

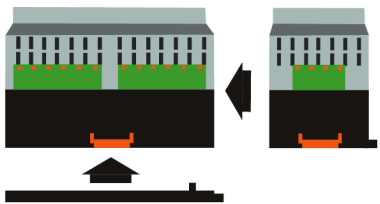


# Solar Monitor

## Installation instructions for SM2-MU v. 2.0

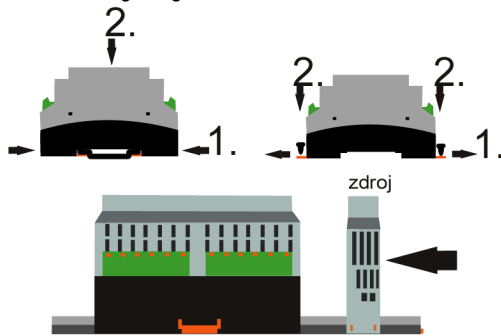
### 1. Step Installation of additional modules

If you are installing SM2-MU without additional modules, skip this step. Connect the bus HBUS to the SM2-MU. Then connect all modules together to the SM2-MU as shown below.



### 2. Step Mechanical fastening

Solar Monitor, including any associated source modules can be mounted on wall or DIN rail mounting according to the following images.



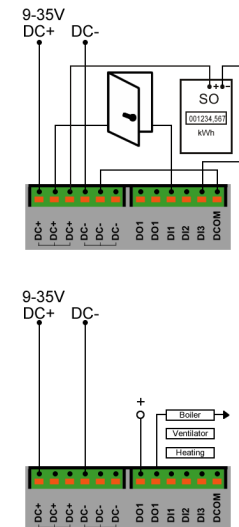
### 3. Step Digital inputs and outputs

#### Inputs

Solar Monitor has 3 digital inputs DI. For the using of inputs is necessary to bring the power signal DC- to terminal DCOM. For switching input is necessary to bring the signal DC+ to the appropriate terminal DI. Digital inputs can be used for reading energy from counters (eg electrometer, gas meter, water meter) as well as binary inputs for state monitoring (closed/open).

