400, 115200
<b>Internal ADC</b>	24bits
<b>Voltage</b>	
<b>Range</b>	60V, 100V, 200V or 1500V
<b>Resolution</b>	1 mV
<b>Accuracy</b>	± (0.15% reading + 0.05% range)
<b>Current</b>	
<b>Range</b>	30A
<b>Resolution</b>	1 mA
<b>Accuracy</b>	± (0.15% reading + 0.05% range)
<b>RTD (pt100)</b>	
<b>Range</b>	150 Ω
<b>Resolution</b>	0.1 Ω
<b>Accuracy</b>	± (0.05% reading + 0.003% range)
<b>Irradiance (0...100mV)</b>	
<b>Range</b>	100mV
<b>Resolution</b>	1 μV
<b>Accuracy</b>	± (0.05% reading + 0.003% range)

Table 4: Specifications

## Contact

For questions, please visit [www.pvblocks.com](http://www.pvblocks.com) or contact us directly by email or phone:

<b>ReRa Solutions BV</b>	
Address	Toernooiveld 300 6525 EC Nijmegen The Netherlands
E-mail	<a href="mailto:info@rerasolutions.com">info@rerasolutions.com</a>
Website	<a href="http://www.pvblocks.com">www.pvblocks.com</a>

## Appendix A - Dimensions

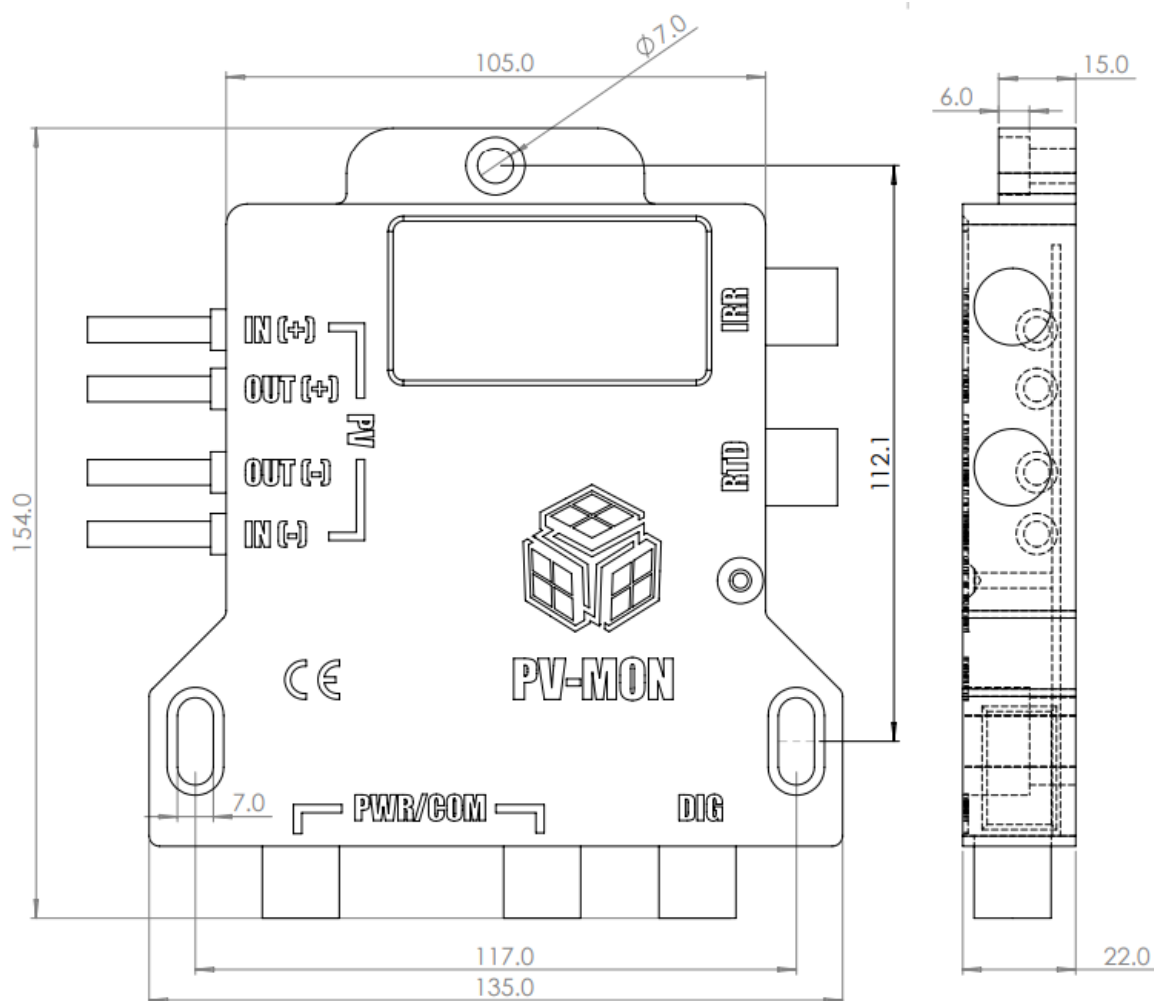


Figure 4: All dimensions in mm

## Appendix B - Modbus registers

Register name	Comment	Register Type	R/W	Modbus Address
VOLTAGE	Voltage [mV]	32 bit Unsigned	R	102
CURRENT	Current [mA]	32 bit Unsigned	R	104
PT100	10 x Pt100 resistance [ $\Omega$ ]	32 bit Unsigned	R	106
MILLIVOLT	Analog input value [ $\mu$ V]	32 bit Unsigned	R	108

