Solar-Log™

EN Manual V.3.6.0.G

Solar-Log™

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1 Introduction

This installation manual is intended for use by solar energy technicians and professional electricians, as well as Solar-Log™ users. It should be noted that the installation and commissioning of the individual components is only to be performed by properly trained specialists. Refer to Chapter 4 "Safety information" for more information.

The wiring for the devices is described in detail in the Component Installation Manual.

The Solar-Log™ must only be used by persons who have fully read and understood the manual before installing, operating and/or servicing the device.

Our product documentation is being constantly updated and expanded.
The current versions of the documents can be downloaded from our website:
https://www.solar-log.com/en/support/downloads

The descriptions in this manual refer to firmware version 3.6.0

Security information!

Update the Solar-Log™ immediately to firmware 3.6.0 build 89 to protect it from security risks and define a user password.

2 Notes for the Firmware Update

The following models may be updated to the Solar-Log Firmware Version 3.6.0.

- Solar-Log^{200}
- Solar-Log 250
- Solar-Log 300
- Solar-Log^{500}
- Solar-Log^{1000}
- Solar-Log 1200
- Solar-Log 2000

3 Updating from Firmware 2.x to 3.x

The following note is for the Solar-Log 200, 500 and 1000 models when updating to firmware version 3.x. In order to update to 3.x, the Solar-Log™ must at least be running firmware version 2.x. The latest firmware can be downloaded from our website:
https://www.solar-log.com/en/support/firmware/

Note!

After installing firmware 3.x, it is no longer possible to downgrade to the previous versions. It is not possible to install older firmware versions.

The following changes occur when upgrading to 3.x:

- The data transfer function is no longer available.
- The Smart Energy section has been completely revised. If the function External Switch (only Solar-Log 1000) is used, this part needs to be reconfigured after the update.
- The settings and function of the power management have to be checked and, if need be, reconfigured.
- With the new modern web interface, old web browsers might sometimes cause problems with the functionality. We recommend using the current version of Mozilla's Firefox, Google's Chrome, Microsoft Edge or Microsoft's Internet Explorer.

As part of the update, the Solar-Log™ has a data reformatting process running in the background. This process starts once the update is finished. This process could last several hours and the Solar-Log™ will operate and react slower until the update finishes.

4 Safety information

In order to protect people, the product itself, and other equipment, please pay attention to the following before handling the product:

- the content of this manual,
- the safety information,
- the warning signs and type plates attached to the product.

This manual is intended for solar energy technicians and qualified electricians who are installing a Solar-Log 250 (read the additional information below), 300, 1200 and 2000, wiring them to inverters, configuring them to operate in particular systems, and putting them into operation.

All the actions described in this manual for wiring and working on inverters must be carried out only by specially trained electricians. All repairs should only be carried out by similarly trained personnel, or by the manufacturers themselves.

Solare-Datensysteme GmbH is not liable for any personal injuries, property damages and system malfunctions and their consequences which result from not adhering to the product documentation.

Note!

The Solar-Log 300 functions described in this manual are essentially identical to those of the Solar-Log 250. Refer to the Solar-Log 250 data sheet for the differences.

4.1 Hazard Classes

The safety instructions in this document are represented with standard signs and symbols. Two classes of risk are identified, depending on their probability of occurrence and the seriousness of their consequences.

Danger!

Indicates an imminently hazardous situation to life
Non-compliance with this warning can lead to severe and irreversible injuries or death

Caution!

Indicates an imminently hazardous situation to people, or a risk of material damage
Non-compliance with this warning can lead to irreversible injuries or to material damage.

5 Electric current

Danger!

Risk of death by electric shock if inverters are opened.
Never open the inverter housing when the inverter is connected to power.
See Switching off the inverters on page 38.
Always read the installation and safety instructions given in the manual for the corresponding inverter.

Danger!

Danger of death if there is condensation in the power supply unit when started!
Condensation can occur if the power supply unit is moved directly from a cold environment to a warm environment.
Wait until the temperatures have equalized before doing this.

Caution!

Damage to the electrical components in inverters and on interface cards due to electrostatic discharge.
Avoid contact with component connections and plug contacts.
Before picking up the component, ground yourself by holding the protective conductor (PE) or the unpainted part of the inverter housing.

Caution!

Damage to the electrical components of the Solar-Log™ due to the wiring of the Solar-Log™!
Switch the Solar-Log™ off;
See Chapter 11.1 on page 38

Caution!

Risk of electric shock.
Do not use the unit if the housing of the external power supply unit is damaged. A damaged power supply unit must be replaced by one of the same type and from the same manufacturer in order to avoid danger.

Caution!

The Solar-Log™ may only be used indoors or enclosed spaces.
The device has the protection class IP20.

6 Package contents

Check the package contents before proceeding to assembly and install.

Report any damage or missing parts to the forwarding agent and dealer immediately.

The unit is supplied with the following components:

- Solar-Log™ basic unit
- 2x cover panels to be fitted to the top and bottom of the unit to protect the connections and reset button
- 12 V power supply with country-specific adapters
- Terminal block connector for all connections
- 4x wall plugs and screws for wall mounting

7 Wall mounting

The device is produced according to protection class IP20 and is intended only for installation in interior areas that are dry and dust-free.
Suitable wall plugs and screws are supplied for wall mounting.

Please remember that an electrical outlet and a local network connection are required near the Solar-Log™ in order for it to operate. GPRS and WiFi models do not require the network connection.

- Put the housing where it is to be fitted and mark the drill holes.

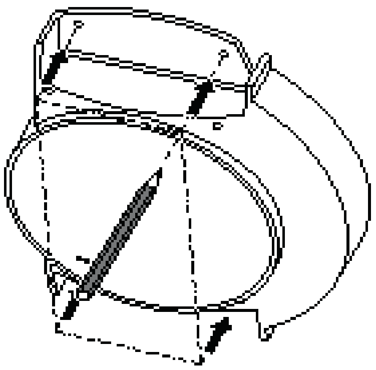
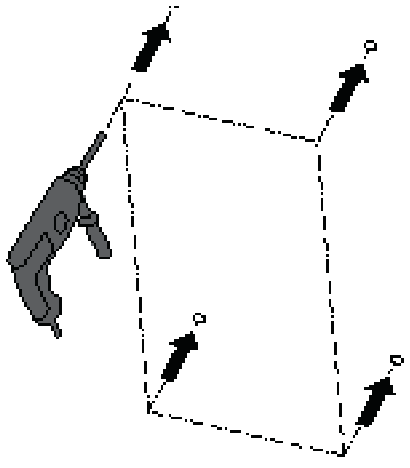


Fig.: Solar-Log™ wall mounting

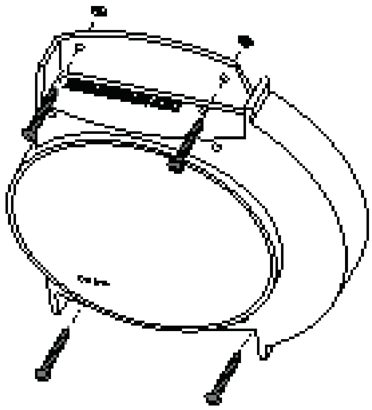
- The Solar-Log™ should be fitted in an easily accessible place.
- Drill the holes and insert the wall plugs
- The information on dimensions of the case and the mounting points is in chapter 26.6 on page 315



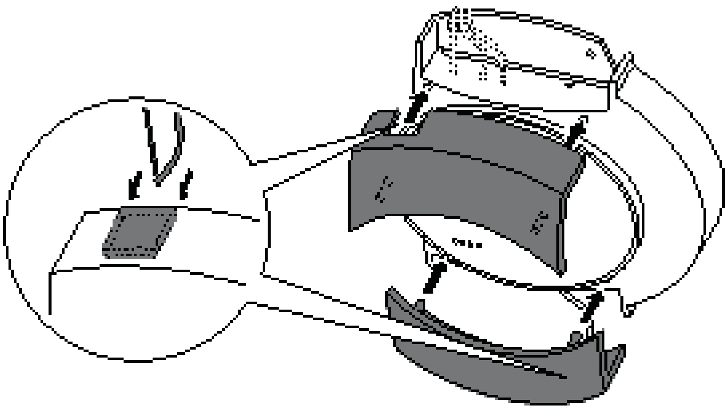
Note! concerning
Solar-Log™ GPRS

The SIM card should be inserted before attaching the unit, as the insertion slot will no longer be accessible after wall mounting.

- Fasten the housing with the screws



- Cable feed through – top and/or bottom covers.
  Using a file or a saw, clear the cable feed holes.
  The top and bottom covers are identical.
- Plug all cable connectors into their connections.
- Attach the covers



8 Unit connections

8.1 Solar-Log 300 / Solar-Log 250

Top connections

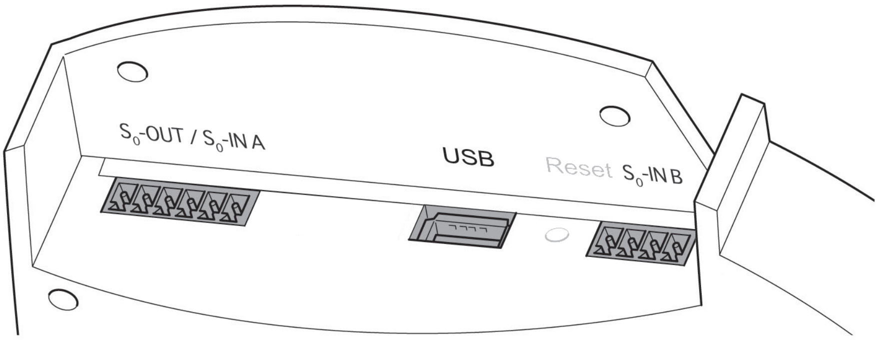


Fig.: Top Connections Solar-Log 300

Solar-Log 300* / Solar-Log 250	
S0-Out S0-IN A*	S0 pulse output for connecting to a large external display. S0 pulse input for connection to an external power meter. Please note the connection characteristics of the S0 connection.
USB	USB connection. Suitable for USB sticks. Not suitable for a connection to a PC
S0-IN B	S0 pulse input for connection to an external power meter.

*Only the Solar-Log 300 is equipped with this connection.

Bottom connections

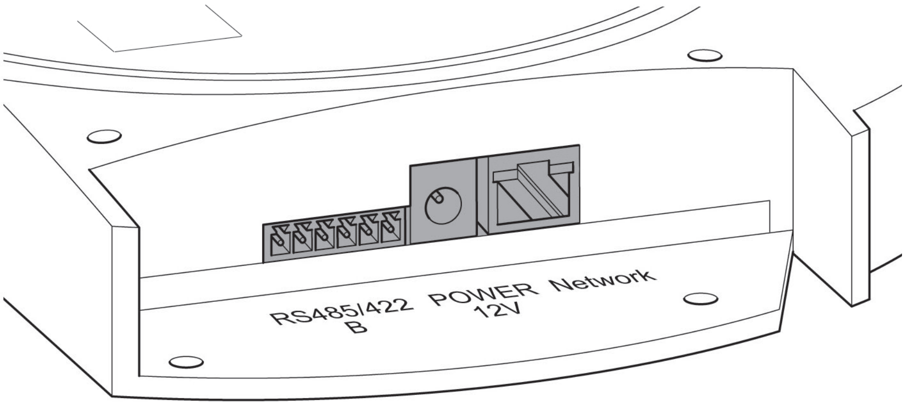


Fig.: Bottom connections Solar-Log 300

Solar-Log 300 / Solar-Log 250	
RS485/422 - B	RS485 interface, 6 pin: Connection for inverters and additional accessories
Power 12 V	12 volt DC input
Network	Ethernet network interface, 10/100 Mbit

8.2 Solar-Log 1200

Top connections

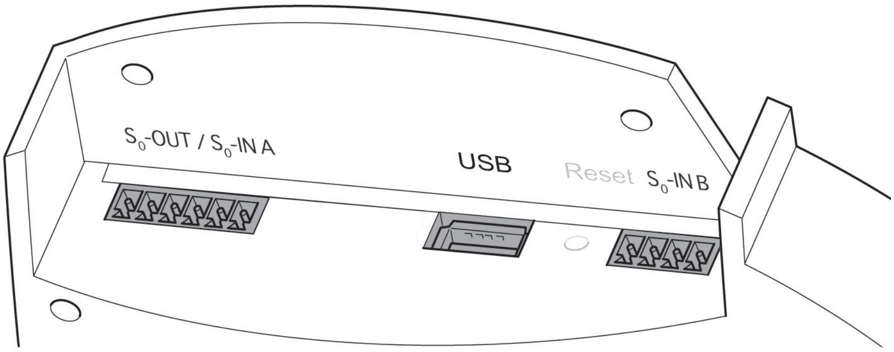


Fig.: Top Connections Solar-Log 1200

Solar-Log 1200	
S0-Out S0-IN A	S0 pulse output for connecting to a large external display. S0 pulse input for connection to an external power meter. Please note the connection characteristics of the S0 connection.
USB	USB connection. Suitable for USB sticks. Not suitable for a connection to a PC
S0-IN B	S0 pulse input for connection to an external power meter.

Bottom connections

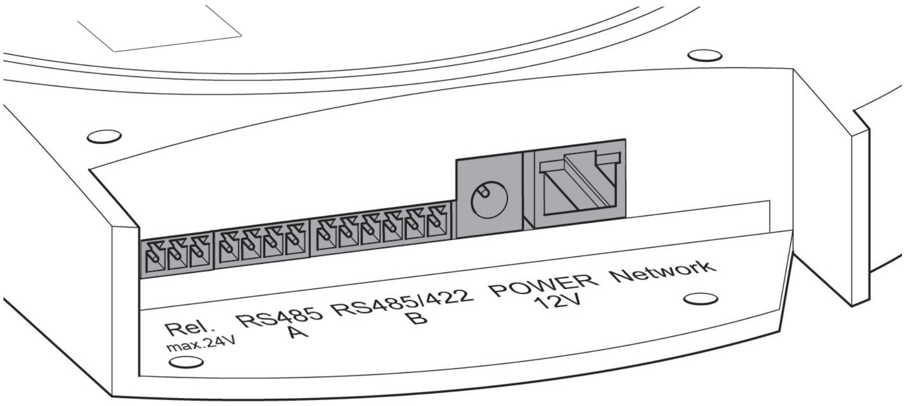


Fig.: Top Connections Solar-Log 1200

Solar-Log 1200	
Relay	Relay with change-over contact
RS485 - A	RS485 interface, 4 pin: Connection for inverters and/or accessories (inacti-ve if the optional Bluetooth interface is used)
RS485/422 - B	RS485 interface, 6 pin: Connection for inverters and additional accessories
Power 12 V	12 volt DC input
Network	Ethernet network interface, 10/100 Mbit

8.3 Solar-Log 2000

Top connections

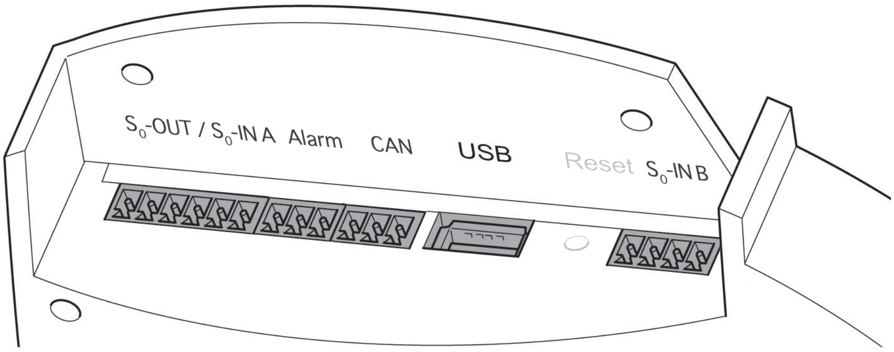


Fig.: Top Connections Solar-Log 2000

Solar-Log 2000	
S0-Out S0-IN A	S0 pulse output for connecting to a large external screen. S0 pulse input for connection to an external power meter. Please note the connection characteristics of the S0 connection.
Alarm	Connection for contact strip for anti-theft protec-tion.
CAN	CAN bus — which, for example, can be used to connect Voltwerk, Conergy or Suntechnics inverters
USB	USB connection. Suitable for USB sticks. Not suitable for a connecti-on to a PC
S0-IN B	S0 pulse input for connec-tion to an external power meter.

Bottom connections

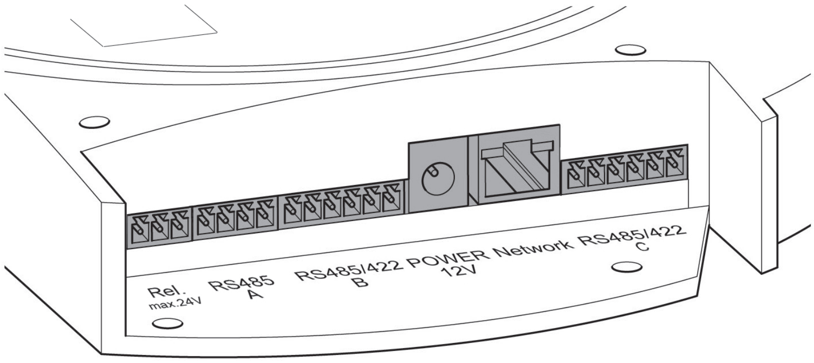


Fig.: Top Connections Solar-Log 2000

Solar-Log 2000	
Relay	Relay with change-over contact
RS485 - A	RS485 interface, 4 pin: Connection for inverters and/or accessories (inacti-ve if the optional Bluetooth interface is used)
RS485/422 - B	RS485 interface, 6 pin: Connection for inverters and additional accessories
Power 12 V	12 volt DC input
Network	Ethernet network interface, 10/100 Mbit
RS485/422 - C	RS485 interface, 6 pin: Connection for inverters and additional accessories => It is not possible to connect a large external display on this interface.

9 Optional Connections

Solar-Log™ devices are available as different models which can be equipped accordingly with additional interfaces and connections depending on the application.

9.1 Solar-Log™ GPRS

Antenna connection and SIM card slot

In addition to the connections on the standard Solar-Log™, the Solar-Log™ GPRS model with an integrated GPRS modem has a SIM card slot and a screw connection for an antenna.

- Insert the SIM card in the slot on the rear right, inside the Solar-Log™ GPRS

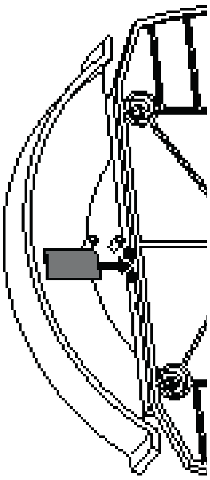


Fig.: Insertion slot for SIM card inside on the right (Solar-Log™ GPRS)

- Screw the external antenna into the antenna connection on the bottom of the unit. Find a suitable position with good reception quality for the magnetic base antenna.

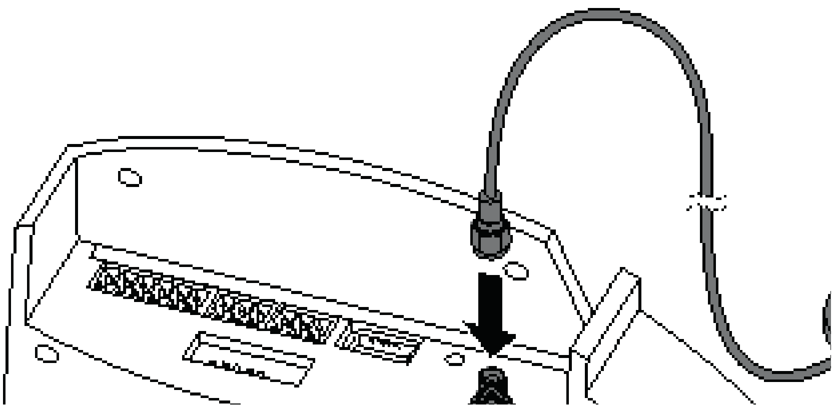


Fig.: Antenna connection on the top of the device (Solar-Log™ GPRS)

Note!

We recommend checking and cleaning SIM cards once a year.
The contact points of the SIM card could start corroding due to humidity and should be cleaned regularly to ensure trouble-free operations.

9.2 Solar-Log™ Meter (Solar-Log 300 and 1200)

The Solar-Log Meter version of the Solar-Log™ has an integrated interface to connect up to six current transformers (CTs). This optional Meter interface makes it possible to measure generating units (production meter) and consumption from individual appliances.

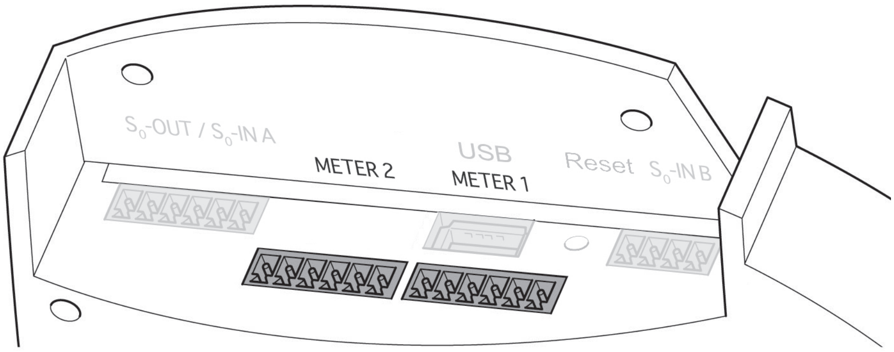


Fig.: Connection for current transformers (Solar-Log™ Meter)

The current transformers (CTs) can record the current flow (AC) of one or two phase appliances in various combinations. The output is calculated based on a defined reference voltage or one calculated by the Solar-Log™.

Note!

With the Solar-Log 300 and 1200 Meter, the mounting direction of the current transformer (CT) is not relevant because the energy flow direction cannot be defined. It lacks a direct voltage measurement.

Combinations:

- 2x3 Phases
- 1x3 Phases + 3x1 Phase
- 6x1 Phase
- 3x2 Phases
- 2x2 Phases + 2x1 Phase
- 1x2 Phases + 4x1 Phase

The current transformers have to be connected to the Meter interface with the secondary side.

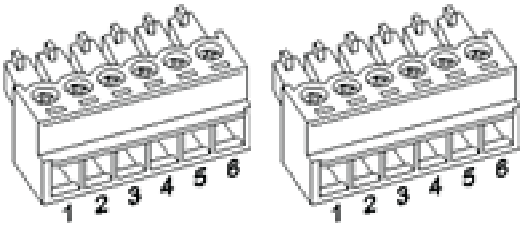


Fig.: Two 6-pin terminal block connectors for the Meter interface

Solar-Log™ Meter 1			
Interface	PIN	Description	Label Current transformer
Meter 1	1	Current transformer/CT 1a	S1/k
	2	Current transformer/CT 1b	S2/i
	3	Current transformer/CT 2a	S1/k
	4	Current transformer/CT 2b	S2/i
	5	Current transformer/CT 3a	S1/k
	6	Current transformer/CT 3b	S2/i

Solar-Log™ Meter 2			
Interface	PIN	Description	Label Current transformer
Meter 2	1	Current transformer/CT 1a	S1/k
	2	Current transformer/CT 1b	S2/i
	3	Current transformer/CT 2a	S1/k
	4	Current transformer/CT 2b	S2/i
	5	Current transformer/CT 3a	S1/k
	6	Current transformer/CT 3b	S2/i

Characteristics of the Meter interface

The current transformer may not exceed a maximum output or secondary current of 200 mA. The input / rated current is calculated by the maximum amount of power that is to be measured and has to be selected for each measuring point.
The current transformer's rated measuring ratio can be defined for each current transformer input.

The current transformers have to be set up in a way so that only one current-carrying conductor is measured. Cables with multiple wires cannot be measured.

The maximum cable length between the current transformers and Solar-Log™ depends on the cable diagram and the load of the current transformer.

We recommend a maximum cable length of 30 meters with a diameter of 0.75 mm² for our products.

For other current transformers, please consult the manufacturer's specifications in regard to cable length and the wiring diagram.

Note!

Due to the lack of a voltage supple for the measurements, only the apparent power – not the active power – is measured. Since in most cases the active power should be measured, we recommend measuring with a power meter when there is a large percentage of reactive power.

Current transformers from Solare-Datensysteme GmbH

Solare-Datensysteme offers the following current transformers that are specially tailored to the Solar-Log™ Meter:

Current transformer		
Name	Description	Article Number:
Solar-Log™ CT 16 A	Current measurement 16 A, transformer: 16A/ 200mA	255639
Solar-Log™ CT 100 A-c	Current measurement 100 A, transformer: 100A/ 200mA sealed transformer	255640
Solar-Log™ CT 100 A-o	Current measurement 100 A, transformer: 100A/ 200mA open transformer (folding mechanism)	255638

9.3 Solar-Log™ PM+

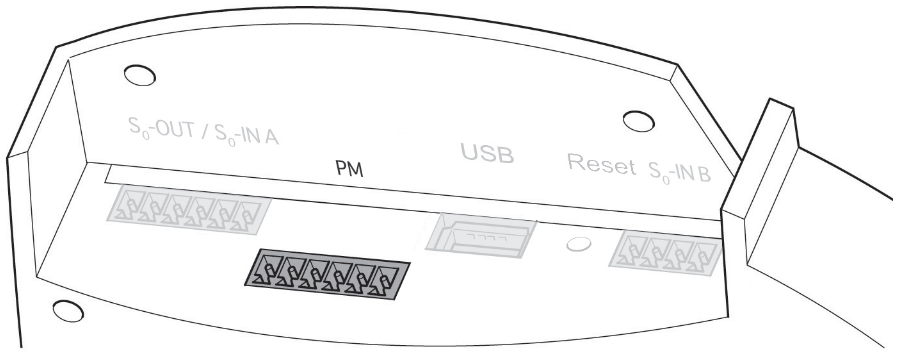


Fig.: 6-pin PM+ interface

PM+

PIN	Assignment	Description
1	+5V	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	+5V	Control voltage for reactive power reduction

10 Connector Assignments and Wiring

The following connecting cables, which may be needed for various purposes, are not included in the package content.

- To connect a router, you need a network cable with the appropriate length. If you want to connect the Solar-Log™ directly to your PC or laptop, you need to use a crossover cable.
- Cable to connect the Solar-Log™ to an inverter.
- Sets of prefabricated cables are available as accessories suitable for the inverter concerned. The length of these cable sets is 3 m.
- If you want to connect several inverters to Solar-Log™, you need suitable cables and connectors to connect the inverters to each other.
- For each connection to the Solar-Log™ (RS485 - A and RS485/422 - B or - C) a separate cable must be used.
- When wiring with CAT cables, the twisted pair of wires should be used.

10.1 Notes on wiring the connections

The wiring of the inverters and accessories needs to be carried out with the greatest care and attention. The most frequent source of errors when installing the Solar-Log™ is faulty wiring.

For this reason, we recommend:

- Wiring with high quality cables
  For example: LIYCY >=0.14mm² or Cat 5/7 SSTP
- Refer to the manufacturer's specifications in regard to UV resistance and mounting type when wiring in outside areas.
- A larger cable diameter is recommended for longer distances.
- Use ferrules with flexible wires
- Twist the corresponding wire pairs and shielding
- Wire from left-to-right.
- Wire from light to dark.

Fig.: Example wiring on a 4-pin terminal block connector

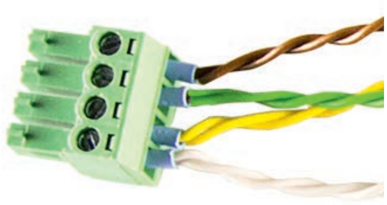


Fig.: Terminal block connector with ferrules

10.2 RS485-A (only Solar-Log 1000, 1200 and 2000)

Use the provided terminal block connectors when connecting inverters or accessories to the RS485 A interface.

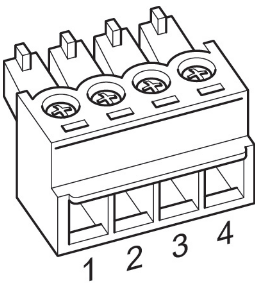


Fig.: 4-pin Terminal block connector

RS485 - A	
PIN	Assignment
1	Data +
2	12 V
3	Ground
4	Data -

10.3 RS485/422 - B

Use the provided terminal block connectors when connecting inverters or accessories to the RS485/422 - B interface.

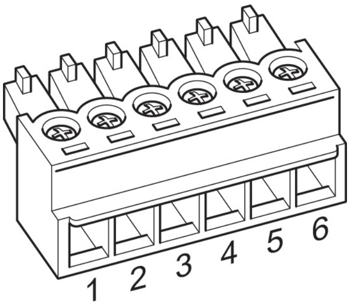


Fig.: 6-pin Terminal block connector

RS485/422 - B		
PIN	Assignments RS485	Assignments RS422
1	Data +	T/RX+
2	12 V	12V
3	Ground	Ground
4	Data -	T/RX-
5		R/TX+
6		R/TX-

Note!

If inverters that use the RS422 connection are connected to this interface (e.g. Fronius, AEG, Riello), then it is not possible to connect accessories such as sensors, meters or displays to this bus.

10.4 RS485/422 - C (only Solar-Log 2000)

Use the provided terminal block connectors when connecting inverters or accessories to the RS485/422 C interface.

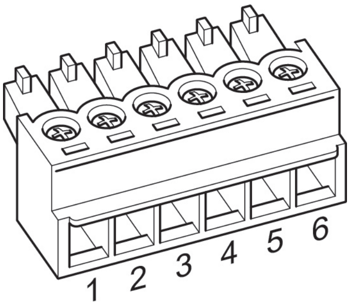


Fig.: 6-pin Terminal block connector

RS485/422 C

PIN	Assignments RS485	Assignments RS422
1	Data +	T/RX+
2	12 V	12V
3	Ground	Ground
4	Data -	T/RX-
5		R/TX+
6		R/TX-

Note!

If inverters that use the RS422 connection are connected to this nterface (e.g. Fronius, AEG, Riello), then it is not possible to connect accessories such as sensors, meters or displays to this bus.

10.5 S0

Solar-Log™ devices are equipped with the following S0 interfaces:

- combined S0_OUT_IN interface (S0-OUT and S0-IN) and
- S0-IN (only Solar-Log 300, 1200 and 2000)

10.5.1 S0 OUT / IN A (S0-OUT and S0-IN A)

The S0_OUT_IN interface is a hardware interface used for recording measurement values from power meters and an output for S0 pulses. Use the supplied terminal block connector for the connection to the Solar-Log™.

S0_OUT_IN A	
PIN	Assignment
1	27 mA output
2	27 mA max. input
3	Measuring contact
4	Ground
5	S0 Out+
6	S0 Out-

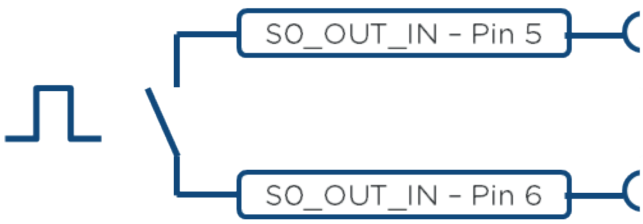


Fig.: Schematic diagram of the S0 output

Note!

We recommend not using the S0 output for sending current feed amount response signals to your grid operator.
Due to the internal calculating processes of the Solar-Log™, there would be a delay in sending the pulses.

10.5.2 S0-IN B

The S0 In interface is a hardware interface used for recording measurement values from power meters. Use the supplied terminal block connector for the connection to the Solar-Log™.

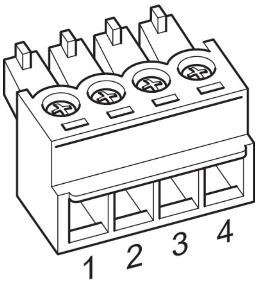


Fig.: 4-pin Terminal block connector

S0-IN B	
PIN	Assignment
1	S0 + Output 27mA
2	S0 - Input max 27mA
3	Measuring contact
4	Ground

Installation instructions for external power meters are also in chapter „12.5 External power meters“ on page 47.

10.6 PM+

The Solar-Log™ PM+ models come with a 6-pin PM+ interface on the top side of the Solar-Log™.
The interface has been designed to link the ripple control receivers or telecontrol plants with potential-free signal contacts. Up to two ripple control receivers can be connected. This allows the commands from grid operators for active and reactive power to be interpreted.

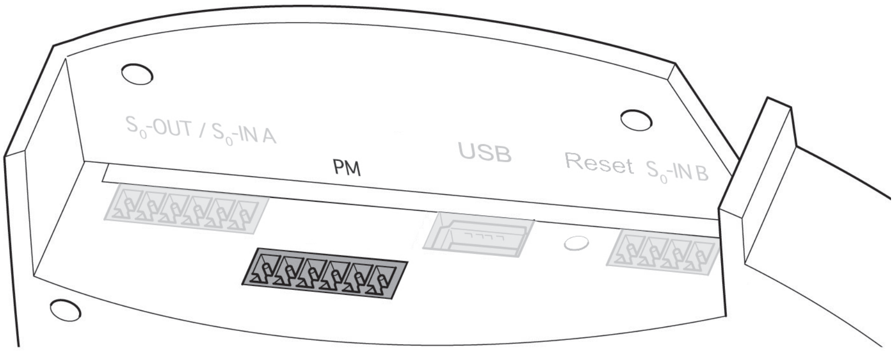


Fig.: 6-pin PM+ interface

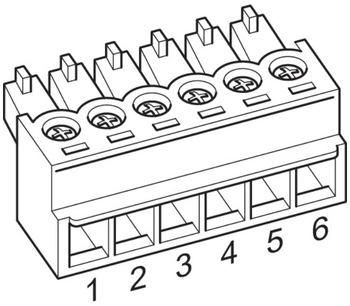


Fig.: 6-pin Terminal block connector

PM+		
PIN	**Assignment**	**Description**
1	+5V	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	+5V	Control voltage for reactive power reduction

To provide the highest possible flexibility, the individual active and reactive power values can be assigned to inputs D_IN_1 to D_IN_4

See Chapter „Feed-In Management"for more information
See the appendix for more ripple control receiver connection examples

11 Connecting the inverters

As each inverter manufacturer uses different wiring connections and connectors, the corresponding data cables must be adapted correctly.

- See Chapter„Connector Assignments and wiring“ for terminal block connector wiring diagrams for the connection to the Solar-Log™
- Please refer to the Component Connection Manual when connecting inverters supported by the Solar-Log™.

Note!

Solare Datensysteme GmbH supplies suitable connection cables for most inverter manufacturers.

Always read the manufacturer-specific instructions for connecting the data cable. You will find these instructions in the manufacturer's documentation.
However, when assigning the inverter wiring on the Solar-Log™, follow the instructions in this manual, otherwise the inverters will not be detected by Solar-Log™.

Danger!

Risk of death by electric shock if inverters are opened.
Never open the inverter housing when the inverter is connected to power.
See the chapter "Switching inverters off."
Always read the installation and safety instructions given in the manual for the corresponding inverter.

11.1 Switch off the inverters and the Solar-Log™.

Switching inverters off

Before a making a cable connection between the Solar-Log™ and the connections inside the inverter and before installing an interface card in the inverter, always turn off all of the inverters first.

To do this, read the manufacturer's documentation for the inverter, and proceed as follows:

- Disconnect the AC side
- Disconnect the DC side
- Wait at least 5 minutes until the condensers in the inverters have discharged.

Turn the Solar-Log™ off.

Unplug the power socket connection

12 Connecting accessories

12.1 Sensor Box Basic and Professional

These sensors record both Irradiation sensor and module temperature values.
The solar radiation sensor must be fitted in such a way that the sensor's solar cell and the plant's modules are aligned as similarly as possible to the sun, i.e. the sensor must have the same alignment and inclination.

The sensors should be positioned in a way to best ensure that:

- as little overshadowing as possible occurs
- and snow cover does not interfere disproportionately with the sensor functions.

To achieve this, it is best to fit the sensor on the side or above the solar module. Fitting bars can normally be used as a fitting surface with modules that are parallel to the roof protrusion. In other cases, a suitable fitting support may have to be added.

Note!

When using inverters with RS422 communication, do not operate the sensor on the same bus.

Wiring the Sensor Box Basic and Professional to the Solar-Log™

The wiring is done using a

- 4-wire data cable which also includes the 12 V power supply and the data connection to the Solar-Log™.
- The sensors are connected to the Solar-Log™ via the RS485 interface parallel to the inverter bus or via a free RS485 interface. Please pay attention to the notes in the component database. Sensors cannot be connected to the same bus with some inverters.
- The cable shielding must be connected with an equipotential bonding system.

A separate power supply is generally not required.
The connection cable can be extended (max. 50 m). In this case, however, it must be ensured that a power supply voltage of at least 8 V is provided for the Sensor Box Basic at the end of the cable and 10.5 V for the Sensor Box Professional. If necessary, a separate power supply can be integrated into the bus wiring.
The cable must also be suitably protected in outside areas. The cabling in inside areas can consist of a shielded data cable.

Procedure

- The four wires in the connection cable must be connected to the 4-pin terminal block connector on the Solar-Log™.
- The connection assignments are printed on the back of the sensor.

Connect the wires according to the following diagram

Important!

Replacing the connection wires may cause damage to the sensor.

Sensor Box Basic and Professional	
RS485 Solar-Log™	Sensor connection cables
PIN	Assignment
1 (Data +)	Brown: Data +
2 (+12V)	Red: 12 V_{DC} (VCC)
3 (Ground)	Black: 0V (GND)
4 (Data -)	Orange: Data -

Installation

When the Solar-Log™ is switched on, the sensor is also automatically powered.
Then the Sensor Basic and Professional have to be configured to the desired RS485 interface:

- Select the "Mencke&Tegtmeyer" sensor via the device definition according to the device class and manufacturer.
- Define the bus.
- Perform device detection.
- The Sensor Box Basic and Professional are integrated into the system like an inverter.

12.2 Sensor Box Professional Plus

The Sensor Box Professional Plus is used to record the Irradiation from the sun. This accessory allows the Solar-Log™ to calculate the deviations in the current output compared to the potential output.
Up to 9 Sensor Box Professional Pluses can be connected to the Solar-Log™. The solar radiation sensor must be fitted in such a way that the sensor's solar cell and the plant's modules are aligned as similarly as possible to the sun, i.e. the sensor must have the same alignment and inclination.

The sensors should be positioned in a way to best ensure that:

- as little overshadowing as possible occurs
- and snow cover does not interfere disproportionately with the sensor functions.

To achieve this, it is best to fit the sensor on the side or above the solar module. Fitting bars can normally be used as a fitting surface with modules that are parallel to the roof protrusion. In other cases, a suitable fitting support may have to be added.
If there are various module alignments at a plant, every alignment should be fitted with a Sensor Box Professional Plus.

The Solar-Log™ can record and save additional environmental data with the Sensor Box Professional Plus (with optional accessories). This environmental data includes:

- Solar irradiation (integrated)
- Module temperature
  Module temperature is recorded by an integrated cell sensor, thus avoiding the costly process of mounting a sensor on the back of the module.
- Ambient temperature (optional, Article Number: 220062)
- Wind speed (optional, Article Number: 220061)

The above data form important parameters in further evaluations and analyses to measure yield.

Notes on roof mounting

The irradiation sensor is specially designed for continuous use in outside areas (IP65). The cables supplied with the Sensor Box Professional Plus are UV and weather resistant.

Recommended installation | Not allowed

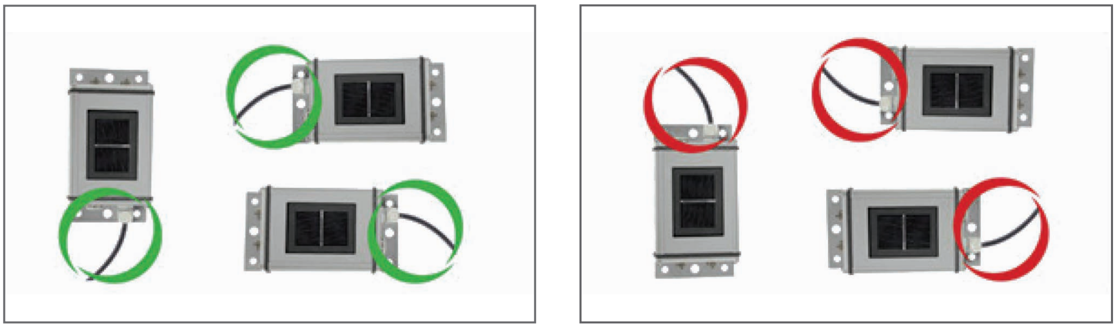


Fig.: Mounting information for the Sensor Box Professional Plus

Please note when fitting the sensor that the connection cable must be arranged as shown in the drawing.

Fitting optional sensors

The ambient temperature sensor must be fitted in a shady place with a wall bracket. The connection plug is screwed firmly into the 3 pin input on the Sensor Box Professional Plus.

It is best to install the wind sensor in a high, exposed position using the mounting bracket. The connection plug is screwed firmly into the 2 pin input on the Sensor Box Professional Plus.

Caution!

Risk of damage to the unit!
Penetrating moisture can cause short circuiting and can destroy the Sensor Box Professional Plus and Solar-Log™.

Warning!

It is not necessary to open the sensor to fit it. All components are simply screwed on. If the housing is opened, water resistance and proper operation cannot be guaranteed.

Wiring the Sensor Box Professional Plus to the Solar-Log™

The Sensor Box Professional Plus can also be integrated in the bus wiring of the inverters.

Note!

When using inverters with RS422 communication, do not operate the sensor on the same bus.
For inverters using RS485 communication, please check the compatibility in our Component Database.

The Sensor Box Professional Plus is connected to the Solar-Log™ using the RS485 interface.
The connection cable between the Sensor Box Professional Plus and the Solar-Log™ consists of 4 wires and includes the 12 volt power supply and the data connection to the Solar-Log™.
The cable shielding must be connected with an equipotential bonding system.
A separate power supply unit is not required.

The connection cable can be extended (max. 50 m). However, an 10.5 V power supply is needed at the end of the cable. For longer stretches please select a larger cable diameter.

Procedure

- The four wires in the connection cable must be connected to the 4-pin terminal block connector on the Solar-Log™.
- Connect the wires according to the following diagram:

Important!

Replacing the connection wires may cause damage to the sensor.

Sensor Box Professional Plus	
RS485 Solar-Log™	Connection cable Sensor Box Professional Plus
PIN	Assignment
1 (Data +)	Brown: Data + A
2 (+12V)	Red: 12 V_{DC}
3 (Ground)	Black: GND
4 (Data -)	Orange: Data - B

Installation

When the Solar-Log™ is switched on, the Sensor Box Professional Plus is also automatically powered. Then the Sensor Box Professional Plus must be configured to the desired RS485 interface:

- Select "M&T Sensor" and the corresponding bus for the initial configuration.
- Perform device detection:
- The Sensor Box Professional Plus is integrated into the system like an inverter.
- The rest of the configuration for the environmental data is carried out via the Solar-Log™'s web interfa-ce.

12.3 Ripple Control Receiver

The Solar-Log™ PM+ series contains an additional 6-pin interface which allows up to two ripple control receivers or telecontrol plants each with four signals to be connected.

Wiring

The relay contacts for the ripple control receiver are connected to the Solar-Log™ PM+ via the 6 pin PM+ interface on the top side of the Solar-Log™.

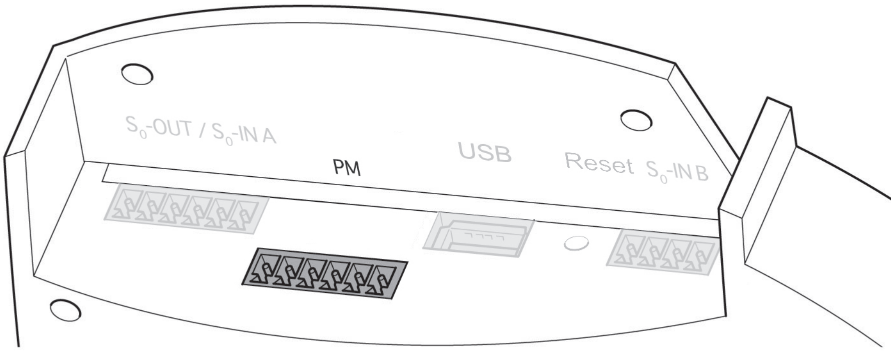


Fig.: 6-pin PM+ interface

The ripple control receivers used by grid operators utilize various numbers of relays. These relays are labeled differently and have different reduction levels and/or shift factors cos (Phi).
To ensure the highest degree of flexibility, the reduction levels specified by the grid operators, together with their signals from the ripple control receiver, can be evaluated by the Solar-Log™ via a maximum of four digital inputs for each.
In order that the Solar-Log™ PM+ can evaluate the signal from the ripple control receiver, it needs to be wired to the control voltage (for active and reactive power) from the PM+ interface. The control contracts normally operate as make contracts; that means they are closed for the respective command.
The control voltage from Pin 1 is used for the active power command.
The control voltage from Pin 6 is used for the reactive power command.
The control voltage is connected to the common contact of each relay. The relay output (closed contact) is then connected to a digital input of the PM+ interface.

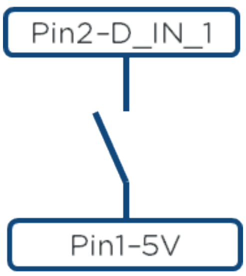


Fig.: The basic principle of wiring the PM+ interface to the ripple control receiver for active power commands

See the Appendix for more ripple control receiver connection examples on page of this installation manual.

Further configurations of feed-in management are carried out via the Solar-Log™ PM+ web interface in the Configuration | Feed-in Management menu with the Active Power | Remote-controlled and Reactive Power | Remote-controlled shift factor cos(Phi) functions. See page 251 for more information.

12.4 Large External Displays

Large external displays can be connected to the Solar-Log™ via two interfaces:

- Connection via RS485
- S0 pulse output

The connection via RS485 is preferred Cable lengths can be up to 1000 meters and the data which is displayed on the Solar-Log™ can specified.

Note!

It is not possible to connect a large external display on the RS485 / 422 C interface.

Note!

If inverters that use the RS422 connection are connected to this interface (e.g. Fronius, AEG, Riello), then it is not possible to connect a display to this bus.
If the display is connected via the same cable as the inverters, the display must be configured accordingly in the interface parameters.

Connection via the RS485/422 interface
Wiring for displays made by Schneider Displaytechnik

The wiring consists of a 3-pin control cable, (3x0.5 mm²) and terminal block connector.

Schneider Large displays	
RS485 Solar-Log™	Terminal block connector Schneider Display
PIN	Assignment
1 (Data +)	A
3 (Ground)	GND
4 (Data -)	B

Further information about the connection can be obtained from the manufacturer of the display.

Wiring for displays from RiCo Electronic

The wiring consists of a 2-pin control cable, (2x0.5 mm²) and terminal block connector.

RiCo Large displays	
RS485 Solar-Log™	Terminal block connector RiCo Display
PIN	Assignment
1 (Data +)	Pin 1 - Data +
4 (Data -)	Pin 2 - Data -

Further information about the connection can be obtained from the manufacturer of the display.

Connection through S0 output

If the S0 output is used, only the current feed-in power can be transmitted in the form of a pulse sequence. The display has to calculate the power output and total yield by itself.

Wiring for a contact-controlled S0 output

Example: RiCo Electronic
The wiring consists of a 2-pin shielded cable (2 × 0.6 mm²,
max. length 100 m) and terminal block connector.

RiCo Large displays	
RS485 Solar-Log™	Display
PIN	Assignment
5	S0-
6	S0+

Further information about the connection can be obtained from the manufacturer of the display.

Pulse factor

In the standard setting, Solar-Log™ sends 1000 pulses/kWh over the S0 output. The pulse factor must be configured according to the size of the plant (kWp) in the Configuration | Devices | Definition | External Display menu.

Pulse factor / plant size	
Plant size kWp	Pulse factor
30 kWp	2000
60 kWp	1000
100 kWp	600
150 kWp	400
300 kWp	200
600 kWp	100

Note!

The impulse factor in the Solar-Log™ and the connected device has to be identical.

12.5 External power meter

External power meters can be connected to every Solar-Log™ model via the S0 input and/or the RS-485 bus.
Solar-Log™ devices have a varying number of S0 inputs:

S0 inputs

Solar-Log™	Number of S0 inputs
Solar-Log™ 300*, 1200 and 2000	2 - $S0_A$ and $S0_B$

* Solar-Log 200s prior to 2011 do not have an S0 input

The energy recorded by these meters can be used for numerous applications:

- Inverter mode
  This mode is used for inverters that are not directly supported by Solar-Log™.
- Total yield meter
  This mode is used to record the energy production of several inverters.
- Consumption meter
  This mode is used to measure power consumption and to make it possible to display this data and to use Smart Energy functions.
- Utility Meter (U) (only Solar-Log 1000, 2000)
  This mode is used for voltage measurements for reactive power control with the characteristic curve Q(U).
- Utility Meter (U+I) (only Solar-Log 2000)
  This mode is used to record the measurement data needed for the response signals sent to the grid operator and for cos phi control at the feeding point.

Note!

We recommend using the meters that we have tested and offer.
We cannot guarantee the functionality of other products.

Note!

Consumption meters can be assigned to plant groups.
It is only possible to assign a meter after a rule with the calculation of self-consumption has been activated in the power management configuration Configuration | Feed-in Management.

12.5.1 External power meters/accumulating meters

With multiple phase meters, a basic distinction is made between phase-exact and accumulating meters.

Accumulating meters provide the total values from all three phases. The meter calculates the total output (also to and from the grid) of the individual phases and provides this total as a single value.

In the example:
Phase 1 supplies 3 kW via an inverter (single phase).
Phase 2 refers to 2 kW (energy)
Phase 3 refers to 1 kW (energy)
With an accumulating meter, this results in a total of 0 kW.

Examples of accumulating meters are the Janitza UMG 104/UMG 604 and the Inepro Pro380-Mod.

12.6 Wiring for S0 meter

The S0 connection for external power meters is connected to a 6-pin S0-Out/In connection (S0-OUT and S0-IN)) or to 4-pin S0-IN as follows:

S0 meters in general	
S0 Solar-Log™	Power meter
PIN	Assignment
1	S0+
2	S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

The maximum cable length between the power meter and Solar-Log™ is 10 meters.