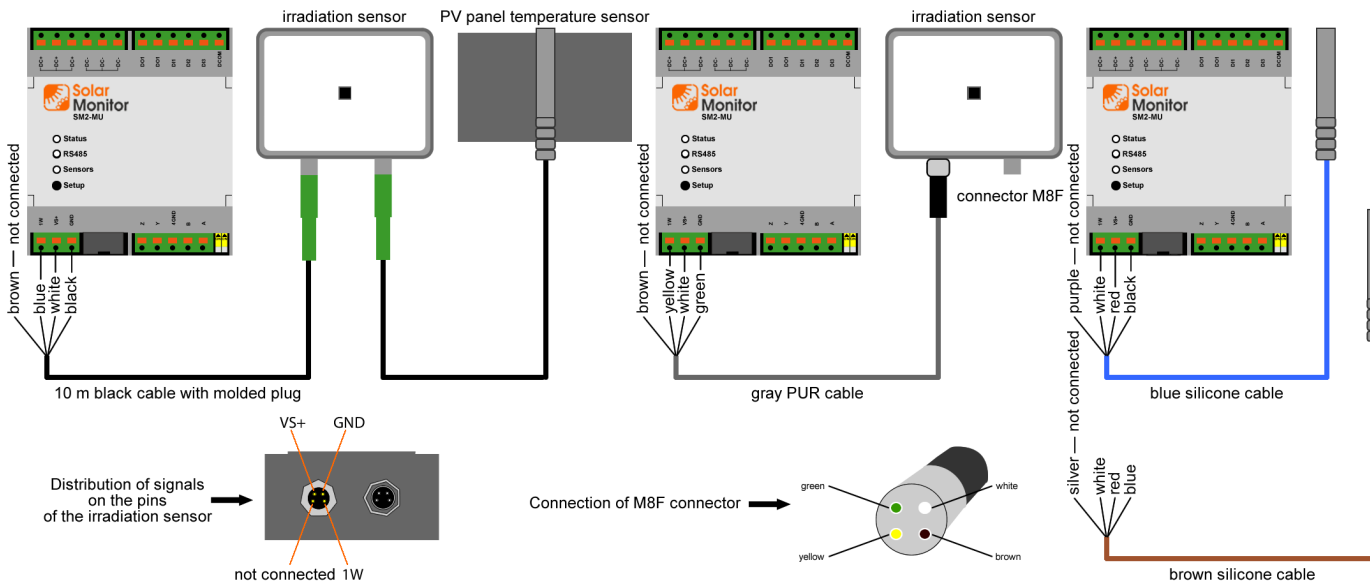
#### Outputs

We can use a relay, which is in the SM2-MU. The relay may control the boiler. For example depending on the current ambient temperature, the relay is able to run ventilation, or depending on the current power, the relay can control a boiler through the contractor. Load that can be permanently switched is 750 VA / 90 W. The relay (32 V, 3 A) is protected by a fuse.



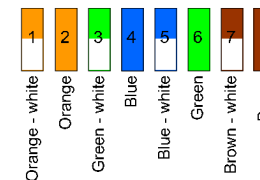
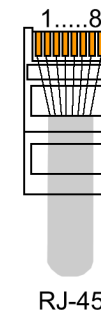
### 4. Step Connection of sensors

The Solar Monitor can connect up to 10 sensors. The total cable length must not exceed 100 meters. The following sensors can be connected with described cables. In case of using multiple sensors, connect the various cables in parallel to the same terminals.



### 5. Step Connection to a LAN

Connect the unit to the LAN (to a switch). Use the UTP cable. Follow the same procedure if you connect the unit directly to your PC.



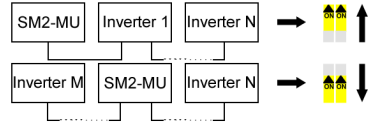
## 6. Step Connection of inverters, counters (RS485)

Depending on the manufacturer of the inverter the following SM2-MU terminals are used: A, B, 4GND, Z, Y, eventually DC+ and DC-. If the Solar Monitor is at the beginning of the bus, it is necessary to place the sliding switch to ON.

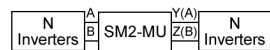
Similarly, for the inverter - if it supports the bus termination, switch it at the last in a series according to the manufacturer's instructions. How to connect the inverters to the Solar Monitor and whether they support the bus termination are listed in the following table. If the inverters have manual addressing, you need to set different addresses, preferably beginning with address 1. For example, 1, 2, 3, ..., 31. The procedure is described in the inverter instructions. It is usually set by the DIP switch or the LCD menu of the inverter.

Two separate branches with different or identical types of inverters can be connected to the Solar Monitor unless one type requires the connection of all A, B, Z, and Y signals. The second branch is then connected according to the table except A and B, which are then connected to the terminals Y and Z. More detailed information about inverter connection can be found at [wiki.solarmonitor.com](http://wiki.solarmonitor.com).

On/Off bus termination in the SM2-MU



Connection of two separate branches with inverters



Notice:

The connection of signal lines to the inverter must comply with the requirements of ČSN EN 61643-21 + A1, A2 and ČSN EN 62305-1 ed.2. Otherwise, the manufacturer will not be liable for damage to the equipment.

