Solar-Log™

Manual - Extension modules V1.2

Solar-Log™

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1 Solar-Log MOD I/O Modul

1.1 Installation, mounting, connecting the module

Important!

Disconnect the power from the Solar-Log Base before installing the Solar-Log MOD I/O module!

Note

The Solar-Log MOD I/O module will be automatically detected after the Solar-Log Base has been restarted.

After the initial installation of the Solar-Log MOD I/O expansion module with the Solar-Log Base, the Solar-Log Base checks the firmware version on the Solar-Log MOD I/O. If this matches the Solar-Log Base, the Solar-Log MOD I/O goes into standby mode. (Recognizable when the lower LED lights up green)
You can then start with the actual configuration.
If the Solar-Log Base detects a difference, the firmware is automatically updated. This can be recognized when the lower LED lights up orange. It is essential to wait until the firmware update has been completed and the MOD I/O has gone into standby mode. (Lower LED lights up green)

VERY IMPORTANT!

Do **not** under any circumstances disconnect the Solar-Log Base and the Solar-Log MOD I/O during an **active** firmware update (lower LED is orange), as otherwise the Solar-Log MOD I/O will get stuck during the start-up process (LED lights up red) and can then no longer be switched to standby status!

First make sure that the Solar-Log Base is properly installed and connected to the photovoltaic system. Make sure that the device communicates via the local network.

MOD I/O installation

- Mount the MOD I/O module on a top-hat rail. (See also note text).
- Connect the module to the Solar-Log Base via the HBUS connection to transfer data and power between the devices. Ensure that the modules are stable and securely fastened.
- Ensure the correct power supply (24V DC or 12V DC depending on the setup). Power is supplied via the HBUS connection unless more power is required.
- Check the LED status indicators of the MOD I/O module to visualize the system status and I/O functions. (See chapter below)

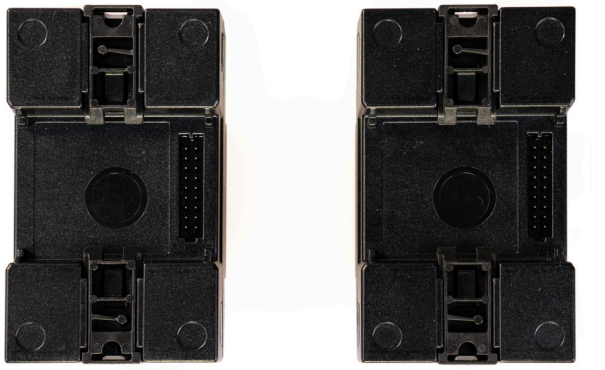

Fig.: Solar-Log Base / Solar-Log MOD I/O without a bus connector

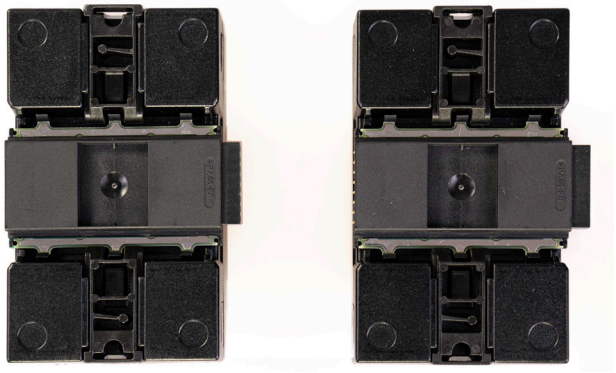

Fig.: Solar-Log Base / Solar-Log MOD I/O with a bus connector

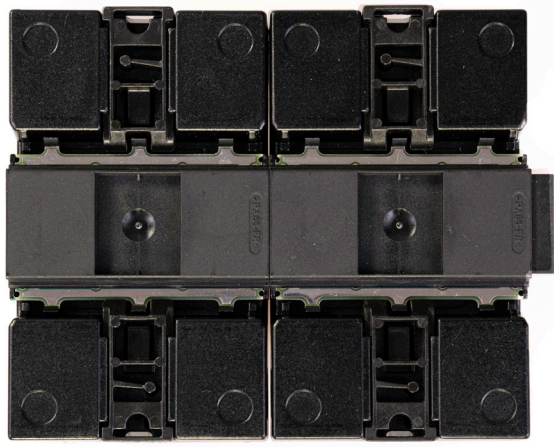

Fig.: Solar-Log Base / Solar-Log MOD I/O with a bus connector joined together.

Note

Only one Solar-Log MOD I/O can be connected to the Solar-Log Base.