Wiring for Inepro 75D meter via S0

Article Number: 255420

Inepro 75D	
S0 Solar-Log™	Power meter
PIN	Assignment
1	Pin 6 - S0+
2	Pin 5 - S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Wiring for Inepro 1250D meter via S0

Article Number: 255421

Inepro 1250D	
S0 Solar-Log™	Power meter
PIN	Assignment
1	Pin 9 - S0+
2	Pin 8 - S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Wiring for Iskra WS0021 meter via S0

Article Number: 255346

Iskra WS0021	
S0 Solar-Log™	Power meter
PIN	Assignment
1	Pin 9 - S0-
2	Pin 8 - S0+
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Wiring for Iskra WS0031 meter via S0

Article Number: 255347

Inepro 1250D	
S0 Solar-Log™	Power meter
PIN	Assignment
1	S0+
2	S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Note!

After selecting S0 from the menu Configuration | Device | Definition, a device detection needs to be performed.
After the detection is finished, the detected meter can be configured under Configuration | Device | Configuration.

12.7 Wiring for RS485 meter

The meter's RS485 output can be connected to any RS485 interface (A, B and C) on the Solar-Log™.

Overview

- 2-pin wiring.
- The communication address does not have to be assigned.

Installation steps

- Switch off the inverters and the Solar-Log™.
- Connect the meter to the Solar-Log™.

The wiring is done using a self-made, shielded 2-wire data cable and a 4-pin or 6-pin terminal block connector.

Procedure

- Connect the wires for the connecting line as shown in the following diagram.

Wiring for RS485 meter

Solar-Log™ RS485 terminal block connector	Inepro 75D terminal block connector Article number: 255420	Inepro 1250D terminal block connector Article number: 255421	Utility meter terminal strip Article Number: 255385
PIN	PIN	PIN	PIN
1	8 - 485A	11 - 485A	22 - B
4	7 - 485B	10 - 485B	23 - A

- Insert the terminal block connector into the Solar-Log™ RS485 A, RS485/422 B or RS485/422 C socket.
- Perform a device detection: The power meter is connected to the system as if it were an inverter.
- Configure the power meter functions under Configuration | Device | Configuration. See ff Seite 109for more information.
  - Generator
  - Total yield meter
  - Consumption meter
  - Utility Meter (U) (only Solar-Log 1000 and 2000)
  - Utility Meter (U+I) (only Solar-Log 1000 and 2000)
  - Utility Meter (U+I) + Consumption Meter (bi-directional) (only Solar-Log 1000 and 2000)
  - Sub-consumer

Note!

Only one Inepro RS 485 meter can be used for each Solar-Log™ interface.

Note!

These meters cannot be used together at the same bus input with inverters that are connected to RS422 (e.g. Fronius).

Note!
Inepro 1250D

All three phases have to be connected for the Solar-Log™ to accurately detect the meter.

If an Inepro 1250D is used, the PRG button on the meter must be pressed and held down during entire detection process.

If it is not possible to hold down the PRG button during the whole process, we recommend provisionally connecting the meter to the Solar-Log™ with a short cable after the installation in order to be able to press and hold down
the PRG button during entire detection process.

In a second detection attempt with the inverter, the meter is then detected by the Solar-Log™ even if the PRG button is not pressed.

The detection of an Inepro 1250D in an existing installation can take up to 15 minutes. After the detection, a restructuring of the data takes places which can take up to 45 minutes depending on the amount of data on the devices.

Note!
Inepro meter

Inepro meters are automatically given the mod bus address 234 by Solar-Log™ during the detection process.
This address is therefore not allowed to be used for other devices.
After the configuration, the display on the Inepro meter alternates between the meter status and the address display (ID=EA). This can be used to check if Solar-Log™ has correctly detected the meter.

All RS485 meters have to be terminated with an 120ff resistor between the two pins used.

12.8 Installation Utility Meter / Janitza UMG 104 / UMG 604 (only Solar-Log 1000 and 2000)

The Solar-Log™ Utility Meter is a universal metering device. It can be integrated in both low- and medium-voltage networks (via a transformer) and is needed for various functions:

- controlling voltage-dependent reactive power via the Q(U) function
- controlling reactive power at the feeding point
- recording the measurement data needed for the response signals sent to the grid operator

Only the voltage measurements are needed to control voltage-dependent reactive power via the Q(U) function (Although, it is still recommended to perform voltage and current measurements to check that the reduction function is operating properly). Current and voltage measurements are needed for the other functions.

The previous chapter explains how to wire the Utility Meter to the Solar-Log™. This chapter deals with connecting the Utility Meter for measurements in low- and medium-voltage power grids.

Utility Meter supply voltage / Janitza UMG 104 / UMG 604:

- 95-240Vac, 45-65Hz or 135-340Vdc

The Utility Meter's measuring inputs have the following limits:

- Voltage line conductor AC (without a voltage transformer): 10...300 V AC
- Voltage phase AC (without a voltage transformer): 17...520 V AC
- Current (without a current transformer) 0.005, 7.5 A
- Frequency of the fundamental component: 45 ..65 Hz

The limit may not be exceeded. For this reason, a measuring transformer needs to be installed for most applications.
We recommend the following transformer ratio:

- Voltage: Secondary 100V
  e.g. at 20kV grid converter 20000:100V
- Current: Secondary 5A
  e.g. 100:5A

Note!

The Utility Meter that we use is produced by the company Janitza.
Refer to the Janitza UMG 104 / UMG 604 manual for further technical details.
We cannot guarantee the functionality of other Janitza devices.
=> The operating modes Utility Meter (U / U+I) are only possible with the Solar-Log 1000 and 2000.

Note!

The Utility Meter cannot be connected to the inverters with a single bus.
For this reason, use one RS485 connection for the inverters and one RS485 connection for the Utility Meter.

Connecting the Utility Meter to the power grid

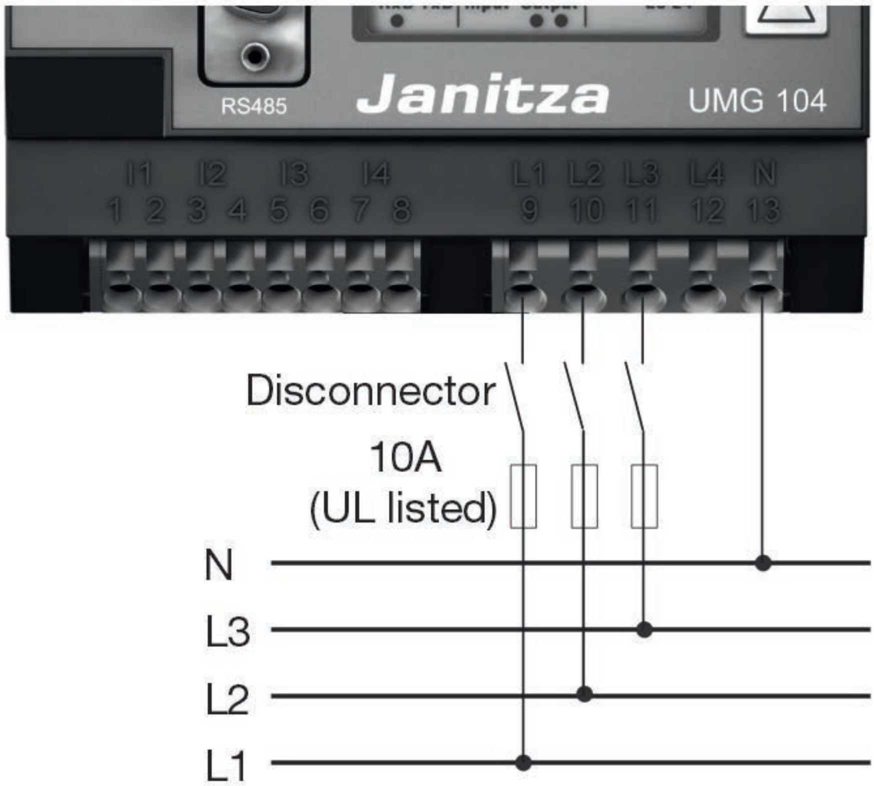


Fig.: Example - Utility Meter UMG 104 connection diagram for voltage measurements in low-voltage power grids

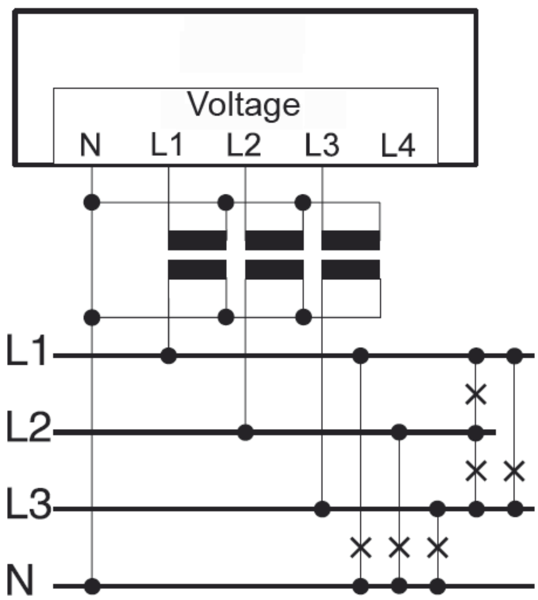


Fig.: Utility Meter connection diagram for voltage measurements with current transformers (medium volta-ge)

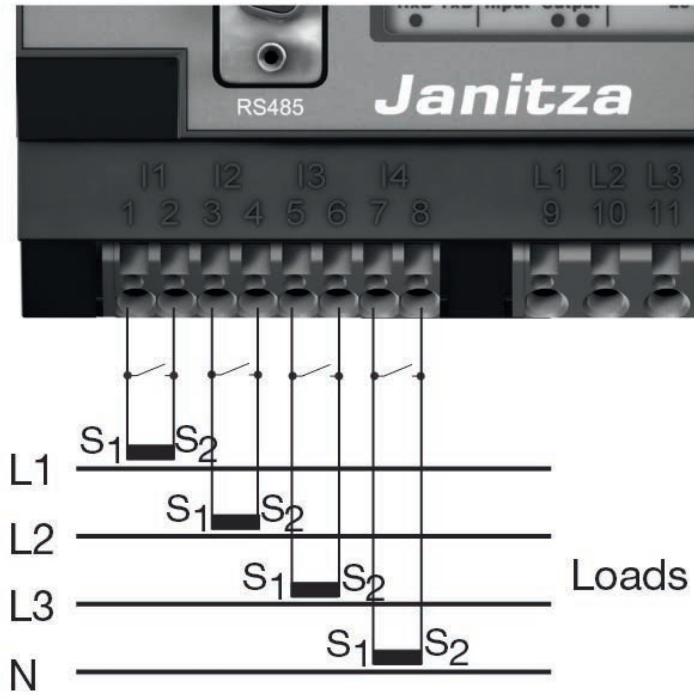


Fig.: Example - Utility Meter UMG 104 connection diagram for current measurements with current transformers

Procedure

- Enter the supply voltage into the Utility Meter

Note!

We recommend using a fuse to safeguard the connection lines for the supply voltage. Please follow the instructions in the Janitza UMG 104/UMG 604 manual.

Note!

Supply voltages that do not correspond to the specifications on the rating plate can cause malfunctions and damage the device.

Caution!

The inputs for the supply voltage are dangerous to touch.

- Connect the measurement lines for current and/or voltage to the bottom of the Utility Meter.

Note!

The measurement voltage must in effect be at least 10V or an exact measurement is not possible.

- Connect the Utility Meter to the RS485 bus of the Solar-Log™ according to the following diagram:

Wiring
the Utility Meter

Terminal block connector RS485 Solar-Log™ only Solar-Log 1000 and 2000	Utility meter Terminal block connector Article Number: 255385
PIN	PIN
1	22
4	23

- The RS485 bus must be terminated.
  Install a 120 Ohm, 0.25 W resistor between pin 22 and 23 of the Utility Meter to terminate.
- Configuring the Utility Meter from the display
  Setting MODBUS Address (PRG 200 = 1)
  Setting Baud rate RS485 (PRG 202 = 2)
  Setting Mode (PRG 203 = 0)
  Setting Current converter primary (PRG 000)
  Setting Current converter secondary (PRG 001)
  Setting Voltage converter primary (PRG 002)
  Setting Voltage converter secondary (PRG 003)
  Refer to the accompanying manual of the device for the UMG 104 configuration procedure.

Note!

The parameter settings need to be adjusted before device detection.
If the parameters differ, the Utility Meter will not be detected by the Solar-Log™.

- Perform an inverter detection
  See the installation manual, Chapter "Performing inverter detections."
- Configure the Utility-Meter under Configuration | Devices | Configuration, select the corresponding Operating mode and click on Save.

Check

- Does the Utility Meter display a positive value for inverters feeding power, the current output (kW)?
  If this is not the case, the current measurements are incorrectly connected.
  If necessary, switch the polarity of measuring inputs.

Note!

When replacing the polarity, the cable must not be energized, since the converter can be destroyed otherwise.

12.9 Solar-Log™ Smart Relay Box

The Smart Relay Box makes it possible to switch 8 relays via the Smart Energy control logic depending on the current production (surplus).

The Relay Box has:

- 4 inverter contacts
- 4 make contacts

Characteristics of the relays:

Maximum current load:

0.5 A @ 120 V_{AC}

0.25 A @ 240 V_{AC}

1 A @ 30V_{DC}

0.3 A @ 110V_{DC}

Procedure:

- Connect the Relay Box to the RS485 bus of the Solar-Log™ according to the following diagram:

Relay Box Wiring

Terminal block connector RS485 Solar-Log™	Relay Box Terminal block connector Article Number: 255656
PIN	PIN
1	Data + (Y)
4	Data - (G)

- Device detection is not necessary for this device.
- The device only has to be selected from the Configuration | Smart Energy menu to be activated.
- The power comes from the top-hat-rail power supply that was included with the Relay Box.

Note!

The Relay Box has to be defined and activated as a switch in the Configuration | Devices | Definition | Interfaces with the plus symbol to be able to configure it.

For more information, refer to the chapter:

"Configuring the device interface" and

"Defining Smart Energy Switching."

Note!

The Solar-Log™ Smart Relay Box cannot be connected together with inverters on an RS485 interface. The Relay Box requires its own separate RS485 bus.
It is possible to combine the Utility Meter with sensors.

Note!

The Solar-Log™ Smart Relay Box cannot be connected together with PM+ packages on a Solar-Log™.

Relay output assignments

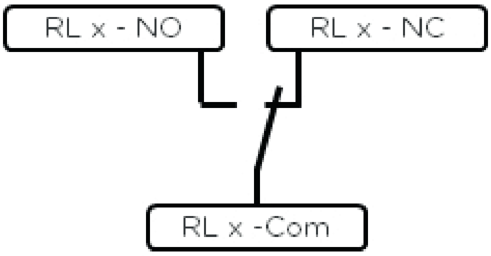


Fig.: Smart Relay Box relay output (change-over contact) diagram

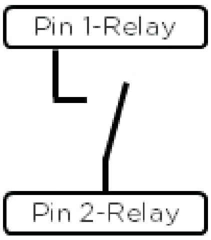


Fig.: Smart Relay Box relay output (make contact) diagram

12.10 WeMo Insight Switch

With the WeMo Insight Switch, home appliances and electronic devices can be connected to a Wi-Fi network, allowing the devices to be remotely turned on and off. The Wemo Insight Switch can also monitor the devices and will send information about the device’s energy usage directly to your smartphone or tablet. Follow the subsequent instructions to be able to use these functions with the Solar-Log™.

Procedure:

1. Connect a desktop/laptop and the Solar-Log™ to the router with a LAN cable.
2. Download the WeMo app to your smartphone or tablet.
3. Reset the WeMo Insight Switch (press the reset button for 5 seconds while turning on the power for the WeMo Insight Switch).
4. The WeMo searches for the smartphone or tablet via WiFi.
5. Start the WeMe app and connect the WeMo Insight Switch to the router's WiFi network.
6. Connect to the Solar-Log™'s WEB interface with the desktop/laptop and go to the Configuration | Devices | Definition menu.
7. Select the device class "Switch" with the +plus button.
8. Select "Belkin" as the manufacturer and "WeMo Insight" as the type. Enter the number of devices and click on save.
9. Then start the device detection from the Configuration | Devices | Detection menu.
10. The connection is now established.

Note!

A direct connection between the Solar-Log™ WiFi and WeMo is not possible.
The Solar-Log™ has to be connected to a router via a LAN cable or to be in a network.

The last step is configuring the Smart Energy Logics. Refer to the Solar-Log ™ Smart Energy Manual for more information. It is available from our website at https://www.solar-log.com/en/support/downloads

12.11 Allnet Network Power Socket

Allnet network power sockets can switch connect electronic devices on and off. These switching operations can be set manual, time-controlled or based on consumption levels. Allnet network power sockets can be integrated into the local network with a LAN cable connection. Follow the following steps to be able to use these functions with the Solar-Log™:

Procedure:

1. Connect the Allnet socket to a laptop or PC with a LAN cable and plug the Allnet device into a power socket.
2. Click on Control Panel
3. and then go to the Network and Sharing Center (for other operating systems, refer to the instructions for setting the IP address).
4. Click on Local Area Connection to open the Status window and then click on Properties.
5. Select the Internet Protocol Version 4 (TCP/IPv4) and then click on Properties

Important!

Note the displayed values before you change them because you will need them again later.

6. Adjust the displayed values as follows (using the following IP address):
   IP address: 192.168.0.101
   Subnet mask: 255.255.255.0
   Gateway: 0.0.0.0
   Confirm the settings with "OK."
7. Enter the IP address 192.168.0.100 as the URL in your browser to access the Allnet menu.
8. Click on settings and go to Configuration | LAN Settings.
9. Configure a separate IP address for every Allnet network power socket. The new IP address need to match the range for the existing network (refer to your computer's original settings).
   For example, if our computer's original IP address was 192.168.178.2 and the next address is free, the Allnet network power sockets would start with192.168.178.3 and continue. The Subnet mask is 255.255.255.0 by default and must be the same for every device in the subnet. The gateway is typically the IP address of the router or switch to which the computer is connected again later. Save the settings when they are completed.
10. After adjusting the networks settings for the network power sockets, change the values for your computer's networking settings back to the original values.
11. The configuration is then finished.

Note!

To ensure functionality with the Solar-Log™, the ALL3075v3 still has to be set to remote control in the Allnet socket configuration.

The last step is configuring the Smart Energy Logics. Refer to the Solar-Log ™ Smart Energy Manual for more information. It is available from our website at https://www.solar-log.com/en/support/downloads

12.11.1 Connecting the Allnet network power socket to the Solar-Log™

The Allnet socket has to be defined with the device detection function to connect to the Solar-Log™. From the WEB interface of the Solar-Log™ go to Configuration | Devices | Definition and select the device class "Switch" with the blue plus symbol and then Allnet as the manufacturer followed by the type and number of devices. Confirm the selection with OK and start the detection from the Configuration | Devices | Detection menu. Let the detection process run completely. After that, select the corresponding devices from the Configuration | Devices | Configuration menu, enter the IP address and perform the rest of the setup. Click on save once everything is finished.

13 Other connections

13.1 Alarm contact (only Solar-Log 1000 and 2000)

The Solar-Log 1000 and 2000 have an alarm contact which is triggered if the connection is broken.

This function can be used for various applications:

- Anti-theft protection for the modules or inverters
- For wiring to the mounting frame or to the modules, use a thin weather-resistant cable that breaks when strained. The maximum cable length is around 500 meters.
- Access control via door contact
- Monitoring of circuit breakers
- Connection to an uninterruptible power supply (UPS).

If the connection is broken, the Solar-Log™ can carry out the following actions:

- Switch a relay
- Send e-mail
- Send text message (SMS)
- Produce an audible signal

The notification actions can be set on the Solar-Log 2000 in the section Configuration | Notifications | Alarm .

Connection

The connection is done using a 3-pin terminal block connector according to the following diagram:

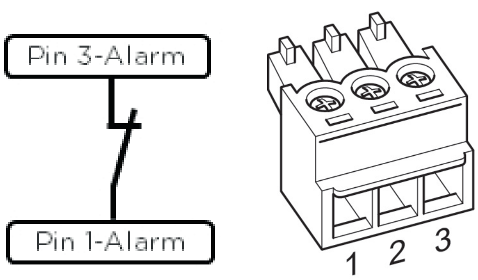


Fig.: Alarm contact connection diagram

If the connection between pin 1 and pin 3 is broken, the alarm is triggered. and the configured action is carried out.

13.2 Relay (only Solar-Log 1000, 1200 and 2000)

The Solar-Log™ has a potential-free control relay, which is activated under the following conditions:

- Alarm contact triggered
- Active power reduction activated
- Optimization of self-consumption

The relay may be loaded with a maximum of 24 V DC and 2 A.
A 230 V appliance has to be connected via another load relay.

Connection

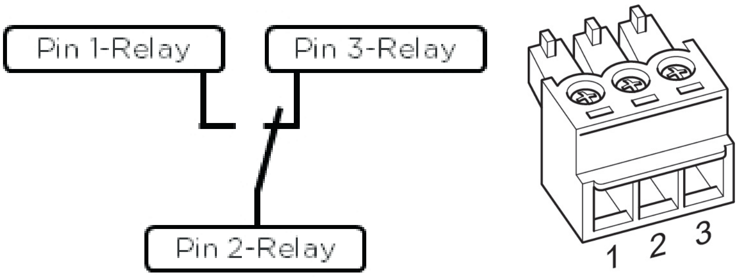


Fig.: Relay connection diagram

Wiring

The wiring is done using the supplied 3-pin connector;

usually pin 1 and pin 2 are used.
In the Off state,

- pin 1-2 are open
- and pin 2-3 are closed.

In the On state (alarm/fault/power reduction activated),

- and pin 1-2 are closed.
- pin 2-3 are open

Note!

If a relay is used for the optimization of self-consumption, it has to be defined as a switch and recognized (see Chapter "Configuring the device interface").
The operating states are then recorded.

Acknowledge notification

There are two options to acknowledge a notification of a relay:

- Display
- Solar-Log™ WEB interface

Display:

A notification is displayed in the top line of the display with a blinking red triangle. Tapping on this triangle is enough to acknowledge the notification. Do not use any pointed objects which may damage the display.

Solar-Log™ WEB interface:

Go to the Diagnostic | Notifications

menu to acknowledge the notification via the WEB interface. The acknowledgment is automatic once the notifications have been loaded.

13.3 USB

Solar-Log™ 250, 300, 1000, 1200 and 2000 have a USB connection. This USB connection can only be used for USB sticks and not for a direct PC connection.

Note!

When a USB stick is connected, the Solar-Log™ automatically saves a backup in the backup folder. A maximum of 10 backup files are saved in the directory. Older backup files are automatically deleted.

The backup is saved on the USB stick in the directory /Backup with the following file names:

- solarlog_backup_YYMMDD.dat
  YYMMDD = year, month and day - each two digits, e.g.
  180822 is then 22 August 2018

14 Installation

The Solar-Log™ has an integrated web server, which contains all the software necessary for operation and configuration.
No additional software needs to be installed on the PC to access the Solar-Log™.
A common web browser with JavaScript enabled is required.
We recommend using the current version of Mozilla's Firefox, Google's Chrome, Microsoft Edge or Microsoft's Internet Explorer.

To run the web browser, a network connection is required between the PC and Solar-Log™, and Solar-Log™ must be up and running.
It is recommended to have DHCP enabled on the router.

- Before setting up, ensure that there is no damage to the power supply. If in doubt, please contact the address indicated on the back cover of this manual.
- Before startup, check that the input voltage on the unit is the same as the voltage supply in your country.
- The unit must be operated only with the power supply unit supplied.
- The unit is intended only for installation in interior areas that are dry and dust-free. (IP20)

Note!

The maximum plant size for the various Solar-Log™ devices:
- Solar-Log 300 up to 15 kWp
- Solar-Log 1200 up to 100 kWp
- Solar-Log 2000 up to 2000 kWp (2MW)

14.1 Connecting the Solar-Log™ to a network / PC

The Solar-Log™ is equipped with a standard Ethernet RJ45 socket, which can be connected through any commercially available network cable. Speeds of 10 Mbit and 100 Mbit are supported.

In general, any PC networking technology can be used for connecting the Solar-Log™. The following technologies are available:
- Connection through an Internet router
  Ethernet RJ45 network cable
- Direct cable connection from PC to Solar-Log™
  Ethernet RJ45 network patch cable
- If connecting directly to a PC, the cable must be the crossover network cable type (patch cable).
- Connection through a power network (PowerLine package)
- Connection through a wireless network (Solar-Log™ WiFi)

If the Solar-Log™ is operated via a router, ensure that the necessary ports have been activated (see Chapter „Internet-Ports“).
Since the Solar-Log™ obtains its IP address while booting, it needs to be connected to the network before being turned on.

14.1.1 Instructions for connection through the PowerLine package

If using the Solar-Log™ PowerLine package, the Solar-Log™ can be connected to the PowerLine adapter using the network cable supplied.
Next, connect the PC, switch or Internet router through the second PowerLine adapter.
The two power connectors are connected to each other automatically and then act as "power supply network cables".
The PowerLine adapters should not be connected to a multi-outlet power strip, as other power adapters will affect the data quality.

Note!

The Solar-Log™ may not be connected directly to a TNV (Telecommunication Network Voltage) circuit.

14.2 Initial installation Solar-Log 250 and 300

The Solar-Log 250 and 300 devices are configured completely from a connected PC or laptop.

Requirements

- All cables and accessories (if any) have been connected to the Solar-Log 250 or 300.
- The Solar-Log 250 or 300 is connected to an Internet router.
- The DHCP service is enabled on the Internet router.

or

- The DHCP service is enabled when connecting directly to the Solar-Log™ with a PC. (We recommend using a patch cable.)

Easy Installation

After selecting the language and country, the initial set up can be carried out with the "Easy Installation" configuration wizard. However, Easy Installation can currently only be used with certain inverters. Depending on the country, different inverter brands are integrated into the Easy Installation mode. Easy Installation cannot be performed with GPRS.
The Solar-Log™ then carries out the initial set up intuitively step by step.
For more information, please refer to the Quick Start Guide that was included with the device.

14.3 Initial set up of the Solar-Log 1200

The initial configuration of the Solar-Log 1200 can be performed either with the touch display or the Solar-Log™'s web browser menu.

Requirements

- All cables and accessories (if any) have been connected to the Solar-Log 1200.
- The Solar-Log 1200 is connected to an Internet router.
- The DHCP service is enabled on the Internet router.
- The DHCP service is also enabled on the PC or laptop.

Easy Installation

After selecting the language and country, the initial set up can be carried out with the „Easy Installation" configuration wizard. However, Easy Installation can currently only be used with certain inverters. Depending on the country, different inverter brands are integrated into the Easy Installation mode.
The Solar-LogTM then carries out the initial set up intuitively step by step.
For more information, please refer to the Quick Start Guide that was included with the device.

14.4 Setting up of the Solar-Log™ with the configuration wizard

After the initial set up of the Solar-Log™ (see chapter 14.2 and 14.3), the Solar-Log™ starts to ask about the following settings:

- Language
- Country and time
- Display access control

At the end, a pop-up window appears where you can start the Solar-Log™ configuration wizard. (See the following image: „Startup screen of the Solar-Log™ configuration wizard").

At this point, if you do not want to continue with the setup, the configuration wizard can be stopped by clicking on the „Cancel" button. After clicking on „Cancel," the local „Cockpit" WEB page is started. The setup can be done manually from this menu. The Solar-Log™ configuration wizard can also be started at any time from the Configuration | System | Configuration Wizard menu.

Note

The configuration wizard can be stopped at any time by clicking on the „Cancel" button (left below the progress bar). The previously entered settings remain active.

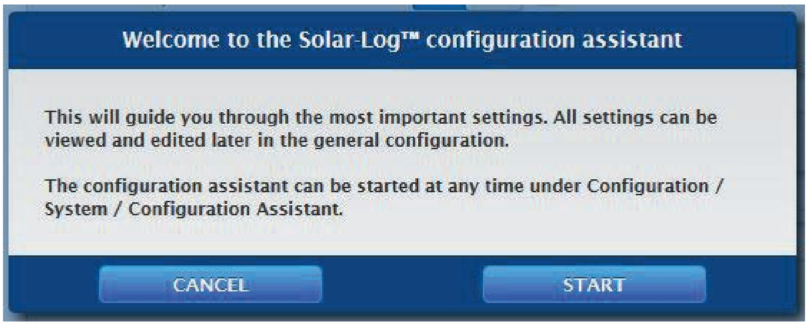


Fig.: Startup screen of the Solar-Log™ configuration wizard

Click on the „Start“ button to run the configuration wizard. Once started, the Ethernet Settings menu appears (see image „Solar-Log™ Ethernet Settings via the Solar-Log™ configuration wizard“). In the network settings can be entered in the IP address, subnet mask and gateway boxes. Instead of manually entering the network settings, „Obtain IP address automatically (DHCP)“ function can be activated. A router with DHCP enabled is required for this function.

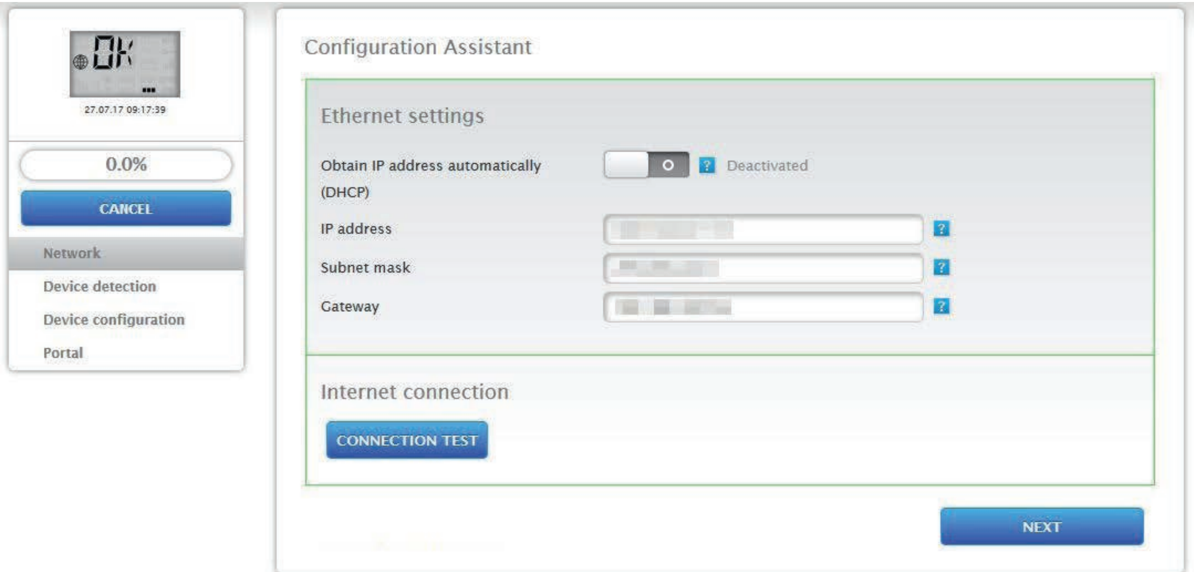


Fig.: Solar-Log™ Ethernet Settings via the Solar-Log™ configuration wizard

Click on the „Connection Test“ button in the Internet connection section to check if the settings are correct.

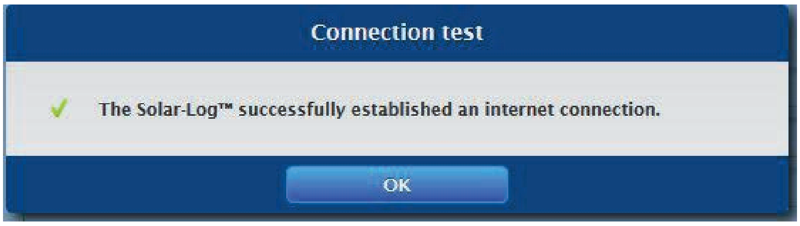


Fig.: Example of a successful connection test

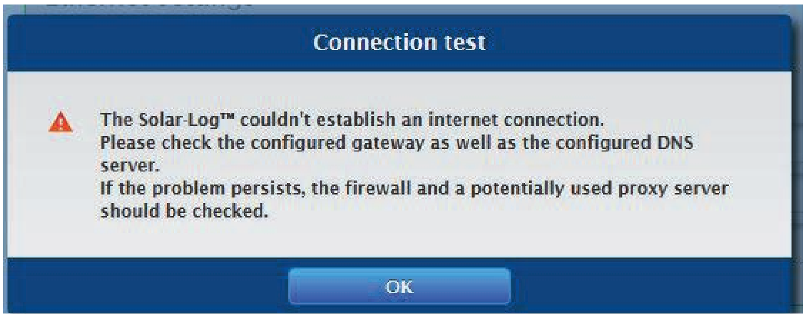


Fig.: Example of an unsuccessful connection test

Note

All settings are automatically saved using the „Next“ button. With the „Back“ button it is possible to change the settings at any time.

If the test is successful, click on the „Next“ button to go to the next section. A dialog window appears. From this window, you can check if a new Solar-Log™ firmware version is available (see image „Displayed Firmware Update Window“).

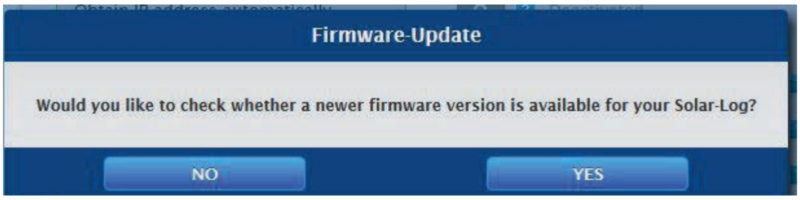


Fig.: Displayed Firmware Update Window

By clicking on „Yes,“ the configuration wizard checks for a new firmware version and can install it after that. At the end, the device detection is performed. Otherwise, the device detection menu appears by clicking on „No“ for the firmware update check.

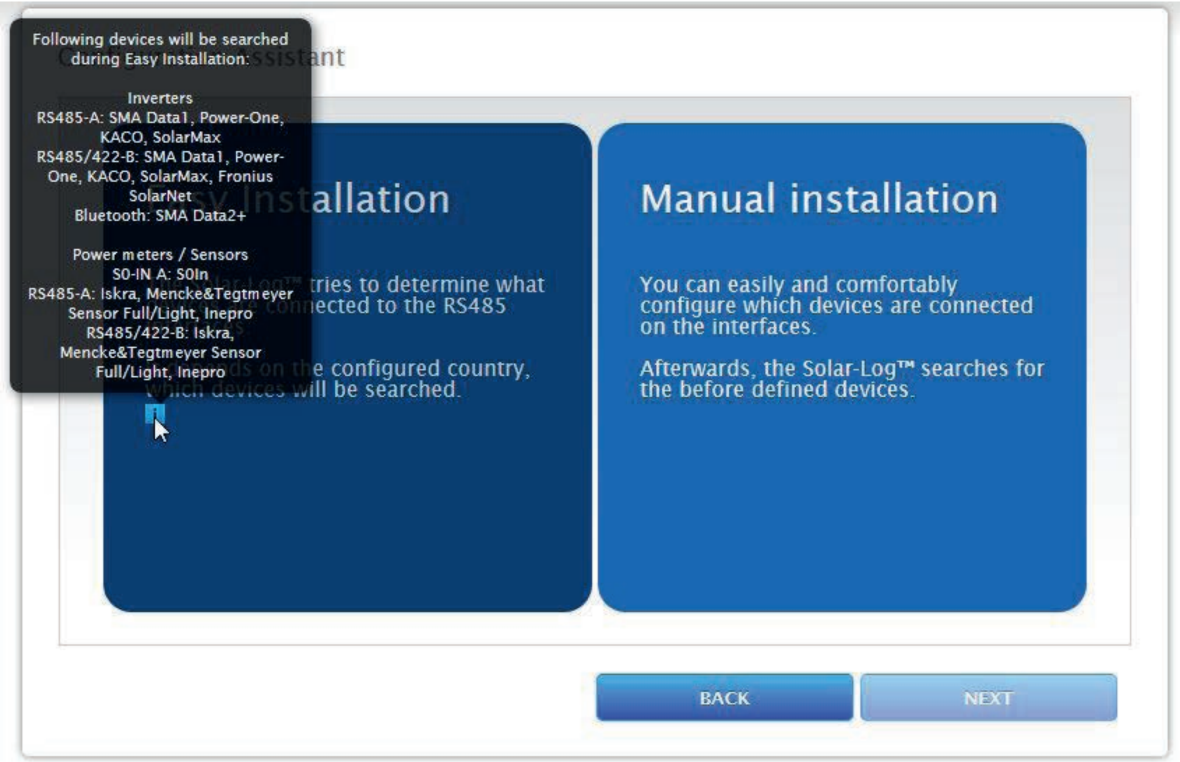


Fig.: Device Detection with help text displayed

Note

The device detection is to be performed after the components have been connected. Otherwise the corresponding boxes for the components are grayed out..

„Easy Installation“ selection

When „Easy Installation“ is selected, the detection is started automatically after clicking on the „Start“ button. Two functions are available during the detection:

- Stop search:
  Use the „Stop search“ button to abort the detection process. This is useful, for example, when no inverts have been detected. After the search is completed, the Interface assignments menu is displayed. Manual adjustments can be made here.
- Next interface:
  Use the „Next interface“ to skip to the next interface if the number of components detected is correct.

After the detection has been successfully completed, the Device Configuration is the next step.

“Manual Installation“ selection

Selecting „Manual Installation“ displays the Interface Assignment menu. From this menu, the connected devices need to be manually selected with the plus symbol. After that click on the „Start“ button to start the detection. (Also refer to Chapter „Device Definition“)

Note

It is important to let the detection process finish running and then to click on OK at the end.

Click on „OK“ after a successful detection. Then click on „Next.“ The device configuration menu appears. In the device configuration, one can, for example, define the generator output, the module fields and the names of the individual components. (Also refer to Chapter „Device Configuration“)

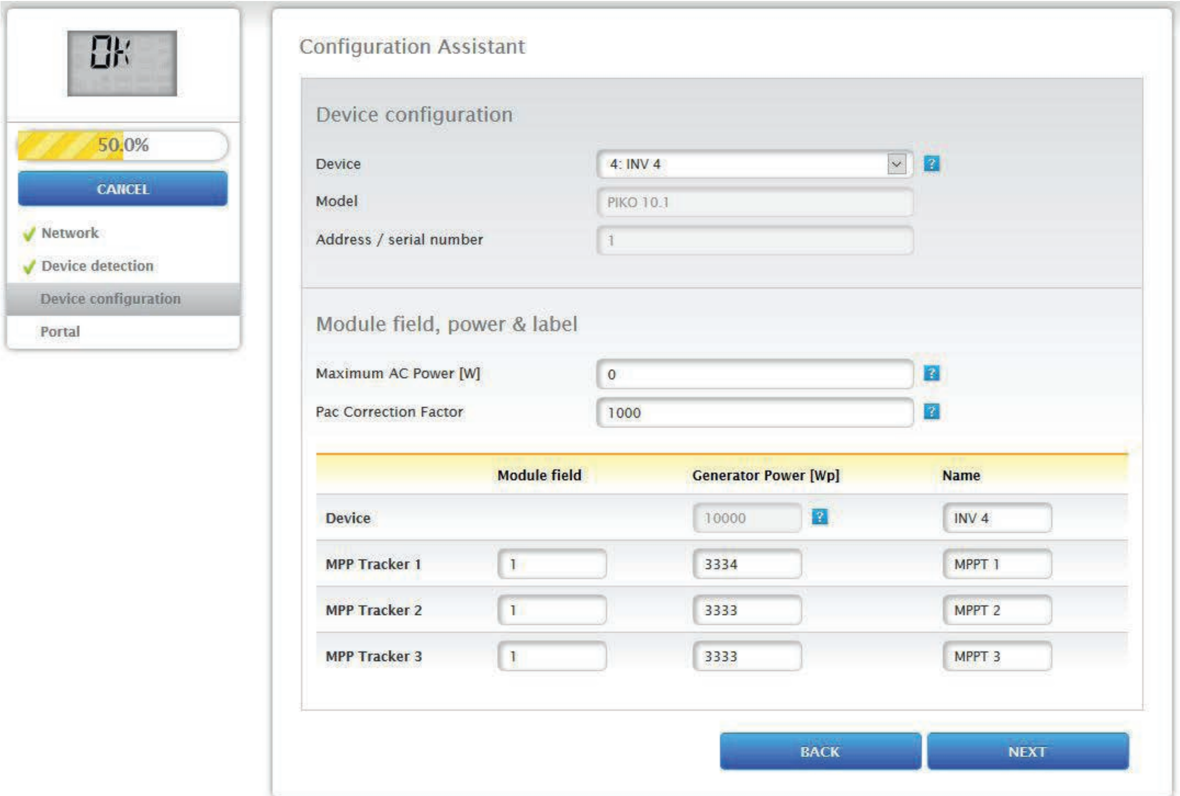


Fig.: Example - Configuration Wizard - Device Configuration

The „Portal“ menu appears after clicking on the „Next“ button. The data transfer to the Solar-Log WEB Enerest™ portal and local monitoring can be activated from this menu.
The box „Portal Server“ appears once the data transfer to the Solar-Log WEB Enerest™ portal is activated.
There are two options for entering the portal server:

- Option when the Solar-Log™ has already been registered on the portal:
  The portal server can be manually entered if it is known. Otherwise, it is possible to enter it automatically with the obtain portal server function (by clicking on the globe symbol).
- Option when the Solar-Log™ has not been registered on the portal:
  If the Solar-Log™ has not been registered on the portal, the function to obtain portal server automatically can be triggered with the globe symbol. Then the box „Portal Server“ is grayed out and the Solar-Log™ enters a waiting state. The Solar-Log™ remains in this waiting state until it has been registered in the Enerest portal (see the Solar-Log WEB Enerest™ User Manual, available to download from https://www.solar-log.com). After that the Solar-Log™ obtains the portal server automatically.

After activating local monitoring, the process can be completed by clicking on the „Next“ button. The E-mail Settings menu then appears.

If local monitoring remains deactivated, the configuration wizard is finished once you click on the „Next“

button. The system information page appears with a summary. (See illustration: „Summary of the configuration wizard with deactivated data transfers“)

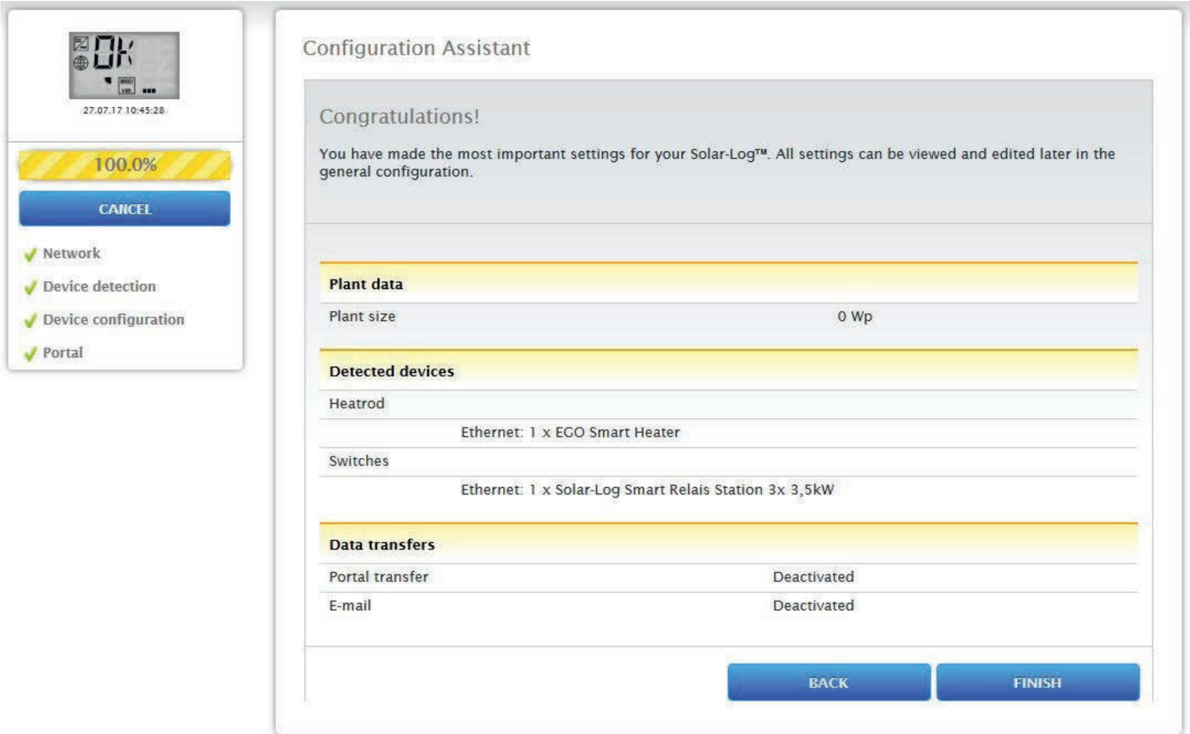


Fig.: Example - Summary of the configuration wizard with deactivated data transfers

Note

When local monitoring is deactivated, the e-mail, text message notifications, FTP export and FTP backup functions are also deactivated.

When local monitoring is activated, the wizard goes to the E-mail Settings menu. The e-mail settings can be configured and tested in this menu (see Chapter „E-mail“).

Note

When the E-mail function is not activated, the configuration wizard is finished once you click on the „Next“ button.

After the E-mail Configuration, the Device Notification menu appears. The error and status codes that, for example, are sent as e-mails can be defined in this menu. The maximum number of e-mails per day can also be defined. (See Chapter „Setting up Notifications for more information")

When the Definition is completed, click on „Next" to configure Performance and Failure Monitoring. The individual monitoring parameters can be configured here (see Chapter „Power & Failure").

Clicking on „Next" takes you to the last menu „Notification by E-mail." In this menu, there is the option to configure the type of yield overview (e.g. short yield overview) and the sending time. After clicking on „Next," the configuration wizard is finished and a summary is displayed. (See the following illustration: Example of the Configuration Wizard Summary)

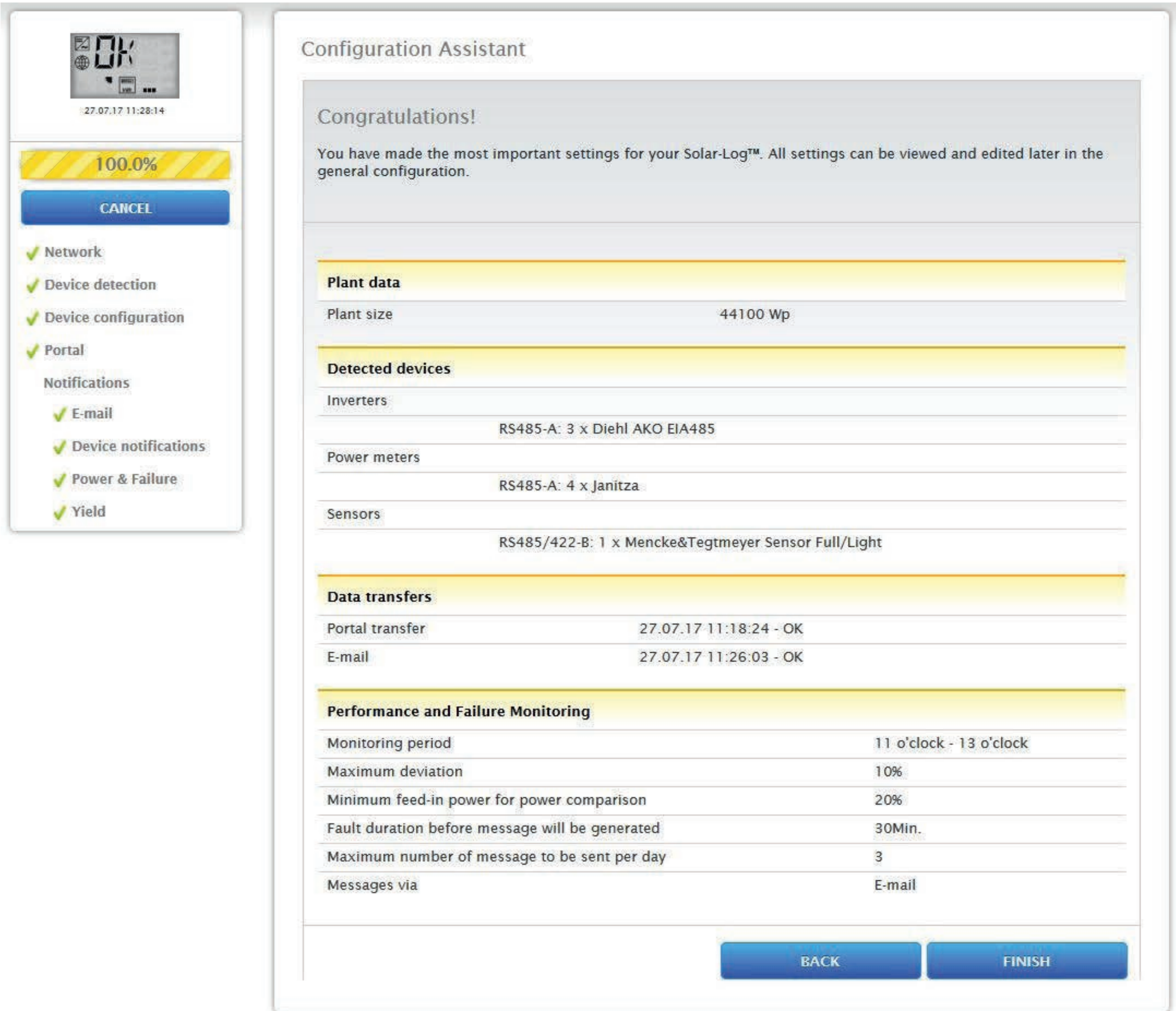


Fig.: Example of the Configuration Wizard Summary

14.4.1 Carrying out the initial set up of the Solar-Log 250, 300, 1200 and 2000 (manually).

The initial configuration of the Solar-Log 250, 300 and 2000 is performed via a web browser. All of the device connections need to be established and it is best to connect the Solar-Log™ to an Internet router. All settings made at the initial startup can be changed later.