SM2-MU	Z	Y	4GND	B	A	DC+	DC-	Support termination	Manual addressing	Baud rate
AEG	R-	R+	-	T-	T+	-	-	✓	-	9600
Power-One (Aurora)	-	-	RTN	-T/R	+T/R	-	-	✓	✓	optional
Carlo Gavazzi	-	-	5(GND)	8(RXB)	7(TXA)	-	-	✓	-	optional
Danfoss	-	-	1	3	6	-	-	✓	-	19200
Delta	-	-	GND	6	7	-	-	✓	✓	optional
Diehl	-	-	shield	B	A	-	-	✓	-	19200
Fronius (IN)	5	4	2	6	3	-	-	✓	✓	optional
Fronius (OUT)	6	3	2	5	4	-	-	✓	✓	optional
GreenBonO	-	-	-	B(-)	A(+)	-	-	-	-	9600
Kaco	-	-	-	A	B	-	-	✓	✓	9600
Kostal	-	-	3	2	1	-	-	✓	✓	19200
Mastervolt	-	-	-	3	4	-	-	✓	-	9600
Morningstar	-	-	-	A	B	+12V	GND	X	-	9600
Omnik	5(Rx-)	4(Rx+)	7(GND)	6(Tx-)	3(Tx+)	-	-	✓	-	9600
Omron	-	-	6: GO	8: A-	7: B+	-	-	✓	✓	optional
Refusol	-	-	-	3	2	-	-	✓	✓	57600
Santerno	-	-	-	S-	S+	-	-	✓	-	optional
Sunways	-	-	-	RS485-	RS485+	-	-	✓	-	9600
Schneider (SunEzy)	4(Rx-)	3(Rx+)	1(GND)	5(Tx-)	6(Tx+)	-	-	✓	-	9600
Siemens	-	-	-	3	2	-	-	✓	✓	optional
Siliken	-	-	5(GND)	8(RXB)	7(TXA)	-	-	✓	-	optional
SMA	-	-	5	7	2	-	-	✓	-	1200
Solar Max	-	-	-	8	7	2(15V)	3	-	✓	19200
Steca	-	-	8	2	1	4	7	✓	✓	38400
Studer	2	3	5	-	-	-	-	✓	-	115200
Sungrow	-	-	-	3	6	-	-	✓	✓	optional
Sunville	4(Rx-)	3(Rx+)	1(GND)	5(Tx-)	6(Tx+)	-	-	✓	-	9600
Vacon	-	-	5	3	4	-	-	✓	✓	optional
Xantrex (GT100-630E)	-	-	GND	RxTx-	RxTx+	-	-	X	optional	optional

## 8. Step First run

After powering the Solar Monitor, the green LED diode Status starts flashing quickly. At the same time the green LED on the network connector lights up and simultaneously the orange LED starts flashing. By default, the unit has DHCP client mode enabled. IP address is obtained automatically from the DHCP server in the local network (if available). If IP allocation fails, address 192.168.1.1 and mask 255.255.0.0 are set.

If you do not have a DHCP server on your network, follow these steps:

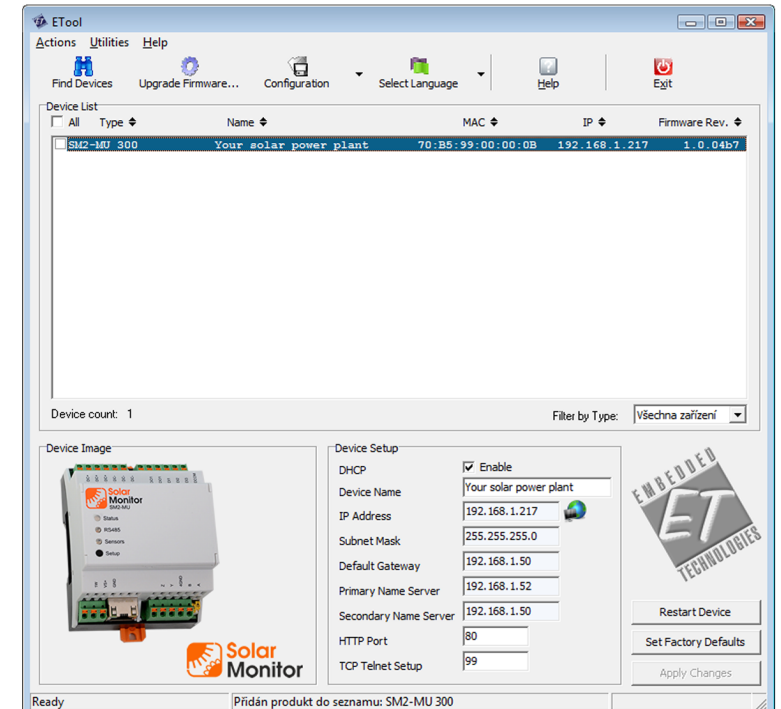
1. Press the Setup button on the Solar Monitor and hold it down.
2. Connect the power supply.
3. After connecting the power supply, wait about 5 seconds until the Status LED starts flashing green, release the Setup button, then press it three times.
4. You can connect to a fixed IP address of 192.168.1.99 within 10 seconds.