Note

It is essential to use a piece of top-hat rail to stabilize the bus connector. Care should always be taken to ensure that a TH 35 / 7.5 or TH 35 / 15 top-hat rail in accordance with IEC/EN 60715 is used.

1.2 PIN assignment

PIN assignment - top side

The Mod I/O modul has a 13-pin connector on the top, which provides the digital inputs and outputs as well as the power supply. With firmware 6.2.0, in addition to the Solar-Log Base, the MOD/IO modul also has the Smart Energy function on 8 inputs and outputs (IO).
The following table describes the pin assignment and the use of the Smart Energy functions:

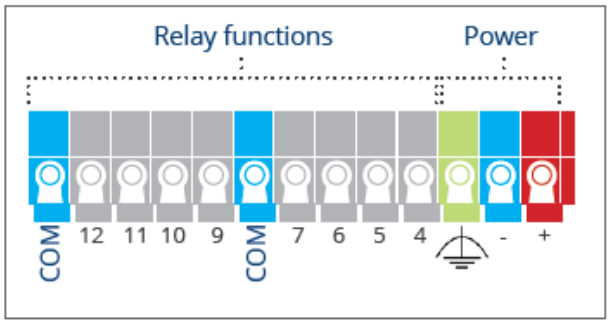

Fig.: PIN assignment on the top side

Power supply and relay functions

Pin name	Name / Assignment	Description
1 +	Vin	Power supply input (24V DC or 12V DC)
2 -	GND	GND / Ground connection
3 FE	FE	Functional earthing (protection)
4 IO	DIO8	Digital output 8
5 IO	DIO7	Digital output 7
6 IO	DIO6	Digital output 6
7 IO	DIO5	Digital output 5
8 COM	GND	GND / Further ground connection
9 IO	DIO4	Digital output 4
10 IO	DIO3	Digital output 3
11 IO	DIO2	Digital output 2
12 IO	DIO1	Digital output 1
13 COM	GND	GND / Ground connection

PIN assignment - bottom side

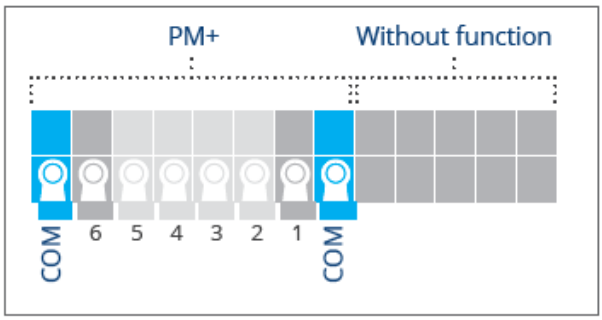

Fig.: PIN assignment on the bottom side

PM+

Pin	Assignment	Description
1	+24 V / (12V)	Control voltage for active power control.
2	D_IN_1	Control input 1
3	D_IN_2	Control input 2
4	D_IN_3	Control input 3
5	D_IN_4	Control input 4
6	+24 V / (12V)	Control voltage for reactive power reduction.

1.3 LED

The color of the LEDs and whether they are blinking or not indicates the operation status (refer to the table below).

Fig.: Display of the Solar-Log MOD I/O with LEDs

Table LEDs - Solar-Log MOD I/O

Solar-Log MOD I/O - LEDs (from top to bottom)

Name	Color	Meaning
Power (top)	green	The Solar-Log MOD I/O is receiving power.
Communication (middle)	blinking / lights up green	Communication with the Solar-Log MOD I/O has been established.
Operating status (bottom)	red	The Solar-Log MOD I/O is starting.
Operating status (bottom)	orange	A firmware is being updated.
Operating status (bottom)	green	The Solar-Log MOD I/O is ready for operation. Important: Data is only read in the operational mode.

1.4 Diagnosis and status of the Solar-Log MOD I/O

The status of the Solar-Log MOD I/O can be checked in the Diagnostics menu under “Expansion modules” (see illustration “Solar-Log MOD I/O - Solar-Log Base Communication bus/LED” and the corresponding sections below). With a mouse-over, you can see the real-time transferred values between the Solar-Log MOD I/O and the Solar-Log Base (see illustration “Communication between the Solar-Log MOD I/O and Solar-Log Base”).