All values are Big Endian formatted

## Appendix C - Configurations

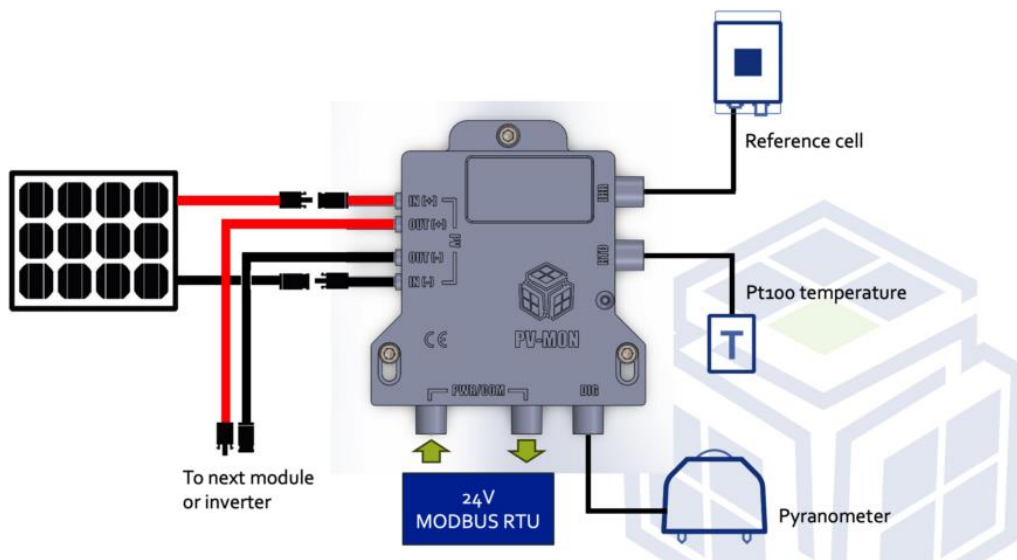


Figure 5: Standard single module connection, please note that the digital pyranometer is not supported at this moment

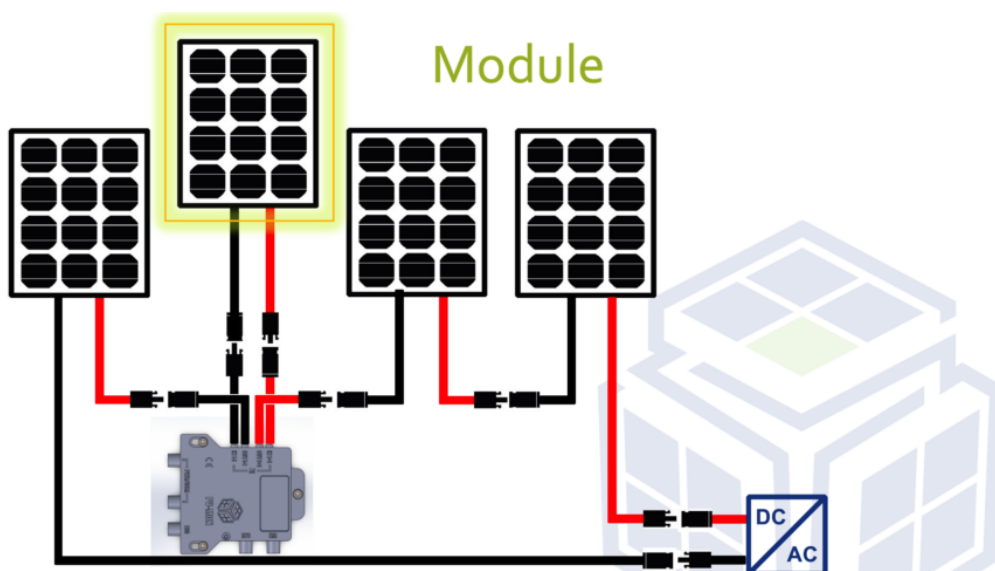


Figure 6: Standard single module connection

## String

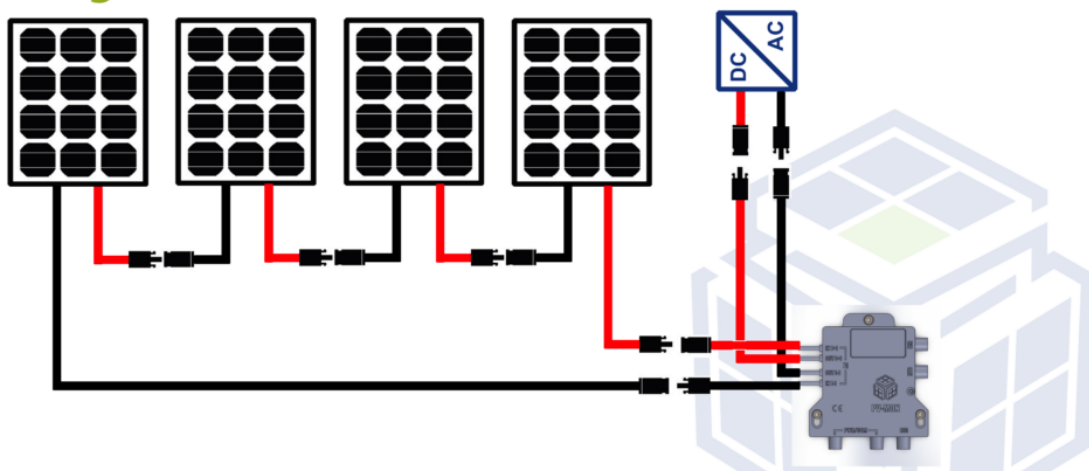


Figure 7: Standard string connection