Note: To set the Solar Monitor to factory default, press the Setup button 5 x in item 3, and within 10 seconds, the unit should be restarted with the newly set parameters (to the state in which you purchased the device).

Use the web browser to connect to the Solar Monitor and type "http://192.168.1.99" or the address from the DHCP to the address bar.

You can use ETool for searching the units in your network (download from <http://www.solarmonitor.cz> in the section Support/Download/Utilities).

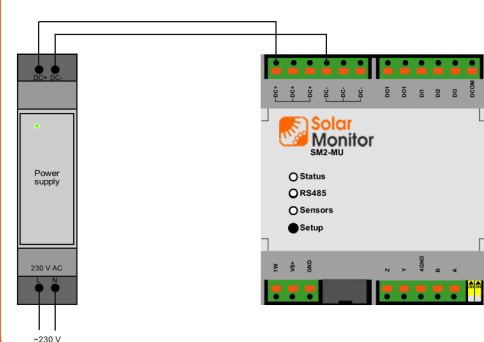
This application will find your unit independently of the IP address setting. To view the Solar Monitor web interface, click on the image of the device at the left bottom or click on the icon which is located at the bottom of the center, to the right of the device's IP address line.



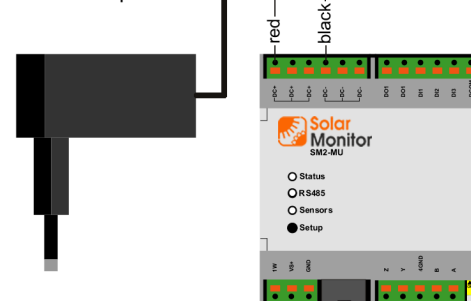
## 7. Step Connection of power supply

Connect the power supply (9-35V) to the SM2-MU.

Source for DIN rail



Power adapter



# 9. Step Setup Wizard

The Setup Wizard appears in the web browser. In eight steps, it will help you with the basic settings of the Solar Monitor.

## Your PVE General

1

SETUP WIZARD

### Settings

Language:

English (EN)

Name:

Your PVE

Power:

50 kWp

In the first step, select your language, fill in the PVE's name and the installed power. Then, go to the next step by clicking on the arrow on the right

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 Portal Send to portal
- 7 Date & Time Time from internet
- 8 Summary Summary of all settings

## Your PVE Devices

2

SETUP WIZARD

### Interface Settings

RS485 Interface (A,B)

Protocol Type:

Power-One (Aurora)

Baud Rate:

19200 Bd

RS485 Interface (Y,Z)

RS232 Interface (SM2-BE)

Network Interface

Choose the interface for the communication with the inverter, then choose the communication protocol and the baud rate. Then, in the Setup Wizard, go to the next step by clicking on the arrow on the right

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
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- 8 Summary Summary of all settings

For more detailed information about this setting see [wiki.solarmonitor.cz](http://wiki.solarmonitor.cz) in the Find Devices section.