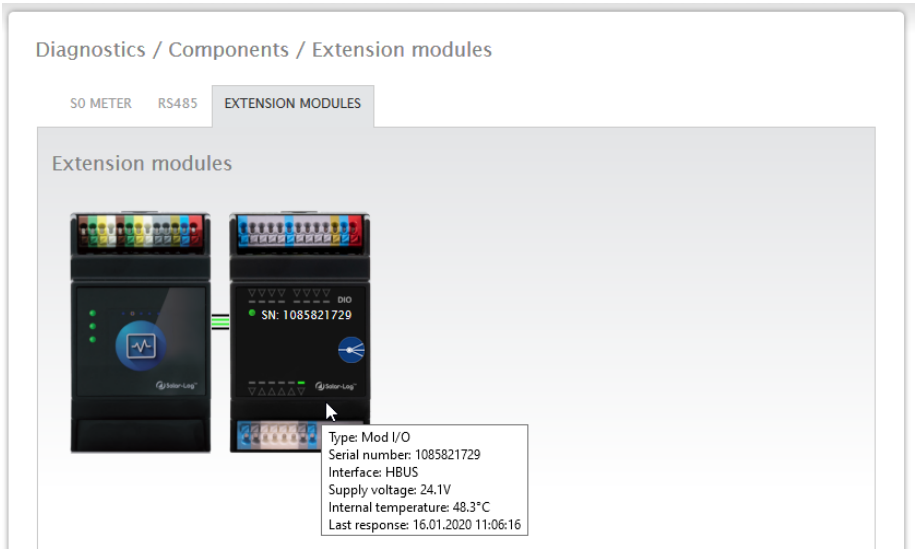

Fig.: Communication between the Solar-Log MOD I/O and Solar-Log Base

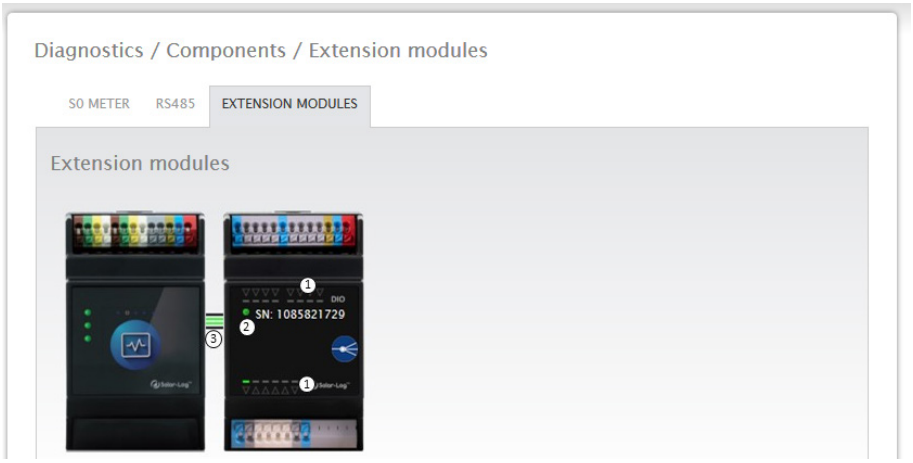

Fig.: Solar-Log MOD I/O - Solar-Log Base Communication bus/LEDs

Connection status

Inputs and outputs (see fig.: “Solar-Log MOD I/O - Solar-Log Base communication bus/LEDs” under 1):

The LEDs indicate the current status of the inputs and outputs.

Communication between the Solar-Log MOD I/O and the Solar-Log Base (see fig.: “Solar-Log MOD 485 - Solar-Log Base communication bus/LEDs” under 2):

LED (green):

- Everything is ok with the communication between the Solar-Log MOD I/O and the Solar-Log Base.

LED (orange/red):

- There is a communication problem between the Solar-Log MOD I/O and Solar-Log Base. This may cause limited functionality.

Communication via the communication bus (see fig.: “Solar-Log MOD I/O - Solar-Log Base communication bus/LEDs” under 3):

The connectors between the Solar-Log MOD I/O and the Solar-Log Base indicate the current communication status for each individual function. Green means there is a connection and everything is ok.

There is a communication problem between the Solar-Log Base and Solar-Log MOD I/O. if one or more of these connectors are orange or red. This may cause limited functionality.

Note!

Please contact our support if the communication problem persists over a longer period.

1.5 Install & configure Smart Energy functions

The MOD I/O modul extends the functions of the Solar-Log Base by providing eight digital inputs and outputs that can be used to control devices such as heat pumps with SG Ready interfaces or heating elements (and other electrical consumer). The use of the digital outputs for Smart Energy and the configuration of the SG Ready interface to maximize self-consumption of surplus PV power is described here.

Very Important!
To be able to use the Smart Energy functions, the MOD I/O must be recognized as a switch. To do this, you must go to the device detection of the Solar-Log Base. Call up the menu item "Configuration / Devices / Definition / Interfaces". Select Add entry via the "Plus symbol", then device class "Switch", manufacturer "Solar-Log" and type "MOD I/O", then confirm with "OK" and start detection. The Smart Energy functions are then available to you.