Procedure:

- Enter the address http://solar-log in the address bar of the web browser.
- A selection of display languages is displayed.
- Select the desired Display Language.
- The browser access control configuration window appears. Click on save after the defining the user password.
- Sign in by clicking on the log in button (bottom right).
- Define the country and time zone. Click on "save."
- Select the installation parameters for the component detection. Click on "manual installation" or "start."
- After selecting "manual installation," the Welcome screen with the interface configuration section appears.
- After selecting "start," the detection is started. Once completed, the menu Yield data | System information appears. Click on "Configuration" in the configuration bar at the top.
- The following menus have to be configured:
  Internet
  Network
  Device
  Plant and
  System

14.5 Starting the configuration

The various options to open the main menu of the Solar-Log™ are listed below:

Device URL

- Start the web browser
- Enter http://solar-log in the address bar and press the ENTER key
- The main menu of the Solar-Log™ is displayed

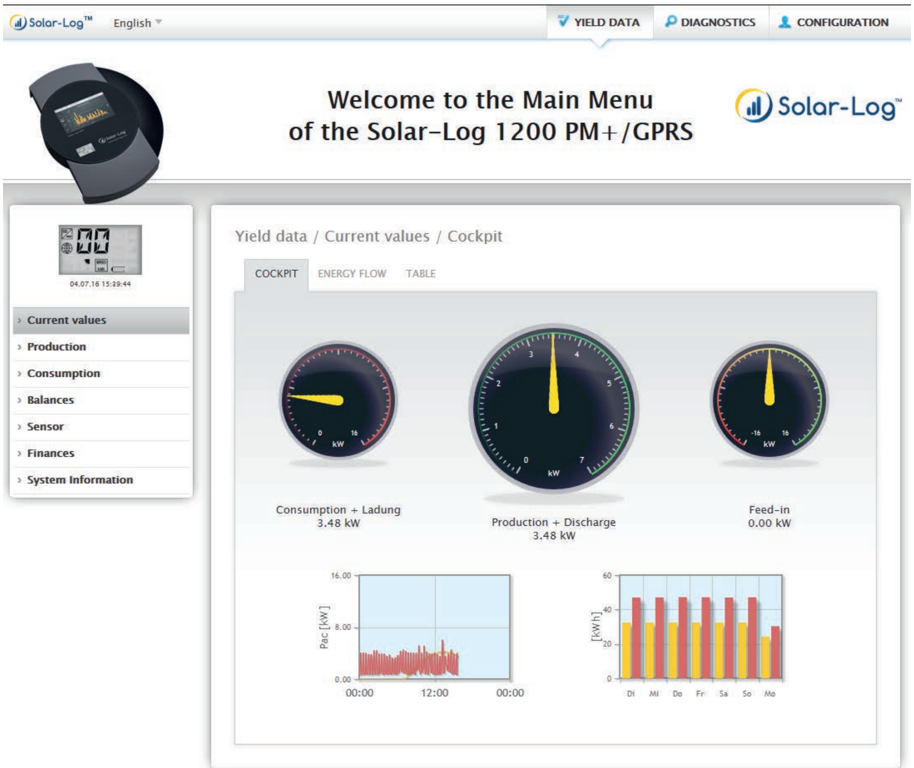


Fig.: Main menu of the Solar-Log 2000 PM+ GPRS

Alternatively, the Solar-Log™ can also be accessed as follows:

IP address from an automatic IP range

- Start web browser
- Enter http://169.254.wx.yz in the address bar and press the ENTER key.

  Here wxyz stands for the last 4 digits from serial number of the Solar-Log™. The serial number is printed on the model tag.

Fig.: Solar-Log™ model tag

The main menu of the Solar-Log™ is displayed.

IP address that was entered during the initial configuration

- Start the web browser
- Enter IP address from the Initial Configuration in the address bar and press the ENTER key.
- The main menu of the Solar-Log™ is displayed.

Device URL when there are several Solar-Log™ devices on the network

- Start the web browser
- Enter http://solar-log-wxyz in the address bar and press the ENTER key
  Here wxyz stands for the last 4 digits from serial number of the Solar-Log™.
  The serial number is printed on the model tag.
- The main menu of the Solar-Log™ is displayed.

Setting passwords

If no password has been defined after the update to firmware 3.5.3, the following window appears with security information.

Fig.: Pop-up window with security information

Click on “Yes” here to directly define a user password. The following configuration page appears:

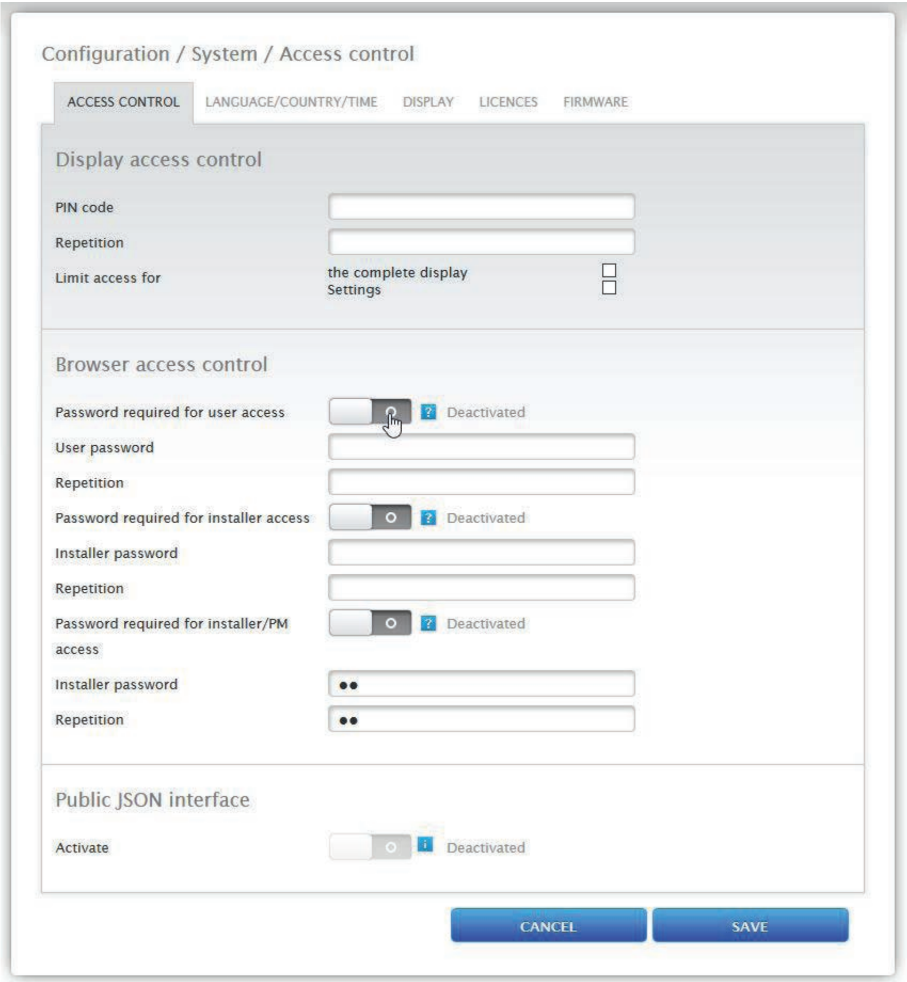


Fig.: Configuration page “Access control”

In the Access protection for the browser section, the user password can be activated and defined. Click on "save" after the defining the password. It is necessary to log in as a user with the newly defined password (log in button on the button right) to continue with the configuration.

Set password later (not recommended)

It is possible to define the user password later by clicking on "No" or by clicking on "No" after checking the box "I am aware of the security risks." Close the "Do not show this dialog automatically any more" window. If "Do not show this dialog automatically any more" was checked, the security warning will no longer appear each time when accessing the web interface.
As a reminder to define a password, a small red triangle appears in the top right corner. Click on this icon at any time to define the user password. Once a password has been defined, the triangle disappears.

14.6 Using the browser menu

The browser menu of the Solar-Log™ functions like a website and is divided into fourth main sections:

- Header bar (A)
- Left navigation (B)
- Tabs (C)
- Configuration page (D)

The sections Yield data and Diagnostic are described in the user manuals of the respective models.

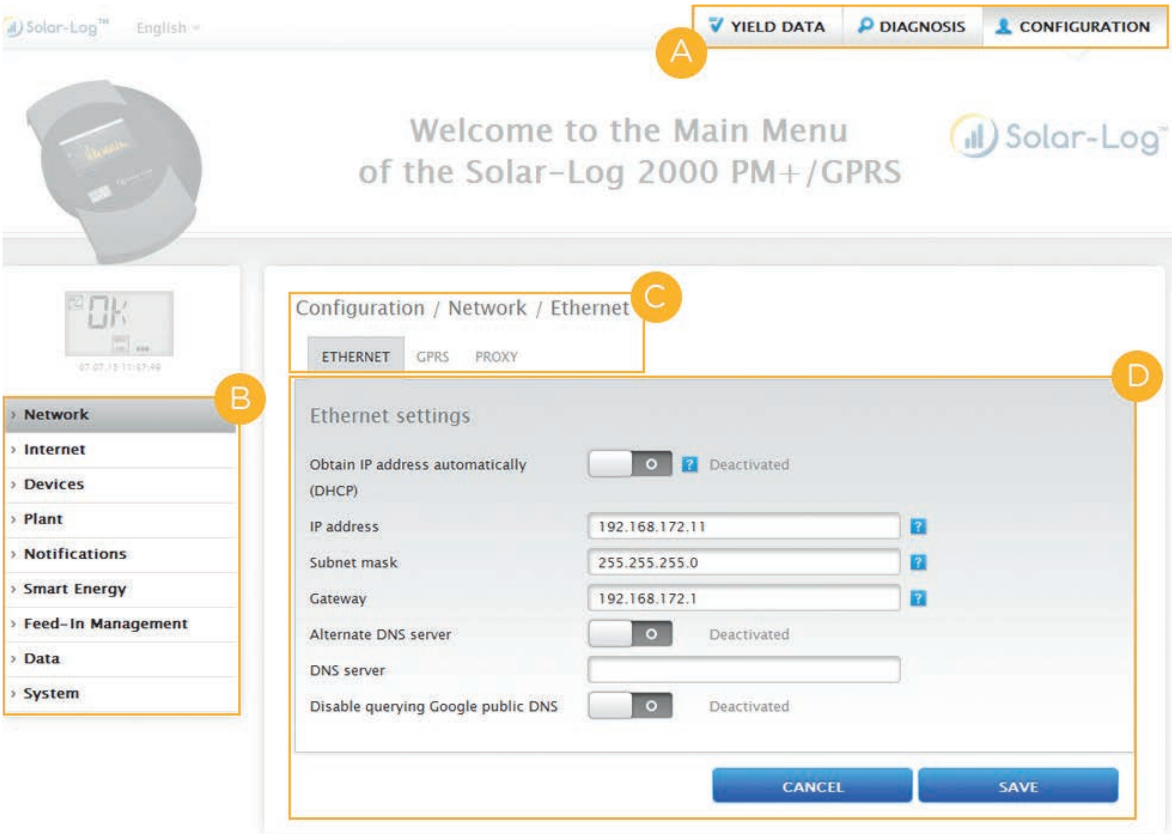


Fig.: Layout of the main menu

14.6.1 Control elements

The following control elements are used:

Control elements in the browser menu

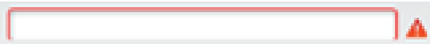
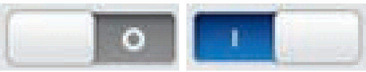
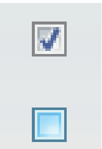
Control element	Meaning
	Text field
	Text field with incorrect or missing entry
	Drop-down selection list
	Virtual switch deactivated and activated
	The question mark boxes display additional information
	Check boxes Several boxes can be selected at one time
	Command buttons for various functions

Fig.: Control elements in the browser menu

14.6.2 Explanations of the names in the main menu

Header bar

The header contains three main sections:

- Yield data:
  Here you will find your plant's yield overview within certain periods of time such as day, month, year and the total yield to date.
- Diagnostics:
  Here you can view the fault and process messages while filtering them according to specified criteria.
- Configuration:
  Here you can change the device settings as required.

Left-side navigation menu

Depending on the tab selected, you can access additional functions from the navigation menu (left-side).

Tabs

Additional configuration sections appear according to the function selected.

Configuration Page

Here you can make necessary configurations for the optimal monitoring and evaluation of your plant. You can also view information on the power output, yields and the device.

Log in button

You can entered a password protected section by clicking on the log in button (at the bottom right corner of the screen) and entering your user and password. On the right side on the bottom, there is a blue line next to the log in button which indicates if you are logged in and with which user level. (Refer to the Access Control section for more information)

Fig.: Log in button with selection box

Hide arrow

The "Hide Arrow" (on the right of the header bar) allows you to increase the amount of the page displayed in the browser by hiding the Welcome header.

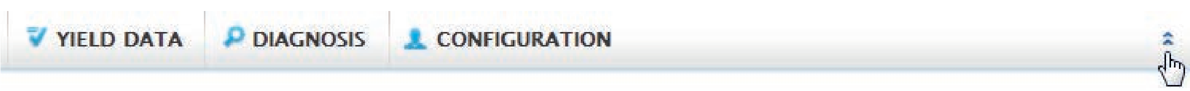


Fig.: Header bar with the "Hide Arrow"

New Firmware

A notification is sent via the Web browser when a new firmware is version available; a green triangle with an exclamation mark is displayed at the top in the status line. (See illustration: Signal for new firmware)

Fig.: Signal for new firmware

Note!

The Automatic Firmware Update Check has to be activated in the Configuration | System | Firmware menu to use this function. (See illustration: Automatic Firmware Update Check with notification text displayed)

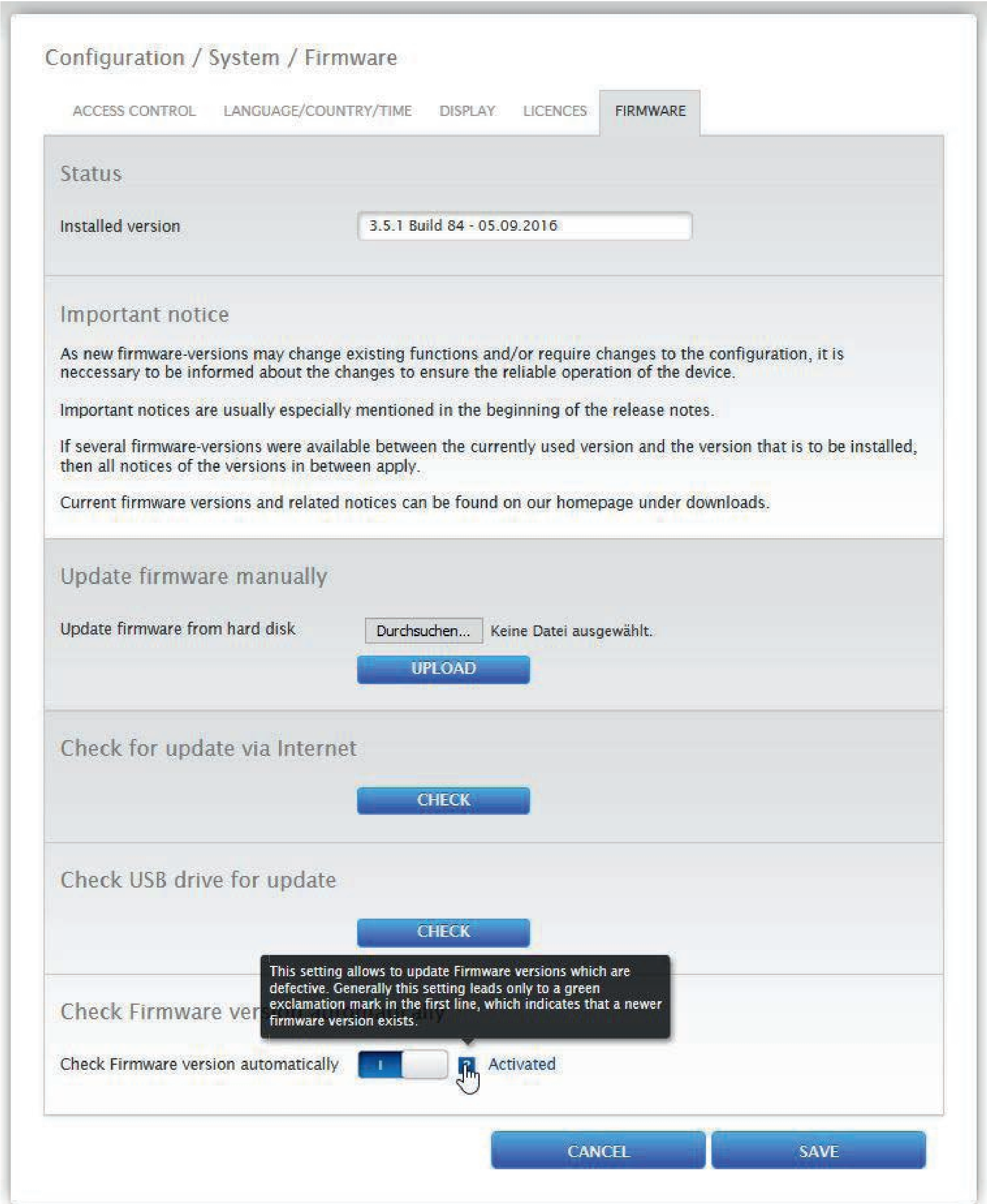


Fig.: Automatic Firmware Update Check with notification text displayed

The following notification text is displayed by clicking on the question mark:
"This settings allows firmware versions with critical errors to be automatically updated. However, generally, this setting only indicates that a new firmware version is available (green exclamation mark at the top).

Clicking on the green exclamation mark in the header displays the following window:

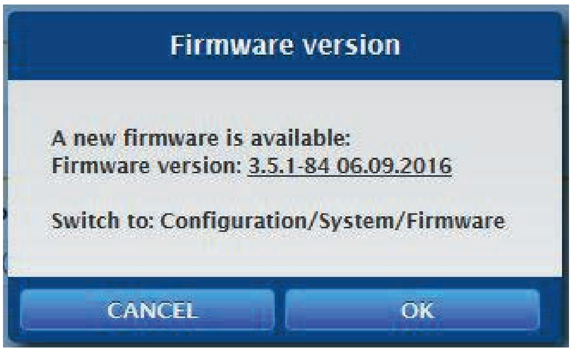


Fig.: Window displayed indicating that a new firmware version is available

Selecting “OK” redirects you to the page of the Solar-Log™ for firmware updates. Selecting “Cancel” closes the window.

15 Main menu

The main menu is divided into the following sections:

- Configuration
- Diagnostics
- Yield data

In addition, the following sub-menus are displayed in this view:

- Cockpit
- Energy flow
- Table

These are also located on the left side of the of the VLCD Display (see “VLCD Display” section for more details) and in additional sub-menus (depending on connected the devices) and as a selection in the main navigation menu.

15.1 VLCD Display

The VLC Display is located above the left navigation menu and displays the notifications from the Solar-Log™in the form of codes and symbols in addition to the date and time. The codes and symbols correspond to those for the LCD display. (Refer to the illustration “VLCD Display” and the chapter “Meaning of the symbols on the LCD display”)
The notifications are in real-time and are identical to those on the Solar-Log™ LCD Display. (Solar-Log 300, 1200 and 2000) (Also refer to the chapter “Notifications on the LCD Status Display”)

Fig.: VLCD Display

16 Configuration Menu

The Configuration menu is divided into the following sub-sections:

- Network
- Internet
- Devices
- Plant
- Notifications
- Smart Energy
- Feed-In Management
- Direct Marketing (as long as a license has been purchased and entered)
- Data
- System

The following sub-sections of the menu will be explained separately in the following chapters.

16.1 Configuring network settings

Open the dialog box.

Select Configuration | Network from the menu.

The Network menu is divided into the following sub-sections:

- Ethernet
- GPRS (only Solar-Log™ GPRS)
- WiFi (only Solar-Log™ WiFi)
- Proxy

Note!

Requests and control commands are sent to the inverters, battery systems and intelligent appliances via the network interface. For this reason, the network should always be available (24/7). If the Solar-Log™ is connected via WiFi, we recommend deactivating the overnight shutdown function.

16.1.1 Ethernet

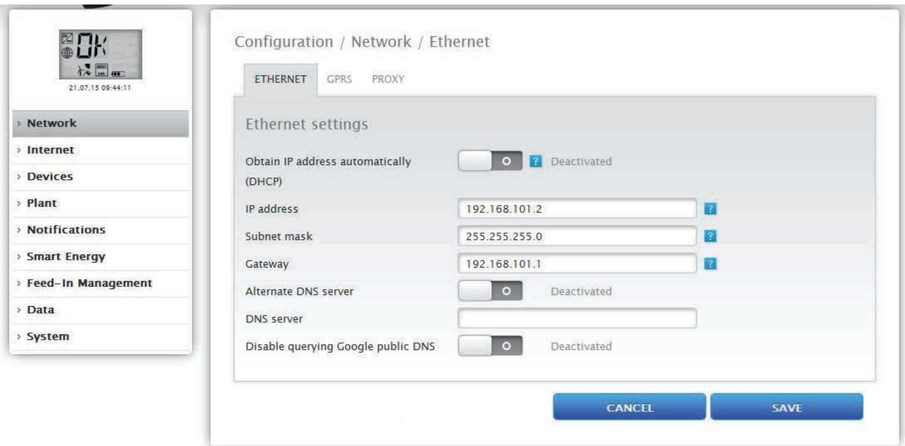


Fig.: Ethernet settings

The Ethernet settings for the Solar-Log™ are adjusted in this tab.

Obtain IP address automatically (DHCP)

Here the following options are available:

- Activate Obtain IP address automatically
- Deactivate Obtain IP address automatically.

.

With the default settings of the Solar-Log™, the Obtain IP address automatically option is deactivated.
If the Solar-Log™ should Obtain its IP address automatically (DHCP), this switch needs to be activated. This is only possible if the Solar-Log™ is connected to an Internet router with DHCP enabled. When the search is started, the Solar-Log™ attempts to obtain an IP address through an Internet router. This can take up to 60 seconds.
If the DHCP server is disabled in the router, the network settings must be configured manually. If necessary, please consult a network specialist who can assign a suitable network address in regard to IP address, Subnet mask and Gateway, for example.
If the Solar-Log™ is to have a fixed IP address, the Obtain IP address automatically (DHCP) switch needs to be deactivated. The following fields need to be adjusted according the network's configurations.

IP address

The address needs to be entered manually in order to allow remote PC access, when using a direct PC connection or a router without DHCP service.

Subnet mask

The Subnet mask is 255.255.255.0 by default and must be the same for every device in the subnet.

Gateway

The gateway is typically the IP address of the router to which Solar-Log™ is connected. That IP address is to be entered here.

Alternate DNS server

In some networks, the DNS server is a separate address for resolving Internet addresses (unlike a gate-way). If an Alternate DNS server is needed, switch the function to activated and enter the IP address of the DNS server.

Once finished, click on Save.

Connection Test

Use the „Connection Test“ button to determine if the entries are correct and if a connection can be suc-cessfully established. The message indicates if the connection was successful or not. (See the following illustrations)

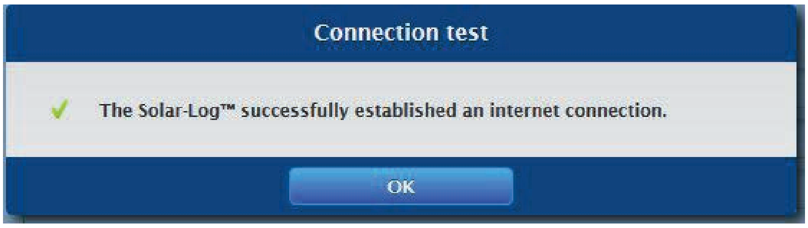


Fig.: Example of a successful connection test

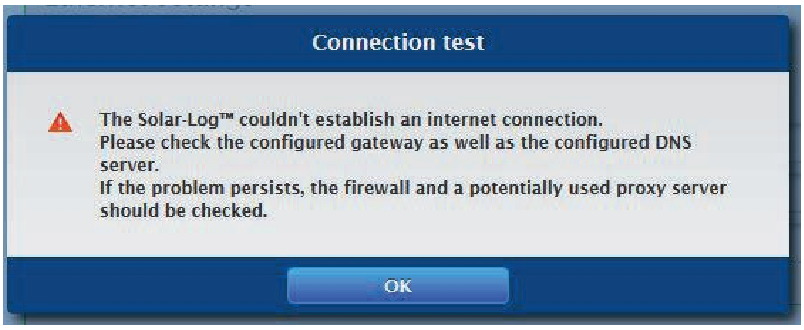


Fig.: Example of an unsuccessful connection test

16.1.2 GPRS (only Solar-Log™ GPRS)

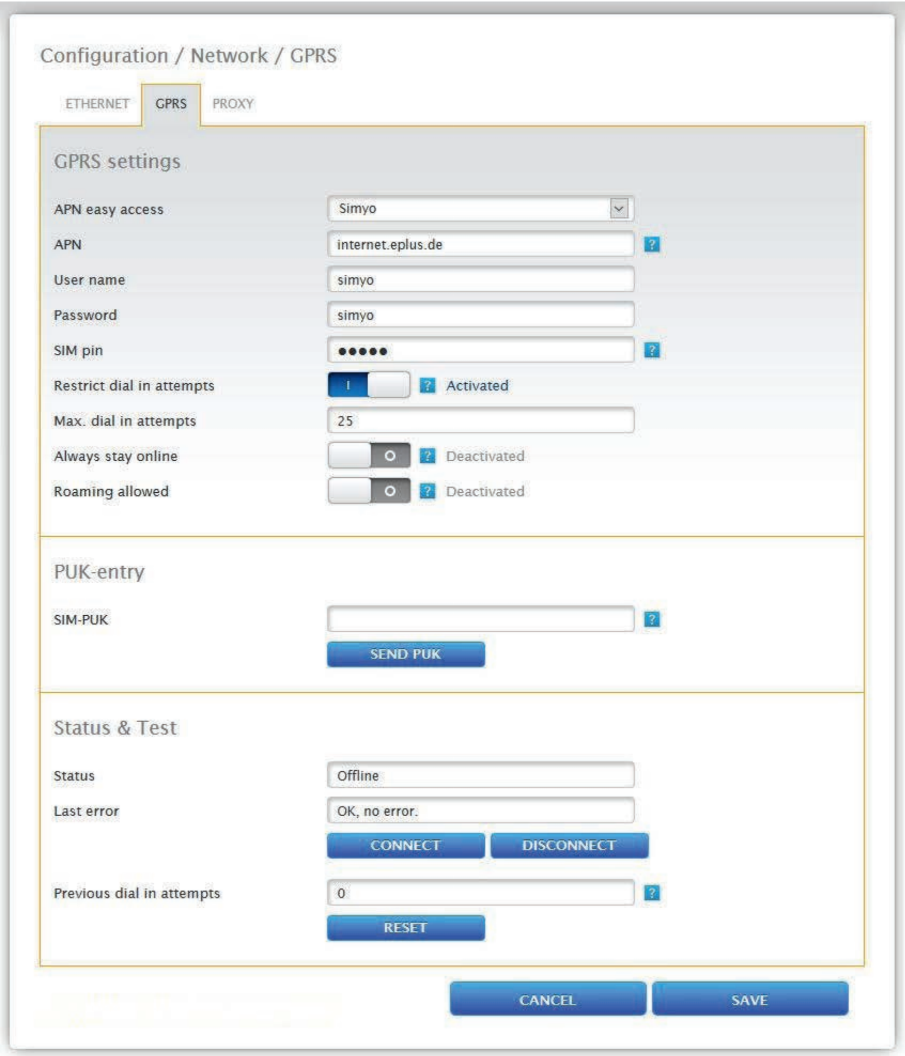


Fig.: GPRS settings

In many cases where no DSL or telephone connection is available, a GPRS mobile network is the only option to connect to the Internet to send e-mails, text messages (SMS) and data to the homepage.
In order to establish a GPRS connection, the data from the GPRS service provider needs to be entered in the following fields.

Note!

The Signal Strength of the GPRS connection is indicated on the LCD display with the symbol.

Note!

Lists of international APN settings and providers is available at http://www.solar-log.com/en/service-support/apn-settings.html.

APN shortcut
Selection of major mobile service providers (APN user and password are automatically filled in)

APN
APN (Access Point Name) of the mobile service provider

Users
User name for your mobile phone account

Password
Password for the mobile phone account

SIM PIN
PIN number of the SIM card

Limiting the number of dial-in attempts
Activating this function provides the option to limit the maximum number of dial-in attempts for the modem per day.

Note!

When the number of dial-in attempts allowed is too low, it is possible that certain tasks such as sending error messages or data transfers via FTP export or HTTP can no longer be reliably executed.

Always stay online
Activate this option when continuous data transmissions are required.
If this option is activated, the GPRS modem is continuously connected to the service provider. This setting is only recommended for flat-rate data plans.

Roaming allowed
By activating the roaming function, the Solar-Log™ can also connect to other mobile networks when the home network is unavailable.

Note!

Activating the roaming function could potentially result in enormous additional costs.

PUK entry
A locked SIM card can be unlocked in the SIM PUK menu. Enter the PUK code / super PIN of the SIM card and then go to Send.

Caution!

After sending the PUK code / super PIN, the PIN of the SIM card is reset to the one defined in the GPRS Settings | SIM PIN menu.

Status and Test section

The GPRS connection can be tested and disconnected with this function. The error codes displayed under Last Error are „21.2.1 Fault messages GPRS“ explained.
The number of attempts for the day can be viewed in the field "Previous Dial-in Attempts."
The count can be reset to 0 by clicking on the "Reset" button.

Note!

The field "Previous Dial-in Attempts" and "Reset" button are only visible once the Limit Dial-in Attempts function has been activated.

Note!

The dial-in Attempts count is reset once per day or also when the device has been rebooted.

16.1.3 General Information about GPRS Devices

We recommend checking and cleaning SIM cards once a year.
The contact points of the SIM card could start corroding due to humidity and should be cleaned regularly with a suitable medium (no screwdriver or cleaning solvents) to ensure trouble-free operations.

Caution!

Only remove the SIM card after the Solar-Log™ has been turned off. Removing the SIM card during normal operation may cause a card defect.

Corrosion on the SIM card contact points is an indication that the installation location does conform to the IP20 protection class.

16.1.4 WiFi (only Solar-Log WiFi)

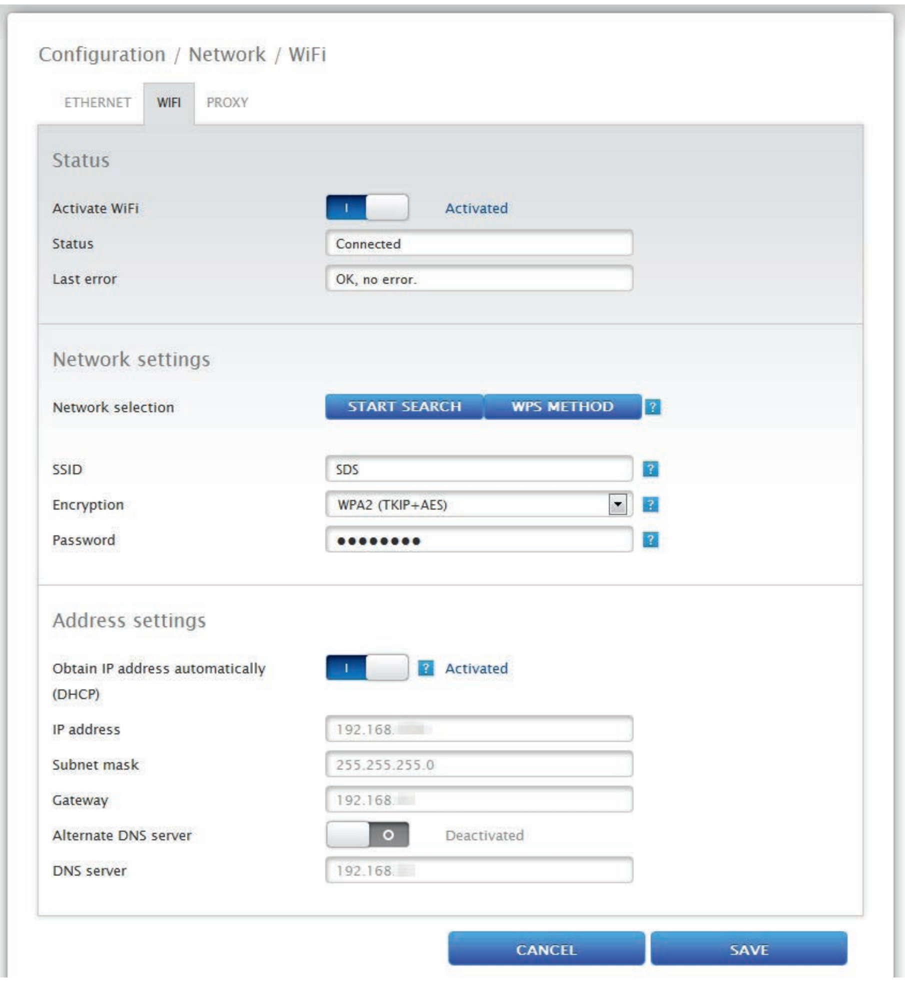


Fig.: WiFi settings

The Solar-Log™ WiFi models are equipped to be connected in a wireless local area network.

Status section

The WiFi function can be switched on and off with the Activate WiFi function. In the status box, the current status of this function is displayed.

Possible Status:

- Initializing
- Initialization error
- Disconnected
- Connected
- Connecting
- Connection lost
- Searching
- Search finished

The Signal Quality is indicated on the LCD display with the symbol.

Network Settings section

The Start search button is used to initiate a search for wireless networks. The status Searching is displayed.
Once the search is completed, the wireless networks found are listed and can be selected from the SSID. The Solar-Log™ automatically switches to the encryption used by this network. If the network name is hidden ("Hidden SSID"), the Access Point is not displayed by the network scan. In this case, enter the network name and security key.

The following encryption options are available:

- WEP
- WPA-AES
- WPA-TKIP
- WPA2-AES
- WPA2-TKIP

After selecting a network, the network's security method is automatically selected. Enter the network's security key in the password box. Save the settings.

Network address settings section

Note!

These settings apply to the wireless connection to the router. We recommend using DHCP. The IP address is obtained automatically if the Solar-Log™ is connected to an Internet router with the DHCP service enabled. After saving and the automatic restart, the new IP address is displayed.

All routers usually come with the DHCP service enabled by default, so that all the subsequent data are entered automatically:

IP address, Subnet mask, Gateway and DNS server

The settings can also be manually configured in these boxes. For this, the DHCP function has to be deactivated.

If necessary, please consult a network specialist who can assign a suitable network address in regard to IP address, Subnet mask and Gateway, for example.

Alternate DNS server

In some networks, the DNS server is a separate address for resolving Internet addresses (unlike a gateway). In this case, the IP address of the DNS server is entered here. The alternate DNS server can also be configured manually from the Network | Ethernet menu.

16.1.5 Proxy

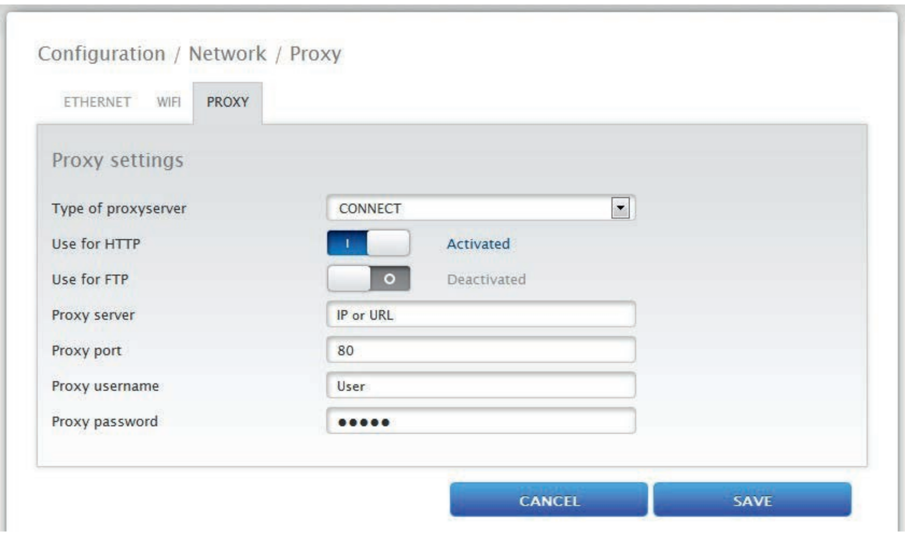


Fig.: Proxy settings

The proxy function is not enabled by default. Configure the proxy in the Configuration | Network | Proxy menu.

The proxy settings need to be configured in the Solar-Log™ to enable Internet communication via the proxy server. Proxy servers are typically used in the networks of organizations and companies.

The data transfer only refers to the FTP transfer.

Procedure

- When using a proxy, select Connect Method.
- Enter proxy server, port, user name and password.
- SAVE the settings.

16.2 Internet Configuration

Select Configuration | Internet from the menu.
The following tabs can be displayed:

- Access type
- Portal

When local monitoring is activated under Configuration | Internet | Portal , the following tabs are visible:

- E-mail
- Text message (SMS)
- Export
- Backup

16.2.1 Access type

The type of Internet access that the Solar-Log™ uses to connect to a portal or server is adjusted in this tab.
Procedure

- Select the type of Internet Access
  Selection options:
  Network Router (DSL, cable, WiFi)
  GPRS (mobile network)
  Mobile router (GPRS, UMTS, LTE)
- SAVE the settings.

16.2.2 Portal

The following functions are available in this tab:

- Activate / Deactivate transfers
- Activate:
  - Portal Server
  - Transfer interval
- Local monitoring can be activated

Note!

Please download the Solar-Log WEB Enerest™ User Manual from our website to efficiently use and configure the Solar-Log WEB Enerest™.
Located here: https://www.solar-log.com/en/support/downloads

Solar-Log WEB Enerest™ settings section

In this section, the following selection options are available:

- Activate / Deactivate transfers
- Portal Server. The box „Portal Server“ appears once the data transfer to the Solar-Log WEB Enerest™ portal is activated. There are two options for entering the portal server:
- Option when the Solar-Log™ has already been registered on the portal:
  The portal server can be manually entered if it is known. Otherwise, it is possible to enter it automatically with the obtain portal server function (by clicking on the globe symbol).
- Option when the Solar-Log™ has not been registered on the portal:
  If the Solar-Log™ has not been registered on the portal, the function to obtain portal server automatically can be triggered with the globe symbol. Then the box „Portal Server“ is grayed out and the Solar-Log™ enters a waiting state. The Solar-Log™ remains in this waiting state until it has been registered in the Enerest portal (see the Solar-Log WEB Enerest™ User Manual, available to download from https://www.solar-log.com). After that the Solar-Log™ obtains the portal server automatically.
- Transfer interval
- SAVE the settings.

Status (Solar-Log WEB) Section

The following fields are displayed in the Status section:

- Date (Last Export)
- Error (Last Export)

Test Solar-Log WEB Section

A connection test can be performed in the Test section. A separate pop-up window is displayed with the progress of test. The connection test also indicates if the test was successful or not. If it was not successful, it displays the error. After the tests are finished, possible causes for the connection problems are listed. (See the following example illustration).

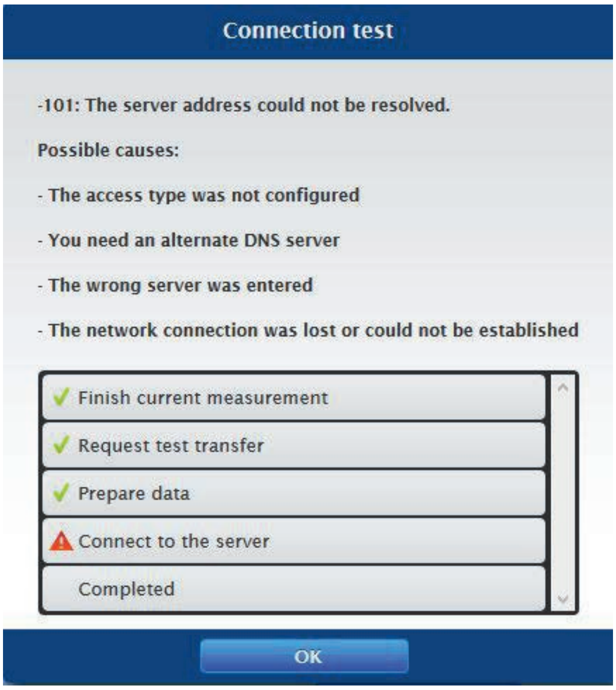


Fig.: Example - Transfer Test with an Error Image

After confirming with OK, an additional field with the status of the test is displayed in the Test section.

Question marks indicate that the test was unsuccessful and possible causes are listed.

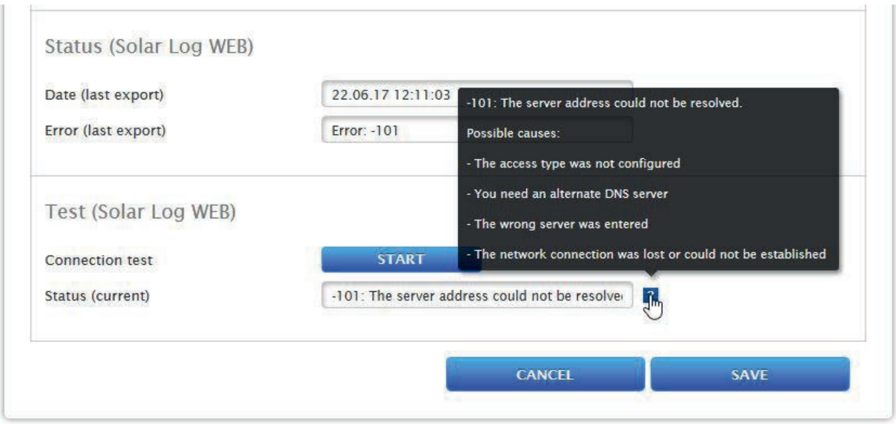


Fig.: Example - Connection Test with an Error

16.2.3 E-mail

The settings in this section serve as the basic configuration for sending e-mails via the e-mail client integrated into the Solar-Log™. The Solar-Log™ can send e-mails in the following situations:

- Daily yield overview
- Inverter faults
- Inverter failure
- Deviation from target power

We recommend using the e-mail address provided by Solare Datensysteme GmbH for sending e-mails.
This is sent to you by e-mail as part of the portal registration process.
In addition, you also have the option of saving your own address.

Note!

Many e-mail providers have switched their servers to secure connections and now only allow e-mail to be send via these secure connections. Users with such e-mail providers have to adjust the settings in the Solar-Log according to the instructions from the providers.

Note!

The certificates from the following providers have been integrated to send e-mail via a secure connection: GMX, WEB.DE, GMAIL and T-ONLINE. Other e-mail servers or certificates cannot be used.

E-mail settings section

Enter the settings for sending e-mail via the Solar-Log™'s e-mail client in this section. The data for the boxes SMTP Server, SMTP user name, SMTP password and sender is in the confirmation message from the portal registration. Enter this data in the corresponding boxes. Enter the recipient's e-mail address in the corresponding box.

Connection security

The security method from the particular e-mail provider has to be selected next to the point Connection security. The port for the secure connection is to be entered after the SMPT server.

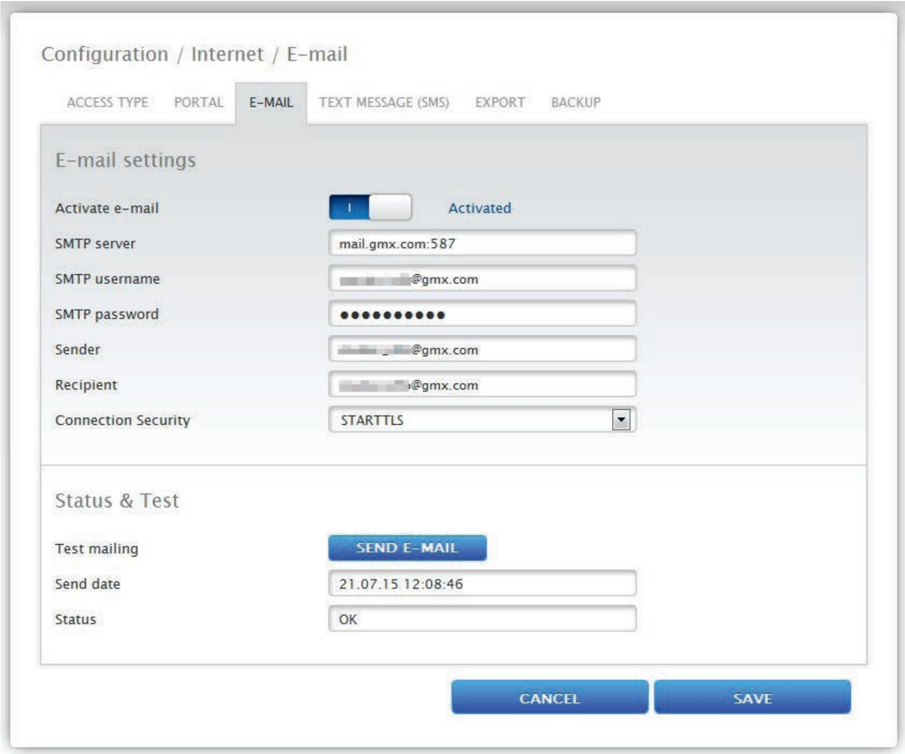


Fig.: Example configuration STATTLS to send e-mail with GMX

Status & Test e-mail section

In this section, the e-mail settings can be tested and the information from the last sent e-mail displayed.

16.2.4 Text message (SMS)

The Solar-Log™ text message (SMS) program sends customized messages with any of the following cont-ent:

- Daily yield overview
- Inverter faults
- Inverter failure
- Deviation from target power

There are two options to send text messages (SMS):

- Text messages (SMS) direct via GSM modem
  This option is only available with GPRS models.
- Text messages (SMS) via e-mail forwarding
  Text messages (SMS) are sent in two stages: First, an e-mail message is sent to an e-mail service pro-vider who provides the text message (SMS) service. From a keyword in the Subject line, this provider detects that the message is to be forwarded as a text message (SMS) to a certain number. For the incoming e-mails, some e-mail providers forward a text message (SMS) free of charge with the Subject line for information.

16.2.5 Export

The automatic data export allows the yield data to be periodically transferred to the server.
Various data formats and export intervals are available.

Exporting settings to an external server

Procedure

- Activate Export switch.
- Enter the name of the server name in the FTP server box.
- Enter the FTP user name and password from the FTP server access data.
- An FTP directory only has to be entered here if the Solar-Log™ homepage is not to be located directly in the main directory of your homepage. Otherwise, this box can be left empty.
- The Export Interval determines how often the Solar-Log™ transmits the data to the server.

Note!

When using local monitoring, the option for a daily export is available.

- The following export data formats are available: CSV, Solar-Log™ or both CSV and Solar-Log™.
- SAVE the settings.

Status & Test external server section

In this section, the export settings can be tested The information from the last export is displayed.

16.2.6 Backup

Periodic data backups can be configured on any homepage by FTP protocol. The data backups include overall statistical data. The size of each backup depends on the plant size and the number of devices connected.

Backup settings section

Procedure

- Activate Backup switch.
- Enter the name of the server in the FTP server box.
- Enter the FTP user name and password from the FTP server access data.
- An FTP Directory only has to be entered here if backup should not be saved directly in the main directory of your homepage. Otherwise, this box can be left empty.
- SAVE the settings.

Status & Test section

In this section, the backup settings can be tested The information from the last backup is displayed.

16.3 Configuring connected devices

From the menu Configuration | Devices, the PV plant components connected to the Solar-Log™ can be

- defined
- detected
- and configured.

We recommend the following procedures for new installations:

- First define the interface to be used for the connected devices
- Device Detection
- Device configuration

16.3.1 Device definition

The Configuration | Devices | Definition menu is divided into the following sub-sections:

- Interfaces
- CT (only Solar-Log™ Meter)
- Large external display (advanced settings have to be activated)
- SCB (only Solar-Log 1000 and 2000)

Configuring the device interface

The interface for the connected devices needs to be defined from the Configuration | Devices | Definition | Interfaces menu before performing a device detection.

Procedure:

- Go to the plus symbol under "Interface assignments".

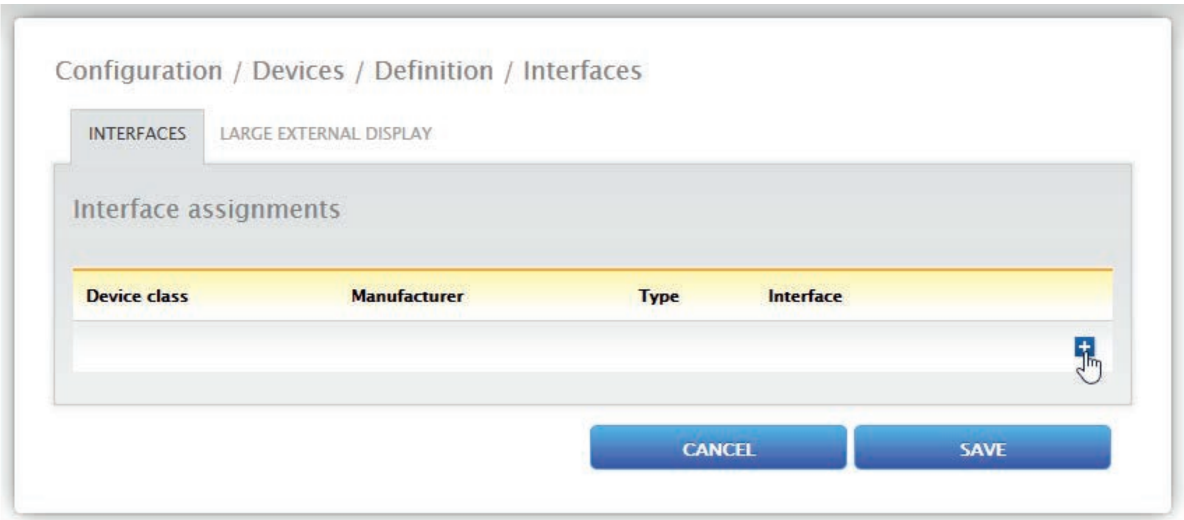


Fig.: Interface definition via the plus symbol

The following window appears:

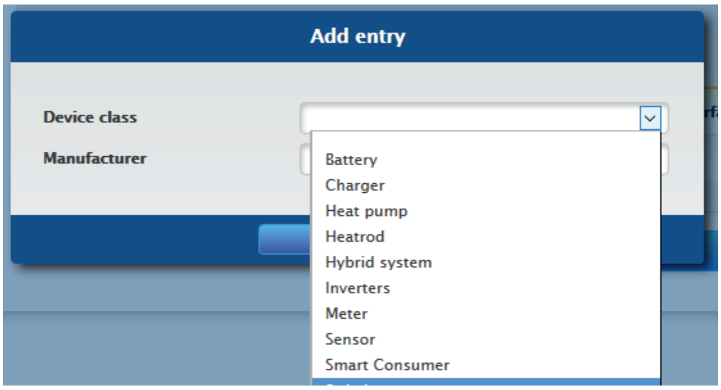


Fig.: Adding components

The connected components are selected in the Device class box. The following device classes can be defined:

- Battery
- Hybrid System
- Smart Appliances
- Switch
- Sensor
- Inverter
- Meter

Depending on the device class and/or the selected Manufacturer, additional boxes visible: Type, Interface and Baud rate.
Furthermore, an existing Wireless Package can be activated here and the expected reply time for a device connected to this bus is increased.