If you do not have any sensors connected to the Solar Monitor, leave NO in the Detect Sensors box and click on the arrow on the right

Sensor Detection

NO Detect Sensors

## Your PVE Sensors

3

SETUP WIZARD

### Sensor Detection

YES Detect Sensors

If you have sensors attached, change to YES and then click on the arrow on the right

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 Portal Send to portal
- 7 Date & Time Time from internet
- 8 Summary Summary of all settings

## Your PVE Counters

4

SETUP WIZARD

### Counter Settings

1

Meter Type:

Pulses Count:

per kWh

Actual State:

kWh

Allow:

NO

2

3

If you have no counter (electrometer, gas meter, water meter, inverter, tracker, battery, or other gauge) connected to the Solar Monitor, go to the next step by clicking on the arrow

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 Portal Send to portal
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- 8 Summary Summary of all settings

You must first enable the input before you are able to set it.

Meter Type:

Pulses Count: per kWh

Actual State: kWh

Allow:  YES

Next, choose which counter it is.

Counter Settings

1

Meter Type:

Pulses Count: per kWh

Actual State: kWh

Allow:  YES

- Electrometer
  - Production
  - Consumption
  - Supply (DSO)
  - Consumption (DSO)
- Gas
  - Consumption
- Water
  - Consumption
- Inverter
  - Production
- Tracker
  - Production
- Battery

Go to the next step by clicking on the arrow

## Your PVE Emails & SMS

5

SETUP WIZARD

### Email Recipients

Recipient (To):   Recipient (Cc):

### SMS Recipients

Recipient 1:   Recipient 2:

Enter e-mail addresses and phone numbers of SMS recipients. Internet connection must be available for sending e-mails and the modul SM2-GSM must be connected to the Solar Monitor for sending SMS.

Then continue to the next step by clicking right to the

← BACK NEXT →

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 **Emails & SMS Recipient Settings**
- 6 Portal Send to portal
- 7 Date & Time Time from internet
- 8 Summary Summary of all settings

Data from devices connected to the SM2-MU inputs are saved in Portal. You have to allow data sending.

With the Portal you have the possibility to see detailed analysis and you can send reports to the 

Sending is not allowed defaultly.

### Portal Setup

NO Send Data

## Your PVE Portal

6

SETUP WIZARD

### Portal Setup

YES Send Data

Here you can set your own portal address

← BACK NEXT →

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 **Portal Send to portal**
- 7 Date & Time Time from internet
- 8 Summary Summary of all settings

If you want to send data to Portal, choose YES and write the Portal address. (eg. portal.solarmonitor.cz). Then go to the next step by clicking right to the button

## Your PVE Date & Time

7

SETUP WIZARD

### Internet Time Setup

NO Enable Internet Time

Write the actual time and date, if you don't want to get them automatically from the internet.

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- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 Portal Send to portal
- 7 **Date & Time Time from internet**
- 8 Summary Summary of all settings

If you click on YES, the time in the unit will be actualized automatically from SNTP server in the internet. The default is ntp.nic.cz. You can write the address of the other SNTP server to get the date and time. Then go to the next step by clicking right on the button

### Internet Time Setup

YES Enable Internet Time

You can see here the recapitulation of the device configuration. For completing the configuration go right on the button

## Your PVE Summary

8

SETUP WIZARD

### General

Language: English (EN)  
Name: Your PVE  
Power: 50

### Counters

1:  YES  NO 2:  YES  NO 3:  YES  NO

### Portal

Send Data:  YES  NO

### Date & Time

Internet Time:  YES  NO

### Sensors

Detect Sensors:  YES  NO

### Email

Recipient (To): support@solarmonitor.cz  
Recipient (Cc): support2@solarmonitor.cz

### SMS

Recipient 1:  
Recipient 2:

### Devices

RS485 (A,B): Power-One (Aurora)  
RS485 (YZ): \_\_\_\_\_  
RS232: \_\_\_\_\_  
TCP: \_\_\_\_\_

← BACK NEXT →

- 1 General Settings
- 2 Devices Device Detection
- 3 Sensors Sensor Detection
- 4 Counters Counter Settings
- 5 Emails & SMS Recipient Settings
- 6 Portal Send to portal
- 7 Date & Time Time from internet
- 8 **Summary Summary of all settings**

After clicking on the button Finish wait until the configuration of the Solar Monitor is done. The configuration time depends on the other detected connected devices (inverters, sensors, etc).