What is SG Ready?

SG Ready is a standard for controlling electrical consumers using external signals, such as surplus PV energy. With the SG Ready interface, consumer (e.g. heat pumps, heating elements, etc.) can be operated in four different operating states. The states are described below using the example of a

Heat pump as a consumer:

- State 1:
  Blocked operation (1:0) - The heat pump is deactivated for a defined time (max. two hours per day), for example to avoid peak loads.
- State 2:
  Normal operation (0:0) - The heat pump operates in energy-efficient normal mode, without special optimization.
- State 3:
  Switch-on recommendation (0:1) - The heat pump is recommended to run in order to convert excess electricity into thermal energy, e.g. to heat up the hot water tank.
- State 4:
  Start command (1:1) - The heat pump is actively switched on to run when there is a high PV surplus and to significantly increase the water temperature if necessary.

Integration into the Smart Energy function:
By integrating the SG Ready interface into the Smart Energy function of the Solar-Log system, the operation of the consumer can be automated. It is controlled via the digital outputs of the Solar-Log MOD I/O modul, whereby the load is activated depending on the PV surplus.

Application examples heat pump + hot water storage tank:

- State 3 (switch-on recommendation):
  Activated when the PV system generates more than (for example) 1500W surplus. The heat pump uses this energy to heat the hot water storage tank.
- State 4 (start command):
  Activated when the surplus is above (for example) 3000W. The heat pump heats the hot water tank to a higher temperature to store the surplus energy.

Setting up the SG Ready function with Smart Energy

Connecting the electrical consumers to the Solar-Log Mod I/O module

Connect the SG Ready interface contacts of the heat pump to the digital outputs of the Solar-Log Mod I/O modul. The outputs DIO1 to DIO4 (pins 12, 11, 10 and 9) can be used for this.

Exemplary allocation:

- Pin 12 (DIO1) - Is used to transmit the start command (state 4) to the consumer.
- Pin 10 (DIO3) - Controls the switch-on recommendation mode (state 3) of the consumer.

Configuration on the Solar-Log web interface

Open the Solar-Log Base web interface and go to Configuration | SmartEnergy.
Create a new switching group for the consumer and allocate the digital outputs (e.g. DIO1 for the start command) to the respective switching group.

Define the surplus thresholds for activating the various operating modes:

- Surplus over 1500W: Activation of DIO3 for the switch-on recommendation mode.
- Surplus over 3000W: Activation of DIO1 for the start command.

Use of the digital outputs for other electrical consumers

Connecting the electrical consumer to the Solar-Log Mod I/O module

Connect the electrical consumer to the digital outputs DIO5 to DIO7 (pins 7, 6, 5) to enable multi-level control.

Example allocation:

- Pin 7 (DIO5) - Activates the first stage when there is a small surplus.
- Pin 6 (DIO6) - Activates the second stage with medium surplus.
- Pin 5 (DIO7) - Activates the third stage when there is a large surplus.

Create a switching group for the consumer in the web interface and allocate the corresponding digital outputs (DIO5 to DIO7) to the respective surplus thresholds.
Define the activation thresholds for each stage (e.g. heating stage), for example to efficiently convert the surplus PV power into other energy (e.g. heat).

Monitoring and optimization

Real-time monitoring

- Monitor the status of the consumer in the live data overview of the Solar-Log web interface. You can see in real time when which operating states are activated and how much electricity is being used.

Troubleshooting

- In the event of malfunctions or unexpected device behavior, check the wiring of the digital outputs and the pin assignment of the Solar-Log Mod I/O modul.
- Also check whether the configured threshold values for the switching logic correspond to the actual PV production.

1.6 Install and configure feed-in management functions (ripple control receiver)

For information on the feed-in management settings, how they work and their implementation in conjunction with the specifications of the grid operators and in particular VDE 4110, see the Manual - Feed-In Management Control, which can be downloaded from our homepage:
Manual - Feed-In Management Control

2 Solar-Log MOD 485 modul

2.1 Installation, mounting, connecting the modul

Important!

Disconnect the power from the Solar-Log Base before installing the Solar-Log MOD 485 module!

After the initial installation of the Solar-Log MOD 485 extension modul with the Solar-Log Base, the Solar-Log Base checks the firmware version on the Solar-Log MOD 485; if this matches the Solar-Log Base, the Solar-Log MOD 485 goes into standby mode. (Recognizable when the lower LED lights up green)
The components can then be connected to the Solar-Log MOD 485.
If the Solar-Log Base detects a difference between the firmware versions, an update is carried out automatically. This can be recognized by the LED triangles on the RS485 interfaces, which also serve as a progress indicator. If all LED triangles light up, the Solar-Log MOD 485 goes into standby mode and the bottom LED lights up green.