Note!

Caution: Using different manufacturers on the same serial bus may cause communication problems.
Only the network interface (Ethernet) can have multiple assignments according to our component database at https://www.solar-log.com/en/support.

If the device class is correct, confirm the selection with OK. Define additional connected device classes as described.

If all of the connected components have been selected and confirmed with OK, an overview is displayed in the interface assignments. (See illustration: "Overview of the selected components")

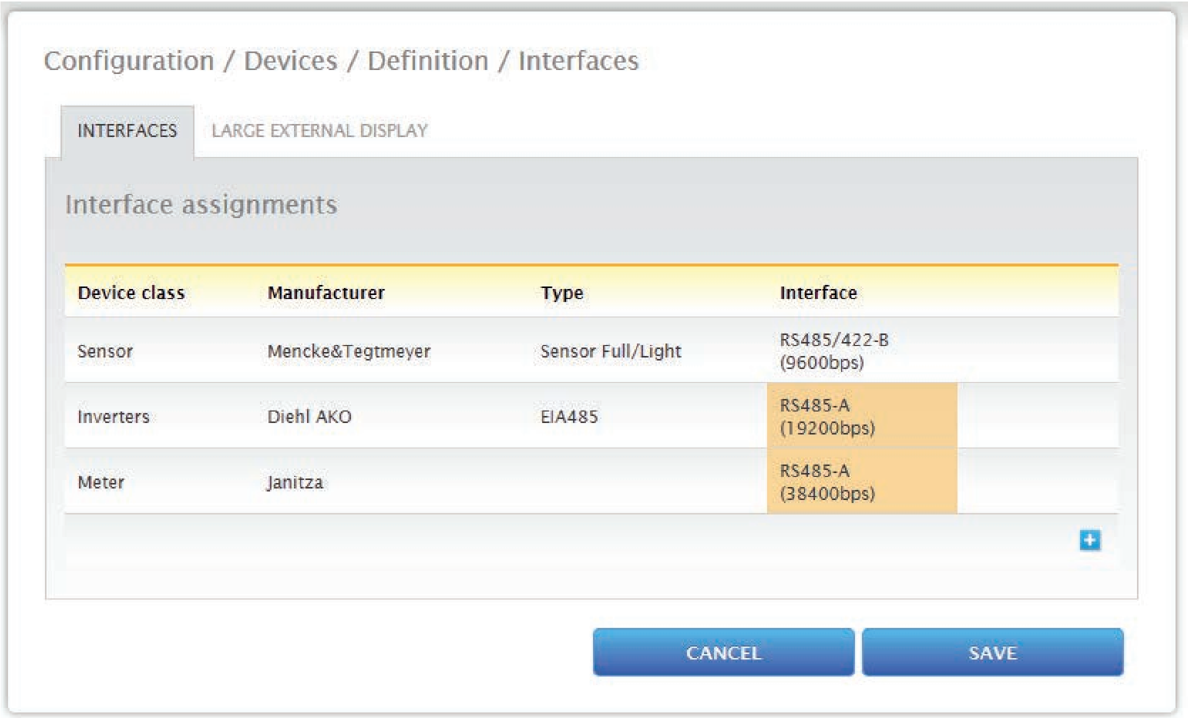


Fig.: Overview of the selected components

From the overview, there is the option to check whether the settings are correct and, if need be, adjust or delete them with the and symbols. (The symbols are only displayed by moving the mouse over the components.) Additionally, the following is displayed in the overview of the device interfaces:

- Device class
  The selected devices can be seen here. In the example:
  - Sensor
  - Inverter
  - Meter
- Manufacturer
  The manufacturer is displayed in this column. In the example:
  - Mencke&Tegtmeyer
  - Diehl AKO
  - Janitza
- Type
  The defined types are listed in this column. In the example:
  - Sensor Full/Light
  - EIA485
- Interface
  Interface indicates which interface and baud rate the devices are using.

Click on SAVE if all of the definitions are correct.

Note!

The number behind the interface (e.g. x1) indicates the number of switching devices for this device type.

Section Defining the Solar-Log™ Meter (only Solar-Log™ Meter)

With this model version, an extra tab Meter is displayed in the Configuration | Devices | Definition menu.
The following setting options are available in this section:

- Input definition
- Reference voltage

The Operating Mode section describes the setting for the various operating modes of the Solar-Log™ Meter and is to be selected in the Device Definition before Device Detection. (See figure „Operating mode Solar-Log™ Meter)“

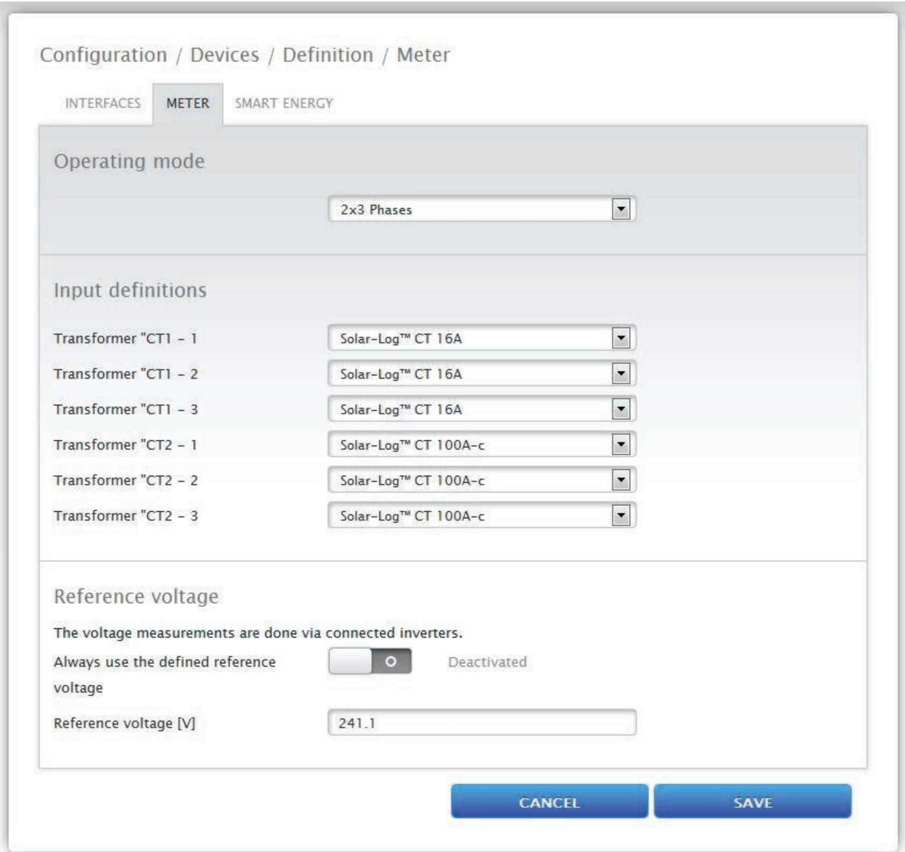


Fig.: Device definition for the Solar-Log™ Meter

Input definition section

- The following CTs are available:
  Solar-Log™ CT 16A
  Solar-Log™ CT 100A - C
  Solar-Log™ CT 100A - o
  user-defined
- The settings for the Solar-Log™ CTs have been pre-defined for the current ratio.
- When using other CTs, select user-defined.
  An additional input box appears for the current ratio of the installed CT.
  The current ratio is calculated with the ratio between primary and secondary current

Example

200A of primary current results into 200mA of secondary current with a user-defined current transformer. There is then a the current ratio of 1000 (200A/0.2A) Enter this value (1000) in the field Current Ratio.

Reference voltage section

In addition to the current measured by the CT, a reference voltage is needed for the power output calculation. This reference voltage can either be

- recorded via the inverters and/or calculated by the Solar-Log™
- or set in the box reference voltage [V].

If the Solar-Log™ does not receive voltage values from the inverters (for example during night), an average value is calculated and used.

By activating the Always use stored voltage button, the value entered in the reference voltage [V] input box is always used for the power output calculation.

Note!

The reference voltage value is predefined by the country settings. Please check this value.
It is best to measure the reference voltage and enter this value.

During the Device Detection process, the CT defined here is recognized as a meter and can be adjusted and named accordingly in the meter configuration menu under Configuration | Devices | Configuration.

Operating mode with the Solar-Log™ Meter in connection with the interface assignment:

- Select the desired Operating mode before the device detection in the Device Definition menu.

The listed operating modes refer to the different possible measuring combinations.

- 2x3 phases stand for the recording of two 3-phase appliances. Here the six current transformers are combined together as two meters.
- 1x3 and 3x1 phases stand for the recording of one 3-phase appliance and three 1-phase appliances. Here the six current transformers are combined together as four meters.
- 6x1 phase stands for the recording of six single-phase appliances. Six meters are displayed in this mode.
- The other modes can be used for other measuring combinations.

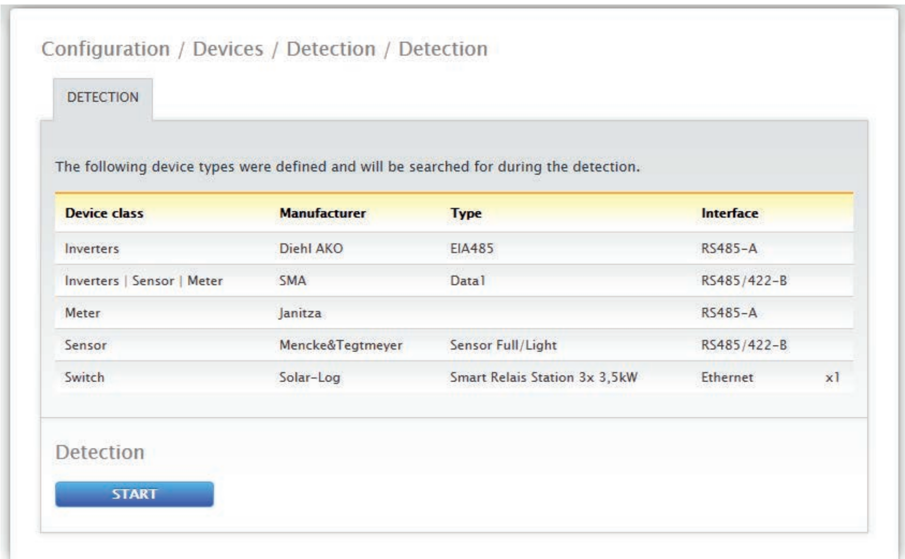
Fig.: Solar-Log™ Meter Operating Mode

16.3.2 Device Detection

During the Device Detection process, all of the predefined components in the Device Definition menu which are connected to the Solar-Log™ interfaces are searched for and recognized. During the Device Detection process, the Solar-Log™'s internal data structure is prepared for these devices.

Procedure:

- Select Configuration | Devices | Detection from the menu.
- The devices which were predefined in the Device Definition menu are displayed in the overview.



Device class	Manufacturer	Type	Interface	
Inverters	Diehl AKO	EIA485	RS485-A	
Inverters | Sensor | Meter	SMA	Data1	RS485/422-B	
Meter	Janitza		RS485-A	
Sensor	Mencke&Tegtmeyer	Sensor Full/Light	RS485/422-B	
Switch	Solar-Log	Smart Relais Station 3x 3,5kW	Ethernet	x1

Fig.: Device detection - not started yet

- START Device Detection.
- The Device Detection goes from the top listed interface to the bottom listed interface when searching for devices.

The progress of the device detection is displayed in a window that automatically appears.

- The detected devices are displayed with the number of devices per bus.
- If all of the devices on a bus have been detected, the rest of the search can be skipped. The search is then continued on the next bus.
- The Device Detection is completed once all of the buses have been checked.
  Status message: New device detected, the data is being reformatted.
- The Solar-Log™ reboots itself.

Note!

Once the detection has been successfully completed, individual device classes can be removed with the symbol without having to initialize the complete device configuration.

16.3.3 Configuring devices

After the Device Detection has been successfully completed, the detected devices have to be defined in the Configuration | Devices | Configuration menu.
Depending on the device, different settings might be needed for the configuration.

Procedure:

- Select the device that needs to be configured in the Device Configuration section.
- Depending on the device type, different configuration boxes appear.
- The sections below—Module Fields, Power Output and Descriptions—are to a large extent identical
  Enter the module field, connected generator power and description

Configuring inverters

The following values have to be configured for inverters:

- Maximum AC Power
- Pac Correction Factor
- Module field
- Generator Power and MPP tracker output (according to the string plan)
- Labels or names of the inverters and/or MPP trackers.

Procedure:

- Select Device.
- Enter
- the maximum AC power from the inverter's data specification in the section: Module Field, Power and Name.
- Enter the Pac correction factor
  (for more information, refer to the section "General Information on the Pac Correction Factor")
- Define the module field.
  Inverters can be assigned to be different module fields. See Chapter „18.4.7 Module Fields".
- Generator Power
  The connected power of the individual inverters in Wp. The total power can be calculated using the formula: Module power * Number of modules. The output does not have to be entered. It is calculated from the total generator power values that have been entered for the Mpp Tracker.
- The generator power for every tracker needs to be entered if the inverter has several MPP trackers.
- IA distinct name can be assigned to every generator/MPP tracker in the Label box.
- SAVE the settings.

16.3.4 General Information on the Pac Correction Factor

At photovoltaic plants, several measuring points and power generators (inverters) are combined with one another. The Solar-Log™ evaluates this data and partially looks for any correlations.
Since some of the components are not calibrated, deviations in the values measured can easily arise.
For example, if the total amount of energy produced based on what the inverters display is compared with the values from calibrated power meters, deviations of up to 8% can arise.
In practice, meters and inverters both can display too much or too little kWh.
To correct these inaccuracies in the medium term, the Solar-Log™ firmware uses a PAC correction factor.
The PAC correction factor is located in the Configuration | Devices | Configuration menu.

Calculating the PAC correction factor

All yield data are always stored internally without any correction factor. This factor is applied only when the data are displayed. The factor can therefore be adjusted at any time.

The formula for calculating the correction factor is as follows:

(Yield power meter / yield inverter) * 1000

If the inverter does not have a display, it is advisable to use the values which are recorded by the Solar-Log™ from a period over a week.

That is why it is recommended to leave the default PAC correction factor at 1000 initially.

The correction factor can be adjusted yearly after receiving the statement from the utility company.

Example calculation:

Inverter 1	Inverter 2	Calibrated power meter
Total energy	Total energy	Total energy
259.12 kWh	305.22 kWh	550.55 kWh
Total = 564.34 kWh		Deviation= 13.79 kWh

By comparing the values, you see that the inverters are more likely to display too much output.

Pac Correction Factor	
Calibrated power meter total energy	Inverter total energy
550.5 kWh	564.34 kWh
Calculated PAC correction factor in the example:	
(550.55 kWh/564.34 kWh)* 1000= 975.66	
Rounded PAC correction factor = 976	

16.3.5 Configuring power meters

An operating mode needs to be assigned to power meters to configure them.

Possible operating modes for power meters:

- Generator (records the individual producers, e.g. PV inverter or CHP
- Meter for the entire plant (records the complete PV plant output)
- Consumption meter (records the complete consumption)
- Utility Meter (U)
- Utility Meter (U+I)
- Utility Meter (U+I) + Consumption Meter (bi-directional)
- Sub-consumption meter (records the consumption from individual appliances)
- Battery (Bi-directional meter)
- Battery (Bi-directional meter)
- Deactivated

Depending on the selected operating mode and/or meter type, additional selection boxes appear: Energy type and/or Impulse rate.

Note!

Several consumption meters can be defined for every plant. Their measurements are added to the total consumption.

Note!

A sub-consumption meter is a consumption meter whose consumption has already been recorded by another meter. It is used to visualize the consumption from a particular appliance or group.

Procedure

- Select Device
- Select the desired operating mode from the Meter configuration section.
- If needed, assign a plant group to this meter.
- SAVE the settings.

16.3.6 Configuring sensors

Under sensors, the configuration only comprises of activating other sensors.
Procedure:

- Use the Ambient Temperature and/or Wind button to activate the sensors.
- If needed, make assignments to the module field.
- SAVE the settings.

16.3.7 Configuring Battery

The following configuration options are available for connected batteries from the Battery menu.

- Battery size
  Enter the battery size in Wh in this box.
- Consumption meter includes battery charge
  This box enables recording the battery charges from the consumption meter.

Note!

The following components always have to be used for battery monitoring to work:
=> Inverters
=> Battery
=> Consumption meter

Note!

Refer to Chapter 17.2 “Battery Diagnostic” for more information on diagnostics and visualization.

16.3.8 Configuring EGO Smart Heaters

EGO Smart Heaters can be selected from the drop-down menu from the Device Configuration menu and configured accordingly.

Procedure:

- Select the Smart Heater from the drop-down menu under devices.
- Enter the maximum storage temperature [C°].
  The maximum storage temperature can range from 40°C to 80°C . When 0 is entered, the settings from the Smart Heater for its potentiometer are used.
- Configure and active the minimal temperature as needed. Once the temperature falls below this value, the water is automatically heated to 7° C with the configured output.
- Select the operating mode from the meter configuration menu. The EGO Smart Heater can be configu-red as a consumption meter or a sub-consumer.
- Enter the description under Module Fields, Power Output and Descriptions.
- SAVE the settings.

Information on the maximum storage temperature for the EGO Smart Heater

By default, the maximum boiler temperature is adjusted with the rotary switch on the EGO Smart Heater. To be able to control the temperature from the Solar-Log™, the rotary switch on the EGO Smart Heater has to be set higher than the value from the Solar-Log™ because the settings from the rotary switch determine the maximum temperature for external control

Example:

If the rotary switch is set to 40°C and the Solar-Log™ to 60°C, the settings from the Solar-Log™ will be ignored and the value from the rotary switch will be applied. The range for the rotary switch has to be set higher so that the Solar-Log™ can assume control. In the example to 60°C.

For this reason, we recommend setting the rotary switch to a maximum of 80°C – or the maximum broiler temperature that is not to be exceeded – when the Solar-Log™ is to control the temperature externally. The Solar-Log™ can control the temperature when it is in the range below the set maximum value.

Note!

The EGO Smart heater is an intelligent appliance. The available reported surplus is repor-ted to the intelligent electrical appliances and can be consumed by them.
Starting with firmware version 3.5.x, the simultaneous connection of several intelligent electrical appliances is supported.

16.3.9 Configuring IDM Heat Pumps

IDM heat pumps can be selected from the drop-down menu from the Device Configuration menu and configured accordingly.

Procedure:

- Select the IDM heat pumps from the drop-down menu under devices.
- Select the operating mode from the meter configuration menu.
- Configure the device.
- SAVE the settings.

The following configuration options are available for the operating mode.

Operating modes:

- Consumption meter mode:
  - Group selection for PM control with self-consumption.
  - Maximum AC power
  - Name
- Sub-consumption meter mode:
  - Maximum AC power
  - Name

Note!

The IDM heat pump is an intelligent appliance. The available reported surplus is reported to the intelligent electrical appliances and can be consumed by them.
Starting with firmware version 3.5.x, the simultaneous connection of several intelligent electrical appliances is supported.

16.3.10 Configuring the Keba Power Charging Stations

The Keba power charging station can be selected and configured accordingly from the Device Configuration section in the Configuration | Device | Configuration menu.

Procedure:

- Select the Keba power charging station from the drop-down menu under devices.
- The model, address and serial number are automatically applied and cannot be modified.
- The following configurations can be made under Charge control:
  - There are different selection options for the Charge limitation function in this section:
    - Not controlled - The Solar-Log™ only records the charging data without
    - any control of the charging process.
    - Surplus - The electric car only changes when there is enough PV power available. The Solar-Log™ takes the defined minimum charge level into consideration. In this case, the release of power for the charging station corresponds to the amount of surplus.
    - Surplus / minimum charge - This ensures that the car always reaches its minimum charge level even when no PV power is available. When there is an energy surplus, the Solar-Log™ informs the charging station.
    - Always charge - The Solar-Log™ allows the charging station to consume power without any restrictions, regardless of the production or surplus levels.
  - min. Charge Current [mA] - The defined minimum charging power value is taken into account.
  - max. Charge Current [mA] - The defined maximum charging power value is taken into account.Off delay [Min.] (only when used with the Charge limitation „Surplus“) - The switch-off delay option defines when the charging process should be stopped after the previous surplus is no longer available. This option prevents the charging process from being interrupted by short-term fluctuations in the amount of available surplus. The time factor can be defined from 1 to 60.
  - Forced charge via Switch (X1):
    - Activated.
    - Deactivated.
- Select the operating mode from the meter configuration menu. The Keba power charging station can be configured as a consumption meter or a sub-consumer.
- Enter the description under Module Fields, Power Output and Descriptions.
- SAVE the settings.

Note about forced charging via wall switch (X1)

If a wall switch is installed and connected to X1 on the charging station, the charging station is allowed via the Solar-Log™ to consume the defined maximum power levels without any restrictions, regardless of the production or surplus levels.

If a wall switch has not been installed, the Solar-Log™ configuration defined for the current limiting function can be set to „always charge.“ This also allows for charging according to the defined maximum power level.

16.3.11 Module Fields, Power Output and Descriptions

Depending on the device type (power meter, inverter, etc.), different settings can adjusted from the Module Fields, Power Output and Descriptions menu. See the following chapters:

- Configuring inverters
- Configuring power meters
- Configuring sensors

In this section, for example, the device name can be changed and the nominal power (maximum AC output) of the individual devices can be defined.
The nominal power (maximum AC output) if the average consumption or the average energy production of a device and is used, for example, for the profile controls (Smart Energy).

Note!

The most exact that the configured nominal power corresponds to the actual consumption, the more accurately the control of consumption via Smart Energy is.

Module Fields

Each connected MPP tracker is assigned to a module field. Module fields are subdivided according to the type of the solar module, angles of inclination and alignment. If all modules within a system are of the same type and have the same alignment, only one module field, e.g. „1“, is defined. MPP trackers that are not used must be switched off (switched to „0“).
Additional module fields need to be defined for modules with different alignments and module types. Ideally, each field should be made up of at least two individual MPP trackers, which monitor each other.
The module fields are used for performance monitoring. In contrast, plant groups (Chapter 19.2 auf Seite 119) are used for the commercial calculations.

Example module fields:
A plant with 23.6 kWp is divided into:
3 x SMA SB5000TL and
2 x SMA SB2500.
18 kWp is located on a barn roof with 30° inclination, 20° South-East deviation, and 5 kWp on an adjoining garage roof, 32° inclination, 0° South deviation.

This results in two module fields according to the following table:

Division of the module fields

Location	Inverter	MPP Tracker output	Module field
Barn	1. SB5000TL	2000	1
Barn	1. SB5000TL	2000	1
Barn	1. SB5000TL	2200	1
Barn	2. SB5000TL	2000	1
Barn	2. SB5000TL	2000	1
Barn	2. SB5000TL	2200	1
Barn	3. SB5000TL	2000	1
Barn	3. SB5000TL	2000	1
Barn	3. SB5000TL	2200	1
Garage	1. SB2500	2500	2
Garage	2. SB2500	2500	2

Fig.: Example of the module field division

Changing the device order

The sequential order of the inverters and other devices is determined during inverter detection. They are normally sorted by their serial number or communications address.

The order can be changed through drag and drop from the Configuration | Devices | Configuration | Order menu.

16.4 Configuring Plant Data

The settings for the following sections are to be adjusted in the Plant menu:

- General
- Plant groups
- Graphic
- Forecast
- Feed in tariff
- Electricity costs

16.4.1 General

Plant information

The general plant information is to be entered in the plant information menu. This tab is only displayed when Export and Backup is activated. These values need to be entered in the portal when Solar-Log WEB Enerest™ or Solar-Log WEB Enerest™ Home are used.Plant name

- Operator
- Contact e-mail address
- Installation
- Location
- Modules
- Orientation
- Inverter
- Power output

Note!

The Forecast data from the portals Solar-Log WEB Enerest™ or Solar-Log WEB Enerest™ Home are only available after this data has been completely configured.

Note!

With firmware version 3.6.0, the menu „Plant Information“ has been removed from the Solar-Log™ devices 250, 300, 1200 and 2000.

Environmental performance

The CO2 factor per kWh can be setup for each electricity tariff. The value is displayed in g/kWh. Contact your power company for the exact number for this value. The default setting for this value is 700g/kWh.

16.4.2 Plant groups

Since the Solar-Log™ can manage up to 100 inverters at the same time, it is helpful to divide these inverters into groups. To provide a clearer overview, these groups are then shown in all selection dialog boxes. The data from each plant group can be presented on its own large external display. Each plant group can also be combined with its own consumption meter.
A name, a specific tariff payment and/or a yearly target value can be assigned to each plant group, Plant groups are therefore also suitable for managing system expansions.
Example: If a plant initially has 5 inverters and 30 kWp and is extended at a later date with 3 more inverters and 20 kWp, this addition can be conveniently managed as a separate group with one Solar-Log™. Individual inverters can then be selected from the group concerned. Plant groups are defined starting with 15 inverters. A maximum of 10 plant groups can be defined.

Note!

When using several plant groups, only one plant group can be used with a tariff mode with self-consumption refund or self-consumption.

Note!

Plant groups cannot be created for Solar-Log 200 and Solar-Log 500 devices.

Procedure:

- Select Configuration | Plant | Plant groups from the menu.
- To use Plant buttons, the button needs to be activated.
- Under Name, a plant group can be uniquely labeled.
- The devices recognized during the Device Detection are now allocated into the device groups.
- Click on to display a list of all of the devices.
- Place a check in the box next to the devices that belong to this plant group and select Apply.
- For the next steps, additional plant groups and their devices can be defined in the same way.
- SAVE the settings.

16.4.3 Graphic

The scale of the graphic for individual devices can be adjusted in the graphic menu. Nothing usually has to be changed here, as Solar-Log™ automatically calculates the values for the generator power input. The values can be adapted to your own data.

For each period (day, month, year, total) the maximum value represented in kW can be entered (except Day, which is a value in W).
The graph shows these values on the Y-axis.
Changes become effective when a new graph is displayed or after updating a displayed graph.

The function can be activated in general with the switch Graphic Auto scaling The auto scaling option always scales the graphics up as much as possible in the yield data section. The auto scaling can be disabled again for the respective graphics.
If the advanced configuration and this menu are deactivated, the graphics are always automatically scaled.

16.4.4 Defining the PV plant's forecast data

By setting forecast values for the yield data, you can check on the graph whether the plant is reaching the desired annual yield or not.
To do this, a percentage rate is allocated to each month. This is deduced from the yield statistics over the previous years.
Solar-Log™ always calculates the target value cumulatively, per day. This means that, at the beginning of the month, it is not the total monthly target that is set, but the target for days already passed, plus that of the current day.
In the forecast, Solar-Log™ also takes account of the yields in all previous years, and in this way can allow for local weather events (in most cases, snow in December). The yearly forecast is therefore usually fairly accurate by September.

Yearly target section

Enter the yearly target value from the installer's plant project planning. The unit of this value is kWh/kWp. Fundamentally, this value depends on the overall irradiation at the plant's location and local factors such as the plant's alignment and shadowing.
In Central Europe, this value is roughly in the range from 800 to 1000 kW/kWp.
If plant groups are used, it is possible to define a separate yearly target for each for each plant group.

Monthly shares & course of sun section

In this section, the settings for the following can be configured for each month:

- Percentage of the yearly target
- Sunrise and
- Sunset

.

Please note that the sum of all of the monthly percentages of the yearly has to always add up to 100%.
This menu is activated by enabling the "Display advanced configuration" setting.

16.4.5 Defining the Feed-in tariff

The feed-in tariff is generally used to calculate a PV plant's output in financial terms.
Considering that self-consumption is used at more and more plants, there are also other calculation modes.

General

The plant costs are set in euros in the General menu. This value is used for the Diagnostic | Finances function.
The Yield offsets field is used to manually add the plant's previously yields,

e.g. in cases when the plant was already operational before having a monitoring system installed. These yields are included in the
yield forecast.

Note!

When using several plant groups, only one plant group can be used with a tariff mode with self-consumption refund or self-consumption.

Tariff settings

The Solar-Log™ provides four different modes:

- Feed-in tariff
- Feed-in tariff + Self-consumption refund
- Feed-in tariff + Self-consumption
- Consumption of Self-produced power

Feed-in tariff mode

All of the power output from the PV plant is completely fed into the grid. Every kilowatt hour is reimbursed according to the valid remuneration rate.
In this mode, the From date and the corresponding rate in cents for the feed-in tariff need to be defined.
The Solar-Log™ calculates the amount of power fed into the grid based on the inverter information.

Feed-in tariff + Self-consumption refund mode

Here a distinction is made between generated power that is fed into the grid and that is directly consumed (self-consumption). In accordance with feed-in tariff agreements (or renewable energy laws), a bonus is paid for self-consumption. This provides a financial incentive for self-consumption. To implement this function, the Solar-Log™ requires an additional consumption meter.
In this mode, the From date and the corresponding rate in cents for the feed-in tariff and self-consumption refund need to be defined. The electricity prices are entered in an extra tab. The Solar-Log™ calculates the amount of power fed into the grid based on the inverter information.

Feed-in tariff + Self-consumption mode

In this mode, only the fed-in power is reimbursed. There is still an incentive for self-consumption because generally the costs for power obtained from the gird are higher than the production costs of self-produced power.
To implement this function, the Solar-Log™ requires an additional consumption meter.
In this mode, the From date and the corresponding rate for the feed-in tariff need to be defined. The electricity prices are entered in an extra tab. The Solar-Log™ calculates the amount of power fed into the grid based on the inverter information.

Self-consumption mode

This mode is used in cases in which there is no reimbursement from a feed-in tariff. There is a financial incentive for using self-produced power when its production costs are lower than the costs for power obtained from the gird.
To implement this function, the Solar-Log™ requires an additional consumption meter. In this mode, the electricity price needs to be defined in an extra tab. The feed-in tariff has to be defined as zero (0). The Solar-Log™ calculates the amount of power fed into the grid based on the inverter information.

Market Integration Model 90/10

To be able to implement the requirements from the German Market Integration Model 90/10, two feed-in tariffs need to be used. The first feed-in tariff covers 90% of the power generated and the second feed-in tariff the remaining 10%.

"Percentage calculation" has to be activated first before adjusting this setting. In the Configuration | Plant | Tariff menu, active the Percentage calculation in the Tariff settings section.
When this option is activated, three additional fields are display for each tariff number. (See the following illustration "Tariff - Tariff settings")
1. Shares [%]
2. Amount [/kWh]
3. Shares [%]

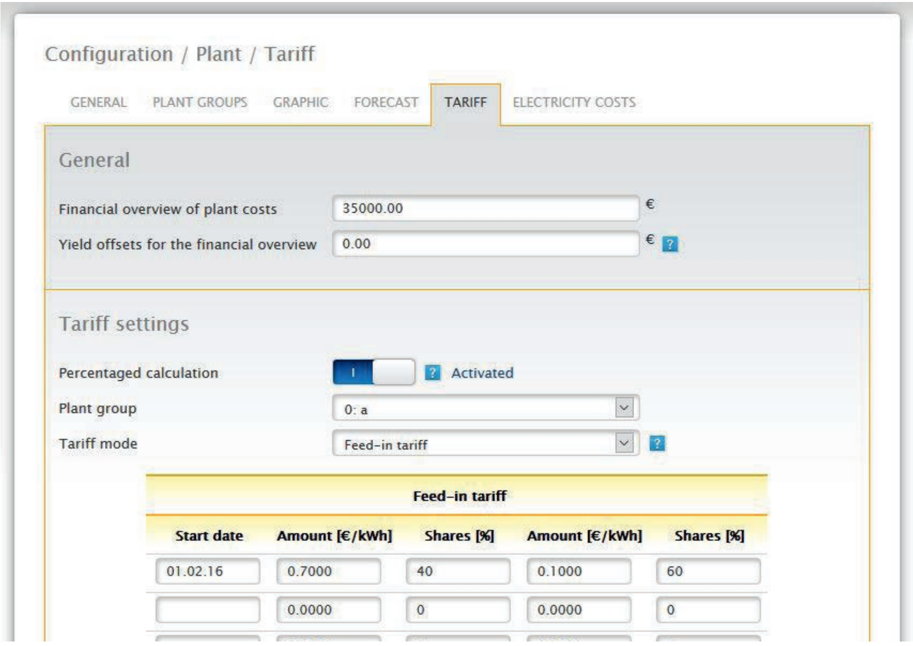


Fig.: Tariff - Tariff settings

The following settings based on the market integration model 90/10 are displayed as an example in the illustration "Tariff - Tariff settings:"

- Date (when the calculation is applied).
- Amount (the amount set for the 90% share).
- Shares [%] (90).
- Amount (the amount set for the 10% share).
- Shares [%] (10).

After entering the information and saving the settings, the tariffs will be calculated with these values in the Financial Overview. (Refer to the "Finances" chapter in the User Manual for more information.)

Note!

The Percentage calculation can be freely defined to allow for different and future requires to be easily implemented.

16.4.6 Define electricity costs

You can define various electricity prices for the plant under the tab “Electricity Prices” for precise calculations. Since the prices may change, there is the option in this section to enter prices with a particular valid date in the fields “Start Date” and “Rate [/kWh].” The Solar-Log™ can include this in its calculations (see section “Finances”).

16.5 Configuring Notifications

Various types of notifications can be configured in the Notifications menu.
The following tabs can be displayed:

- Recipient
- Device notifications
- Yield
- Alarm
- Power & Failure
- PM

16.5.1 Recipient

The Solar-Log™ contains an e-mail program which can send messages in the following situations:

- Daily yield overview
- Inverter faults
- Inverter failure
- Deviation from target power

E-mail

The e-mail addresses can be entered in the box. The Solar-Log™ sends all e-mail notifications to these e-mail addresses.

SMS (only with GPRS)

A mobile number can be entered in the box. The text message (SMS) is then sent to this mobile number.

16.5.2 Device notifications

If certain status or fault codes occur, Solar-Log™ can send messages by e-mail or text message (SMS). The Solar-Log™ retrieves fault messages from the connected inverters. Therefore, the status and fault codes can vary depending on the inverters installed.
The codes are always divided into two groups.

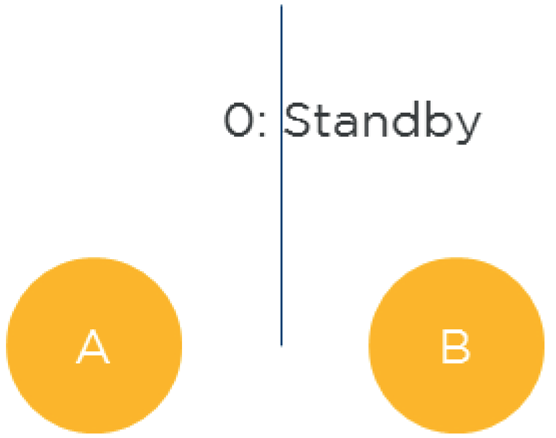


Fig.: Status and fault code groups

In group A, inverter specific messages are numbered in ascending order, starting with 0. The code which is automatically determined is used for the filter function.
In group B, the actual messages from the inverters are displayed. The meaning of these fault messages can be found in the particular manufacturer's manual.

Note!

When making support inquiries with the inverter manufacturer, please use the messages from group B.

Open the dialog box

Select Configuration | Notifications | Device messages from the menu.
This is divided into the following sections:

- Device
- Status codes
- Fault codes
- Filter

Status and fault codes section

The status and fault codes that are available depend on the inverter type. To find out which status and fault codes are relevant for automatic messaging, please refer to the inverter user manual.

Filter status and fault codes section

The default setting is that messages are sent for all fault codes. Custom limits to sending notifications can be configured in this section.
The status and fault messages that do not have any influence on the inverter operation can be filtered out with this function.

Procedure

- Select the relevant code groups based on the list for status and fault codes.
- Check the Active box.
- Select whether the filter applies to status or fault messages.
- Determine which codes are to trigger a notification with the From Code and To Code box.
- Select whether the notifications should be sent by e-mail and/or text message (SMS) and/or signaled via a relay.
- By activating After X active readings, brief, temporary fault notifications can be filtered out.

Note!

A corresponding status or fault message is also sent from the inverters for very brief, temporary faults. To filter out brief faults, the After X active readings function should be set to at least 20. A measurement usually takes 15 seconds.

- The Max. per day box defines how many notifications per day should be sent from this code range.

Note!

If the maximum number of notifications per day is defined too low, this can lead to important messages not being sent.

- SAVE the settings.

In the Save menu, there are three different options:
- SAVE
- SAVE MULTIPLE
- SAVE ALL

Save
When using this button, the settings for the device selected as the device are saved.

Save multiple
When using this button, a selection box appears from which other devices can be added by checking them.

Save all
When using this button, all of the settings are saved for all of the detected devices.

Using the same settings for several or all of the devices is a good idea when these devices also have the same status and error codes.

Configuration example
Status codes 0 to 8, 12 to 15 and 31 to 45 should result in an e-mail notification being sent, and status codes 16-31 for a relay signal. The fault codes 0 to 30 should result in a text messages (SMS) notification being sent.
This results in the following configuration:

	Active	Status	Error	From Code	To Code	E-mail	Text message (SMS)	Relay	Activate after X readings	Maximum per day
1	☑	◉	○	1	8	☑	☐	☐	20	1
2	☑	◉	○	12	15	☑	☐	☐	20	1
3	☑	◉	○	16	31	☐	☐	☑	20	1
4	☑	○	◉	0	30	☐	☑	☐	20	1

Fig.: Configuration example for filtering status and fault codes

Note!

This filter can also be used for status notifications from other devices such as meters and sensors as an option to deactivate notifications.

16.6 Yield

The Solar-Log™ come with an e-mail program that can send a daily overview of the day's performance to two different e-mail addresses.

The settings are configured under the Configuration | Notifications menu.

Click on the Recipient tab to enter the recipient's e-mail address.

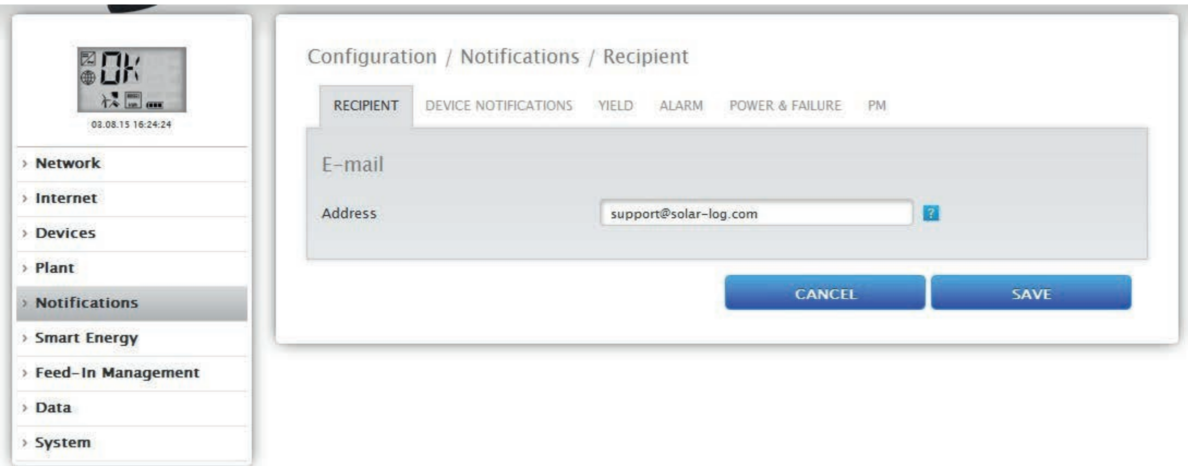


Fig.: Entering the recipient's e-mail address.

In the Yield tab, you can define yield notifications to be sent via e-mail or text message (SMS).

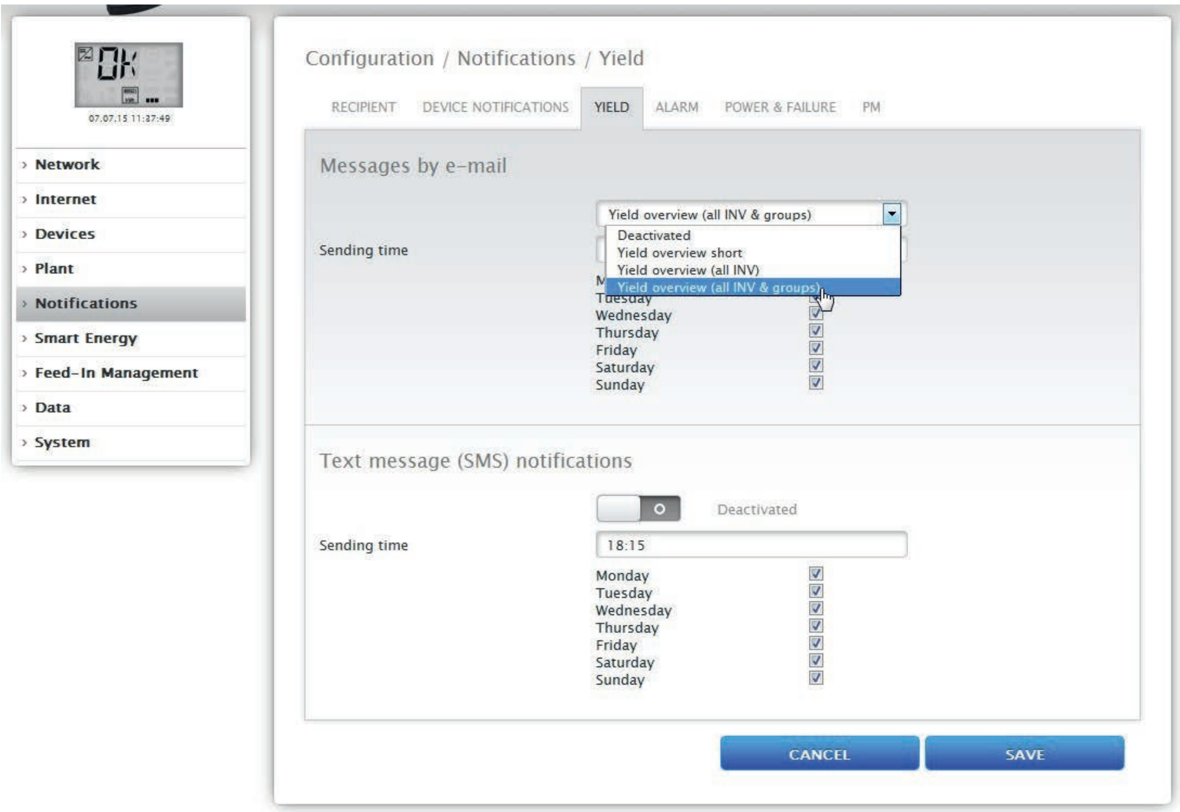


Fig.: Defining Notification times and setting types

The time frame for notifications can be defined here.
There are many types of settings:

- Deactivated
- Yield overview short
- Yield overview (all INV)
- Yield overview (all INV & groups)

Note!

See the chapter "Notification Settings" in the Installation Manual for additional information on the notification function.

16.6.1 Explanation of the individual E-mail Functions:

Deactivated

- When no e-mail notifications are to be sent.

Yield overview short

- The yield data from the entire plant is totaled and displayed for the day, month and year. See the figure: Screenshot of a yield message.

Day:
Total 44.28 kWh
Spec. 0.73 kWh/kWp
Target 154.8 kWh
Act. yield 28 %
Consumption meter 96.44 kWh

Month:
Total 2616 kWh
Spec. 43.6 kWh/kWp
Average 153 kWh
Target 2635 kWh
Act. yield 99 %

Year:
Total 6560 kWh
Spec. 109 kWh/kWp

Fig.: Example of a yield message

Yield overview (all INV)

- Yield data is totaled for the entire plant with the totals for every individual inverter (also SO meters) broken down by day, month and year. This is then displayed in HTML format as a table. See the figure: Yield overview (all INV) in HTML format.

	Day				Month					Year	
	Total	Spec.	Target	Act. yield	Total	Spec.	Average	Target	Act. yield	Total	Spec.
Total	31.26 kWh	0.70 kWh/kWp	88.31 kWh	35 %	465 kWh	10.5 kWh/kWp	77.5 kWh	531 kWh	87 %	37423 kWh	848 kWh/kWp
INV 3	10.42 kWh	0.70 kWh/kWp	29.43 kWh	35 %	155 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp
INV 1	10.41 kWh	0.70 kWh/kWp	29.43 kWh	35 %	154 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp
INV 2	10.42 kWh	0.70 kWh/kWp	29.43 kWh	35 %	155 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp

	Type	Daily total
Total	-	0.00 kWh
Meter	Consumption meter	0.00 kWh

Fig.: Yield overview (all INV) in HTML format

Yield overview (all INV & groups)

- Yield data is totaled for the entire plant with the totals for every plant and its inverter (also SO meters) broken down by day, month and year. This is then displayed in HTML format as a table. See the figure: Yield overview (all INV & groups) in HTML format.

	Day				Month					Year	
	Total	Spec.	Target	Act. yield	Total	Spec.	Average	Target	Act. yield	Total	Spec.
Total	31.26 kWh	0.70 kWh/kWp	88.31 kWh	35 %	465 kWh	10.5 kWh/kWp	77.5 kWh	531 kWh	87 %	37423 kWh	848 kWh/kWp
House	20.83 kWh	0.70 kWh/kWp	58.87 kWh	35 %	310 kWh	10.5 kWh/kWp	51.6 kWh	354 kWh	87 %	24948 kWh	848 kWh/kWp
INV 3	10.42 kWh	0.70 kWh/kWp	29.43 kWh	35 %	155 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp
INV 1	10.41 kWh	0.70 kWh/kWp	29.43 kWh	35 %	154 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp
Barn	10.42 kWh	0.70 kWh/kWp	29.43 kWh	35 %	155 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp
INV 2	10.42 kWh	0.70 kWh/kWp	29.43 kWh	35 %	155 kWh	10.5 kWh/kWp	25.8 kWh	177 kWh	87 %	12474 kWh	848 kWh/kWp

	Type	Daily total
Total	-	0.00 kWh
Meter	Consumption meter	0.00 kWh

Fig.: Yield overview (all INV & groups) in HTML format

Explanation of the individual sections of the Yield Overviews

Subject: The Solar-Log serial number and time and date

Day:

Field	Explanation Text
Total	The actual amount of grid feed for the day in kWh.
Specific	Yield specific. The energy yield divided by the amount of generator power installed. (Values are normalized to 1 kWp)
Target	The yield in kWh that can be achieved according to the forecast.
Actual Yield	The percentage of days on which the target was achieved, The daily yield achieved as a percentage in relation to the total/target.
Total yield meter	displays the plant's total yield. (Lines only appear when a total yield meter is available.)
Consumption meter	The consumption is displayed with this meter. The consumption is displayed according to the configuration with several consumption meters (this line only appears when meters are connected).

Month:

Field	Explanation Text
Total	The actual amount of grid feed for the day in kWh.
Specific	Yield specific. The energy yield divided by the amount of generator power installed. (Values are normalized to 1 kWp)
Medium	The average daily production that was achieved for this month.
Target	The yield in kWh that had been achieved up to the current day according to the forecast.
Actual Yield	Displays the percentage of the monthly target that has already been achieved up to the current day. The monthly yield achieved as a percentage in relation to the total/target.

Year:

Field	Explanation Text
Total	The actual amount of grid feed for the day in kWh.
Specific	Yield specific. The energy yield divided by the amount of generator power installed. (Values are normalized to 1 kWp)

16.6.2 Text message (SMS) notifications

Procedure

- Activate the Text message (SMS) notification button.
- The Sending time can be entered in the text field.
  It is recommended to select a sending time when the inverters are no longer feeding power.
- Check the days on which the e-mails should be sent. E-mails are only sent on the days checked.
- SAVE the settings.

16.7 Alarm (only Solar-Log 1000 and 2000)

The Solar-Log™ continuously monitors its internal alarm contact. If this contact is opened, it sets off an alarm which can be indicated in various ways. In the Alarm tab, the alarm contact can be activated and different types of notification can be configured.

Activating alarm contact
Procedure:

- Select Configuration | Plant | Plant groups from the menu.
- Activate the Activate Alarm Contact button.
- SAVE the settings.

After activating alarm notifications, a triggered alarm can be indicated by:

- E-mail
- Text message (SMS)
- Relay
- Speaker

.The e-mail and text message (SMS) settings must be pre-configured.

Procedure

- Activate the desired Notifications.
- SAVE the settings.

Test section

Here you have the option to perform an alarm test.

16.8 Power & Failure

Performance monitoring is based on a comparison of the power out from all of the inverters, including individual trackers in the case of inverters with more than one tracker or, as the case may be, sensors. If the target power deviates from the actual power by more than a certain tolerance (= min. feed-in power), a notification can be sent by e-mail and/or text message (SMS) after the selected fault duration has been reached.
If an individual module loses power, the string power for the same level of irradiation will drop, and can thus be detected and reported.
Power comparison always works reliably, even if the weather is cloudy. The important thing is that all modules should not be overshadowed. Therefore, the monitoring period should be scheduled for periods when there are no shadows.
As power measurement in the inverter is very inaccurate under a certain threshold, a minimum percentage value can also be specified below which monitoring is interrupted.

Procedure

- Select the device that is to be monitored
- Select the Performance Monitoring mode.
  Select per MPP tracker or for the total of all of the MPP trackers. There is also the option to deactivate the performance monitoring.
- Set the monitoring parameters
- Enter the monitoring begin
- Enter the monitoring end
- Enter the Minimum amount of feed-in power
- Enter the Deviation as a percentage
- Enter the fault duration in intervals
  This indicates how long a fault should be continuously present, before it is recognized as a fault. The minimum fault duration is 5 minutes, but a longer one should be selected.
  An interval corresponds to 5 minutes. The fault duration is determined by the number of intervals entered and display under the input box.
  Enter the Maximum number of message to be sent per day
  So that malfunctions are not reported too often, a maximum number of messages per day can be defined.
- Maximum number of messages per day
- Snow cover
  False messages may occur if the unit is covered in snow. These are messages from the power comparison that occur if modules are partially covered, or failure messages if the inverter is no longer switched on because it is fully covered by snow.
  There are two ways to minimize this problem:
  The minimum percentage value above which power monitoring starts should be set as high as possible, e.g. 30%. For example, if the generator power is 4500 Wp, power monitoring will start only at 1350 watts. The partly shaded modules reduce the power from the unshaded modules so that the required 1350 watts is rarely or never reached. This is how the problem of partial covering is resolved.
  Failure messages are always sent when the inverter is not working or when it is not online at times that have been configured as unshaded. It is then assumed that there is a fault. Complete snow covering would therefore be reported as a failure. To solve this problem, check the box for snow coverage. If the box is checked, no failure message is sent if all of the inverters are offline. This is not taken into account in the period from 01 November to 30 April. Outside of this period, the snow covering function is automatically disabled. Monitoring then works as usual and also reports complete failures of all of the inverters.