Your device is connected now. You see the main Solar Monitor page. You can find detailed information here: [wiki.solarmonitor.cz](http://wiki.solarmonitor.cz)

# 10. Step Inputs and Counters - detailed settings

Serves for correct inputs setting. Click on menu Settings/Inputs and Counters.

Binary Inputs Setup

This is the table default setting

ID	Function	Name	State	Allowed State	Email	SMS
1	Input	1	🔥	Opened	NO	NO
2	Input	2	🔥	Opened	NO	NO
3	Counter					

Solar Monitor has 3 inputs. Choose the function of each of them. Each input can work as an input (binary) or counter or input and counter.

## 1. Input = binary input

The actual input state is mentioned in the table. Set the allowed input value. Choose, if you want to receive report (by e-mail, SMS) if the input value changes (Open/Closed).

ID	Function	Name	State	Allowed State	Email	SMS
1	Input	1	🔥	Opened	NO	NO

## 2. Counter = for counting meter pulses (electric, gas, water meter)

In the table Binary Inputs Setup choose the function Counter of the input, to which the meter is connected in. Note: the meter can be connected to any of three inputs. So you can connect up to 3 meters into SM2-MU.

ID	Function	Name	State	Allowed State	Email	SMS
1	Counter					

After you choose the function Counter, the table for counter settings will be displayed above the inputs table.

Counter 1

Name: Electrometer

Type: Electrometer Production

Pulse count: 1000

Energy Correction: 4736460.8

Pay-off Price: 0

Currency: EUR

write the counter name (eg. electro meter, gas meter, water meter)

number of pulses for 1 kWh (according to input parameter S0 on the counter)

write the counter state (eg. the total production on the electro meter)

choose the type of the meter

The impulses number for 1 kWh is usually between 250-1000 imp/1kWh. If there are 2 data with impulse number value on your electro meter, the value for S0 input is usually the lower one. The higher value shows the number of diode flashing on the electrometer.

If you need to set other pulses number for 1 kWh than 1000, follow these instructions:

### For direct measuring

Find from the electrometer label or from its documentation, how many pulses for 1 kWh your electro meter generates on input S0 and write this number into the Pulse count in SM2-MU.

### For indirect measuring

Find from the electrometer label or from its documentation, how many pulses for 1 kWh your electro meter generates on input S0 and use this number for the calculation see the example mentioned below.

Example: if the electro meter shows, that 10000 pulses pass to 1 kWh.

Look at the transformer of indirect measuring of electro energy which is connected to the electro meter 1 transformer to each phase), the rate (eg. 150A/5A) should be written there). The result of this rate (here number 30) put into the formula eg. 10000/30. Write the whole formula in this state (means 10000/30) into the Pulse count.

Counter 1

Name: Electrometer

Type: Electrometer Production

Pulse count: 10000/30 per kWh

Energy Correction: 4736460.8 kWh

Pay-off Price: 0 USD/MWh

Currency: EUR

If you write the wrong pulses number value, Solar Monitor will display incorrect data of the produced energy. If pulses are not counted, check the wiring and polarity of electro meter connection.

## 3. Input and Counter = counting from devices detected to RS485, RS232, Ethernet + can be used as binary input

ID	Function	Name	State	Allowed State	Email	SMS
1	Input & Counter	1	🔥	Opened	NO	NO

After you choose the function Input and Counter, the table for counter settings will be displayed above the inputs table. If it is set that there is an inverter production, the production value in View menu will be the summary value from all detected inverters.

Counter 1

Name: Inverter - Production

Type: Inverter Production

Energy Correction: 70200.51562

Pay-off Price: 0

Currency: EUR

Production

Tracker

Battery

Charge

Discharge

Meter

Production

Consumption

Supply (DSO)

Consumption (DSO)

If you use this input as binary one, set its allowed value.

After each settings change click on the button 