VERY IMPORTANT!

Do **not** under any circumstances disconnect the Solar-Log Base and the Solar-Log MOD 485 during an **active** firmware update (lower LED is orange), as otherwise the Solar-Log MOD 485 will get stuck during the start-up process (LED lights up red) and can then no longer be switched to standby status!

Connection Solar-Log Base - Solar-Log MOD 485

To establish a connection between the Solar-Log Base and the Solar-Log MOD 485, use the enclosed bus connectors. (See illustrations below)

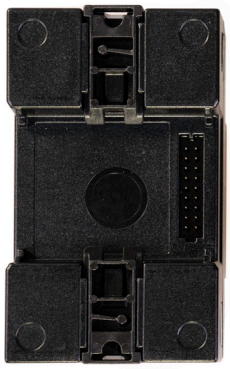

Fig.: Solar-Log Base / Solar-Log MOD 485 without a bus connector

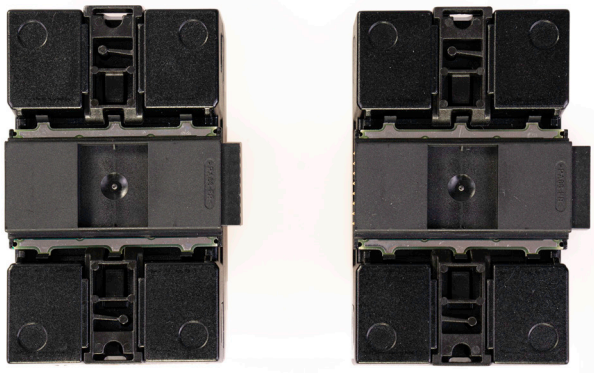

Fig.: Solar-Log Base / Solar-Log MOD 485 with a bus connector

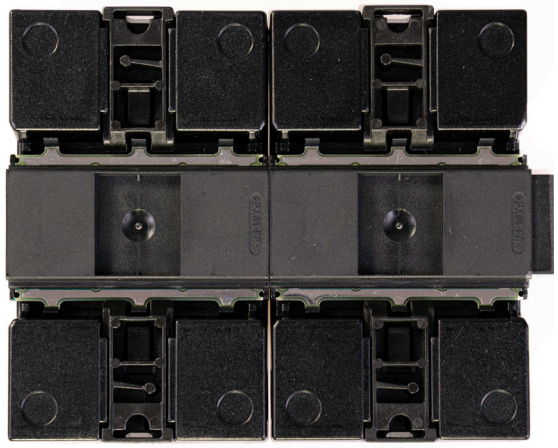

Fig.: Solar-Log Base / Solar-Log MOD 485 with a bus connector joined together.

Technical data

Device voltage	24V (+-5 %), if required 12V (+-5 %)
Cable cross-section	► Solid conductor: 0.2 to 1.5 mm² ► Fine-stranded conductor: 0.2 to 1.5 mm² ► With ferrules: 0.14 to 1.0 mm² (ferrules should be used with fine-stranded conductors).
Stripping length	8.5 - 9.5 mm, with ferrules ≤ 6 mm
Device power	2.4 W (Solar-Log Base) with additional modules higher
Dimensions (WxHxD) in mm	53,6 x 89,7 x 60,3

2.2 PIN assignment

PIN assignment - top side

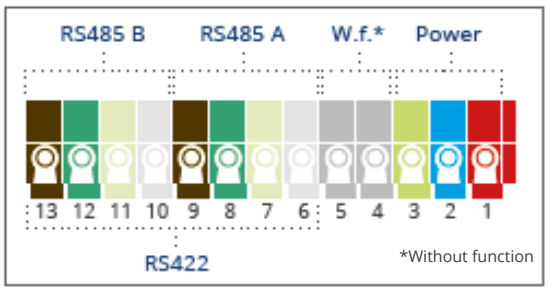

Fig.: Solar-Log MOD 485 connections - 2 x RS485 (A and B) or 1 x RS422

Solar-Log MOD 485 Top connections	
2 x RS485 or 1 x RS422	Connection for accessories according to component connection manual.
1 x Power	Connection pins for power supply

Note

The software automatically switches between the RS485 and the RS422 interface assignment.

Note

Only one Solar-Log MOD 485 can be connected to the Solar-Log Base.

Color Legend

Color	Meaning
Red	Power supply
Blue	GND
Light green	Functional ground
White	Input (Data+, TX+/RX+, A+)
Yellow	24 V / (12V)*
Olive green	GND*
Brown	Output (Data-, TX−/RX-, B-)

*Power connection for external components, depending on the 24V / 12V power supply unit used.