Note!

For PV plants with only one inverter, an inverter failure notification is sent even when the snow cover parameter is active.

- Select Message as.
- Activate required options and enter values.
- SAVE the settings.

In the Save menu, there are three different options:

- SAVE
- SAVE MULTIPLE
- SAVE ALL

Save

When using this button, the settings for the device selected as the device are saved.

Save multiple

When using this button, a selection box appears from which other devices can be added by checking them.

Save all

When using this button, all of the settings are saved for all of the detected devices.

Using the same settings for several or all of the devices is a good idea when the devices can be compared with each other. Other than production meters, meters can be largely excluded from this section.

16.8.1 General Information on Performance Monitoring

To monitor different sized inverters, the Solar-Log™ normalized the value from every inverter to 1 kWp. The Solar-Log™ uses the amount of generator power set in Configuration | Devices | Configuration.
The generator power is equivalent to 100% and the value here is normalized to 1 kWp.

Example plant:

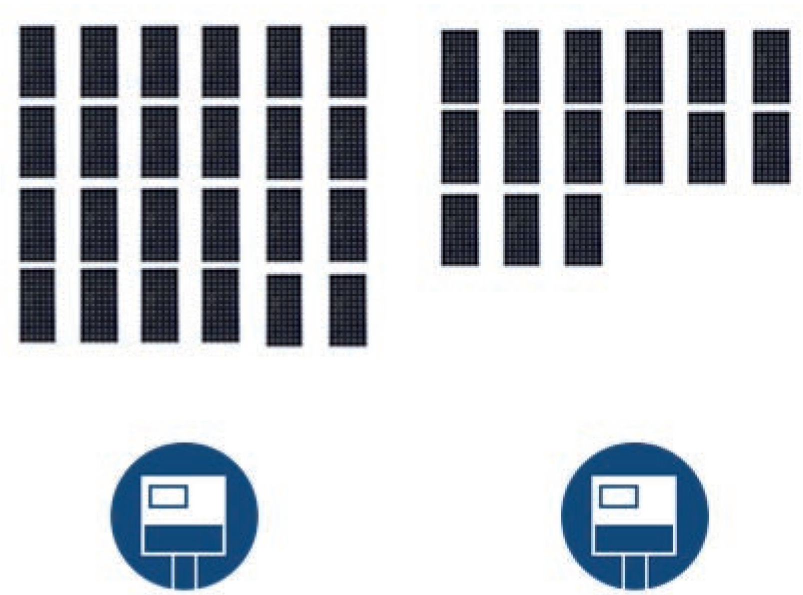


Fig.: Performance Monitoring: Example plant with two inverters

Inverter 1, Inverter 1 house	Inverter 2, Inverter 2 house
Generator Power: 25* 220W (modules) = 5500 Wp	Generator Power: 15* 220W (modules) = 3300 Wp
Module Field 1	Module Field 1

The Solar-Log™ compares all of the inverters that are located in the same module field.
Settings for the module fields are under Configuration | Devices | Configuration.

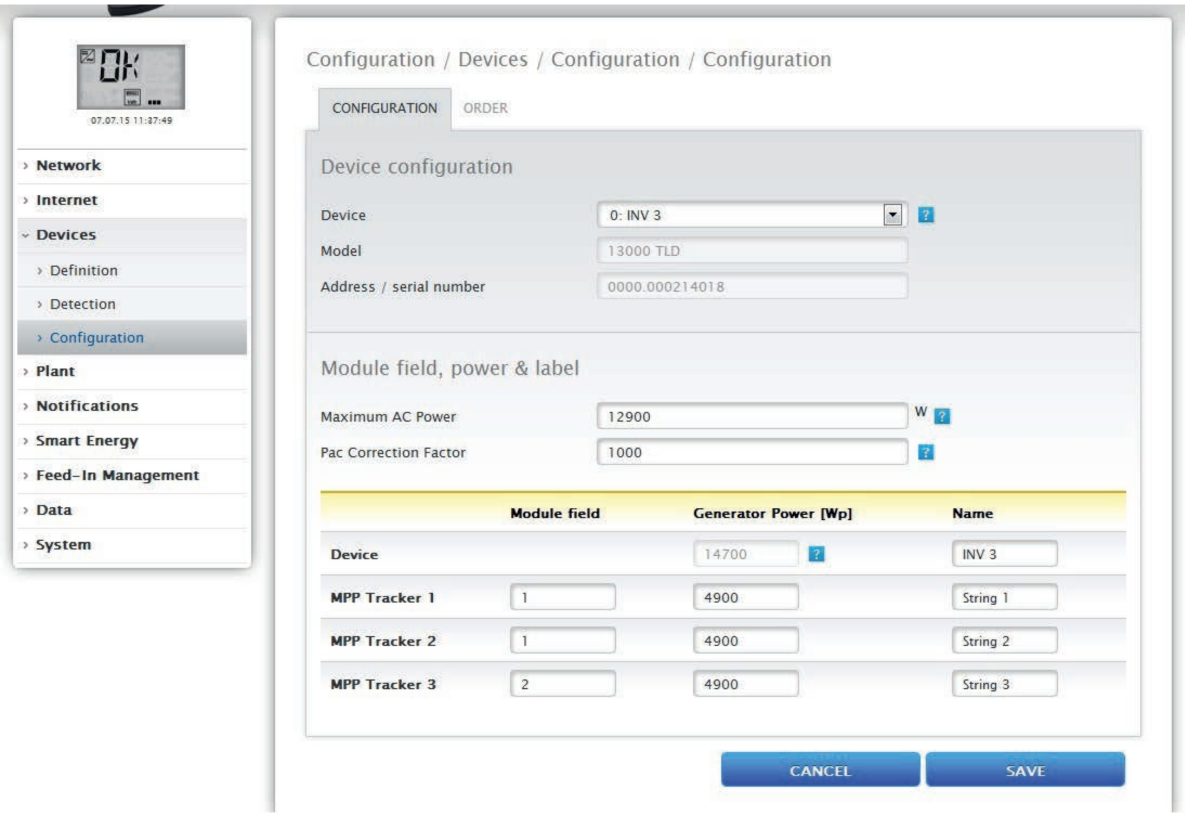


Fig.: Configuring module fields

Performance Monitoring Configuration under Configuration | Notifications.

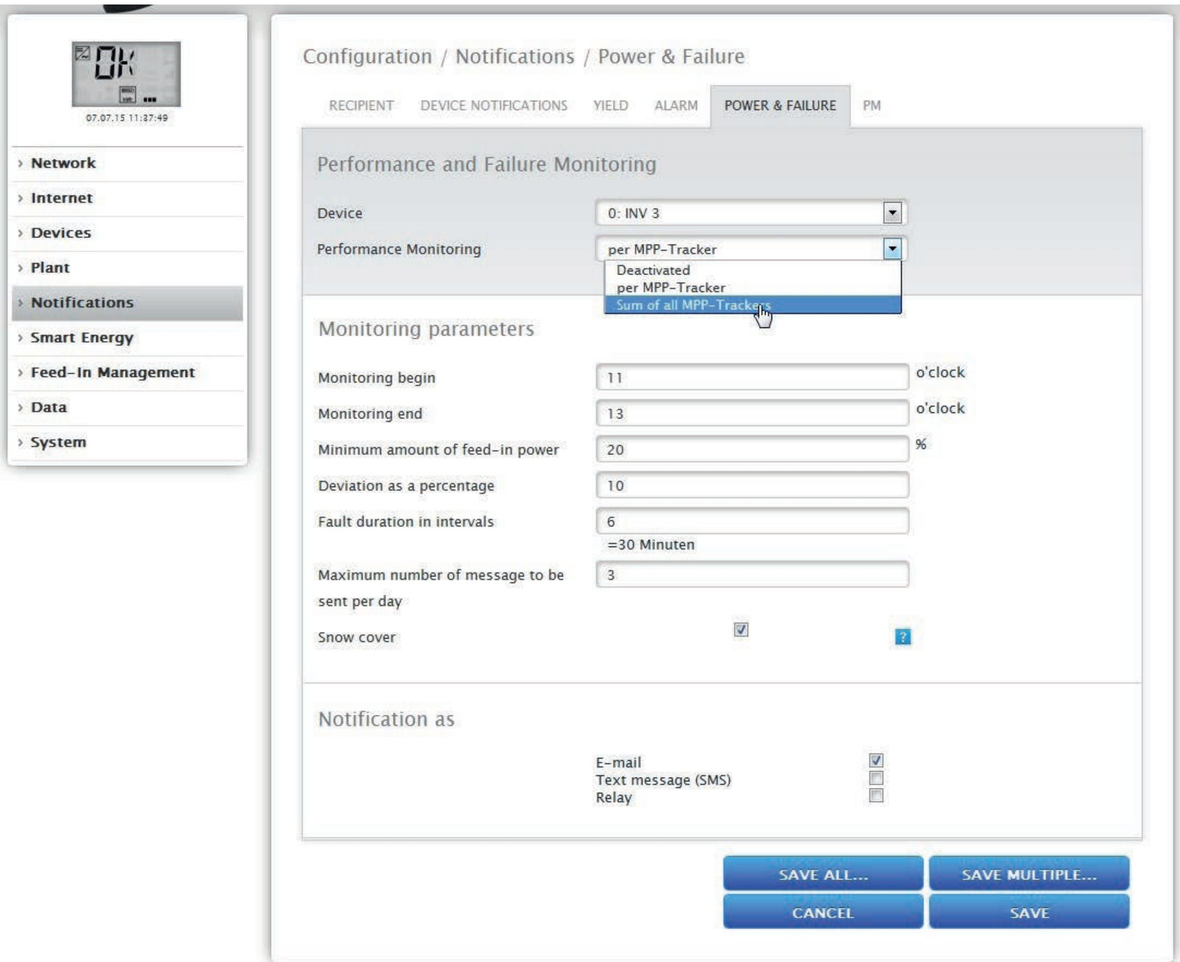


Fig.: Configuring performance monitoring

The output measured from the inverters is compared to the generator capacity that is listed in the system.

A notification is sent (by email) when the deviation exceeds the amount configured (for example 10%) over a set time period (for example 30 minutes).

Note!

For performance monitoring configurations, see the chapter "Configuring Notification " in the Installation Manual.

Performance Monitoring Notification

Example Notification:

Module Field 1 - Inverter 1 'Inverter 1 House'

IRV = 4916W (Inverter 2, Inverter 2 House'), IAV = 3950W, deviation = 19.65 %

The notification contains the following information:

Module field:

The module field which was affected or at least the module field in which a deviation was detected.

Deviating inverter:

Inverter 1

IRV:

The reference value that is used to contrast inverters. It comes from the most effective operating inverter, the value is in W.

IAV:

The amount of output from inverter with a deviation.

Dev:

The amount of deviation as a percentage of the reference value.

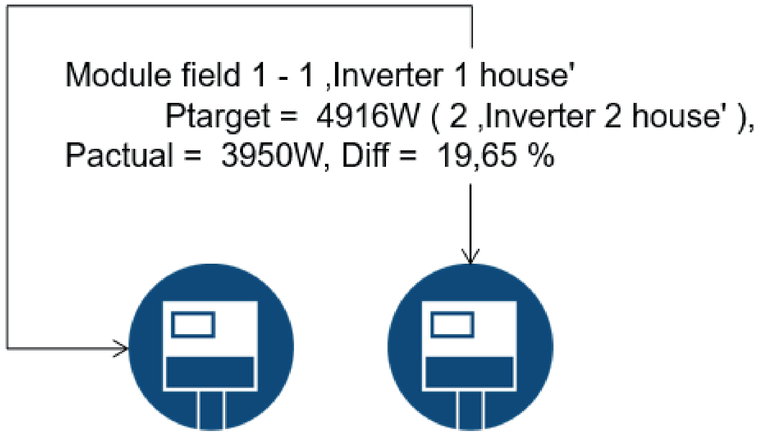


Fig.: Performance Monitoring with notification and inverter

	Inverter 1, Inverter 1 house	Inverter 2, Inverter 2 house
Generator Power	= 5500 Wp	= 3300 Wp
Current power output	= 3950 W	= 2950 W
Current efficiency	= 71.81 %	= 89.39 %
	Inverter with a deviation	Reference Inverter

The inverter that has generated the most power (inverter 2 with its value of 0.8939 in this case) is used as the reference inverter.

Calculation and Explanation of the Notification

In regard to the reference inverter, inverter 1 is compared to all of the inverters in the same module field (in the example only output is used).
A deviation of 19.65% is determined based on the comparison of the generator capacity and IRV forecast.

Calculating the Deviation for Inverter 1

Deviation Calculation

Inverter 1 IRV calculation	(5500 x 89.39)100= IRV 4916 W
Efficiency of Inverter 1	(3950 W: 5500 W)* 100= 71.81%
This corresponds to 71.81 % of the generator power or a value of 0.7181 kWp.	

Deviation as a percentage

IRV Inverter 1 - IAV Inverter 1	4916 W -3950 W= 966 W
Deviation as a percentage	(966 W: 4916 W)* 100= 19.65 %

Inverter 2 is used as the reference inverter since it was the most effective one at the time of the measurement. Inverter 1 should have produced an output of 4916 W based on the measurement and the calculations comparing all of the inverters in the same module field. The actual output was 3950 W, a deviation of 19.65%. This caused a notification to be sent.

16.9 PM

In the PM tab, two types of email notification types can be activated:

- Notification for power reductions.
- Notification for master/slave connection problems.

Procedure

- Activate this function to receive an e-mail notification for every change to the power reduction and/or master/slave connection problems.
- SAVE the settings.

Notification for power reductions

When Notifications for power reductions have been activated, an email is sent to the configured receiver e-mail address for every power reduction.

Notification for master/slave connection problems

When the forwarding of control command has been entered under Configuration | Feed-in Management | Linking, five notifications per day will be sent from each slave when a problem occurs as soon as Notification for master/slave connection problems is active.

An e-mail is sent as soon as a slave cannot be reached for at least five minutes. An e-mail is sent again once the slave is back online.
This e-mail appears in the Notification Overview with the notification type "PM."
Example when a slave is offline:

- Communication Status Master/Slave: 21.03.17 - 09:04:31 No response from 192.168.100.110.

Example when a slave is back online:

- Communication Status Master/Slave: 21.03.17 - 09:08:37 Response received from 192.168.100.110.

16.10 Smart Energy

16.10.1 Defining Smart Energy Switching

The switches that are to be used for the Smart Energy function - switching on appliances in certain consumption or production scenarios - have to be defined and configured (see Chapter 18.1.1. “Configuring the device interface”).
These switches, as described below, can be configured under the device class definition.
Up to 10 switches are available. They can be assigned to either the same manufacturer/model or to different combinations of manufacturers/models.

Procedure:

- Go to the Configuration | Devices | Definition menu. Go to Interface assignments on and select Switch for the device class.

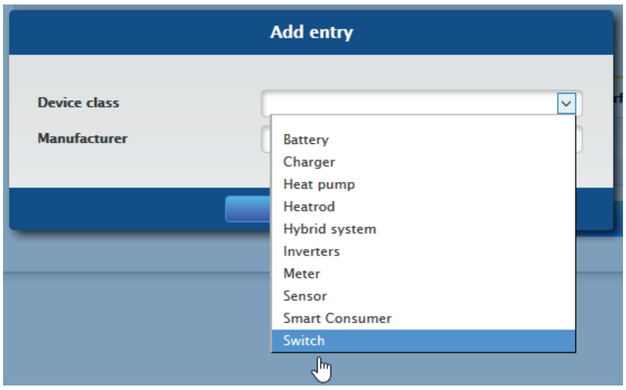


Fig.: Selecting switch for Smart Energy

- The Manufacturer box is displayed. The following selection manufacturers are available:
  - AllNet
  - Belkin
  - Gude
  - Solar-Log

- After that, the Type has to be defined. Depending on the selected manufacturer, all of the supported models can be selected here.
  - Allnet:
    - 3000RF
    - 3073
    - 3075/3076
    - 3075/3076V2
    - 3075V3
  - Belkin:
    - WeMo Insight
    - WeMo Socket
  - Gude:
    - 1002
    - 1100/1001
    - 2104
    - 2110
    - 2301

- Solar-Log:
  - Relay (only Solar-Log 1000, 1200 and 2000)
  - Smart Relay Box
  - Smart Relay Station 1x 3.5kW
  - Smart Relay Station 3x 3.5kW

After that, the number of devices still has to be defined; up to 10 devices are available in total. The Smart Relay Box is the only exception here, instead of the device number box, the interface has to be selected.

- If the definition is complete, confirm by selecting OK.
- Define additional switches in the same way.
- Start the detection after defining the interfaces (see Chapter 18.4 “Device Detection”).
- Configure the switches after the detection (See Chapter 18.4.4 “Configuring Switches”).

16.11 Configuring the Switches

Switches are configured in the Configuration | Devices | Configuration | Configuration menu. Device and meters are to be configured in this menu.

The actual maximum power input is defined in the nominal power (W) under Device in the Module field, power & label menu. Depending on which switch is used, the correct value is normally already entered here. A unique name can be entered for each device in the label box.

If the switch is to be used for Smart Energy management, the connected output (W) has to be additionally defined for each switch contact. This value in this box serves as the basis to calculate the surplus regulation. This value is used for the contacts that report the current output if the connection to the switch is temporarily interrupted.

Note

The number of contacts depends on the device connected. If the switch does not support output measurements, the device nominal power (W) box is omitted.

Note

This detection differs from the inverter detection in that it does not proceed according to the principle of the search, but a device is set up for every defined switch.

After they have been detected and configured, the switches are available in the Hardware section under Configuration | Smart Energy | Switch groups and can be assigned to switch groups.

16.11.1 Smart Energy Switching Groups

There are two tabs under Configuration | Smart Energy:

- Switching groups
- Surplus management

The Switching groups menu is divided into the following sub-sections:

- Hardware
  All of the detected switches are displayed in this section.
- Switching groups
  The switch contacts for the switching groups can be added in this section and new switching groups can be created and configured. Switching contacts in the switching groups are activated by the Solar-Log™. Unassigned contacts are only recorded – as long as the values can be recorded (depends on the hardware).
  Up to 10 groups are available. Up to eight contacts can be assigned to each group.

Creating switching groups

There are two ways to create a switching group:

The first method:

- Left-click on the "Create switch contact here via Drag & Drop" box.

The second method:

- Drag a defined switch from the hardware section to the "Create switch contact here via Drag & Drop" box.

The next steps are identical for both methods.

- A new window with settings appears. Here, the switching group can be given a name and assigned the operating mode "consumer" or "generator."
- Save the settings by clicking on "Continue."
- The switch group is now visible.

(See illustration: "Creating switching groups")

Click on the Demo box to start the corresponding help for the procedures. (The Demo box is only visible once a switch has already been created.)

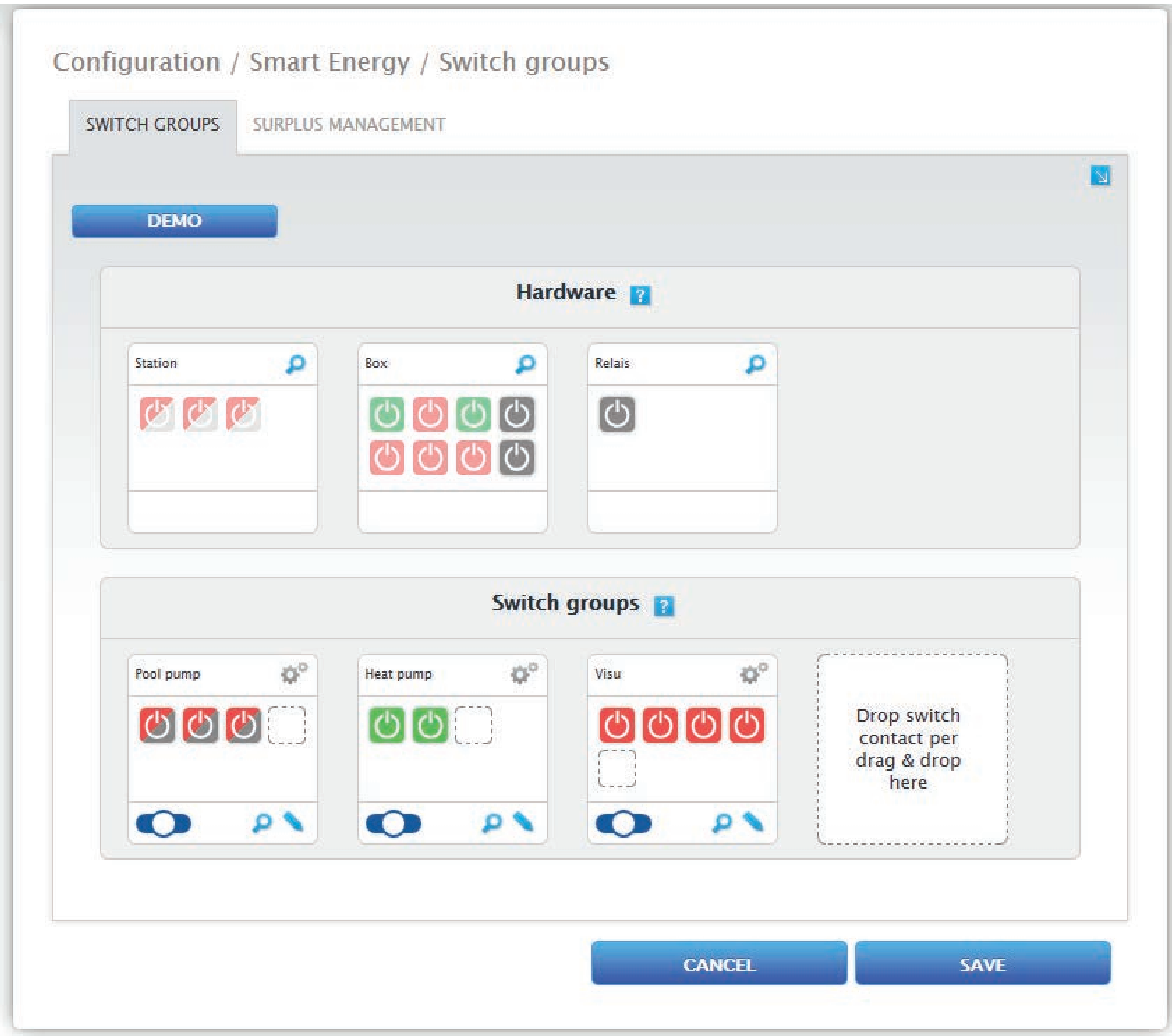


Fig.: Creating switching groups

Note!

Click on this symbol to display all of the hardware data that can be accessed and recorded by the Solar-Log™ and to display the target state.

Switch states / Color Definition

The switching state of each contact is displayed with the following symbols:

Symbol	Explanation Text	Notes
	Target state: On Actual state: On Everything OK	If the hardware does not support the current state being read, this symbol is also used to clearly identify a fault case.
	Target state: Off Actual state: Off Everything OK	If the hardware does not support the current state being read, this symbol is also used to clearly identify a fault case.
	Target state: On Actual state: Off	For example: The Solar-Log™ determined that the switch should be activated (e.g. surplus reached), but the command was not sent to the switch. This can only happen when the switching state can be read. => This state is temporarily valid, but not a longer period without a change. (e.g. the switch does not accept the switching command.)
	Target state: Off Actual state: On	For example: The Solar-Log™ determined that the switch should be deactivated (e.g. surplus too low), but the command was not sent to the switch. This can only happen when the switching state can be read. => This state is temporarily valid, but not a longer period without a change. (e.g. the switch does not accept the switching command.)
	Switch state: None Actual state: Unknown	The switch is not assigned to a group. => No target state The switch state cannot be read or the switch is not available. => If no state can be read (hardware does not support this), everything is ok. => Otherwise the hardware is not available (fault).
	Target state: On Actual state: Unknown Error	The switch state can be read, but the hardware is unavailable.
	Target state: Off Actual state: Unknown Error	The switch state can be read, but the hardware is unavailable.
	Target state: None Actual state: On Everything OK	The switch can be read, but the switch is not assigned to a group. => No target state
	Target state: None Actual state: Off Everything OK	The switch can be read, but the switch is not assigned to a group. => No target state

The current switching states are display within a few second and are continuously updated.

Switch definitions

There is the option to assign one of the following states with a mouse click.
(See illustration: “Adjustable switch with help text”):

- All of the contacts are permanently switched off (switch position “left”).
- The contacts are switched on according to the configured automatic switching rule.
- All of the contacts are permanently switched on (switch position “right”).

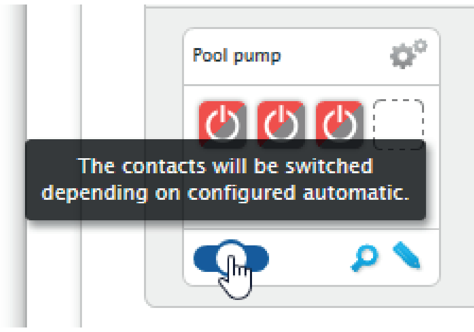


Fig.: Adjustable switch with help text

It is only possible to configure switching groups in the switch position “The contacts are switched according to the configured automatic switching rule. The editing pencil for the switching group is not visible for the other two options. If the switch is set to one of the other modes, the configured logic remains and is active once the mode has been set back. Click on the gear icon to change the name of the switching group, delete it or adjust the mode.

16.11.2 Configuring switching groups

Use this  symbol to configure the switching group. The following window appears after clicking on the symbol:

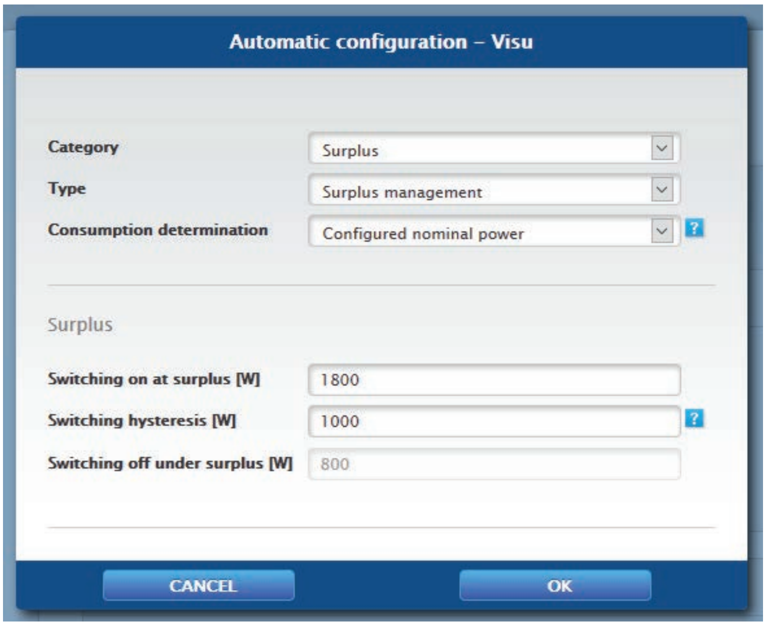


Fig.: Control logic configuration window

The configuration is divided into two section. The top section contains the following boxes:

- Category
- Type and
- Consumption determination. If the Consumption meter option is selected for the Consumption determination, an additional selection box is displayed with all of the available (sub) consumption meters. For the temperature profiles, an additional selection box is displayed with all of the available temperature sensors.

The bottom section is automatically determined by the selected category.

16.11.3 Control Logics Definition - Operating Mode Appliances

Various control logics can be defined with the input boxes. (See the Smart Energy Manual for more details – available for download from our website –
The individual boxes can be combined differently, depending on the control is used.
The following rules can be selected from the Category box:

- Surplus
- Production
- Consumption
- Device-specific
- Other

Depending on the rule, different types can be set.

Surplus

The following types can be configured under the Surplus category:

- Surplus management
- Surplus management and Temperature Control
- Surplus management and Time Control
- Surplus management and Runtime Control
- Surplus matrix
- Surplus visualization

Surplus management:

The following consumption definition can be selected in the Surplus management section:

- Configured nominal power:
  Consumption is calculated from the configured nominal power for the contacts and the switch state. The nominal power can be configured under Configuration | Device | Configuration. If it is available, the current state is used for the calculation, otherwise the target state.
- Measured value from the contacts (can only be selected if at least one contact that provides output values has been assigned to the switching group. This depends on the hardware used and can be viewed by clicking on the magnifying glass icon in the hardware section under Configuration | Smart Energy | Switching groups):
  Consumption is determined by the measured consumption from the individual contacts as long as these values are provided. This is determined by the configured nominal power for contacts that do not provide these values or when communication is offline.
- Consumption meter:
  Consumption is determined by a separate consumption meter that has to be detected as a device. If this type of consumption determination is selected, the responsible consumption meters also have to be selected.

After the consumption determination has been selected, the threshold values have to configured in the last step.

- Switching on at surplus [W]
- Switching hysteresis [W]
  The switching hysteresis is to prevent that the switch will be permanently turned on/off at the threshold. It is recommended to have a hysteresis of 100 to 1000 W depending on the switch-on threshold.
- Switching off under surplus [W] (This value is grayed out and cannot be manually modified. It is calculated from the “Switching on at surplus [W]” value minus the “Switching hysteresis (W)” value.)

Surplus management and Temperature Control:

This Consumption determination is almost completely identical to that of Surplus management. The only difference is that the temperature sensor has to be selected.

After selecting the Consumption determination, the following sections are to be configured:

- Surplus
- Temperature

The Surplus configuration (see Surplus management).

The following settings can be made and/or activated under temperature configuration:

- Switch on when temperature is (C°):
  - greater
  - less
- Runtime (min.):
  If the appliance was activated because of the temperature threshold, it will be deactivated after this time has passed, even if the minimum/maximum temperature has not been reached.
- Minimum/Maximum temperature (C°) (depends on the selection for "Switch on when temperature is (C°) greater or less"):
  It is applied even if the appliances are activated because of a surplus or the temperature.

Surplus management and Time Control:

This Consumption determination is identical to Surplus management.

After selecting the Consumption determination, the following sections are to be configured:

- Surplus
- Time

The Surplus configuration (see Surplus management).

Up to two daily runtimes can be set in the time configuration. If only one runtime is needed, the second one can be deleted by clicking on the trash can symbol.

Surplus management and Runtime Control:

This Consumption determination is identical to Surplus management.

After selecting the Consumption determination, the following sections are to be configured:

- Surplus
- Daily runtime

The Surplus configuration (see Surplus management).

The following settings can be made and/or activated under Daily runtime configuration:

- Daily runtime [Min.] (this values is determined by the time from 0:00 to 23:59.)
  - Minimal
  - Exact
  - Maximal
- Fill runtime from
  Depending on the situation, it could happen that the period of time from the defined daily runtime could not fulfilled with the surplus rule. In this case, it can be defined in this box at which time the remaining daily runtime should be fulfilled. The process is also carried out when there is no surplus available.
- Minimum continuous switch on time [Min.]
- Minimum continuous switch off time [Min.]
- Max. switch on operations
  The remaining daily runtime is completely fulfilled with the last switching run.

Note!

The daily runtime will be set to the value of the new day starting at 0:00 (midnight). That is why it is not possible to have a runtime extending past the particular day. The devices controlled in this section will be turned off at 0:00 (midnight).

Surplus matrix:

At least two and no more than three contacts have to be assigned to the switching group to use this function.

This Consumption determination is identical to Surplus management.

In the bottom section, there is a matrix to determine the output of the appliances and with which contacts are linked to in the switching group.

Up to seven surplus levels can be created by clicking on the plus symbol.

Levels that are not needed can be deleted by clicking on the trash can symbol.

Surplus visualization:

With Surplus visualization, its own surplus threshold can be configured for every contact (1-8) assigned to the group.

Note!

This function is only for the visualization and no loads may be switched on since the Solar-Log™ would then have incorrect calculations which would lead to faulty switching operations.

Production

With output visualization, its own output threshold can be configured for every contact (1-8) assigned to the group.

Note!

This function is only for the visualization and no loads may be switched on since the Solar-Log™ would then have incorrect calculations which would lead to faulty switching operations.

Consumption

With Consumption visualization, its own consumption threshold can be configured for every contact (1-8) assigned to the group.

Note!

This function is only for the visualization and no loads may be switched on since the Solar-Log™ would then have incorrect calculations which would lead to faulty switching operations.

Device-specific

The following types can be configured under the Device-specific category:

- Heat pump with a grid company blocking signal
- Vaillant heat pump with a grid company blocking signal
- Heating rod three level digital

Heat pump with a grid company blocking signal:

Heat pumps can have a control input for a grid company blocking signal. This input is used by grid operators via ripple control receivers to release heat pumps at a certain time. If a heat pump can now be run with PV power, this input can be used to switch on the heat pumps in relation to the amount of power being produced. The relay is then turned off during periods with a PV surplus--when the heat pumps “may” run. When no PV surplus is available, the heat pumps remain deactivated. There are a maximum of three configurable periods available to avoid a cool down during periods with a longer deactivation, e.g. during periods of bad weather. During such periods, the heat pumps are enabled and - if required - power is purchased from the grid.
This profile is defined based on two thresholds and three periods of continuous operation. The periods of continuous operation are defined based on the:

- Time from/to and
- Month from/to

.

Vaillant heat pump with a grid company blocking signal:

This control logic is especially pre-configured for Vaillant heat pumps. The function and configuration corresponds to the “heat pump with a grid company blocking signal” profile.

Heating rod three level digital

At least two and no more than three contacts have to be assigned to the switching group to use this function.
This Consumption determination is identical to Surplus management.

In the bottom section, there is a matrix to determine the output of the heating coil and with which contacts are linked to in the switching group.
Up to seven surplus levels can be created by clicking on the plus symbol.
Levels that are not needed can be deleted by clicking on the trash can symbol.

Other

The Automatic timer type under Other category operates independent of the current PV production and measured consumption.
Up to ten daily runtimes can be created by clicking on the plus symbol.
Levels that are not needed can be deleted by clicking on the trash can symbol.

Generation Information on Thresholds

Average values (every 5, 10 or 15 minutes) are generated to balance the fluctuations in PV production (e.g. due to clouds) for managing appliances. The average value is aligned to the threshold set in the respective logic control.

General information about nominal power (maximum AC output):

The nominal power (maximum AC output) is the average consumption of appliances that is controlled by the profile. Appliances, such a laundry dryer, have a short high peak of power consumption and times in which little power is required. Based on this, it would be problematic to calculate the current power consumption for power management control. The is why the Solar-Log™ calculates the entire runtime with the value configured for the nominal power (maximum AC output) which can be entered in the Configuration | Devices | Configuration | Configuration in the Module Fields, Power Output and Descriptions section. (See the Chapter "Module Fields, Power Output and Descriptions" under Device Configuration.)

Note!

The most exact that the configured nominal power (maximum AC output) corresponds to the actual consumption, the more accurately the control of consumption via Smart Energy is.

Note!

The configured control rules can be simulated in the Diagnostics menu. Click on the arrow symbol at the top under Configuration | Smart Energy | Switching groups to switch directly to the Smart Energy Simulation.
(See the User Manual for more information about the Smart Energy Simulation.)

Note!

A detailed document about Smart Energy with practical examples is available from our website:
https://www.solar-log.com/en/support for Download.

16.11.4 Control Logics Definition - Operating Mode Generator

Various control logics can be defined with the input boxes. (See the Smart Energy Manual for more details – available for download from our website –
The individual boxes can be combined differently, depending on the control is used.
The following rules can be selected from the Category box:

- Power from the grid
- Other

Power from the grid

The following types can be configured under the Grid Power category:

- Power from the grid
- Power from the grid and Time Control
- Power from the grid and Runtime Control

Power from the grid

The following production definition (production) can be selected in the Grid Power section:

- Configured nominal power:
  Production is calculated from the configured nominal power for the contacts and the switch state. The nominal power can be defined in the Module Fields, Power Output and Descriptions section of the Configuration | Devices | Configuration. If it is available, the current state is used for the calculation; otherwise, the target state is used. .
- Measured value from the contacts (can only be selected if at least one contact that provides output values has been assigned to the switching group. This depends on the hardware used and can be viewed by clicking on the magnifying glass icon in the hardware section under Configuration | Smart Energy | Switching groups):
  Production is determined by the measured production from the individual contacts as long as these values are provided. This is determined by the configured nominal power for contacts that do not provide these values or when communication is offline.
- Production meter:
  Production is determined by a separate production meter that has to be detected as a device.

Section Grid Power

After the production determination has been selected, the threshold values have to be configured in the last step.

- Switching on at grid power [W]
- Switching hysteresis [W]
  The switching hysteresis is to prevent the switch from being permanently turned on/off at the threshold. It is recommended to have a hysteresis of 100 to 1000 W depending on the switch-on threshold.
- Switching off below production [W] (This value is grayed out and cannot be manually modified. It is calculated from the „Switching on at grid power [W]“ value minus the „Switching hysteresis (W)“ value.)

Power from the grid and Time Control:

This production determination is identical to that of the grid power

After selecting the production determination, the following sections are to be configured:

- Power from the grid
- Time

The configuration of grid power (see the section „Grid Power“ above).

Up to two daily runtimes can be set in the time configuration. If only one runtime is needed, the second one can be deleted by clicking on the trash can symbol.

Grid Power and Runtime Control:

This production determination is identical to that of the grid power

After selecting the production determination, the following sections are to be configured:
- Power from the grid
- Daily runtime

The configuration of grid power (see the section „Grid Power“ above).

The following settings can be made and/or activated under Daily runtime configuration:
- Daily runtime [Min.] (this values is determined by the time from 0:00 to 23:59.)
  - Minimal
  - Exact
  - Maximal
- Fill runtime from
  Depending on the situation, the period of time from the defined daily runtime might not be fulfilled with the surplus rule. In this case, it can be defined in this box at which time the remaining daily runtime should be fulfilled. The process is also carried out when there is no surplus available.
- Minimum continuous switch on time [Min.]
- Minimum continuous switch off time [Min.]
- Max. switch on operations
  The remaining daily runtime is completely fulfilled with the last switching run.

Note!

The daily runtime will be set to the value of the new day starting at 0:00 (midnight). That is why it is not possible to have a runtime extending past the particular day. The devices controlled in this section will be turned off at 0:00 (midnight).

Other

The Automatic timer type under Other category operates independent of the current PV production and measured consumption.
Up to ten daily runtimes can be created by clicking on the plus symbol.
Levels that are not needed can be deleted by clicking on the trash can symbol.

16.11.5 Smart Energy Surplus Management

The Surplus Management menu is divided into the following sub-sections:

- Settings
- Surplus priority

(See illustration: “Surplus management”)

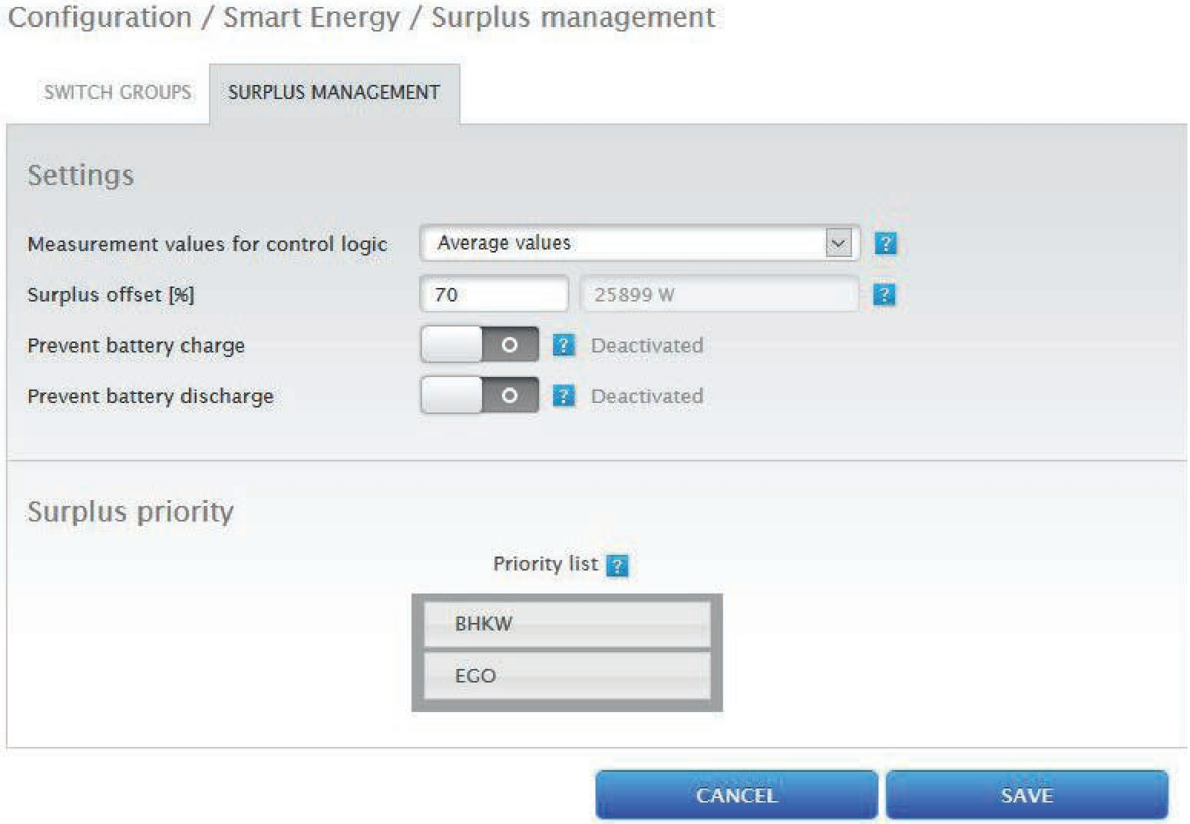


Fig.: Surplus management

The following values can be defined in the Settings section:

- Measurement values for control logic
- Surplus offset [%]
- Battery charging suspension (only displayed when a hybrid or battery system has been detected)
- Battery discharging suspension (only displayed when a hybrid or battery system has been detected)

The following values for the control logic can be selected under Measurement values for control logic:

- Current values
  are the instantaneous values. For systems with constant measurements values (e.g. CHP as producer), current values can also be used to react more quickly.
- Average values
  Average values compensate for power fluctuations and help the control logic to operate more steadily.

Note!

Depending on the number of connected inverters, the average value is based on 5, 10 or 15 minute values.
< 30 INV: 5 minutes, 30-59 INV: 10 minutes, >= 60 INV: 15 minutes

Battery charging suspension:

When activated, the Solar-Log™ switches appliances on to prevent the battery from being charged. The battery will only be charged when the respective appliances are deactivated again or when there is still a power surplus despite the consumption from the appliances.

Battery discharging suspension:

When activated, the Solar-Log™ turns on the generators to provide enough power production to cover the amount required for consumption. This means that the battery is only discharged when the power production cannot cover the consumption.

Note!

The "Battery (dis)charging suspension" options are only available when a hybrid or battery system has been detected and are deactivated unless production/consumption controls have been defined.

Surplus offset [%]:

How much nominal plant output is to be fed into the grid and how much should be used for the Surplus manage of the Smart Energy control logics can be defined in this box.
When output reduction is activated, a sensor has to be installed to determine the amount of theoretically available production.

In the Surplus priority section, the list of defined switching groups and the detected intelligent appliances are displayed according to their priority (the first entry in the list has the highest priority). This can be adjusted at anytime with the drag and drop function.

Note!

The prioritization occurs only for the surplus profiles and not, for example, for the runtime control profiles.

16.12 Feed-In Management

Access Feed-in Management via the menu Configuration | Feed-in Management.
In this section you have the possibility to implement the grid operator's requirements in regard to active and reactive power control.

Note!

The Solar-Log™ is not equipped with protection functions such as grid and plant protection, section switches and Q/U protection. When it comes to such functions, special protection hardware needs to be installed. All protection commands, for example the emergency stop, cannot be switched on with or via the Solar-Log™.

16.12.1 Plant parameters

The plant data is entered in the plant parameters tab.

- Maximum apparent power from the generating plant
  Enter the maximum plant power output in volt-ampere (VA) here. This value has to match the value registered with the grid company.
  Typically, this calculation is based the total module power output.

When using the Utility Meter, these additional boxes need to be defined

- UC
  In this field the agreed grid voltage in the grid operator's medium-voltage network is entered. This value is specified by the grid operator. As a rule the network voltage at medium voltage levels corresponds to 20,000 V.
- UNS
  The reference voltage to be entered depends on the sensor used. The medium voltage measuring factory setting is 100.0 V for the Solar-Log™ Utility Meter.

UC and UNS settings

	Medium voltage Utility Meter (U)	Medium voltage Utility Meter (U+I)	Low voltage
UC	20000	20000	398
UNS	20000	20000	398

Fig.: Configuration of UC and UNS at different voltage levels

Note!

In a master-slave setup, only the connected power on the particular device may be entered for each Solar-Log™.

Plant passwords

The log-on data can be entered for the inverters in the Configuration | Feed-in Management | Plant Parameters | Plant Passwords menu – as long as the devices configured support this function..

- Inverter Password
  Plant password, if service password is required to access the inverters.
- Log-on Mode
  If supported by the inverters, a difference can be made between normal and privileged access. With individual modules, privileged access can be required to gain access to power management functions.
- Parameter Password
  Password which is needed to change critical settings for the inverters, e.g. the GridGuard-Code for SMA inverters.

Note!

Please make sure that the inverter password matches the log-on mode.
If separate passwords for an inverter can be assigned to users and installers, the corresponding password has to be assigned to the log-on mode.

Note!

The Plant Password menu is only displayed when the inverters connected required a password to access the inverters and/or a password to change critical settings.

16.13 Active power

The following modes are available from the Feed-in Management | Active power menu:

- Deactivated
- Remote controlled
- Remote controlled with the calculation of self-consumption
- 70% fixed reduction
- 70% Fixed reduction with the calculation of self-consumption
- Adjustable reduction
- Adjustable reduction with the calculation of self-consumption
- Fixed reduction in watts
- Fixed reduction in watts with the calculation of self-consumption

Note!

The active power reduction mode that needs to be implemented for a particular PV plant is determined by the current national laws, standards and grid operator's requirements. The planner and/or installer of your plant or the respective grid operator can provide you with information regarding the mode of active power reduction that needs to be used.

Note!

The feed-in management functions are not supported by all makes and models of inverters. Prior to installation please check whether power management and reactive power control are supported by the inverters used. Please consult our inverter database for an overview of all the inverters supported by Solar-Log™ devices and more details on supported functions of a particular inverter:
https://www.solar-log.com/en/support

Interface assignments section

The inverters with their assigned interfaces that are connected to the Solar-Log™ are displayed in this section.
Select the inverter(s) to control and activate it/them.

LCD Display

In the LCD Display section, the values that are displayed can be defined.
The following values can be selected:

- Only error:
  This is displayed when there are PM control errors.
- Target power (% DC):
  This is the value (%DC) that has been selected for the reduction (e.g. 70%).
- Percentage of consumption (only selectable when the “Percentage of consumption for an adjustable reduction” has been defined under type):
  Value, which was entered for “Percentage of consumption for an adjustable reduction”. 100% will nor be visilized, because the LCD display can only display 2 digits.
- Control value power (% AC):
  The control value is the value sent to the inverters in order to reach the target value. The relationship between the nominal power (AC) and the installed DC power (DC) is factored in. The current consumption from the control with self-consumption is also factored in.

The value of 100% is not displayed on the LCD display.

Dynamic control for different module orientations

Depending on the plant, there might be different module orientations. To integrate these differences with the active power, the switch “Dynamic control for different module orientations” needs to be activated (deactivated by default). This switch is located in the Feed-In Management | Active Power menu. Activate this.

When this option is activated, different reduction commands are sent to the inverters, e.g. taking their orientation into consideration, to maximize the amount of power fed into the grid without exceeding the limit. The advantage here, for example, is that when some inverters are performing below a 70% limit, the output from other inverters can be adjusted above the 70% to balance the final output to 70%.

16.13.1 Active power deactivated

When this menu item is selected, active power is deactivated. After that, the controllable interfaces can be selected when control is via the Modbus PM or via a PM Profile.

16.13.2 Remote controlled active power reduction (only Solar-Log™ PM+)

This option should be selected if you want the active power reduction to be remotely controlled by the grid operator.
To enable this function, a ripple control receiver or similar device is required. Typically, these devices are provided by the grid operator for a fee.
The type of ripple control receiver or telecontrol technology used depends on the level of development of the respective grid operator. The control signals emitted by the grid operator are converted to potential-free signal contacts by the ripple control receiver and can be evaluated by the Solar-Log™ PM+ models via the digital PM+ interface.

Note!

The function of the PM+ interface is only possible when the contacts of the ripple control receiver are potential free and are wired with a supply voltage of 5VDC from the PM+ interface.

Examples of ripple control receiver connections and the corresponding configuration are in the chapter “Appendix“ .

Channel settings for power reduction section

The relay outputs for the ripple control receiver are connected to the PM+ input of the Solar-Log™ PM+. This allows the grid operator's signals to be evaluated by the Solar-Log™.

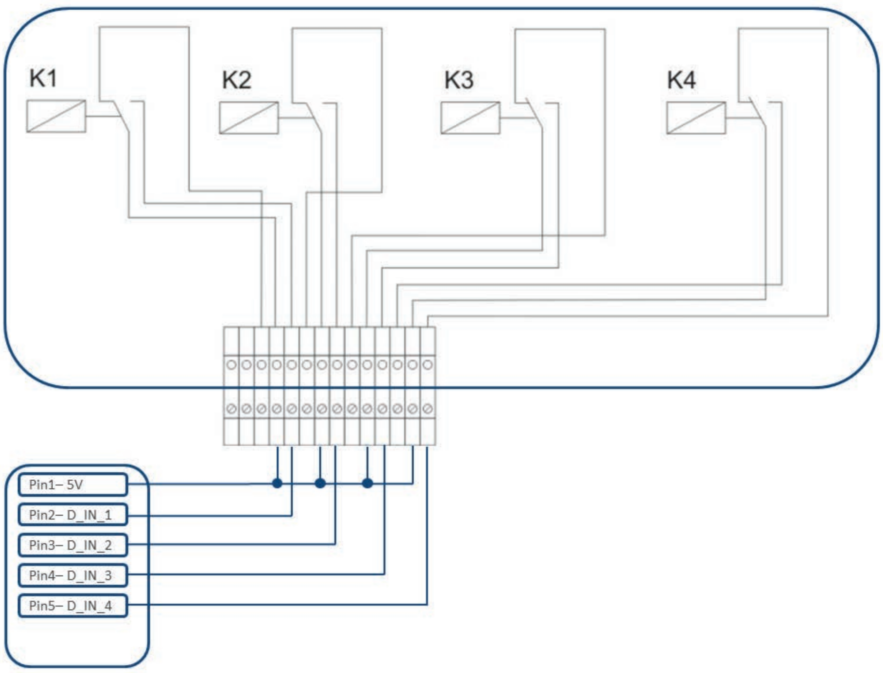


Fig.: Schematic diagram of a ripple control receiver with four relays.