PIN assignment	RS485-A/B	RS422	Power
Pin	Assignment	-	
1 (Red)	-	-	V_{in} 24 V_{DC} / (12 V_{DC})
2 (Blue)	-	-	Ground
3 (Light green)	-	-	Functional ground
4 (Gray)	-	-	
5 (Gray)	-	-	
6 (White)	Data+	T/RX +	
7 (Yellow)	24 V / (12V)	24 V / (12V)	
8 (Olive green)	GND	GND	
9 (Brown)	Data -	T/RX -	
10 (White)	Data +	R/TX +	
11 (Yellow)	24 V / (12V)	-	
12 (Olive green)	GND	-	
13 (Brown)	Data-	R/TX -	

Important Note!

As the RS485 interfaces on the MOD 485 module are not current-carrying, an appropriate power supply unit must be connected to the MOD 485 module if required.

PIN assignment - bottom side

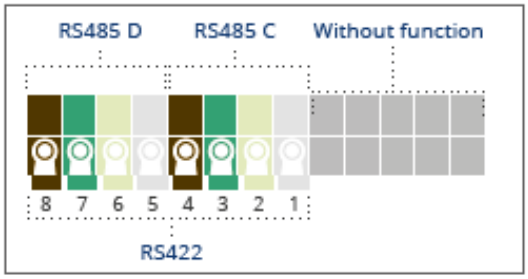

Fig.: Solar-Log MOD 485 connections - bottom side

Solar-Log MOD 485 - Bottom side	
2 x RS485 or 1 x RS422	Connection for accessories according to component connection manual.

Note

For wall mounting, it is essential to use a piece of top-hat rail to stabilize the bus connectors. In any case, it should be ensured that a top-hat rail TH 35 / 7.5 or TH 35 / 15 according to IEC/EN 60715 is used.

PIN assignment	RS485-C/D	RS422
Pin	Assignment	-
1 (Red)	Data+	T/RX+
2 (Blue)	24 V / (12 V)	24 V / (12 V)
3 (Light green)	Ground / GND	Ground / GND
4 (Gray)	Data-	T/RX-
5 (Gray)	Data+	T/RX+
6 (White)	24 V / (12 V)	-
7 (Yellow)	Ground / GND	-
8 (Olive green)	Data-	T/RX-

Device definition with the extension module - Solar-Log MOD 485

When using the expansion module - Solar-Log MOD 485, the new interfaces can be selected separately via the menu item Configuration | Devices | Definition | Interfaces.
The exact procedure for the device definition itself is described in the chapter „Device definition“.
The following point is important here: via the „Interface“ selection menu item, you can switch between the Solar-Log Base interfaces (selection via „Internal“) and the interfaces of the expansion module - Solar-Log MOD 485 (selection via „Mod 485“) can be distinguished. (See the following figures).

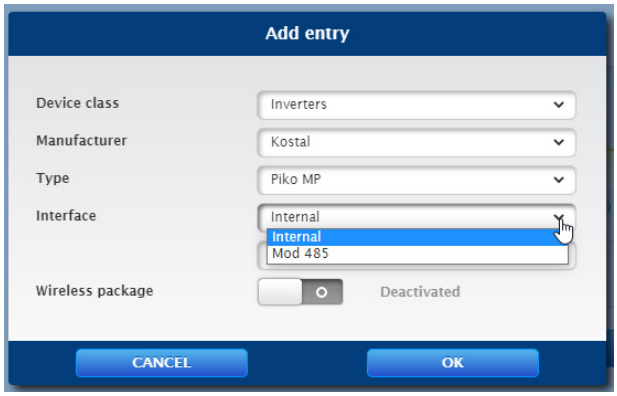

Fig.: Example - Interface selection between Solar-Log Base (Internal) and MOD 485 (Mod 485)

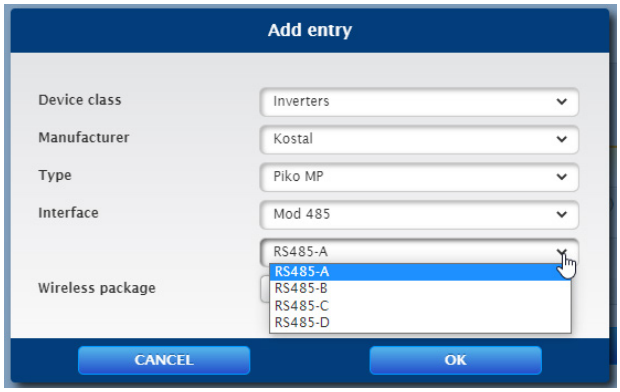

Fig.: Example - Interface selection MOD 485 and RS485

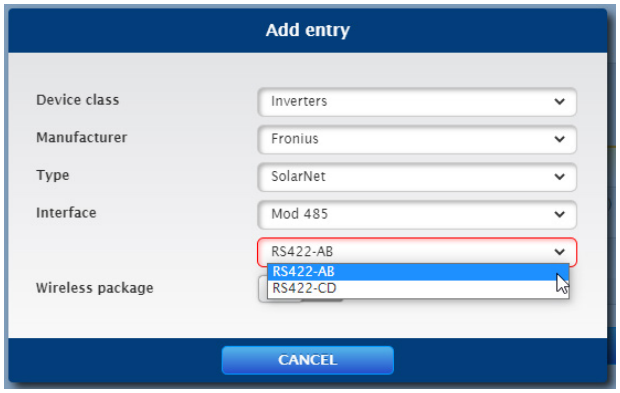

Fig.: Example - Interface selection MOD 485 and RS422

Note

Simultaneous use of RS485 and RS422 on the same interface is not possible.

For a detailed description of device detection, please refer to the Solar-Log Base manual. Download it from our homepage.

2.3 Diagnosis and status

The status of the Solar-Log MOD 485 can be checked in the Diagnostics menu under “Expansion modules” (see illustration “Solar-Log MOD 485 - Solar-Log Base Communication bus/LED” and the corresponding sections below). With a mouse-over, you can see the real-time transferred values between the Solar-Log MOD 485 and the Solar-Log Base (see illustration “Communication between the Solar-Log MOD 485 and Solar-Log Base”).

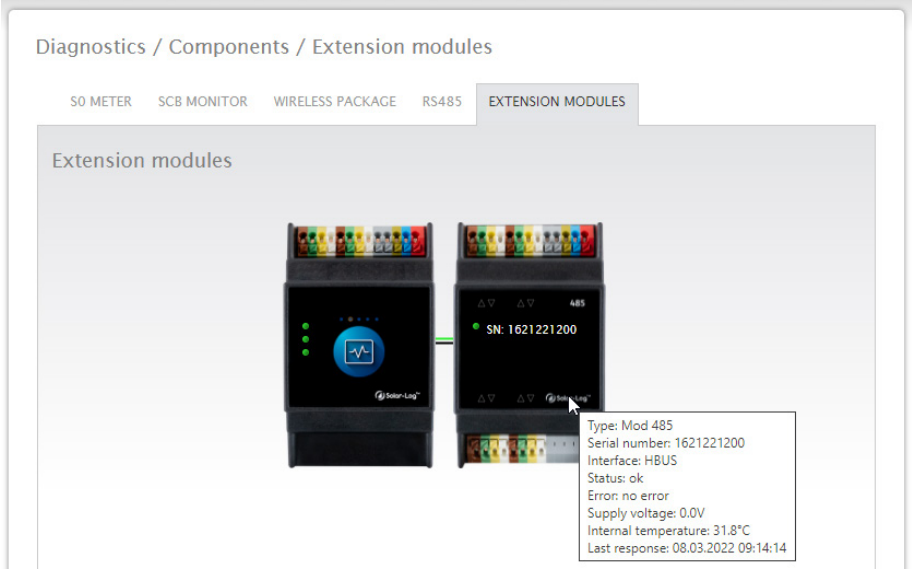

Fig.: Communication between the Solar-Log MOD 485 and Solar-Log Base

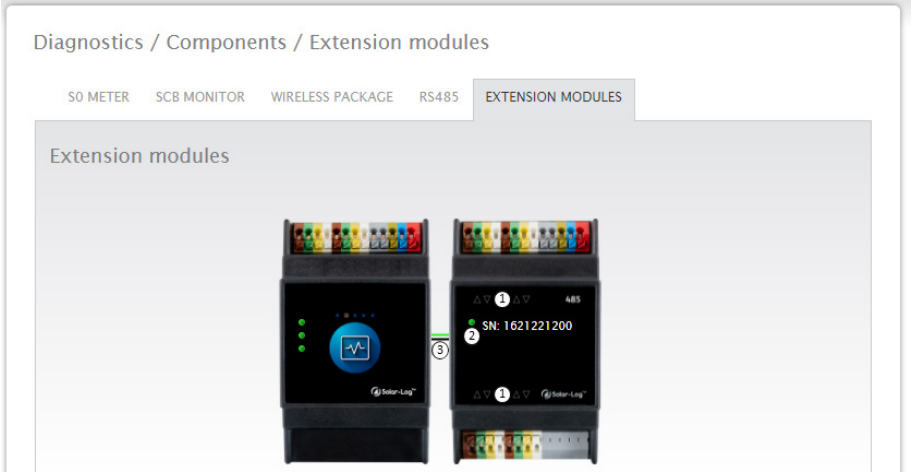

Fig.: Solar-Log MOD 485 - Solar-Log Base Communication bus/LEDs

Note

The Solar-Log MOD 485 can only be used with Solar-Log Base firmware 6.x or higher.