The relay for active power control is wired to the PM+ interface.

Note!

The function of the PM+ interface is only possible when the contacts of the ripple control receiver are potential free and are wired with a supply voltage of 5VDC from the PM+ interface.

In practice, various ripple control receivers with varying numbers of relays and different signal codes are used. The configuration matrix for the Solar-Log™ PM+ thus offers maximum flexibility – most common versions can be configured.
Ripple control receivers generally possess 2 to 5 relays. The assignment of the individual relay states for certain reduction levels is specified by the respective network operator and stored in the Solar-Log™ using this matrix. In this way the connected inverters can be adjusted to meet the specified reduction levels.

Channel settings for power reduction

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Power in %
Level 1	☑	☐	☐	☐	100
Level 2	☐	☑	☐	☐	60
Level 3	☐	☐	☑	☐	30
Level 4	☐	☐	☐	☑	0

Fig.: Channel settings for power reduction

For each level, the input signal combination and a value for the power in % is entered.
Checking the box next to the digital inputs of the PM+ interface (D_IN_1 to D_IN_4) means that theses inputs are supplied with 5V from pin1 to reduce to the percentage of the set in the box "Power in %".

Four levels are shown in the basic setting. The "+" sign can be used to extend the list by additional levels.

Procedure:

- Select remote controlled.
- Select the inverter(s) to control in the Interface assignments section.
- Enter the channel settings for power reduction according to the specifications and wiring.
- Select options.
- SAVE the settings.

More Options

Closing relays at level 4 (only Solar-Log 1200 PM+ and 2000 PM+).

By selecting this function the potential-free control relay for the Solar-Log 2000 PM+ is closed when level 4 is activated.

- The relay may be loaded with a maximum of 24 V DC and 5A.
- A 230 V appliance has to be connected via another load relay.

Please also refer to the additional information on relays in Seite 64 of this installation manual.

Closing relay during power reduction (only Solar-Log 1200 PM+ and 2000 PM).

Select this option in order to signal any power reduction via the relay output on the Solar-Log 2000 PM+.

- The relay may be loaded with a maximum of 24 V DC and 5A.
- A 230 V appliance has to be connected via another load relay.

Please also refer to the additional information on relays in Seite 64 of this installation manual.

Max. change in power in %:

A jerky reduction or increase in active power could have a negative impact on inverters in the long-term.
The "max. change in power" field is used to specify how high the maximum percentage change in power is per period of time (15 seconds).
This value refers to the power reduction but is also used when starting up the plant after a power reduction.

Note!

The notifications per e-mail for active power reductions can be activated from the Configuration | Notifications | PMmenu.

16.13.3 Remote controlled active power reduction with the calculation of self-consumption (only Solar-Log™ PM+)

This function is an enhancement to the Remote controlled active power reduction function described in the previous chapter. This function does not correspond to provisions of the German EEG laws and has to be arranged with the grid operator before being used.

Note!

The Solar-Log PM+ needs to be
linked to a consumption meter to implement this function. Please note the instructions in chapter “12.5 External power meter“.

The configuration of this corresponds to that already described for the remote controlled active power reduction.
The instruction for integrating the meters into the electric wiring of the house or building are found in the appendix.

Notes about the function!

Self-consumption is taken into account with a command (less than 100% and greater than 0%). The inverter(s) supply a higher output than the command value by taking the current consumption into account.
Self-consumption is not taken into account with the 0% command value. As a safeguard here, the plant is always limited to 0%.

16.13.4 70% fixed reduction

By activating this menu item the inverter(s) are controlled to be fixed at 70% of the installed DC power. Enter the Maximum AC Power and Connected Generator Power as reference values in the Configuration | Devices | Configuration menu.
The maximum power output for the inverters can be calculated from the connected generator power value that has been entered.

Procedure

- Select 70% fixed reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

Note!

Changes to the Maximum AC Power of the inverter in Configuration | Devices | Configuration menu are disabled.
Enter your password via the Log-on as Installer / PM to enable changes.

Note!

The 70% reduction is always applied to the entire plant.
All of the inverters are controlled on the same level by the Solar-Log™, independent of their alignments (east-west orientation). This can lead to a lower feed-in amount than the maximum allowed.

Example 1

DC power	12kWp
AC power	12kW

70% of the DC power corresponds to 8.4kW.
As the AC and DC power are identical, the down-control is correct.

Example 2

DC power	12 kWp
AC power	10kW

70% of the DC power corresponds to 8.4kW.
For this reason the inverter controlled by the Solar-Log™ is reduced to 84% (8.4kW) and not only to 70% (7kW).

16.13.5 70% Fixed reduction with the calculation of self-consumption

This function is an enhancement to the 70% fixed reduction described in the previous chapter.
The Solar-Log™ needs to be linked to a consumption meter to implement this function. Please note the instructions in chapter “12.5 External power meter“. The configuration of this corresponds to that already described for the 70% fixed reduction.

Procedure

- Select 70% Fixed reduction with the calculation of self-consumption
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

Note!

The Solar-Log™ needs to be linked to a consumption meter to implement this function.
Please note the instructions in chapter„12.5 External power meters“.

The current amount of self-consumption is calculated by employing a power meter for self-consumption. The consumption is calculated with the energy generated by the inverter.
If the difference between the current production and consumption is lower than 70% of the module's power output, the inverters are regulated accordingly, so that the amount of power at the feeding point is still only at 70% of the connected generator power.

16.13.6 Adjustable reduction

This function allows the maximum amount of grid feed-in power to be configured. The reduction level in regard to the amount of connected generator power can be freely defined as a percentage (X%). The Solar-Log™ only regulates the inverters when the amount of feed-in power for the grid has reached the limit.

Procedure:

- Select Adjustable reduction.
- Enter the percentage for the adjustable reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

16.13.7 Adjustable Reduction with the Calculation of Self-Consumption

This function allows the maximum amount of grid feed-in power to be configured. The reduction level in regard to the amount of connected generator power can be freely defined as a percentage (X%). The amount of self-consumption is taken into account for this calculation. The Solar-Log™ only regulates the inverters when the amount of feed-in power for the grid has reached the limit. If there is enough self-consumption, the inverters continue to operate without any reductions.

Procedure:

- Select Adjustable reduction with the calculation of self-consumption
- Enter the percentage for the adjustable reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

Note!

The Solar-Log™ needs to be linked to a consumption meter to implement this function. Please note the instructions in chapter "12.5 External power meters".

16.13.8 Fixed reduction in watts

This function allows the maximum amount of grid feed-in power to be configured. The reduction level in regard to the amount of connected generator power can be freely defined to a particular output level (W). The Solar-Log™ only regulates the inverters when the amount of feed-in power for the grid has reached the limit.

Procedure:

- Select Adjustable reduction.
- Enter the Output (W) for the adjustable reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

16.13.9 Fixed reduction in watts with the calculation of self-consumption

This function allows the maximum amount of grid feed-in power to be configured. The reduction level in regard to the amount of connected generator power can be freely defined to a particular output level (W). The amount of self-consumption is taken into account for this calculation. The Solar-Log™ only regula-tes the inverters when the amount of feed-in power for the grid has reached the limit. If there is enough self-consumption, the inverters continue to operate without any reductions.

Procedure:

- Select Adjustable reduction with the calculation of self-consumption
- Enter the Output (W) for the adjustable reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

Note!

The Solar-Log™ needs to be linked to a consumption meter to implement this function. Please note the instructions in chapter “12.5 External power meters“.

16.13.10 Percentage of consumption for an adjustable reduction

This function allows the maximum amount of power generated by the inverter to be configured. The percentage configured (freely adjustable) results in a corresponding reduction in regard to the total consumption at the inverter. There is power feed into the grid with this power reduction type.

Example:

The total consumption of an installation is at 2000 W and the reduction of the inverters is configured to 90%, leaving 1800 W. 200 W has to be purchased from the grid to cover the total consumption.

Procedure:

- Select the percentage of consumption for the adjustable reduction.
- Enter the percentage (%) for the adjustable reduction.
- Select the inverter(s) to control in the Interface assignments section.
- SAVE the settings.

Note

The Solar-Log™ needs to be linked to a consumption meter to implement this function.
Please note the instructions in chapter “12.5 External power meters“.

16.14 Reactive Power

The following modes are available from the Feed-in Management | Reactive power menu:

- Deactivated
- fixed value cos (Phi) shift factor
- fixed reactive power in Var
- variable cos (Phi) shift factor over characteristic curve P/Pn
- variable reactive power over characteristic curve Q(U) (only Solar-Log 2000 PM+ with Utility Meter)
- Remote controlled fixed value cos (Phi) shift factor(only Solar-Log™ PM+)

Note!

The active power reduction mode that needs to be implemented for a particular PV plant is determined by the national laws and guidelines.
The planner and/or installer of your plant or the respective grid operator can provide you with information regarding the method of reactive power control.

Note!

The feed-in management function is not available for all supported inverters. Prior to installation please check whether PM+ is supported by the inverters used.
Additional information as well as our inverter database can be found underwww.solar-log.com/pm+.

Note!

The configuration for reactive power is always emanated from the reference direction, from the side of the Solar-Log™.
The power companies define the requirements from their point of view. PV plants are usually defined in the consumption direction (with negative totals).
For more information, refer to http://en.wikipedia.org/wiki/Electric_current#Reference_direction

Interface assignments section

The inverters with their assigned interfaces that are connected to the Solar-Log™ are displayed in this section.
Select the inverter(s) to control and activate it/them.

16.14.1 Reactive power deactivated

When this menu item is selected, reactive power control is deactivated. After that, the controllable interfaces can be selected when control is via the Modbus PM or via a PM Profile.

16.14.2 Fixed value cos (Phi) shift factor

With this function it is possible to adjust the connected inverters to a fixed shift factor.

Using this matrix it is possible to specify a fixed cos (Phi) for certain periods of time. If over the course of one day various shift factors must be adhered to, they can be configured here. If an Utility Meter with power measurement is available, the measurements can be performed at the feeding point.

Procedure:

- Select Fixed value cos (Phi) shift factor.
- Activate the interface assignments to control.
- Enter the from (time).
- Enter the cos (Phi) for this time period.
- Check the box Inductive/under-excited for cos (Phi).
- If necessary, enter additional times and the accompanying cos (Phi).
- If necessary, activate measuring at the feeding point.
- SAVE the settings.

If a certain cos (Phi) must be maintained for 24 hours, the time 00:00 as well as the cos (Phi) have to be entered in the first line. The other lines must also be filled with 00:00. It is not necessary to enter the cos (Phi).

16.14.3 Fixed reactive power in Var

Reactive Power Management

This function allows the connected inverters to generate a certain reactive power in Var for a definable period of time.

Procedure:

- Select Fixed reactive power in Var.
- Activate the interface assignments to control
- Enter the from (time).
- Enter the Reactive power for this time period.
- Check the box Inductive/under-excited for reactive power.
- If necessary, enter additional times and the accompanying reactive power
- SAVE the settings.

If a certain reactive power in Var must be supplied for 24 hours, the time 00:00 as well as the value in Var have to be entered in the first line along with checking the Inductive box. The other lines must also be filled with 00:00. It is not necessary to enter reactive power.

Reductions

The following configuration options are available in the Reductions section.

- Max. cos(phi) inductive/under excited and max. cos(phi) capacitive/over-excited:
  A maximum shift factor can be defined wit this the reduction. With this, it can be that less reactive power is fed-in into the grid than allowed in the partial load range in order to maintain the shift factor limits.

Note!

Entering zero as the value deactivates the particular limit.

16.14.4 Variable cos (Phi) shift factor over characteristic curve P/Pn

The function allows the cos (Phi) to be adjusted according to characteristic curve P/Pn.
With a characteristic curve P/Pn, the ratio of the currently generated power (P) to nominal power (maximum output) (Pn) is determined. A Cos (Phi) is assigned to ratio by a characteristic curve.
The function is also referred to as Phi (P).

The currently generated power (P) is calculated by the Solar-Log™ based on the inverter data. If an Utility Meter with power measurement is available, the output value will be used instead.

Note!

Please check that all of the Solar-Logs in a master/slave setup have the same firmware version, especially for the characteristic curve P/Pn with the Utility Meter.

Type of characteristic curve section

Using this menu item a characteristic curve specified by the grid operator can be stored. In principle a distinction is made here between a 2-point and a 4-point characteristic curve.

2-point characteristic curve

By selecting “2-point characteristic curve” it is possible to define a characteristic curve using two points.

Procedure

- Select Variable cos (Phi) shift factor over characteristic curve P/Pn from the menu.
- Activate the interface assignments to control.
- Select 2-point characteristic curve.
- Define the characteristic curve points A and B based on the boxes P/Pn and cos (Phi) and put a check in front of inductive/under-excited.
- SAVE the settings.

The characteristic curve displayed changes according to the values entered.

4-point characteristic curve

By selecting "4-point characteristic curve" it is possible to define a characteristic curve using four points.

Procedure

- Select Variable cos (Phi) shift factor over characteristic curve P/Pn from the menu.
- Activate the interfaces.
- Select 4-point characteristic curve.
- Define the characteristic curve points A, B, C and D based on the boxes P/Pn, cos (Phi) and put a check in front of inductive/under-excited.
- SAVE the settings.

The characteristic curve displayed changes according to the values entered.

16.14.5 Variable reactive power via the characteristic curve Q(U)

(only Solar-Log 2000 with Utility Meter)

In order to be able to achieve this function, the Solar-Log™ Utility Meter is required in addition to a Solar-Log 2000.

Reactive Power Management

The Solar-Log™ Utility Meter is linked to the Solar-Log™ via the RS485 bus and continually transmits the measured voltage values to the Solar-Log™. The measured values can be recorded at either the low or medium voltage side (when the corresponding converter and its configuration are present). Using the stored characteristic curve the Solar-Log™ continually calculates the reactive power to be supplied and controls the connected inverter accordingly.

Note!

Information on connecting and configuring the Utility Meter is found in the „12.8 Installation Utility Meter (only Solar-Log 1000 and 2000)" section.

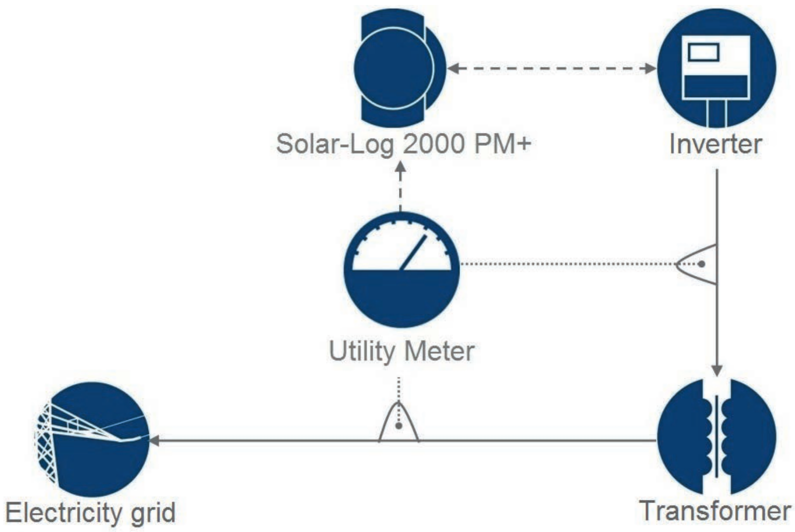


Fig.: Q(U) control function diagram

Type of characteristic curve section

Using this menu item a characteristic curve specified by the grid operator can be stored. In principle a distinction is made here between a 2 point and a 4 point characteristic curve.

2-point characteristic curve

By selecting “2-point characteristic curve” it is possible to define a characteristic curve using two points.

Procedure

- Select Variable reactive power via the characteristic curve Q(U) as the type.
- Activate the interface assignments to control.
- Select 2-point characteristic curve.
- Define the characteristic curve points A and B based on the boxes U/Uc, Q/SAmax and put a check in front of inductive/under-excited.
- SAVE the settings.

The characteristic curve displayed changes according to the values entered.

4-point characteristic curve

By selecting “4-point characteristic curve” it is possible to define a characteristic curve using four points.

Procedure:

- Select variable reactive power via the characteristic curve Q(U) as the type.
- Activate the interface assignments to control.
- Select 4-point characteristic curve.
- Define the characteristic curve points A, B, C and D based on the boxes U/Uc, Q/SAmax and put a check in front of inductive/under-excited.
- SAVE the settings.

The characteristic curve displayed changes according to the values entered.

Reductions

The following configuration options are available in the Reductions section.

- Gradient limit (adjustment rate):
  If the power company requires a reduction, it has to be configured in this box. (Enter the values in seconds)
- Max. cos(phi) inductive/under excited and max. cos(phi) capacitive/over-excited:
  A maximum shift factor can be defined wit this the reduction. With this, it can be that less reactive power is fed-in into the grid than what the characteristic curve allows in the partial load range in order to maintain the shift factor limits.

Note!

Entering zero as the value deactivates the particular limit.

16.14.6 Remote-controlled fixed value cos (Phi) shift factor only Solar-Log™ PM+)

This option allows the cos (Phi) shift factor to be remotely controlled by the grid operator. To enable this function, a ripple control receiver or similar device is required. Typically, these devices are provided by the grid operator for a fee.
The type of ripple control receiver or telecontrol technology used depends on the level of development of the respective grid operator. The control signals emitted by the grid operator are converted to potential-free signal contacts by the ripple control receiver and can be evaluated by the Solar-Log™ PM+ models via the digital PM+ interface.

Note!

The ripple control receiver's potential-free commands have to be present for the duration of the command. Command impulses cannot be processed.

Channel settings for power reduction section

The relay outputs for the ripple control receiver are connected to the PM+ input of the Solar-Log™. This allows the grid operator's signals to be evaluated by the Solar-Log™.

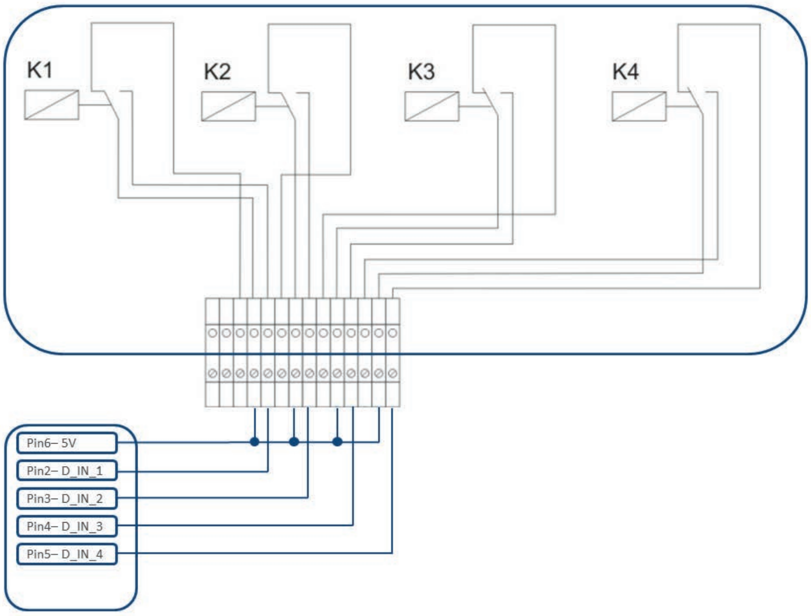


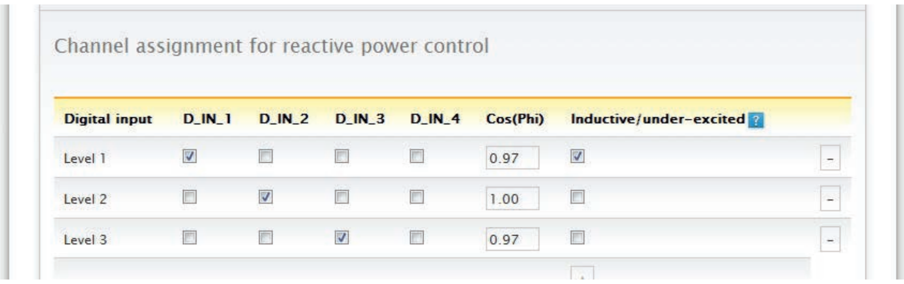
Fig.: Schematic diagram of a ripple control receiver with four relays.

The relay for reactive power control is wired to the PM+ interface.

Note!

The function of the PM+ interface is only possible when the contacts of the ripple control receiver are potential free and are wired with a supply voltage of 5VDC from the PM+ interface.

In practice, various ripple control receivers with varying numbers of relays and different signal codes are used. The configuration matrix for the Solar-Log™ PM+ thus offers maximum flexibility – most common versions can be configured.
Ripple control receivers generally possess 2 to 5 relays. The assignment of the individual relay states for a particular shift factor is specified by the respective grid operator and stored in the Solar-Log™ using this matrix. In this way the connected inverters can be adjusted to meet the specified reduction levels.


Channel assignment for reactive power control

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Cos(Phi)	Inductive/under-excited
Level 1	☑	☐	☐	☐	0.97	☑
Level 2	☐	☑	☐	☐	1.00	☐
Level 3	☐	☐	☑	☐	0.97	☐

Fig.: Channel settings for remote controlled cos (Phi)

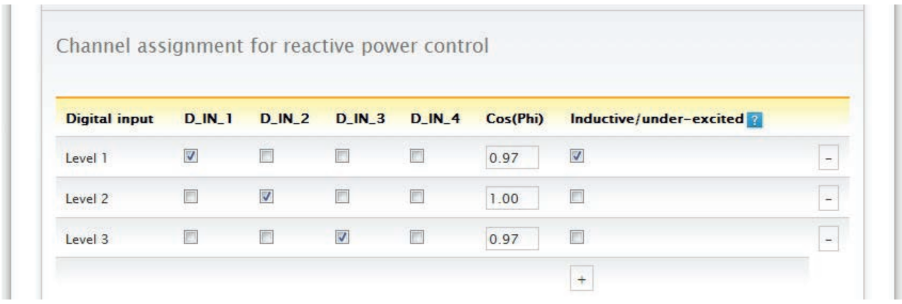
For each level, the input signal combination and a value for the shift factor in cos (Phi) is entered. Checking the box next to the digital inputs of the PM+ interface (D_IN_1 to D_IN_4) means that the input is supplied with 5V from pin 6 to reduce the output on the cos phi defined in the box “cos (Phi)”.
Four levels are shown in the basic setting. The “+” sign can be used to extend the list by additional levels.

Procedure:

- Select remote controlled.
- Select the inverter(s) to control in the Interface assignments section.
- Enter the channel settings for power reduction according to the specifications and wiring.
- Select options.
- SAVE the settings.

More Options

Switching from the remote-controlled cos (Phi) to the possible characteristic curves can be implemented via assigned combinations of signals to the PM+ interface.


Channel assignment for reactive power control

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Cos(Phi)	Inductive/under-excited
Level 1	☑	☐	☐	☐	0.97	☑
Level 2	☐	☑	☐	☐	1.00	☐
Level 3	☐	☐	☑	☐	0.97	☐

Fig.: Switching to reactive power characteristic curves with certain signals

If a switch to the characteristic curve operating mode (P/Pn and Q(U)) is required due to a certain ripple control receiver signal, the respective levels for the switch can be entered in the input box. If no switch should take place, enter 0 in the input box.
When the switch is activated, the configuration page reloads itself. The corresponding characteristic curves need to be defined. The settings for the characteristic curves correspond to the procedures described in „24.1.5 Variable reactive power via the characteristic curve Q(U) (only Solar-Log 2000 with Utility Meter)”
Examples of ripple control receiver connections and the corresponding configuration are in the appendix of this manual.

16.14.7 Linking (only Solar-Log 1000 and 2000)

The linking function is to be used when there are not enough interfaces on one Solar-Log™ or the cable lengths between the Solar-Log™ and the various inverters exceeds the RS485 specifications.
The link between the data loggers is established with an Ethernet connection. This TCP/IP connection can be established with various technologies such as fiber optics, wireless LAN, radio relay. For the Solar-Log™ network it is only relevant that the connection is fast and reliable.
The master within Solar-Log™ network always has to be a Solar-Log 2000 PM+. The Solar-Log 2000 can be used as the slaves.

The link is used to exchange control commands and responses between the Solar-Log™ devices.
Each Solar-Log™ has to transfer yield data itself to a server.

Procedure:

- Select configuration from Configuration | Feed-in Management | Networking .
- Enter the IP address of the first slave.
- Click next to the box with the mouse.
- After entering the IP address an additional input box appears.
- A maximum of nine slaves can be active inside of a network.
- SAVE the settings.

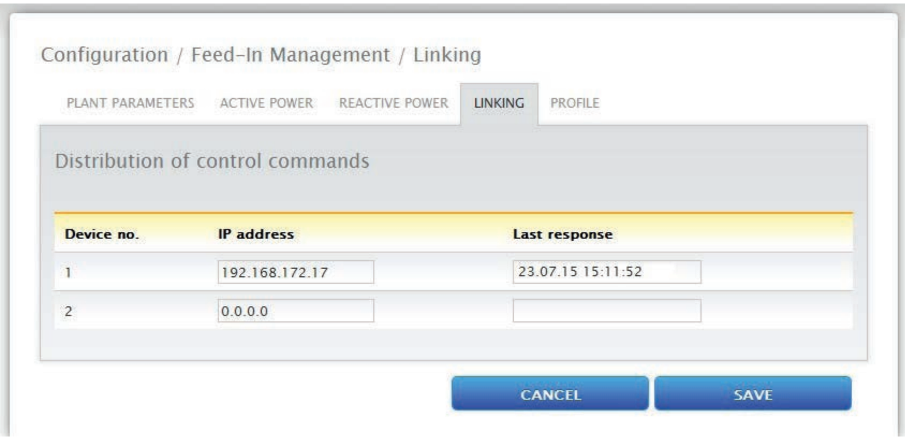


Fig.: Solar-Log™ network configuration

Note!

If there are no inverters connected to the master in the master/slave mode, the plant parameter under Configuration | Feed-in Management | Plant parameters and forecast value under Configuration | Plant | Forecast have to be set to 0.

16.14.8 Profile

For feed-in management, PM+ profiles come with the Solar-Log™ PM Package equipment. These profiles contain the pre-configured settings for feed-in management and enable the PM+ Package I/O Boxes

The profiles are delivered in the
config_pmprofil_NameGridOperator.dat file format.

Procedure:

- Select configuration from Configuration | Feed-in Management | Profile ,
- Click on Browse to import the profile and select the file to open it.
- Select load profile
- The Solar-Log™ reboots itself. The status is displayed in the progress bar.

The following window appears after the reboot.

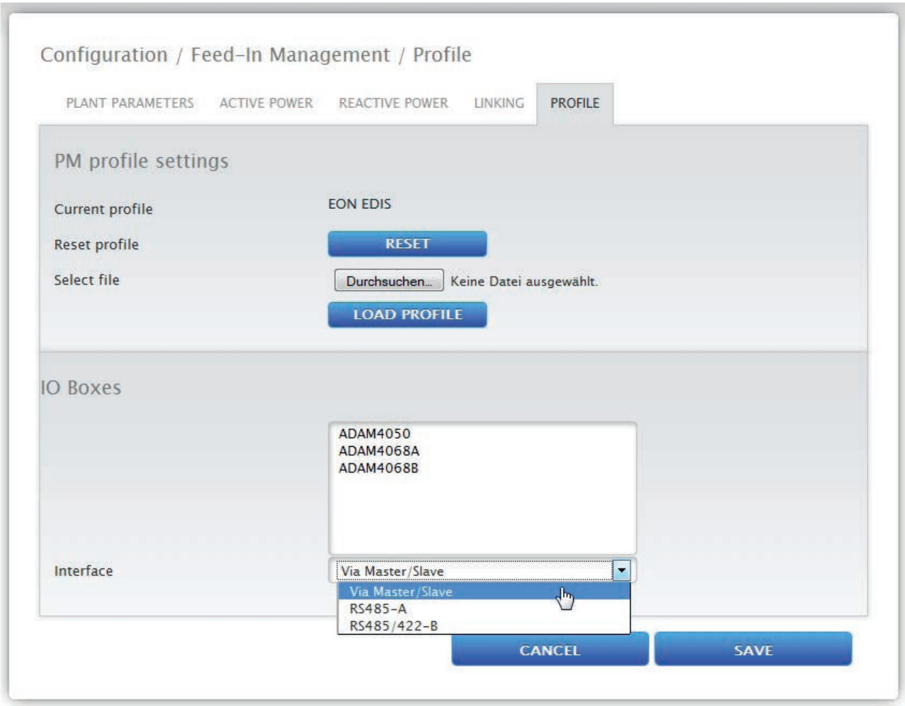


Fig.: Activated PM+ Profile for a PM Package

- The name of the grid operator / profile are displayed in the Current Profile section
- At the bottom of the page, the I/O Boxes that are used in the corresponding PM+Package are displayed.
- In the interface section, the RS485 interfaces or Master/Slave on which the I/O Boxes are connected to have to be selected.
- SAVE the settings.

Note!

If a new PM+Profile needs to be imported, the current profile has to be reset first.

Note!

A special operator specific installation manual is included for the installation of the PM+ Package.

16.15 Direct Marketing

Note!

With the amendment of the German Renewable Energy Act (EEG 2014), direct marketing is required for all new plants with an output greater than 500 kW.
Starting 01 January 2016, the requirement applies to all plants with an output greater than 100 kW.

An interface has been implemented with firmware version 3.3.0 (extra license required) for the simple, efficient and secure communication
between the the direct marketer and the remote controlled photovoltaic plant. The Solar-Log™ with the firmware version 3.3.0 or newer fulfills the requirements to receive the management bonus for remotely controlled plants.
Secure data communication between the and direct marketer is mandatory. This has been implemented with VPN encryption (VPN router).

Note!

A VPN router is required to be able to use the direct marketing function.

The Direct Marketing function is not enabled by default. To use this function the license key has to be entered in the Configuration | System | Licenses menu.
The following providers are available:

- Energy & Meteo
- Next Kraftwerke (Firmware 3.4.0)

Energy & Meteo / Next Kraftwerke
Direct marketing via Energy & Meteo or Next Kraftwerke is carried out using remote control options.

The following remote control options are available:

- Modbus
- Ripple Control Receiver
- Ripple control receiver with consideration of self-consumption

We offer different license models via a corresponding license key.
The following license options are available:

- Plant size to 100 kWp
- Plant size to 500 kWp
- Plant size to 1 MWp
- Plant size to 2 MWp
- Plant size to 5 MWp
- Plant size to 10 MWp
- Plant size to 20 MWp

Procedure

- Select Energy & Meteo or Next Kraftwerke as the provider.
- Select Remote Control options.
- SAVE the settings.

16.16 Editing Data

The Configuration | Data menu offers several functions in regard to the data recorded by the Solar-Log™ and contains the following options:

- Initial yield
- Data correction
- System backup
- Backup
- Reset

16.16.1 Initial yield

This function manually imports initial yields from previous recorded daily data into the Solar-Log. This is useful any time that a large amount of data has to be changed and would take too long with the "Data correction" function.
The Data import deletes the existing data memory completely before the daily data is imported from a CSV file. Therefore, the data import should be carried out immediately after the startup of Solar-Log™.
The Initial yield can contain production, consumption or self-consumption values.

Note!

A data import can only be made if all inverters have been correctly detected and configured or if a valid system configuration has been imported.

The data has to be in the CSV format for the import. Files in the CSV format can be created with simple text editors or spreadsheet programs like MS Excel or Open Office Calc.
The import file must consist of individual rows of text, in which the date and daily yield value in "Wh" (not kWh!) are separated by semicolons (CSV format).
Example:
DD.MM.YY; Production in Wh; Consumption in Wh; Self-consumption in Wh
    21.03.17;136435;264371;33684
    22.03.17;138219;213145;43476
etc.

Note: Here, the year value should also consist of 4 digits.

Procedure

- Click on Browse.
- The file manager of your OS appears.
- Select the CSV file that is to be imported
- The selected file name is displayed
- Click on Upload.
- The progress and status of the data import are displayed
  Upload file
  End current measuring
  Delete all of the old data and initialize structure
  Import daily data
  Calculate monthly/yearly data
  restart
- The Solar-Log™ resets itself
- Check the imported data in the yield data section.

16.16.2 Data correction

Here you can adjust the values for previous days or change daily totals.

Procedure

- Enter a 6-digit date
  DD/MM/YY
  For example: 21.03.17 for 21 March 2017

The following values can be corrected:

- Daily yield (kWh)
- Daily consumption (kWh)
- Daily self-consumption (kWh)
- Daily self-consumption Battery (kWh)

If consumption or yield values were modified with the data correction option, these corrected values are displayed additionally in the key and in the yield data under the Production | Day and Balances | Day menus.

16.16.3 System backup

The Configuration | Data | Backup menu offers the following functions:

- Restore configuration from hard disk
- Save configuration to hard disk
- Save configuration to USB
- Restore configuration from USB

The system data consist of all the data that have been saved in the configuration. It is recommended always to make a backup of the system data before changing the configuration or updating the firmware.

Restoring configuration from hard disk section

This function imports the configuration file from the solarlog_config.dat file into the Solar-Log™.

Procedure

- Click on Browse.
- The file manager of your OS appears.
- Select the DAT file that is to be imported.
- The selected firmware's file name is displayed.
- Click on Upload.
- The configuration is being imported. Please wait a moment.
- The Solar-Log™ reboots itself.

Saving configuration to hard disk section

With the function a configuration file can be created and saved to a hard drive.
A Solar-Log configuration file has the following file name:
"solarlog_config.dat."

Procedure

- Click on Prepare.
- After the data has been prepared, the Download option is displayed.
- Click on Download.
- Depending on your browser settings, a window pops up with the options to open the file with a program or save file.
- Select Save file.
- The file is saved in the download folder.

Alternative procedure

- Click on Prepare.
- After the data has been prepared, the Download option is displayed.
- Right click with the mouse on Download.
- Select Save link as.
- The file manager of your OS appears.
- Select the desired location to save the file to.
- Select save.
- The file is saved in the selected folder.

Saving configuration to USB section

With this function, a backup can be saved to a USB stick which is directly connected to the device.

Procedure

- Touch Save.
- The configuration is being created. Please wait a moment.
- The progress and status of the update are displayed
  Finish current measurement
  Select the USB storage device
  Save configuration
- The solarlog_config_YYMMDD.dat file is saved in the /Backup directory of the USB stick.
  YYMMDD = year, month and day - each two digits, e.g. solarlog_config_170321.dat is then the backup from 21 March 2017.
- The configuration file can be saved elsewhere as a backup or imported into the Solar-Log™ again.

Restoring configuration from USB section

This function imports the solarlog_config.dat (or solarlog_config_YYMMDD.dat) configuration file from a USB stick which is directly connected to the device into the Solar-Log™.

Procedure

- Click on RESTORE.
- Backup files are searched for on the USB stick that is directly connected to the Solar-Log™
  First it looks in the main directory of the USB stick for solarlog_config.dat, then it looks in the /backup directory. And lastly it looks in the backup directory for solarlog_config_YYMMDD.dat. When it looks for the solarlog_config_YYMMDD.dat. file, it loads the latest file.
- Start this search.
- When a configuration file is found on the USB stick, click on Restore to import it.
  The data is being imported
  Please wait
- The Solar-Log™ reboots itself.
- The configuration file was imported.

16.16.4 Backup

The Configuration | Data | Backup menu offers the following functions:

- Restore data backup from hard drive
- Save data backup to hard drive
- Restore data backup from USB
- Save data backup to USB

Restore data backup from hard drive section

This function restores the backup file with the name solarlog_backup.dat to the Solar-Log™.

Procedure

- Click on Upload.
- The file manager of your OS appears.
- Select the DAT file that is to be imported.
- The selected backup's file name is displayed
- Click on Upload
  The backup is being restored. Please wait a moment.
- The Solar-Log™ reboots itself.

Saving data backup to hard drive section

With the function a backup can be created and saved to a hard disk.
A Solar-Log backup file has the following file name:
solarlog_backup.dat.

Procedure

- Click on Prepare.
- The progress and status of the update are displayed
  End current measuring
  Select the USB storage device
  Save configuration. After the data has been prepared, the Download option is displayed.
- Click on Download.
- Depending on your browser settings, a window pops up with the options to open the file with a program or save file.
- Select Save file.
- The file is saved in the download folder.

Alternative procedure

- Click on Prepare.
- The progress and status of the update are displayed
  End current measuring
  Select the USB storage device
  Save configuration
- After the data has been prepared, the Download option is displayed.
- Right click with the mouse on Download.
- Select Save link as.
- The file manager of your OS appears.
- Select the desired location to save the file to.
- Select save.
- The file is saved in the selected folder.

Saving data backup to USB section

With this function, a backup can be saved /Backup directory of a USB stick which is directly connected to the device.

Procedure

- Touch Save.
- The backup is being created. Please wait a moment
- The progress and status of the update are displayed
  End current measuring
  Select the USB storage device
  Save configuration
- The solarlog_backup_YYMMDD.dat file is saved in the /Backup directory of the USB stick.
  YYMMDD = year, month and day - each two digits, e.g. solarlog_backup_170321.dat is then the backup from 21 March 2017.

The Solar-Log™ backup can be copied to another storage medium or imported into the Solar-Log™ again.

Restoring backup from USB section

This function restores a backup file with the name solarlog_backup.dat from the
USB stick connected directly to the device to the Solar-Log™.

Procedure

- Click on RESTORE.
- A configuration file is search for on the connected USB stick
  First it looks in the main directory of the USB stick for solarlog_backup.dat, then it looks in the /backup directory. And lastly it looks in the backup directory for solarlog_backup_YYMMDD.dat. When it looks for the solarlog_config_YYMMDD.dat. file, it loads the latest file.
- Start this search.
- When a configuration file is found on the USB stick, click on Restore to import it.
- The backup is being restored. Please wait a moment.
- The Solar-Log™ reboots itself.
- The configuration file was imported.

16.16.5 Reset

The Configuration | Data | Reset menu offers the following functions:

- Reset the yield data
- Reset the inverter configuration
- Restore factory settings

Resetting the yield data section

In certain circumstances after an inverter detection, it may occur that incorrect or unusable data is displayed. In this case, the stored data can be deleted without having to reconfigure the Solar-Log completely.

Procedure

- Click on RESET
- If you are sure that the data should be deleted, click on Continue. Otherwise click on Cancel
- The data is being deleted
- The Solar-Log™ reboots itself

Resetting inverter configuration section

If the Device Detection needs to be started again, it is recommended to delete the previous inverter configuration with this function.

Procedure

- Click on RESET.
- If you are sure that the inverter configuration should be deleted, click on Continue. Otherwise click on Cancel.
- The data and inverter configuration are deleted.
- The Solar-Log™ reboots itself.

Restore factory settings section

This function restores the Solar-Log™ to its factory settings. All of the yield data and configuration is deleted.

Procedure

- Click on RESET.
- If you are sure that the data should be deleted, click on Continue. Otherwise click on Cancel.
- The factory settings are being restored
- The Solar-Log™ reboots itself.

Note!

The network settings remain when this function is used.

Note!

The reset button on the device has to be used to delete all of the settings, including network settings, for Solar-Log™ devices without a display (Solar-Log 200, 250 and 300). The Solar-Log™ is then set to automatically receive its IP address from the router. (DHCP)
=> only with router or switch.

16.17 System Configuration

The Configuration | System menu has the basic settings for the Solar-Log™ and contains the following tabs:

- Access control
- Language/Country/Time
- Display
- Licenses
- Firmware

16.17.1 Access control

Access protection for different parts of the Solar-Log™ can be configured in this menu. The following sections can be restricted with pin codes or passwords

- Access protection for the display
- Access protection for the browser menu
- Displaying advanced configuration

Access protection for the display (only Solar-Log 1000, 1200 and 2000)
A pin code can be activated to restrict access to the Solar-Log™'s display. The pin code may contain a maximum of 8 numerical digits.
Access at the display can be restricted for the entire display or just the settings section.
Procedure:

- Enter the pin code.
- Enter the pin code again.
- Select restricted Sectionsby checking them.
- SAVE the settings.

Access protection for the browser menu

In this section, the following parts of the Solar-Log™'s browser menu can be restricted with a password:

- User
  General access to the Browser menu
- Installer
  Access to the Configuration menu
- Feed-in management
  Access to the Configuration | Feed-in Management menu

The default password for access to the Feed-in Management menu is PM. Access for users and installers is not restricted.

Note!

We advise installers to discuss with their customers the scope of the settings in the area of feed-in management, to block the configuration menu using a password and to assign an individual password.

Procedure

- Activate the password restriction for the desired menus.
- Enter a secure password for each of the menus
- Enter the password again
- SAVE the settings.

16.17.2 Language/Country/Time

The following options are available from the Configuration | System | Language/Country/Time menu:

- System language of the Solar-Log™
- Country/Location of the Solar-Log™
- System time of the Solar-Log™
- Time synchronization

Language section

Procedure

- Select the desired language from the menu
  The selected display language applies both to the display and the web browser.
- SAVE the settings.

Country section

Procedure

- Select your Country from the menu.
  The country setting affects how the date, time and currency formats are displayed.
- SAVE the settings.

Time section

Solar-Log™ has an integrated real-time clock which can maintain the clock time even in the case of a power failure or grid disconnection, and for a long period (50 days).
The clock time is factory-set, but it may be lost due to long periods of storage.
The time zone, date and summertime values must be set correctly, so that no incorrect statuses or results are obtained during monitoring and graph display, e.g. when e-mail messages are sent or when a curve is displayed on the day graph.

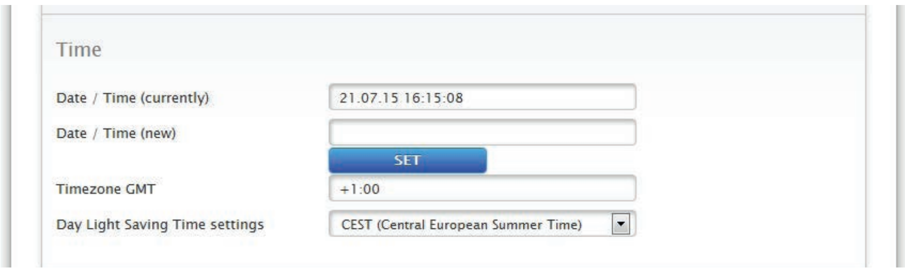


Fig.: Configuring the time on the Solar-Log™

Adjust the time in the Configuration | System | Language/Country/Time menu.

Adjust the new system time

Procedure

- The current system time is displayed
- To change the time, enter the new time in the following format
  DD/MM/YY HH:MM:SS
  For example: 12.12.16 4:14:05 PM for 12 December 2016 16 Hours 14 Minutes 05 seconds (2:14 p.m.)
- SET a new date and time

Adjust the time zone

Procedure

- Enter the time difference in hours.
  Default: GMT +1
- Save Entry .

Set Day Light Saving Time.

Procedure

- Select the corresponding Day Light Saving Time settings
  Options: no, CEST (Central European Summer Time), USA
- SAVE settings

Automatic time synchronization section

To automatically synchronize the system time, the Solar-Log™ regularly contacts a network time protocol (NTP) server.
If the Solar-Log™ is connected to the Internet via a router, the synchronization occurs during the night.
With a GPRS connection, the time synchronization occurs during a data transfer.

Procedure

- Activate the Automatic time synchronization button.
- SAVE the settings.

Update now function, the time synchronization with the NTP server can be manually started. The NTP port 123 needs to be enabled in the gateway or firewall.

16.17.3 Display

The following options are available from the Configuration | System | Display menu:

- Dimming at a certain time
- Dimming when all of the inverters are offline
- Dimming after inactivity
- Slide show dialog

The settings refer to the touch display. The small LCD display is continuously in operation.

Dimming at a certain time

The display brightness can be limited to a certain period. If the display is touched, the screen lights up again.

Procedure

- Enter the Turn on at and Turn off at time
  Times are to be entered in the hh:mm format
  For example: 19:30 (for 7:30 p.m.)
- SAVE the settings.

Dimming when all of the inverters are offline

When this function is active, the Solar-Log™ automatically dims when all of the inverters are offline (no more power feed). The Solar-Log automatically resumes from the sleep the next morning and starts recording again.

Dimming after inactivity

The display brightness can be dimmed by 50% and/or 100% after a certain period. If the display is touched, the screen lights up again completely.

Procedure

- Activate Dimming level switch.
- Enter the Period of inactivity in minutes on the display.
  The minutes are to be entered in the mm format,
  for example, 60 for 60 minutes.
- SAVE the settings.

Slide show section

After a defined period of time, the display changes about every 15 seconds: Overview, Tachometer, Energy Flow, Balance, Forecast, Day, Month, Year, Total, Environmental Contributions 1 - 3.

Procedure

- Enter the desired time in minutes.
  The minutes are to be entered in the mm format,
  for example, 15 for 15 minutes.
- The starting view of the Slide show can be set from the start screen.
- SAVE the settings.
- Alternatively, a start screen can be set for when the Slide show is deactivated.

16.17.4 Licenses

Certain Solar-Log™ functions have to be activated by entering a license code. You receive a license certificate after purchasing a license for a particular function. The licenses are always linked to the serial number of the particular Solar-log™ and can only be used with the device with this serial number.

Steps for purchasing and importing a license for the Solar-Log™:

- Go to the online shop at https://shop.solar-log.com
- and select a license.
- Enter the serial number of the Solar-Log™ in the box on the right.
- Confirm with the enter button.
- Proceed with the payment.
- Manually download the license.
- Enter the license code in the Configuration | System | Licenses menu.
- „Activate“license code.

Activating licenses section

In the Active licenses section, all of the activated functions and license codes are displayed.

Entering a license code

Enter a License code to activate this function. The name of the license is displayed in the Active License section.

16.17.5 Firmware

The firmware tab offers the following functions:

- Information about the current firmware version
- Firmware Update

Status section

The firmware version currently installed on the Solar-Log™ is displayed. The version number contains three sections:

Version number	Build		Date
3.6.0	Build 91	-	02.05.2018

Updating firmware manually section

This function allows a new firmware to be imported from a disk.

Note!

Before manual updating, it is important to save the current system data and make a backup.

Note!

Clear the browser's cache after updating the firmware to prevent any possible display errors.

Procedure

- Click on Browse.
- The file manager of your OS appears.
- Select the firmware file that is to be imported
- The selected firmware's file name is displayed.
- Click on Upload.
- Then you are asked if system and data backups have been made. If you click "Cancel" on these queries, the process is aborted.
- The progress and status of the update are displayed
  Upload the file
  Finish current measurement
  Restart
  Unzip the file
  Restart
- FW for firmware update is shown in the LCD Display.
- The Solar-Log™ reboots itself.
- The Current Firmware Version is shown in the display and in this menu.

Check for Update from the Internet section

With this function, the Solar-Log™ contacts the Solare Datensysteme GmbH firmware servers to check if a new version is available and offers to install it.

Check for Update from USB

With this function, the Solar-Log™ checks the USB stick connected directly to the device if a new version is available.

When this function is used, the progress and status of the update are displayed

- Finish current measurement
- Select the USB storage device

Automatic Firmware Updates

With this function, the Solar-Log™ regularly checks the firmware servers to see if a new version is available. When a new version is available, it is automatically downloaded and installed during the night.

Note!

By activating this function, you give Solare Datensysteme GmbH permission to automatically load minor updates. This function is not intended to replace manual firmware updates.

17 Accessing Diagnostic values

Click on Diagnostics in the tool bar to access the Diagnostics menu. The following options can be selected from the left-side navigation menu.

- Inverter Diagnostic
- Event log
- Notifications
- Feed-In Management
- SCB Monitor (only Solar-Log 1000 and 2000 with SCB activated)
- Alarm contact (only Solar-Log 1000 and 2000)
- CSV Export

17.1 Inverter Diagnostic

To access the Inverter diagnostic menu, go to Diagnostic | Inverter Diagnostic.

The following tabs can be selected from this menu:

- Inverter details
- Tracker comparison
- Module field comparison

Different values with different units are displayed in the following diagnostic graph. A key is displayed for every graphic to define which units are used and their colors.

17.1.1 Inverter details

To access the Inverter details menu, go to Diagnostic | Inverter Diagnostic | Inverter details.
A particular date and device (e.g. inverter or sensor) can be selected under inverter details and evaluated.