2.4 LED

Inputs and outputs (see fig.: “Solar-Log MOD 485 - Solar-Log Base communication bus/LEDs” under 1):
The LEDs indicate the current status of the inputs and outputs.

Communication between the Solar-Log MOD 485 and the Solar-Log Base (see fig.: “Solar-Log MOD 485 - Solar-Log Base communication bus/LEDs” under 2):

LED on top:

- Green = Power on

LED middle:

- Flashing green when there is traffic on the bus between Solar-Log and MOD485.

LED bottom:

- Red during boot process of the MOD485.
  During the boot process, the Solar-Log Base checks whether an update is necessary for the MOD485 module.
  During the check the LED is red.
- Boot process finished - no update necessary = LED goes to green
- Boot process finished - update necessary and will be executed directly = LED goes to orange
- Status of the update can be read via the arrow LEDs (all 8 LEDs on 100 %)

Communication via the communication bus (see fig.: “Solar-Log MOD 485 - Solar-Log Base communication bus/LEDs” under 3):
The connectors between the Solar-Log MOD 485 and the Solar-Log Base indicate the current communication status for each individual function. Green means there is a connection and everything is ok.
There is a communication problem between the Solar-Log Base and Solar-Log MOD 485. if one or more of these connectors are orange or red. This may cause limited functionality.

Note!

Please contact our support if the communication problem persists over a longer period.

Note!

The LED arrows (see figure „Solar-Log MOD 485 - Solar-Log Base communication bus/LEDs“ under 2) light up for the respective occupied interface.

► If the communication is OK, the LED arrows light up green.

3 Combination option Solar-Log Base and Expansion modules

3.1 Combination Solar-Log Base - Solar-Log MOD I/O & Solar-Log MOD 485

With the Solar-Log MOD I/O it is possible to use the entire range of feed-in management control, while with the Solar-Log MOD 485 there is the possibility of interface expansion (see chapter Solar-Log MOD 485 above). The combination allows the complete range of functions of the modules to be used for the Solar-Log Base.
(See the figures below)

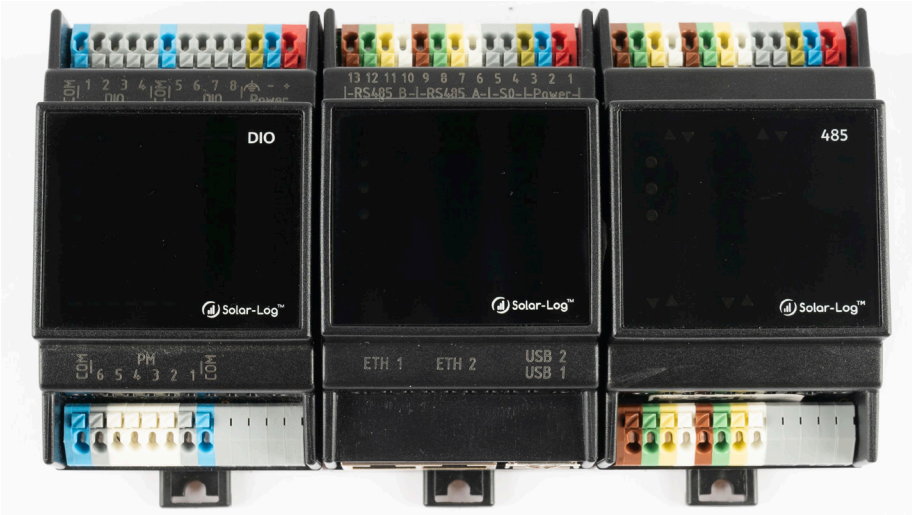

Fig.: Combination Solar-Log Base with Solar-Log MOD I/O and Solar-Log MOD 485 (Connected - front side)

Fig.: Combination Solar-Log Base with Solar-Log MOD I/O and Solar-Log MOD 485 (Connected - back side)

Note

Only one Solar-Log MOD I/O and one Solar-Log MOD 485 can be connected to the Solar-Log Base at a time.

► This results in the combination option shown above.

4 List of figures

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