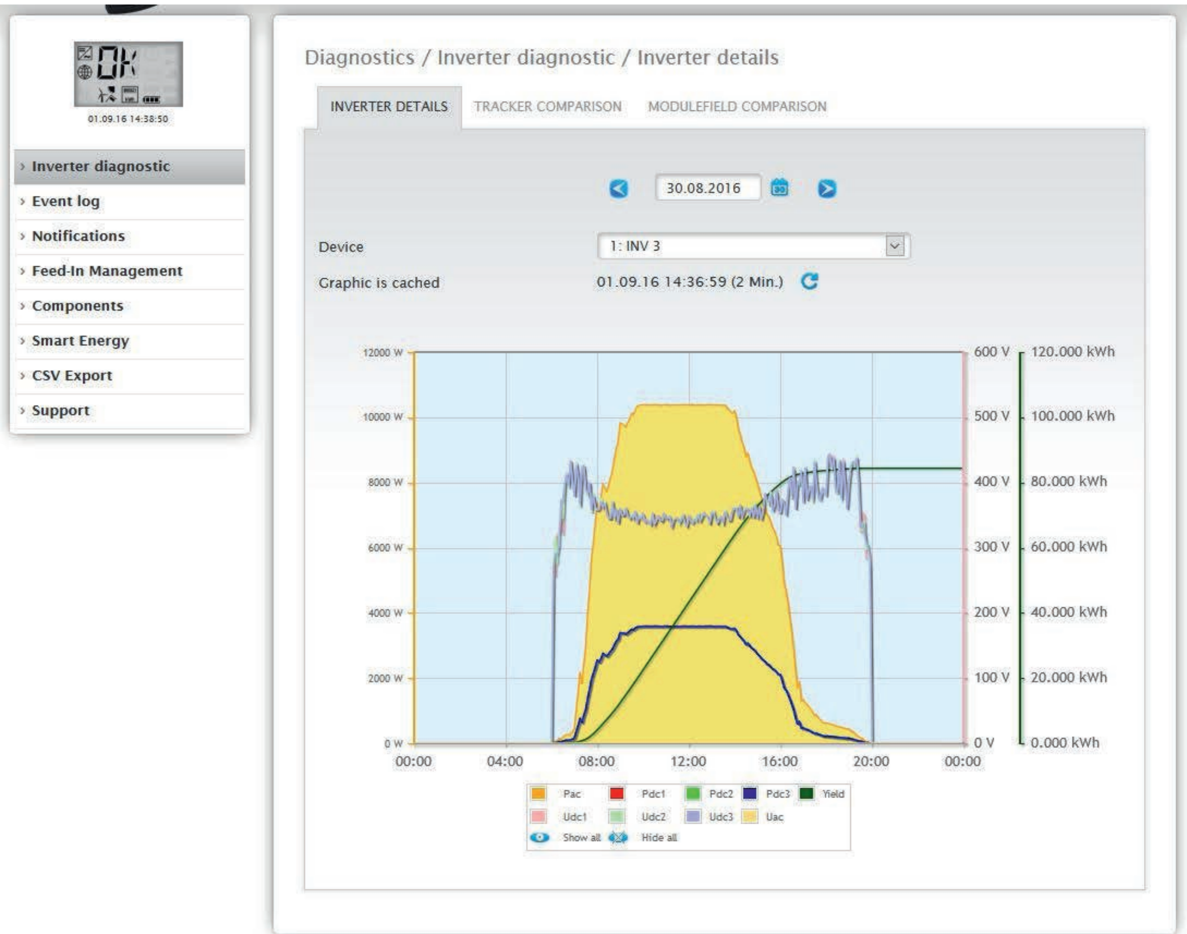


Fig.: Inverter details graph

In the example (see Fig.: Inverter details graph), the following values can be displayed for the inverter:

- Pac
- DC power 1
- DC power 2
- DC power 3
- Yield
- DC voltage 1
- DC voltage 2
- DC voltage 3
- AC voltage (Uac) – this value is displayed if the inverter supports this function).

All of the values displayed in the key can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (cur-ves) other than the one selected can be hidden.

17.1.2 Tracker comparison

To access the Tracker comparison menu, go to Diagnostic | Inverter Diagnostic | Tracker comparison. Two trackers (either from the same device or two different devices) can be compared on a particular date by selecting the date, device and tracker.

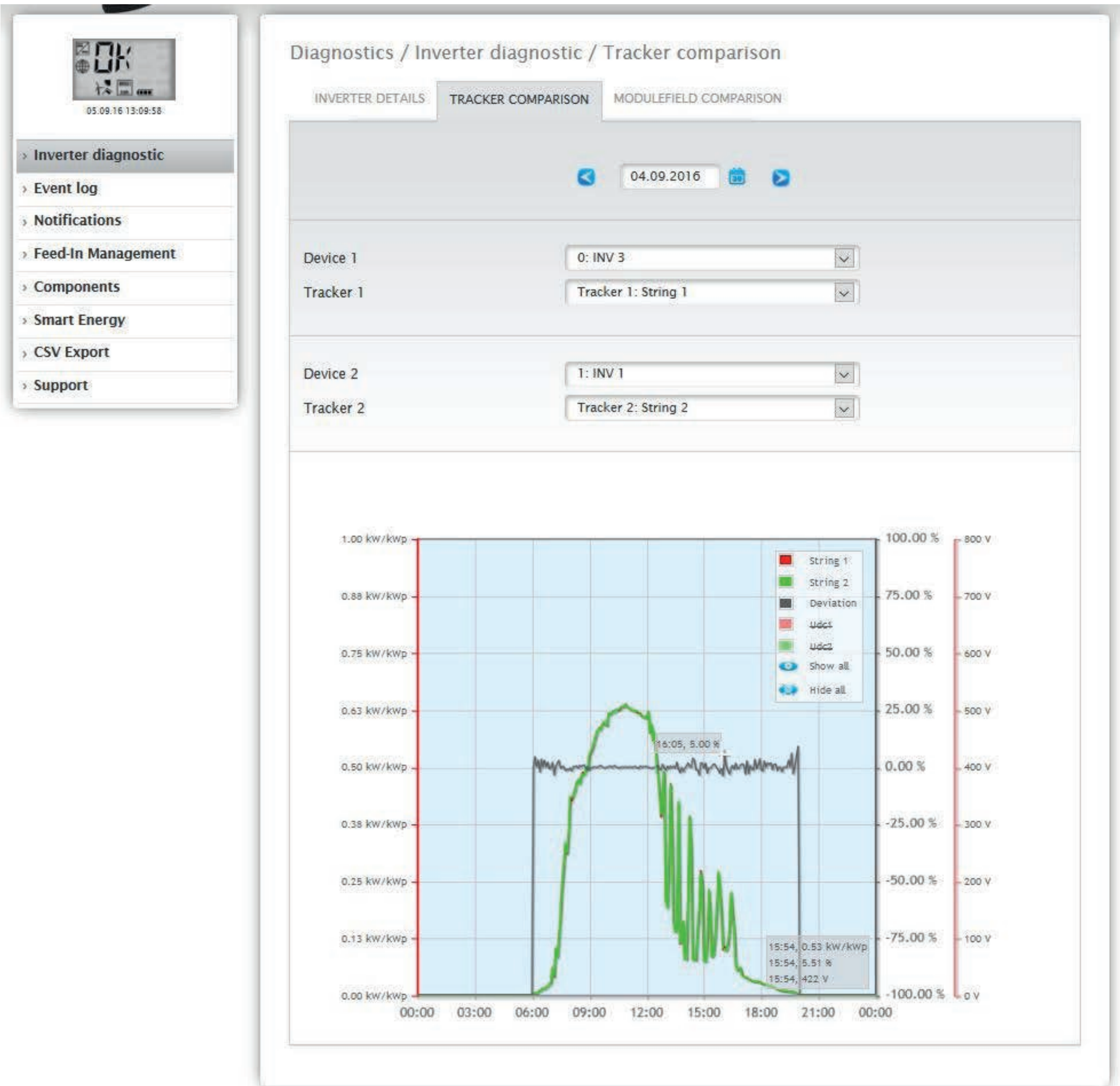


Fig.: Tracker comparison graph

In the example (see Fig.: Tracker comparison graph), two different inverters have been selected and evaluated. The better view has been selected for the DC voltage 1 and 2 values.
The two strings from inverter 3 and 1 are directly compared to each other.
The gray line displays the degree of deviation. The deviation is indicated as a percentage in the right column and displayed as a positive or negative percentage. In the example, the deviation between the strings is from about -5% to +5%. The column on the left indicates the kW/kWp output of the tracker.
All of the values displayed in the key can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (curves) other than the one selected can be hidden.

17.1.3 Module field comparison

To access the Module field comparison menu, go to Diagnostic | Inverter Diagnostic | Module field comparison.

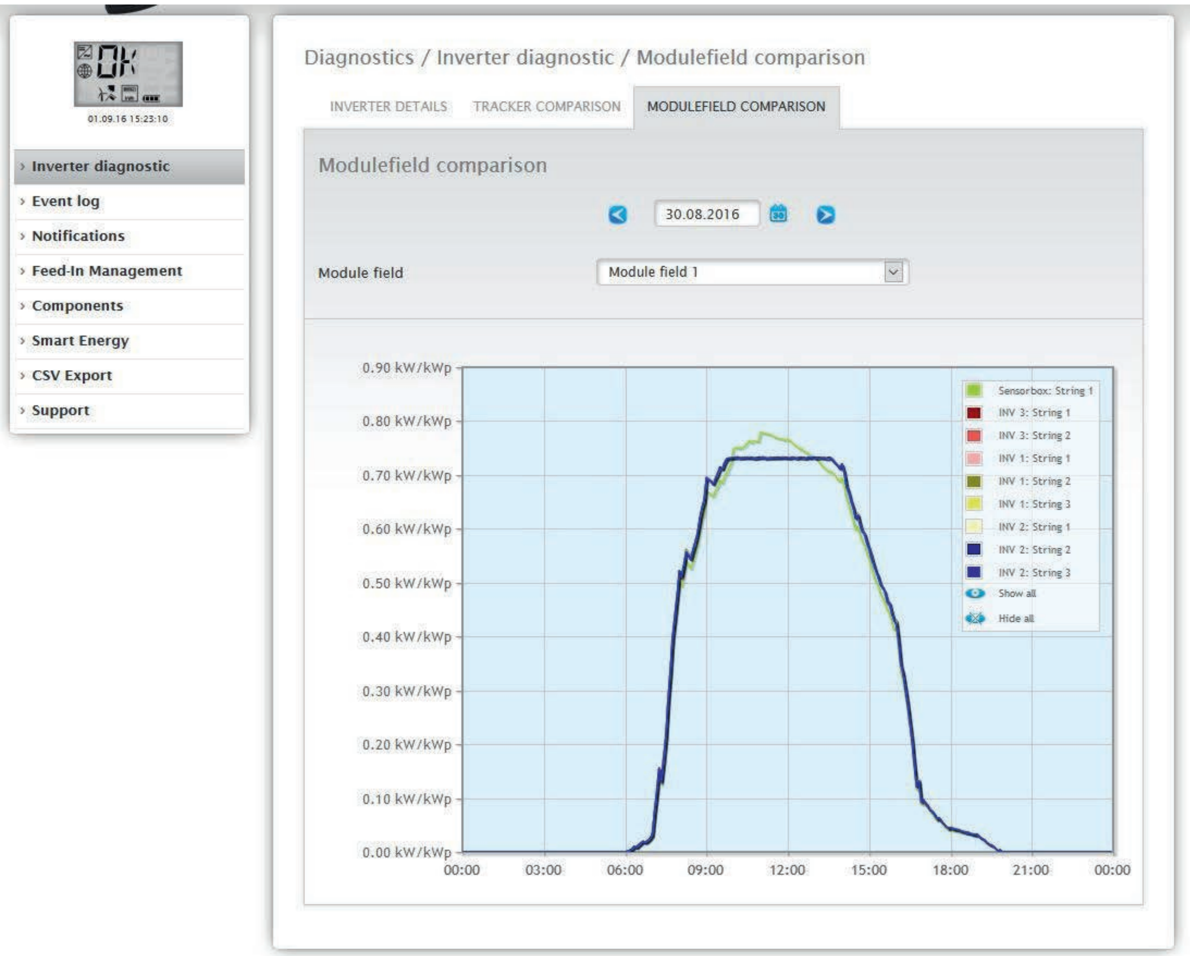


Fig.: Module field comparison graph

With the Date and Module Field boxes, the module field comparison permits all devices (e.g. inverters and sensors) and their strings that are assigned to the same module field to be compared on the current and previous days (see Fig.: Module field comparison graph) in order to more efficiently detect faults from the performance monitoring.
In the example graph, the following values are displayed:

- Sensor Box
- INV 3
- INV 1
- INV 2

All of the values displayed in the key can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (curves) other than the one selected can be hidden.

17.2 Battery Diagnostic

To access the Battery diagnostic menu, go to Diagnostic | Battery Diagnostic.

The following tabs can be selected from this menu:

- Current Measurement Values
- Charging History 1-Day
- Charging History 7-Days
- Balances

17.2.1 Current Measurement Values

The following values are available from the Current Measurement Values tab:

- Battery voltage
  The current voltage of the battery.
- Charge Level (%)
  The current charge status of the battery as percentage.
  (The charge level for power meters in battery meter mode is currently not set.)
- Current charging power [W]
  The battery's current amount of charge in watts.
- Current discharging power [W]
  The battery's current discharge amount in watts.

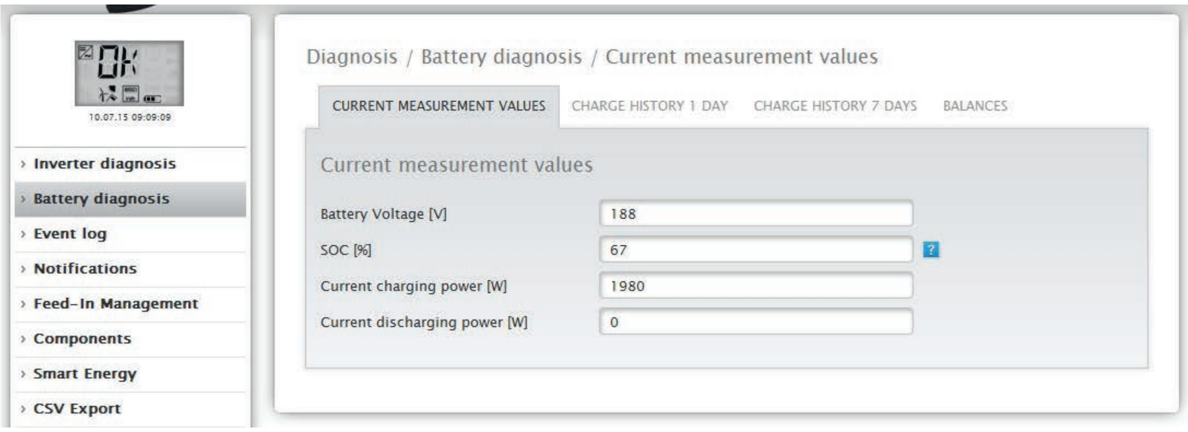


Fig.: Battery diagnosis - Current measurement values

17.2.2 Charging History 1-Day

A daily graph with the following values is in the Charging History 1-Day tab.

- Charge
  The battery's charge levels throughout the day in watts.
- Discharge
  The battery's discharge levels throughout the day in watts.
- Charge Level (%)
  The battery's charge levels throughout the day as a percentage.
- U (V)
  The battery's voltage curve throughout the day in volts.

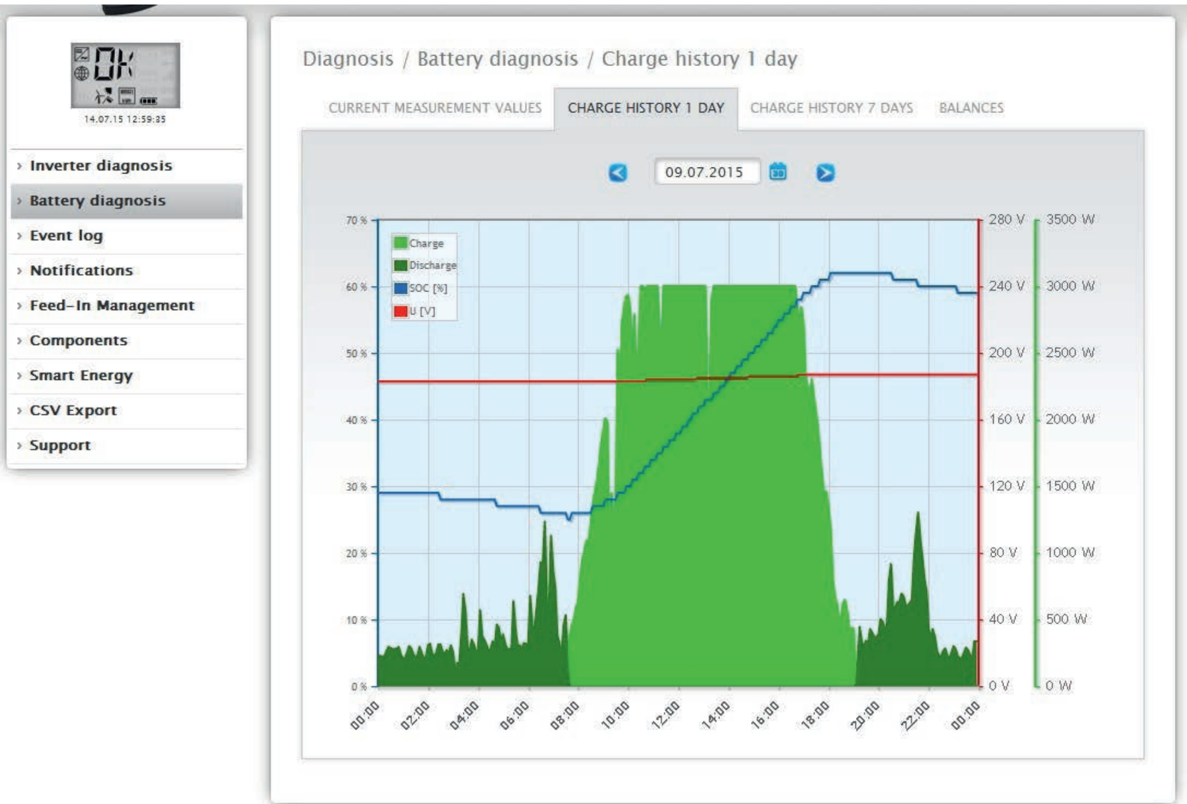


Fig.: Battery diagnosis - Charging History 1-Day

The Date box offers the option to select a particular day for viewing. The arrow keys can also be used to move to the next or previous date.
The individual values, at the top-left of the graph key, can be displayed or hidden with a mouse click.

17.2.3 Charging History 7-Days

A graph containing the last seven days with the following values is in the Charging History 7-Days tab.

- Charge
  The battery's charge levels from the last 7 days in watts.
- Discharge
  The battery's discharge levels from the last 7 days in watts.
- Charge Level (%)
  The battery's charge levels from the last 7 days as a percentage.
- U (V)
  The battery's voltage curve over the last 7 days.

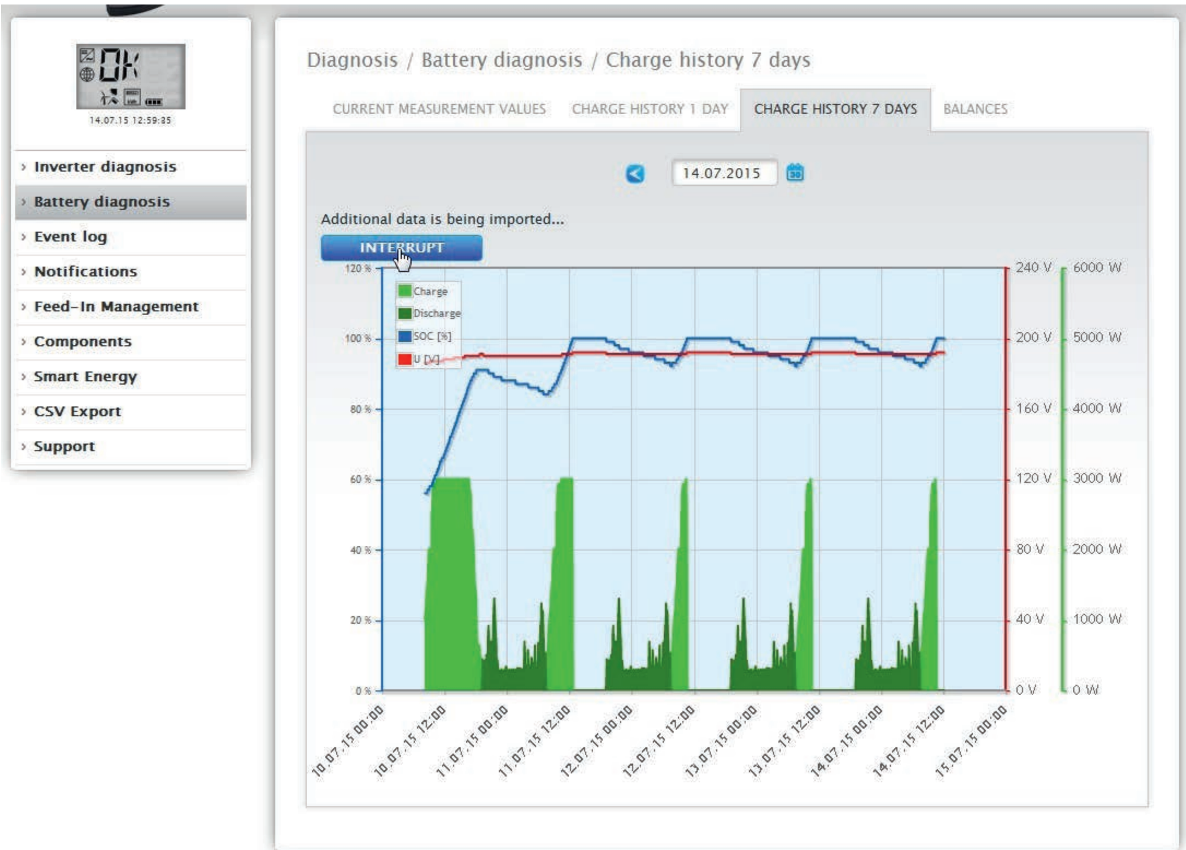


Fig.: Battery diagnostic - Charging History 7-Days

The Date box offers the option to select a particular 7-day period for viewing. The arrow keys can also be used to move to the next or previous date.

The individual values, at the top-left of the graph key, can be displayed or hidden with a mouse click.

If needed, click on the interrupt button to stop loading the data.

Charge Level of the Battery via the LCD Display

The charge level of the battery is displayed via the charge history in the Web interface and via the LCD display. The following charge levels of the battery are indicated with the battery symbol elements. (see the following illustration)

- Charge level < 25%: Battery drained
- Charge level < 50%: 1 Element
- Charge level < 75% 2 Elements
- Charge level >= 75: 3 Elements
- The drained battery symbol blinks when the battery is offline.

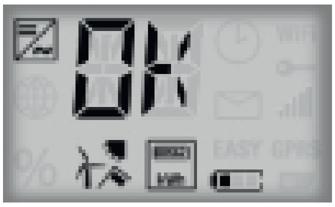


Fig.: LCD Display with the battery symbol and one element

Also refer to the chapter “Current Values”

17.2.4 Balances

The following sections are in the Balances tab:

- Electricity savings from battery usage
- Battery efficiency

Electricity savings from battery usage

The following columns are in this section:

- Discharge

  The battery’s discharge during its entire run-time in kWh.
- Electricity costs saved

  The electricity savings from battery usage during its entire run-time in the defined currency.

Battery efficiency

The following columns are in this section:

- Charge
  The battery's charge during its entire run-time in kWh.
- Discharge
  The battery's discharge during its entire run-time in kWh.
- Efficiency values
  The battery's efficiency values during its entire run-time as a percentage.

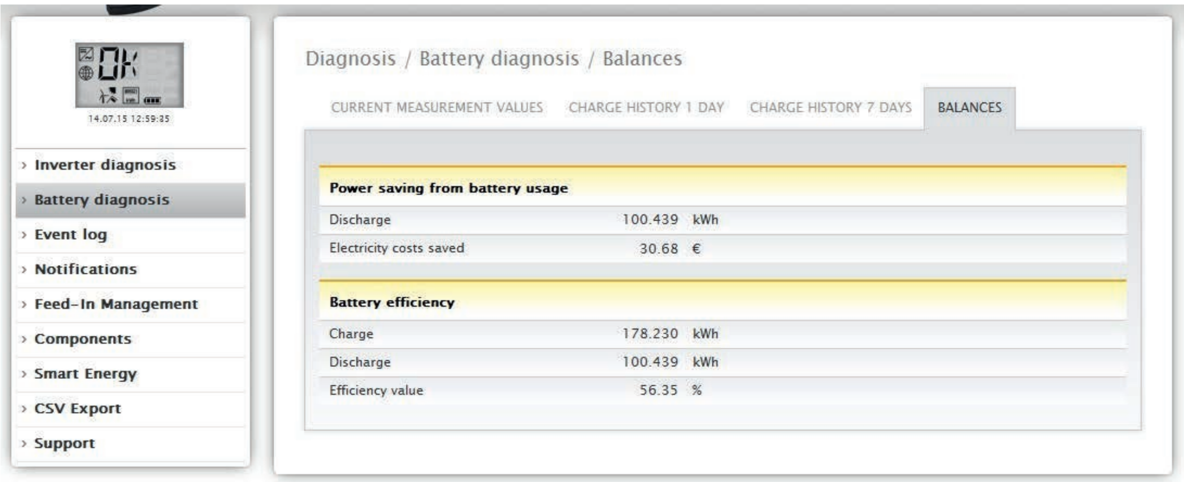


Fig.: Battery diagnosis - Balance

17.3 Accessing Event logs

To access the Event logs menu, go to Diagnostic | Event logs.
The following mode is loaded when accessing the event logs.

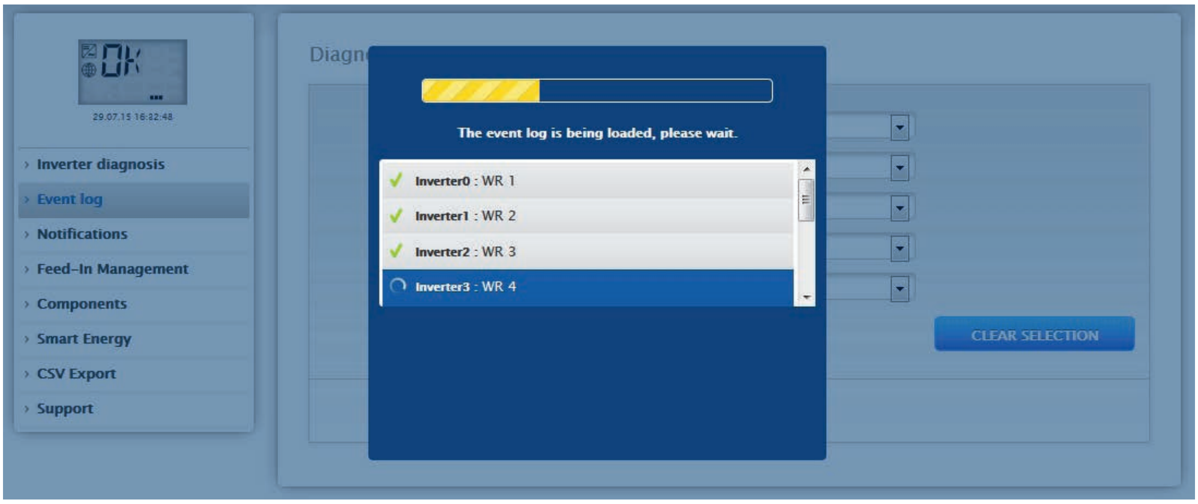


Fig.: The event log is being loaded.

After the event log has been loaded, the window switches back to the normal view.

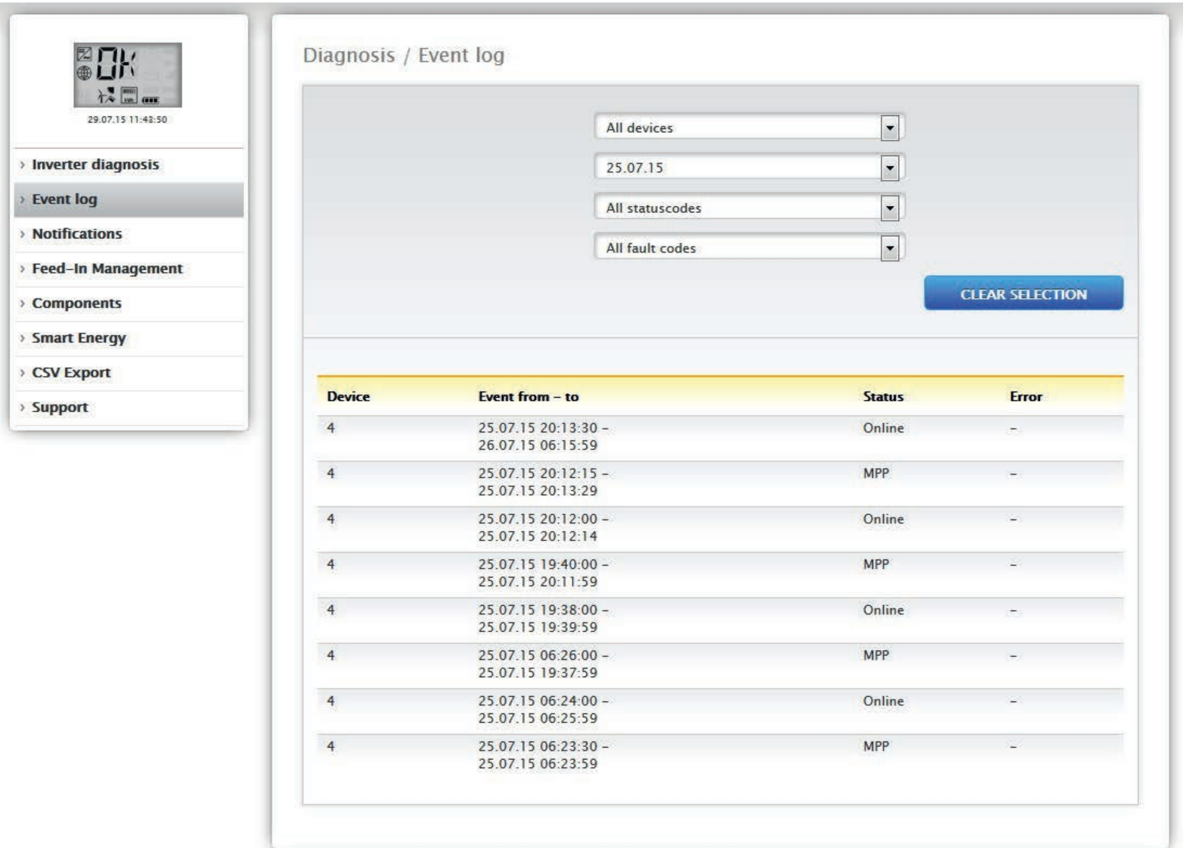


Fig.: Event log

The following settings are available from the four drop-down menus in this view:

- Devices:

Under devices (default "All devices"), you can select individual devices or leave the default selection as is.

- Days:

Under days (default “All days”), you can select individual days or leave the default selection as is.

- Status codes:

Under status codes (default “All status codes”), you can select individual status codes or leave the default selection as is.

- Fault codes:

Under fault codes (default “All fault codes”), you can select individual fault codes or leave the default selection as is.

By default, the current day is displayed in the table with all devices, fault codes and status codes.

17.4 Accessing Notifications

To access the Notifications menu, go to Diagnostic | Notifications.

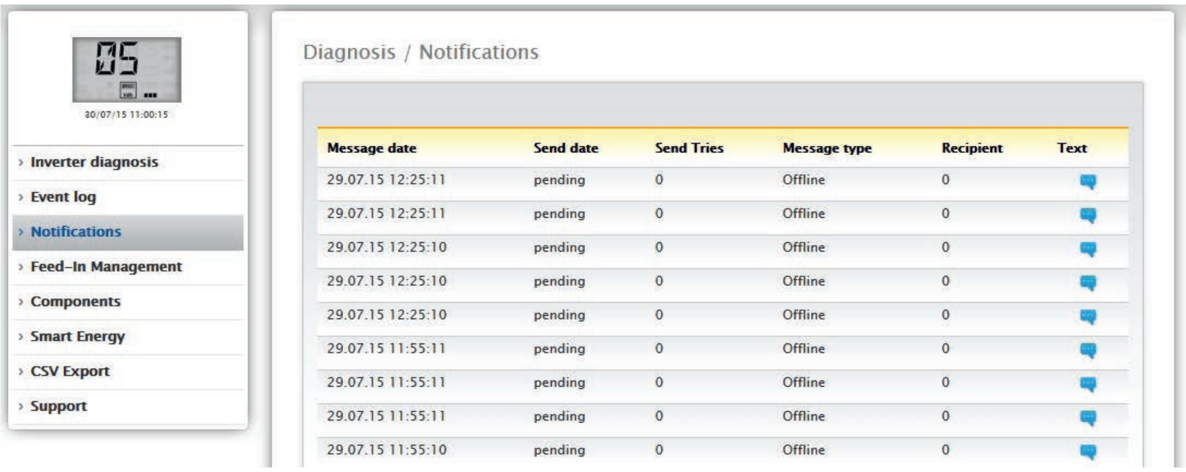


Fig.: Notification overview

The notification overview is displayed as a table.

A maximum of 50 messages is displayed in this table. The following columns are displayed:

- Message date:

Displays when a fault is detected and reported.

- Send date:

This column displays the date when the message has been successfully sent. Pending is displayed in this column if there are more send attempts remaining, or aborted after 5 unsuccessful attempts to send the message.

- Send Tries:

The number attempts needed to successfully send the message or the number of unsuccessful attempts is displayed in this column. It is reported as “aborted” after 5 unsuccessful attempts to sent the message. The number 1 to 5 can be displayed in this column if there are still more send tries remaining (“pending”).

- Message type:

This column displays the type message (for example, Offline. If an inverter is offline).

- Recipient:

The method with which the message is sent is displayed here.

- Text:

There is the option to display the messages sent by the Solar-Log™ under Text.

Note!

For sending notifications, see the chapter "Configuring Notifications" in the Installation Manual.

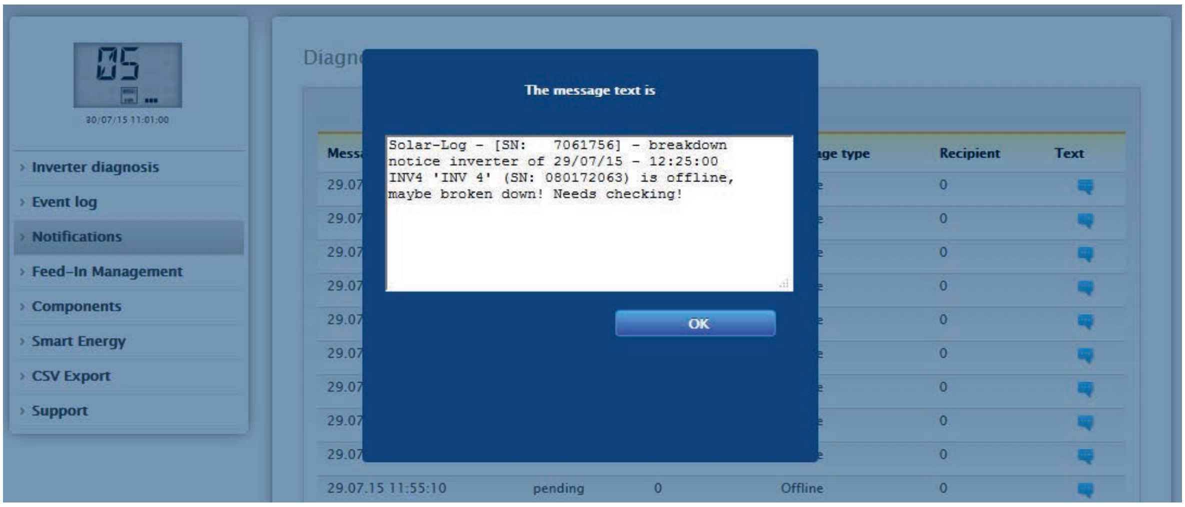


Fig.: Message with text field

17.5 Accessing Feed-In Management

To access the Feed-In Management menu, go to Diagnostic | Feed-In Management.

Note!

The menu Feed-In Management under Diagnostic | Feed-In Management only appears if active power has been configured in the Configuration | Feed-In Management section.

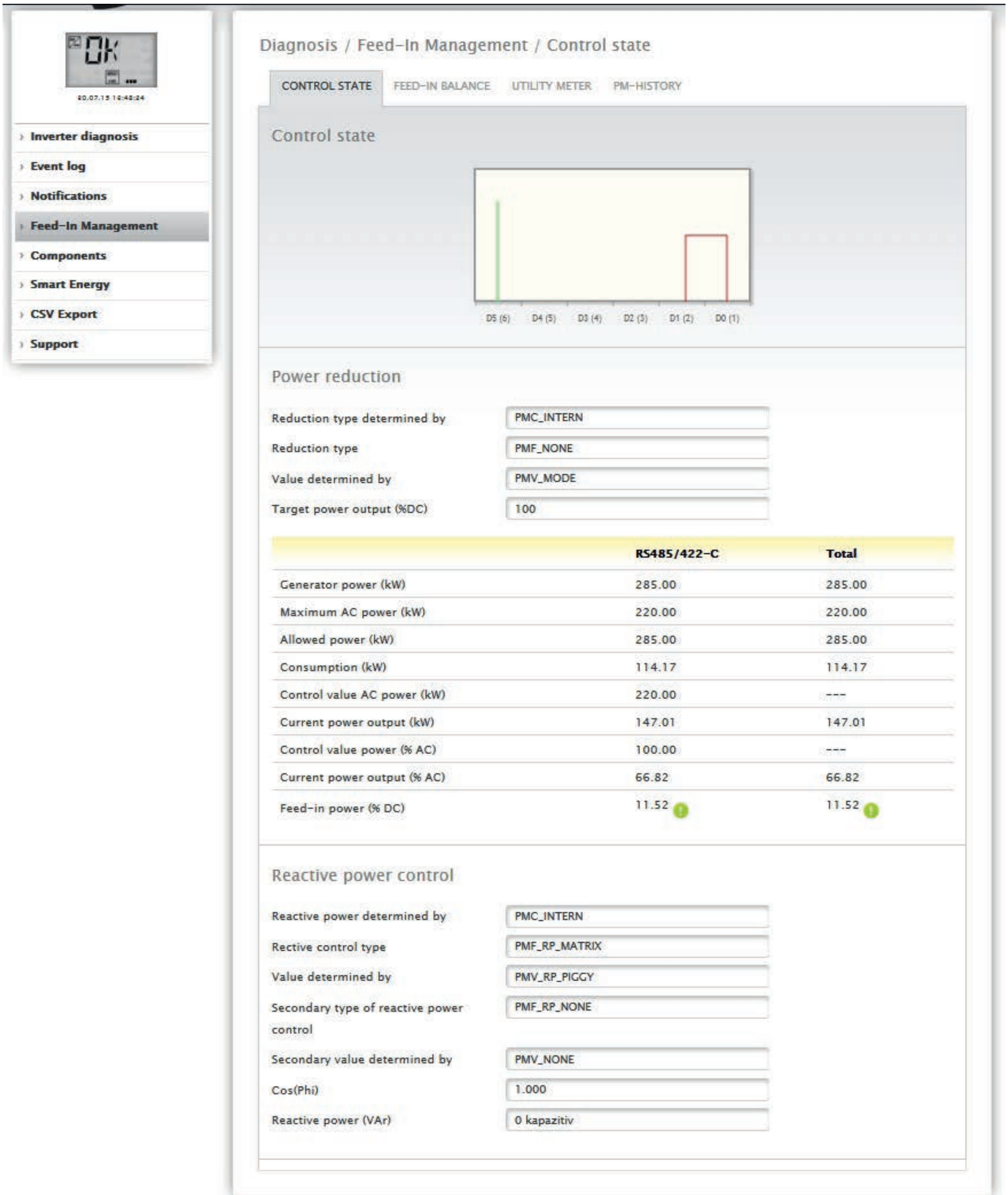


Fig.: Feed-In Management - Control State

The inverter control can be analyzed and adjusted in the Diagnostic | Feed-In Management settings section.

There is also a 10% Diagnosis Function to simulate a dynamic reduction to 10%.
The values are displayed in the table.

Note!

The 10% Diagnosis Function can only be used when the 70% Fixed Reduction has been activated.

17.5.1 Explanation of the Values in the Power Reduction Section

The following values are displayed in the Power Reduction section:

Power reduction type determined by:
The currently active control source is indicated in this field.

Displayed Text	Explanation Text
PMC_NONE	No control source.
PMC_DIAG	Controlled by the diagnostic mode.
PMC_MODBUS_2	Controlled by the ModBus PM V2 (new ModBusPM).
PMC_MODBUS_1	Controlled by the ModBus PM V1 (old ModBusPM).
PMC_PROFILE	Controlled by the PM Profile.
PMC_INTERN	Controlled by the internal configuration.
PMC_DM_MODBUS	Controlled by direct seller via ModBusDM.
PMC_DM_RCR	Controlled by direct seller via ripple control receiver

Type of Reduction:

This contains the current type of power reduction that is specified by the control source.

Displayed Text	Explanation Text
PMF_NONE	No power reduction function.
PMF_PR_ERROR	An error occurred while determining the power reduction function.
PMF_PR_FIX_PERC	Fixed reduction at % DC.
PMF_PR_FIX_KW	Fixed reduction at X kW (AC)
PMF_PR_VAR_PERC	Fixed reduction at % DC with self-consumption calculation.
PMF_PR_VAR_KW	Fixed reduction at X kW (AC) with self-consumption calculation.
PMF_PR_FIX_MATRIX	Reduction based on the value from the matrix (ripple control receiver configuration).
PMF_PR_VAR_MATRIX	Reduction based on the value from the matrix (ripple control receiver configuration) with self-consumption calculation.

Value specification from:

This field indications how the control value used was determined.

Displayed Text	Explanation Text
PMV_NONE	No control source.
PMV_CONFIG	The value is stored in the configuration.
PMV_MODE	The value can be determined by the reduction mode.
PMV_PR_PIGGY	The value comes from the PM (power reduction) input (and is determined in combination with the matrix in the configuration or PM profile).
PMV_MPR_PIGGY	The value comes from the PM (power reduction) input of the master (and is determined in combination with the matrix in the configuration or PM profile).
PMV_MODBUS_1	The value comes from the ModBus PM V1 interface.
PMV_MODBUS_2	The value comes from the ModBus PM V2 interface.
PMV_PROFILE_ADAM	The value comes from the analog or digital input of the IO Box (Adam Box).
PMV_PROFILE_INTERN	The value is specified in the PM profile.
PMV_ERROR	An error occurred while determining the value.
PMV_CONFIG_UTILITY	The value was determined via the internal configuration based the Utility Meter measurement.
PMV_MODBUS_DM	The value comes from the ModBus DM interface (direct seller interface).

Target power output %:

The fields indicates the percentage of the Plant’s DC power determined by the control for the target output.

The detailed values for the individual bus connections and for the total plant are displayed in the following table below. The individual buses (RS485 A-C) are displayed depending on which bus is assigned to control the inverters.

The column Total always corresponds to the plant total and reflects the value from the grid connection point. The consumption values are displayed in all of the columns, but only the plant total is taken into account.

Note!

The values from the individual inverters are calculated per bus and for the entire plant.

Generator power (kW):

The generator power corresponds to the module output of the inverter that is connected to this data bus. This value results from the total of the partial outputs entered in the field generator power under configuration | Devices | Configuration. This kW values is used when calculating the output reduction (e.g.: the 70% reduction).

Maximum AC power (kW):

The maximum AC power of the inverter(s) depends on the device. Refer to the inverter specifications for this value and configure it in the field Maximum AC power under configuration | Devices | Configuration.

Allowed power (kW):

This kW value is the maximum amount of power that is allowed at the grid connection point. The value is calculated based on the generator output and the current power output.

Consumption (kW):

This value is calculated from the consumption meters and refers to the entire plant. The values displayed in the respective bus column only refer to the plant total and are not taken into account in the corresponding columns. The consumption value is normally subtracted from the allowed power from the entire plant.

Control value power (kW):

This value is calculated by the Solar-Log™ and is the maximum current power output from the inverters. It is used for the current target power output.

Note!

Due to technical reasons, the calculation from the Solar-Log™ is subject to a rounding factor. This may lead to deviations in the data recording.

Current power output (kW):

The value refers to the current output generated by the inverter per interface (column) and for the entire plant.

Control value power (% AC):

The Solar-Log™ calculates the control value power (kW) as a percentage of the maximum AC power and relays this to the inverters.

Current power output (AC%):

The value indicates the total output generated as a percentage of the maximum AC power for the inverter or all of the inverters on a bus.

Feed-in power (% DC):

This value is the current amount of feed-in power as a percentage of the generated output.

17.5.2 Explanation of the Symbols in the Feed-in power (% DC) column:

The feed-in power value is in the target power range with a tolerance of -2% to +1%.

The feed-in power value is below the target value allowed. Generally, this means that the output allowed at the grid connection point is not being achieved due to low irradiation or high self-consumption.

This means that the value is above the target value allowed.
If the red triangle is only displayed at a bus and entire plant has a green symbol, this means that only this bus is over the target value allowed. However, the plant totals do not go over the target value because of self-consumption.

17.5.3 Explanation of the Values in the Reactive Power Reduction Section

The following values are displayed in the Reactive Power Reduction section:

Reactive Power determined by:

The currently active control source is indicated in this field.

Displayed Text	Explanation Text
PMC_NONE	No control source.
PMC_DIAG	Controlled by the diagnostic mode.
PMC_MODBUS_2	Controlled by the ModBus PM V2 (new ModBusPM).
PMC_MODBUS_1	Controlled by the ModBus PM V1 (old ModBusPM).
PMC_PROFILE	Controlled by the PM Profile.
PMC_INTERN	Controlled by the internal configuration.
PMC_DM_MODBUS	Controlled by direct seller via ModBusDM.
PMC_DM_RCR	Controlled by direct seller via ripple control receiver

Type of Reactive Power Reduction:

This contains the type of reactive power reduction that is specified by the active control source.

Displayed Text	Explanation Text
PMF_RP_NONE	No reactive power control.
PMF_RP_ERROR	An error occurred while determining the reactive power control function.
PMF_RP_FIX_COS	Fixed Cos(Phi) specification.
PMF_RP_FIX_Q	Fixed reactive power specification.
PMF_RP_Q_U_LINE	Reactive power determined by the characteristic curve Q(V)
PMF_RP_P_PN_LINE	Cos(Phi) determined by the configured characteristic curve P/Pn
PMF_RP_ADJUSTABLE	The control function is determined by an input (e.g. via a ripple control receiver or IO Box/Profile).
PMF_RP_MATRIX	The Cos(Phi) specifications are determined by the the configu-red matrix.

Value specification from:

This field indications how the control value used was determined.

Displayed Text	Explanation Text
PMV_NONE	No control source.
PMV_CONFIG	The value is stored in the configuration.
PMV_MODE	The value can be determined by the reduction mode.
PMV_RP_PIGGY	The value comes from the PM (reactive power control) input (and is determined in combination with the matrix in the confi-guration or PM profile).
PMV_MRP_PIGGY	The value comes from the PM (reactive power control) input of the master (and is determined in combination with the matrix in the configuration or PM profile).
PMV_MODBUS_1	The value comes from the ModBus PM V1 interface.
PMV_MODBUS_2	The value comes from the ModBus PM V2 interface.
PMV_PROFILE_ADAM	The value comes from the analog or digital input of the IO Box (Adam Box).
PMV_PROFILE_INTERN	The value is specified in the PM profile.
PMV_ERROR	An error occurred while determining the value.
PMV_CONFIG_UTILITY	The value was determined via the internal configuration based the Utility Meter measurement.
PMV_MODBUS_DM	The value comes from the ModBus DM interface (direct seller interface).

Secondary Type of Reactive Power Control:

If “PMF_RP_ADJUSTABLE” is entered as the “Type of Reactive Power Reduction,”
the variable assignment from the selected type of reactive power control is indicated in this field.

For example, a PM profile defines that the type of reactive power control is determined by the Adam Box.
That means:
The profile is responsible for the control. It is set up in the profile that the control can be selected via the Adam Box.
The type of control selected is displayed under “Secondary Type of Reactive Power Control.”
The possible values are identical to those for “Type of Reactive Power Control.”

Secondary value specification from:

When a secondary control is used, the source of the control value is indicated in this field. The possible values are identical to those for “Value specification from.”

Cos(Phi):

The value defined in the Configuration | Feed-In Management | Reactive Power Control is displayed in this field.

Reactive power (Var):

The value defined in the Configuration | Feed-In Management | Reactive Power Control is displayed in this field.

17.5.4 Feed-Balance

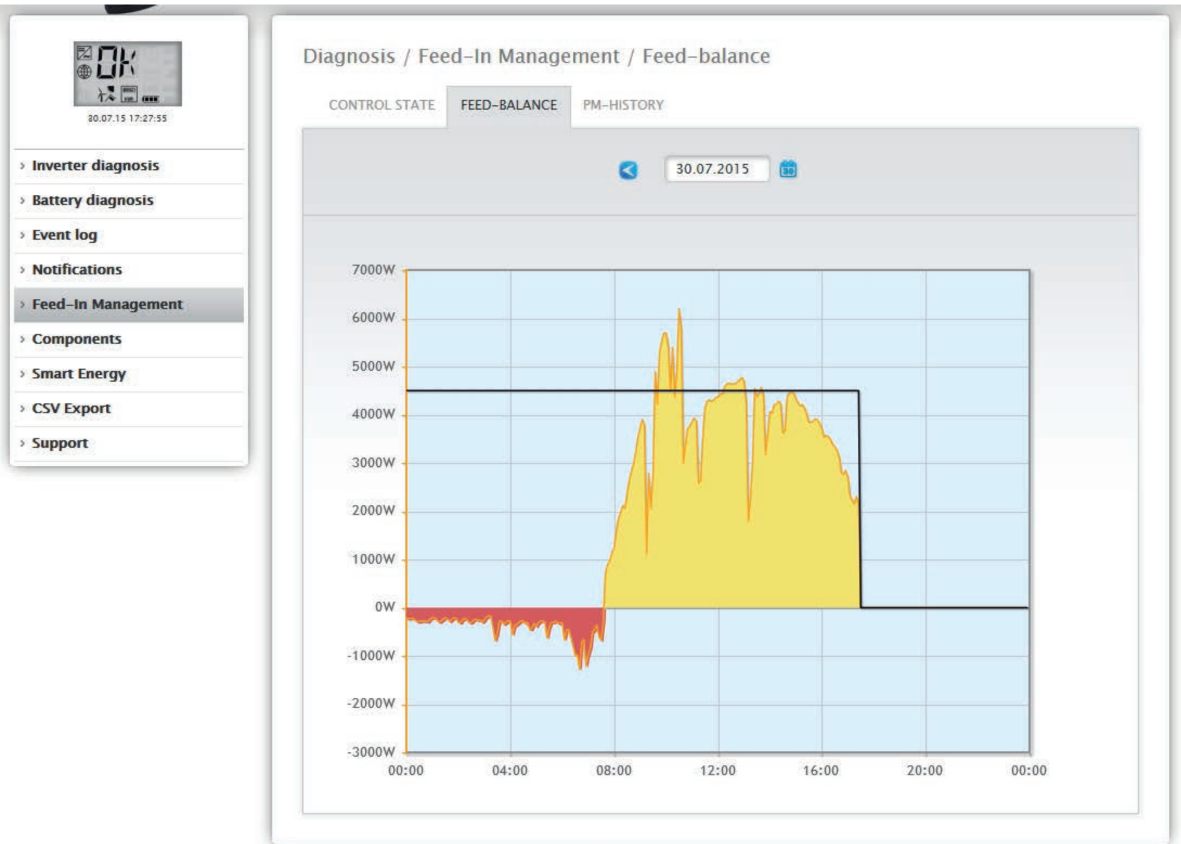


Fig.: Feed-In Management - Feed-Balance

The Feed-balance tab displays when there was a grid feed and when electricity was purchased from the grid. Negative values mean that the power was purchased from the grid and positive values mean that power was fed into the grid.

Move the mouse cursor over the black line to display the following values for the power reductions:

- Time
- Percentage (%DC)
- Watt

17.5.5 PM History

The power reductions are displayed in a table with three columns in the PM History tab.

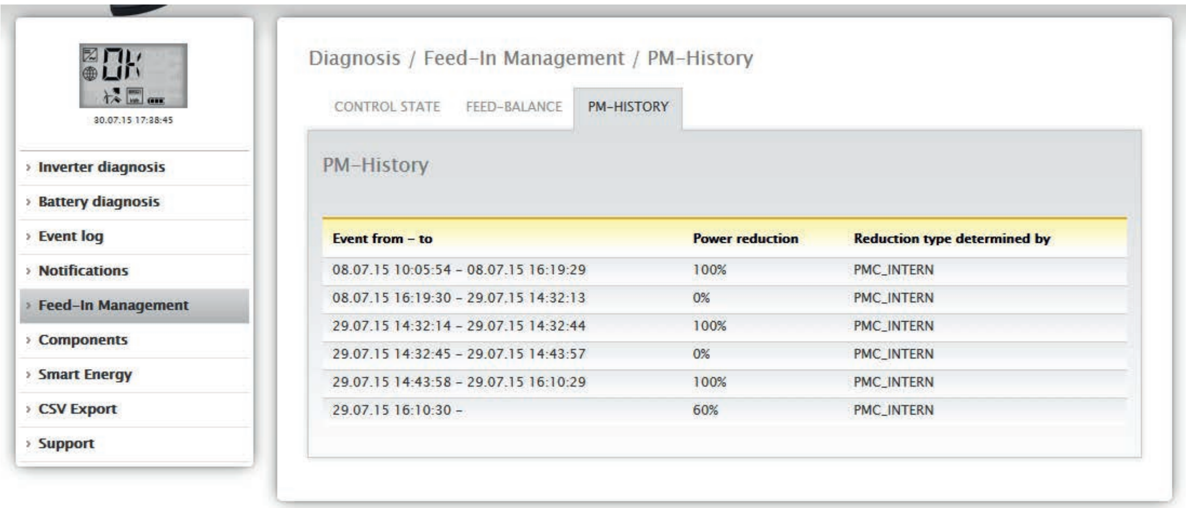


Fig.: PM History

- Event from - to:
  - The time and date that a power reduction was activated.
- Power reduction type determined by:
  Possible values in this column:
  - PMC_NONE
  - PMC_DIAG
  - PMC_MODBUS_2
  - PMC_MODBUS_1
  - PMC_PROFILE
  - PMC_INTERN
  - PMC_DIRECTM

  (For an explanation, refer to the section: "Explanation of the Values in the Power Reduction " in the table "Power reduction type determined by").
- Power reduction:
  - The power reduction as a percentage.

Two additional tabs can be accessed in the Feed-In Management menu (as long as the devices are connected):

- Utility Meter
- I/O Box

There is a detailed guide for this in the Feed-In Management chapter of the Installation Manual.

17.6 Accessing the SCB Monitor (only Solar-Log 1000 and 2000)

To access the SCB Monitor menu, go to Diagnostic | Components | SCB Monitor.

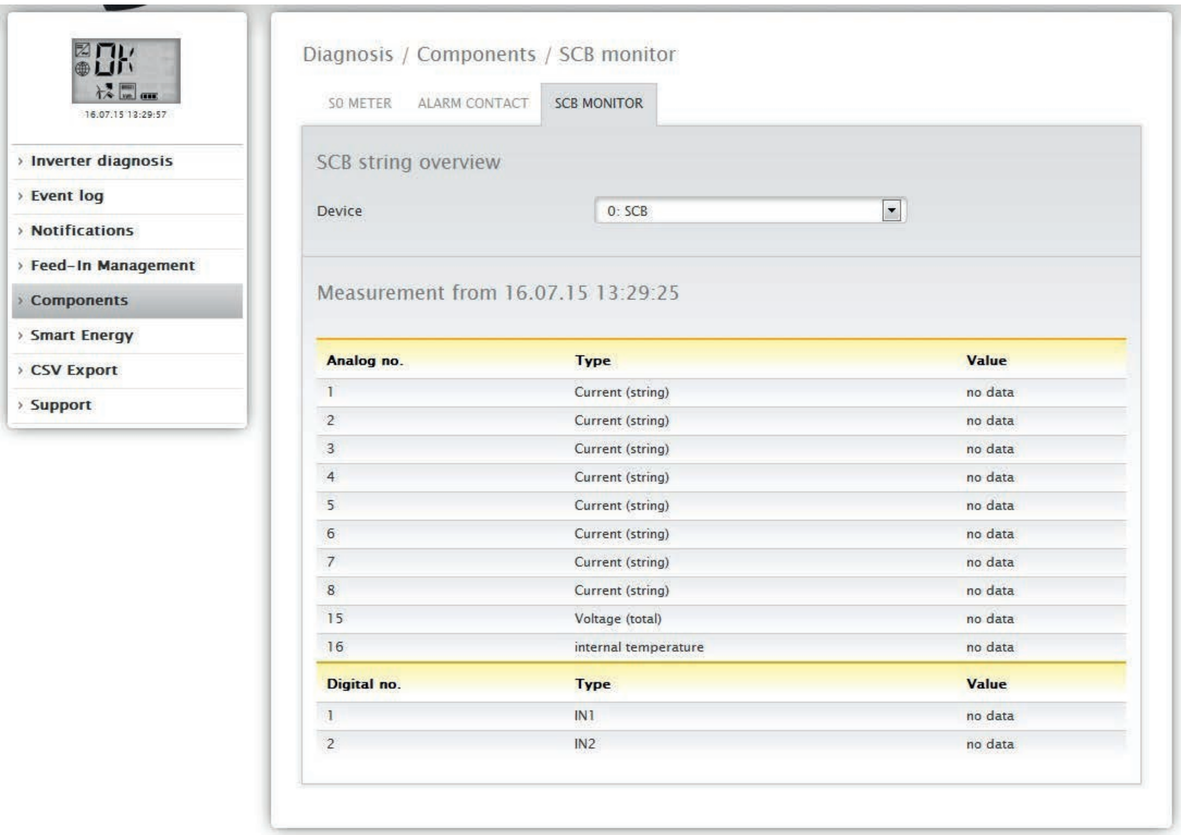


Fig.: SCB string overview

The SCB String Overview is displayed in a split-screen window. The connected devices (SCBs) can be individually accessed in the top screen via the pull-down menu.
The bottom screen displays the current measurements of the individual strings based on the analog and digital number.

Note!

The SCB Monitor menu only appears when an SCB is connected.
It is also only available with the Solar-Log 1000 and 2000.

17.7 Accessing components

To access the Components menu, go to Diagnostic | Components.

Fig.: Components - S0 meter on interface A and B

The following tabs are available in the Components menu:

- SO meter (see Fig.: Components - S0 meter on interface A and B)
- Alarm contact (only with the Solar-Log 1000 and 2000) (see Fig.: Alarm contact)
- Wireless Package (only when connected and the Wireless package visible has been activated) (See Fig.: Connection test - Wireless Package).

All of the SO meters connected to the Solar-Log™ are listed in the Diagnostic | Components | S0-Meter menu. The following values are displayed in the Pulse meter box:

- Total number of pulses for the SO meter since the last restart of the Solar-Log™ (first number)
- Number of pulses since the menu has been accessed (second number)
- Pulse number interval in a minute (third number)

Note!

The Solar-Log™ reorganizes the data every night so the total pulse counter of the SO meter is reset every night.

The Diagnostic | Components | Alarm contact menu is displayed in a split-screen window.

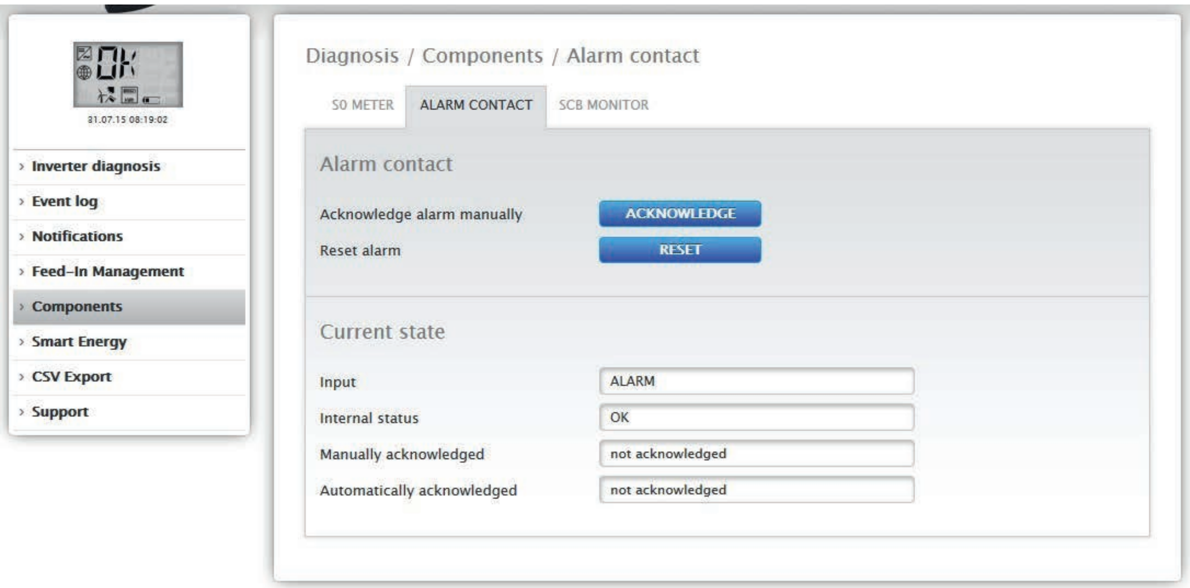


Fig.: Alarm contact

In the Alarm contact part at the top, you have the option to manually acknowledge the alarm or to reset it.
In the Current Status part at the bottom, you see the information in regard to the input of the notification (e.g. alarm), the internal status (e.g. OK) and if the notification has been manually or automatically acknowledged.

Note!

The alarm contact is only available with the Solar-Log 2000.

You can access the Wireless Package test function from the Diagnosis | Components | Wireless Package.

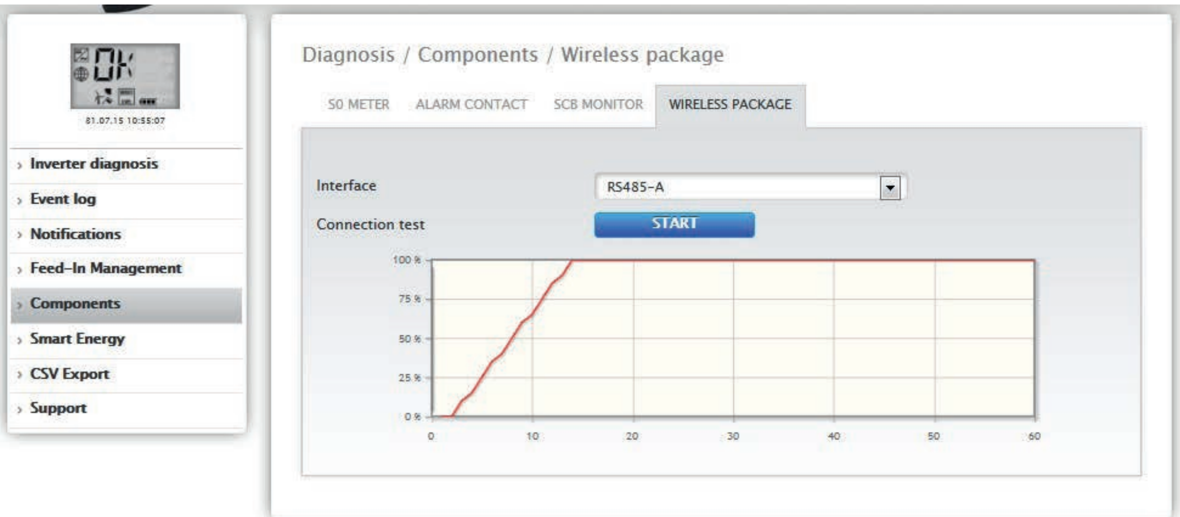


Fig.: Connection test - Wireless Package

To perform a connection test a Wireless Package has to be connected to the Solar-Log™, the interface with the Wireless Package has to be activated in the Configuration | Devices | Definition menu and the inverter has to be selected (refer to the RS485 Wireless Package Installation notes).
Select the interface that the Wireless Package is connected to and press the Start button for the connection test.
The test is successful when the line goes to 100% percent and remains there.

Note!

Successful data transfers can only be guaranteed when the wireless connection is permanently at 100%.

Note!

Refer to the Installation Manual for the installation and configuration of the Wireless Package.

17.8 Smart Energy

The following tabs are visible under the Smart Energy menu:

- Status (current)
- History
- Simulation

Status (current)

The following values are displayed as a table in the Status (current) tab:

- Averaging (is visible when managing with average values)
- Total Plant
- Priority List

There is also the option in this section to directly switch to the configuration of the Smart Energy switching group by clicking on the arrow symbol in the top right corner.

17.8.1 Explanations of the Tabs

Averaging

The last time that the average value was calculated can be determined based on the countdowns in the averaging field.

Note!

The average value consists of the 5-, 10- or 15-minute average value depending on the number
of connected inverters:
< 30 INV: 5 minutes, 30-59 INV: 10 minutes, >= 60 INV: 15 minutes

Internal processes, e.g. HTTP transmission or communication with the inverters, may cause a delay in the interval. In such cases, the countdown remains at "0" until the interval has been calculated.

Total Plant

The following values can be viewed under plant-wide:

- Production [W]The production from the entire plant in watts. Current or average value (this value is recorded directly from all producers)
- Consumption [W]
  The entire consumption in watts. Current or average value (this value is recorded directly from all consumption meters)
- Remaining surplus [W]
  Surplus that is still fed into the grid. Current or average value (calculation [production - consumption])
- Smart Energy Consumption [W]
  This value is comprised of the nominal power or of the retrievable output from all of the currently active profiles and the current output from the controlled smart appliances. Current or average value.
- Smart Energy Production [W] (is only visible when at least one switching group is defined as a generator)
  The value indicates all of the current power output (e.g. CHP) that is currently active via the Solar-Log™. Current or average value.

- **Theoretical surplus [W]**
  The theoretical surplus is the amount that would be fed into the grid if no Smart Energy logic was operating (including smart appliances). It is calculated accordingly: [(Production-Smart Energy Production)-(Consumption Smart Energy Consumption)]. Current or average value.

The selection for “Measurement values for control logic” under Configuration | Smart Energy | Surplus management determines whether the current values or or average values are displayed for the status.

Priority List

The priority of the defined control logics are displayed under the Priority list. (See illustration: “Smart Energy Status (current)”)

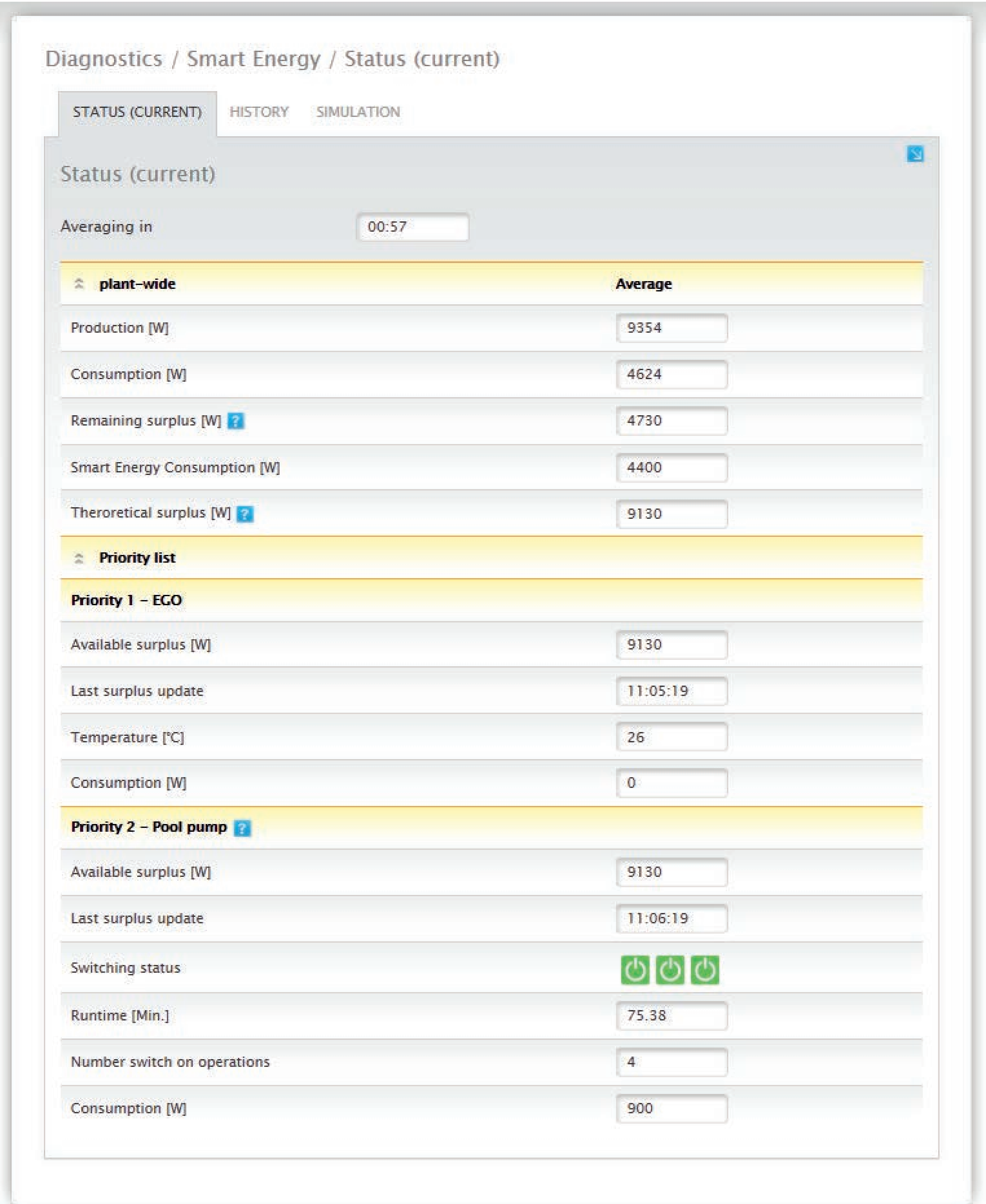


Fig.: Smart Energy Status (current)

Depending on the device or profile type selected, different information is displayed. For example: surplus available, runtime or temperature.
By clicking on the question mark the current configuration for the switching groups is displayed without switching to the configuration section.

17.8.2 History Section

Daily graphics, all of the configured control logics and the intelligent appliances are displayed according to their priority in the History tab.
All of the relevant data for the particular device is displayed in the graphic.
Each graphic has the curves "Total production," Total consumption" and "Total surplus." This is identical for every graphic and is part of the overview with the plant-wide values.
(See illustration: "Smart Energy History - Example with EGO Smart Heater - Surplus Priority 1"):
All of the values displayed in the key can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (curves) other than the one selected can be hidden.

Fig.: Smart Energy History - Example of Priority 1

Depending on the connected device and configured control logic the labels may be different and also the values may vary (e.g. runtime and switching status can be saved, as well as charging states when a hybrid or battery system is connected).

Note!

The selected section can be enlarged by clicking on the graphic and dragging it.

Certain days can be selected to be viewed with the Date box. It is possible to scroll the dates back and forth with the arrow buttons.
The individual values that are displayed at the top-left of the graph key can be explicitly displayed or hidden with a mouse click.

Basic View

The basic view can be activated with a button.
If this option is selected for a basic surplus rule in which all of the contacts are switched together only the curves of the first contact are displayed in order to maintain a clear overview in the graphic.

There is the option to directly switch to the configuration of the Smart Energy switching group by clicking on the arrow symbol in the top right corner.

17.8.3 Simulation Section

The configured control logics can be simulated under the Simulation tab to check if the logics are correct. The simulation is always based on the the underlying calculated averages.
(See the example Figure: “Smart Energy - Simulation with EGO - Surplus Priority 1”)

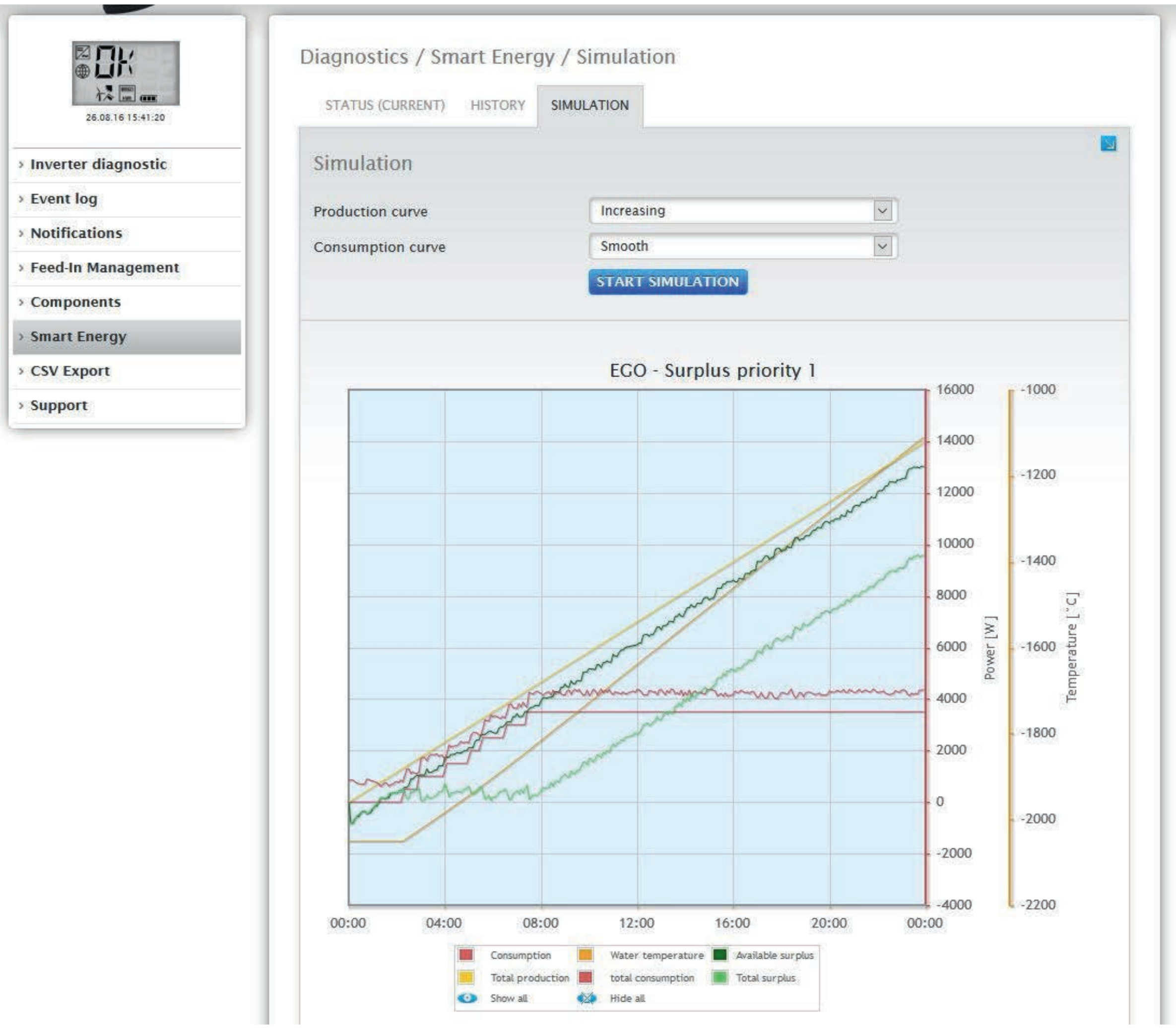


Fig.: Smart Energy - Simulation with EGO - Surplus Priority 1

Similar to the History view, there are various values displayed in the graphic view. These values depend on the particular connected device and/or configured control logic.
All of the values displayed in the key can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (cur-ves) other than the one selected can be hidden.

In the simulation, different view options can be selected for the production and consumption curves.
The following options can be selected:

- Production curve
  - Zero line
  - Increasing
  - Decreasing
  - Constant (a fixed value in watts can be defined here)
  - Normal levels of irradiation
  - Very high levels of irradiation
  - Low levels of irradiation
  - Inconsistent levels of irradiation
  - Selected day (a particular day can be selected here)
- Consumption curve
  - Zero line
  - Increasing
  - Decreasing
  - Constant (a fixed value in watts can be defined here)
  - Normal
  - Smooth
  - Jagged
  - Selected day (a particular day can be selected here)

There is the option to directly switch to the configuration of the Smart Energy switching group by cli-cking on the arrow symbol  in the top right corner.

17.9 Accessing CSV Export

To access the CSV Export menu, go to Diagnostic | CSV Export.

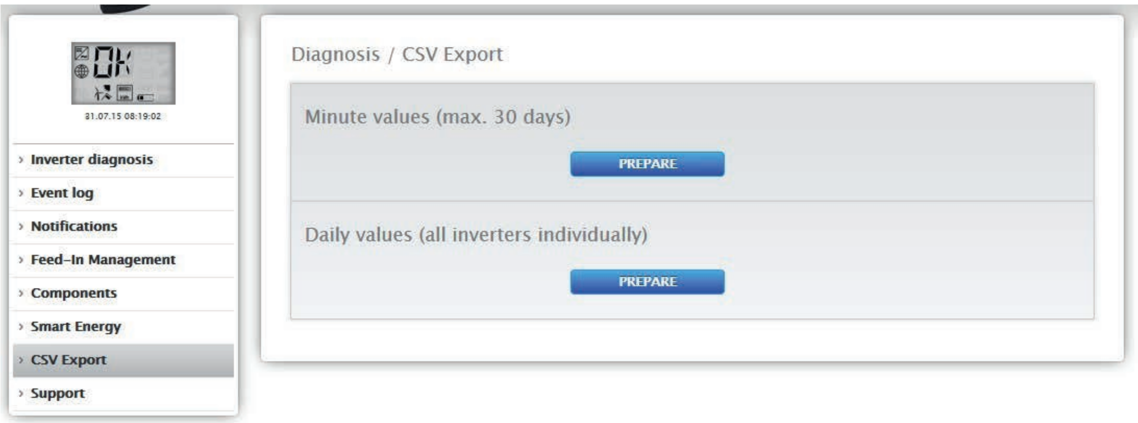


Fig.: CSV Export

You can download a CSV file from your plant from the CSV Export menu. You can select between minute values or daily values for the CSV file.
When Minute Values are selected, the file contains only a maximum of 30 days' worth of values. When selecting Daily Values, all of the inverters are individually listed, but only the end-of-the-day value is documented.
The CSV file with minute values is in a table format and contains the 5-minute values from the last 30 days and the Pac and DC values from the individual inverters and also from every MPP tracker.
In addition, there is the „Output units" button that provides the option to include the units and splitting ratio (e.g. 0.001 [W]) in the first row (deactivated by default).

Note:
The setting has to be reactivated each time; it is not saved.

The CSV file with day values is in a table format and contains the day values from every individual inverter since the start of the plant's operation (with Solar-Log™ monitoring).

Note!

Files in the CSV format can be created with simple text editors or spreadsheet programs like MS Excel or Open Office Calc.

Important!

Only a CSV file with day values can be imported and not a CSV file with minute values.

Important!

When importing CSV data, all of the data on the device is deleted and replaced.

17.10 Accessing Support

To access the Support menu, go to Diagnostic | Support.

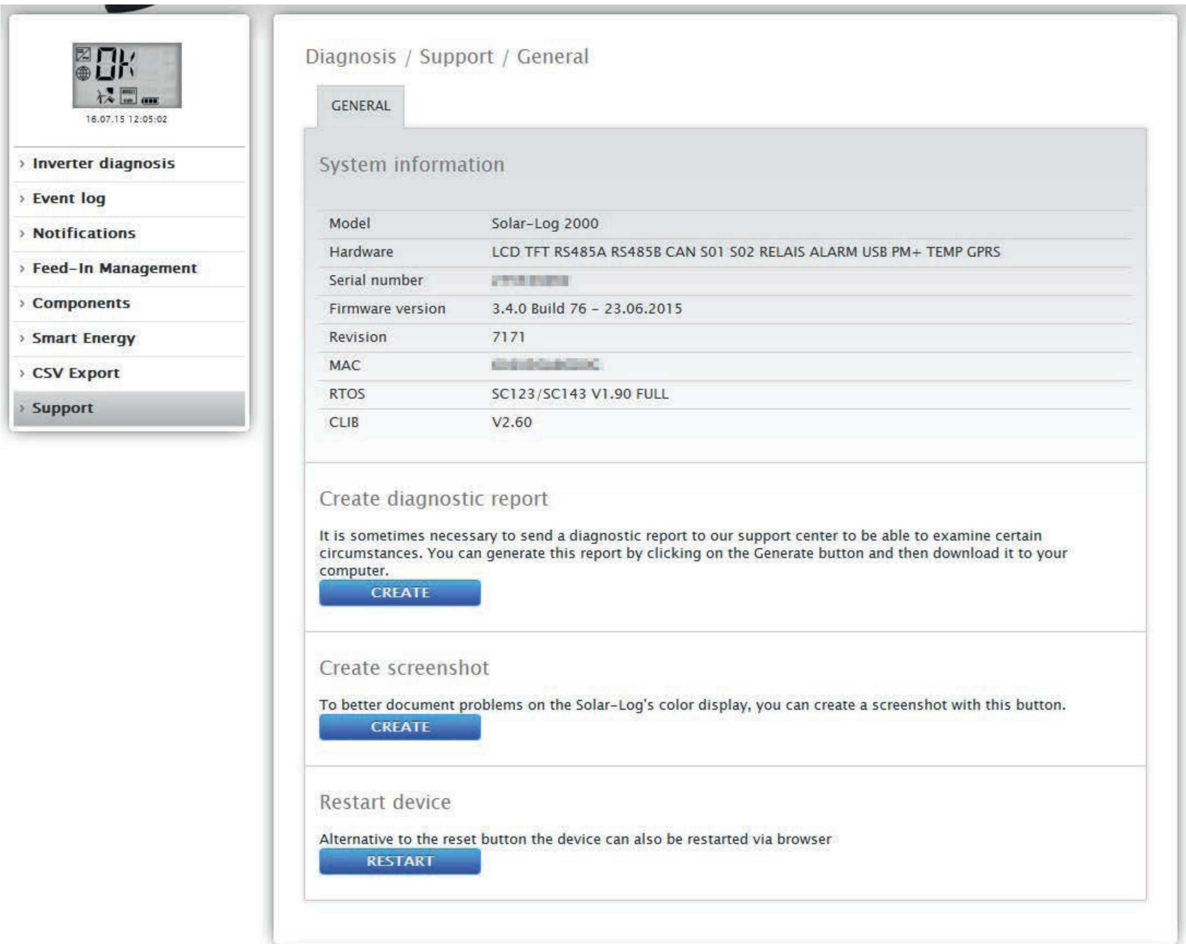


Fig.: Support - General

There are three sections under the Support | General menu:

- System Information:

The following information is available in this tab:

- Model (type of Solar-Log™)
- Hardware (hardware components available for the device)
- Solar-Log™ serial number
- Firmware Version and date
- Revision number
- MAC (MAC address of the device)
- RTOS (Solar-Log™ operating system)
- CLIB (Version number of the Solar-Log™ library used)

- Creating diagnostic reports:

You have the option to create and download a diagnostic report. This can be sent to Solar-Log support for analysis. See Figure: Support - General.

- Creating screenshots:

You have the option to create and download screenshots of the display in this section. This can be used to document errors on the Solar-Log's internal display. See Figure: Support - General.

- Restart

As an alternative to the reset button the device itself, the Solar-Log™ can be rebooted with the restart button in the WEB menu.

18 Accessing Yield Data

Click on Yield Data in the tool bar to access the Yield Data menu. The following options can be selected from the left-side navigation menu.

- Current values
- Production
- Consumption (only appears when a consumption meter is connected)
- Balances
- Finances
- Sensor (only appears when a sensor is connected)
- System Information

18.1 Current values

The Cockpit tab can be automatically selected from the Current values . the Dashboard view of the plant includes the following values:

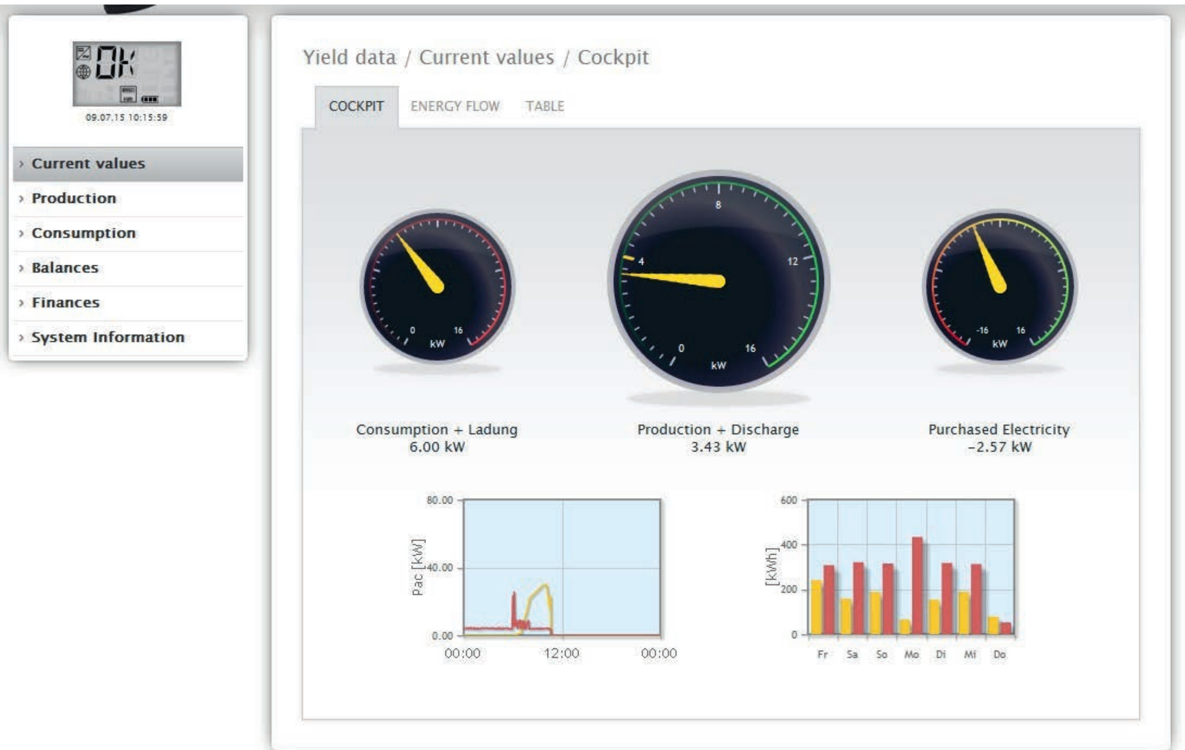


Fig.: The plant's current values (cockpit view)

- Consumption (only when consumption meters are connected). This displays the current consumption.
- Production (power generated by the plant) + discharge *only with a connected battery system) displays the current production and battery discharge.
- Feed-in amount (only when meters are connected). This displays the power output that is currently being fed into the grid.

There are two graphs located below the Dashboard display:

- The current day curve (graph on the left). There is also the option to display the previous five days as a curve in this graph. Therefore, just click on the day value in the graph on the right.

- The current day value as well as those from the previous 5 days (graph on the right). Move the mouse above one of the bars to display the day value. Click on one of the bars to have it display in the graph on the left as a curve.

Additional tabs can be selected in this view:

- Energy flow
- Table

Note

If the Solar-Log™ is just used as a consumption monitoring tool, the menu is limited to Current values, Consumption and System information.
All of the other menus are hidden.

Note

When only consumption meters are connected to the Solar-Log™, a large consumption tachometer is displayed instead of the production tachometer in the Current values | Cockpit menu.

18.1.1 Energy flow

The plant is displayed as a flow graphic in the Energy flow tab.

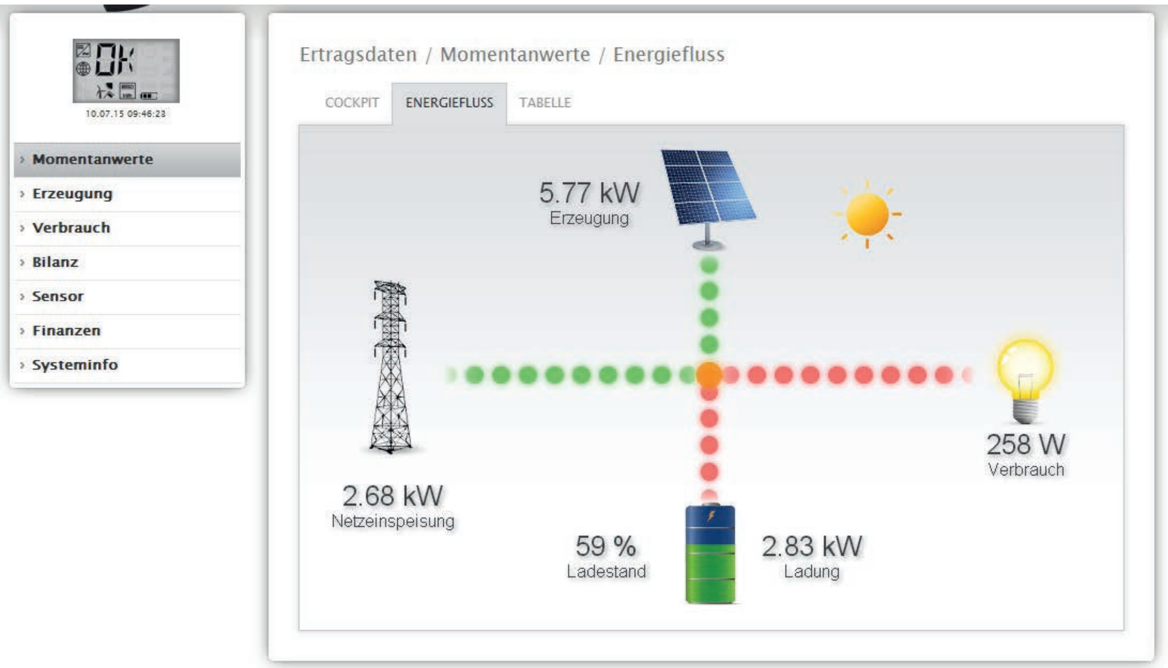


Fig.: Example of a plant with an energy flow

Depending on the particular devices connected, the following values are displayed in the flow graphic in real time:

- Production (W)
- Consumption (W)
- Grid fed / purchase from grid (W)
- Battery Status
  - Charge Status (%)
  - Charge / Discharge Output (W)

Note:
When a battery meter is connected, the value for the battery's charge status cannot be read. That is why for the presentation of energy flows that the charge status is displayed with n/a and the charge with 0 W.

Energy Flow Color Key

- Production (W):
  - Green, energy is being generated.
  - Gray, energy production is not active.
- Consumption (W):
  - Red, energy is being consumed.
  - Grey, no active consumption.
- Grid fed / purchase from grid (W)
  - Red, energy is being purchased from the grid.
  - Green, energy is being fed into the grid.
  - Gray, no energy transfer in either direction with the grid.

Battery:

- Charge Level (%):
  - Red, battery is being charged.
- Discharge (W)
  - Green, battery is being discharged.

18.1.2 Table

The output recorded from the connected devices is displayed as a table in Table tab.

Fig.: Table with the recorded output from an example plant

Depending on the particular device connected, the following values are displayed:

- The current output from each individual inverter.
- The total current consumption as measured by the consumption meters.
- The current irradiation per m^2 as measured by the sensor.
- The values from the battery with the columns Charge/Discharge, Charge Level (%) and Status.

18.2 Production

You can select a graphic display of your plant's production from the Production menu.

Fig.: Graphic display of the plant's total production

From this display, you can select the following tabs:

- Day
- Month
- Year
- Total

You can select to display the view as a graph or table. The values displayed in the graph or table depend on the view selected.

Note

The auto scaling option always scales the graphics up as much as possible. The auto scaling can be manually disabled for the respective graphics. Then the scaling is done based on the value defined in the device configuration. Please refer to the the chapter on configuring inverters in the Installation Manual.
The selected section can be enlarged by clicking on the graphic and dragging it.

18.2.1 Day view

The Day tab displays the current day as a curve graph. The values Output (W) and Yield (kWp), on the top left of the diagram key, can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (curves) other than the one selected can be hidden.
The different values throughout the day can be displayed by moving the mouse along the curve.

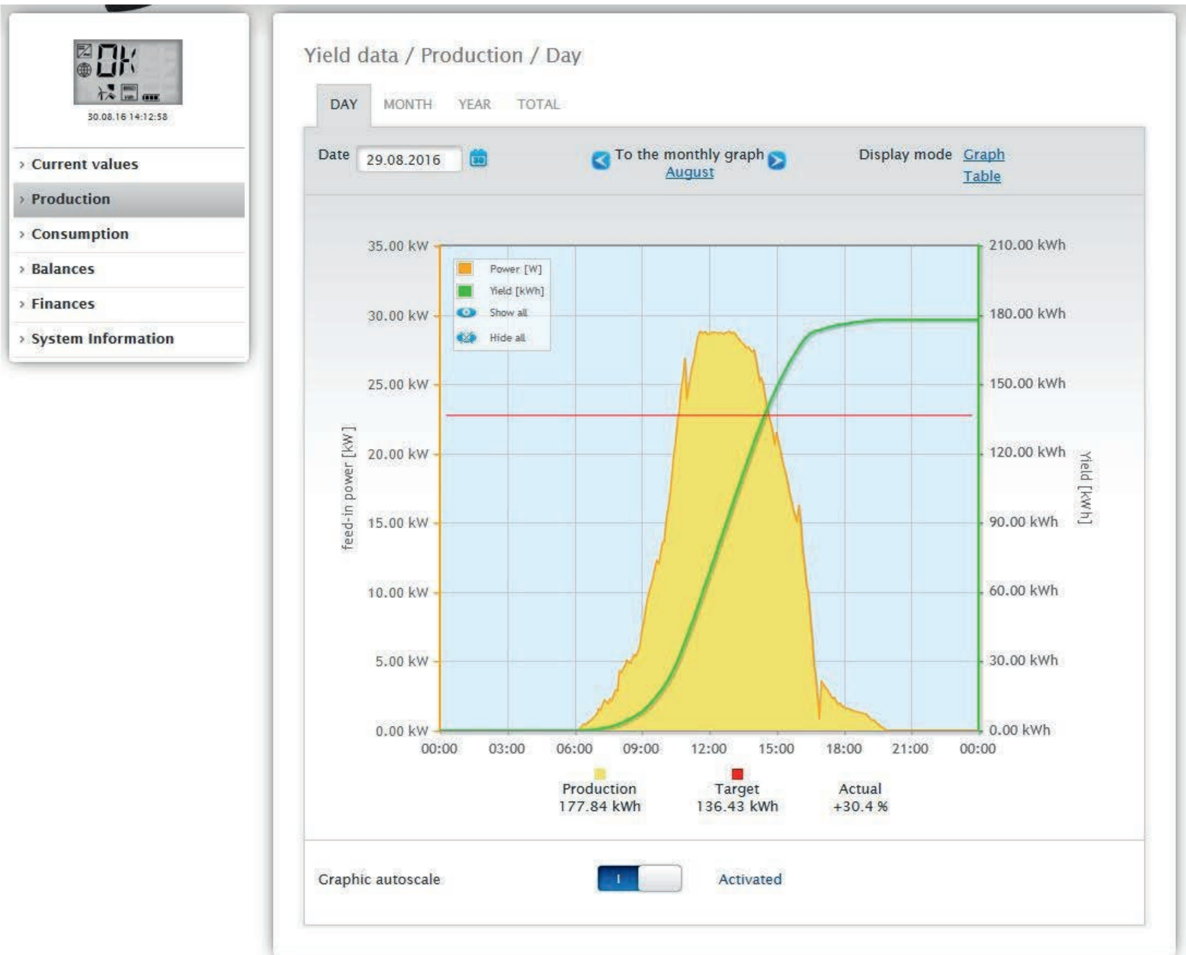


Fig.: Daily View of the Production Graph with the Auto Scaling activated

The following data is graphically displayed in the production day:

- Production (kWh) (If the daily yield value is modified with the data correction function, the modifications are displayed in brackets.)
- Target (kWh)
- Actual (%):

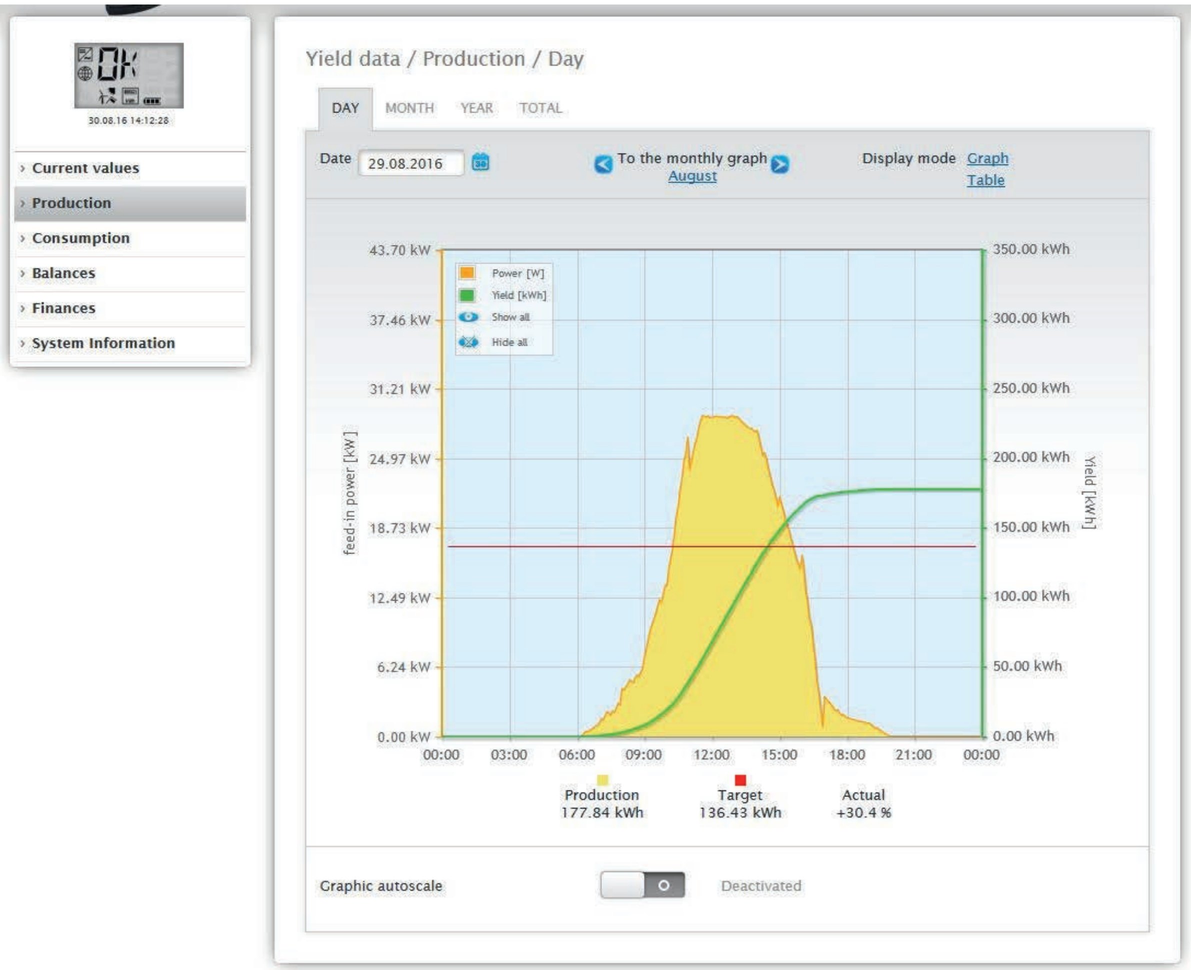


Fig.: Daily View of the Production Graph with the Auto Scaling deactivated

Different values with different units are displayed in the graph. The units used and their colors are defined in the key at the top.

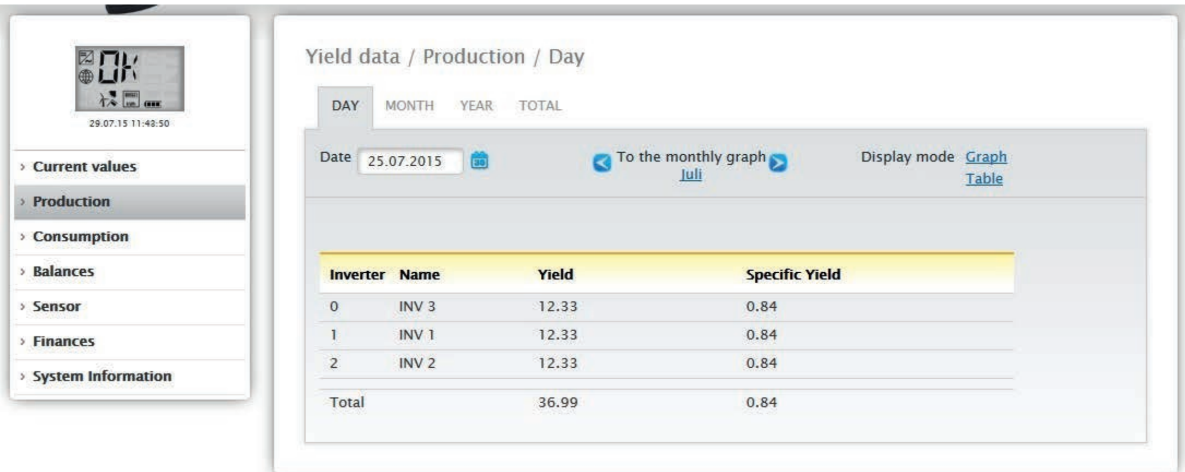


Fig.: Day view of the production table

When you click on Table, the values from the current output generated will be allocated to the individual inverters and displayed as a table. In this way, you can check the output of every inverter at any time.

18.2.2 Month view

The tab Month displays the daily yields from the month as a total in a bar graph.

- The daily yield can be displayed by moving the mouse above one of the bars.
- Click on a bar to go to the corresponding day view.

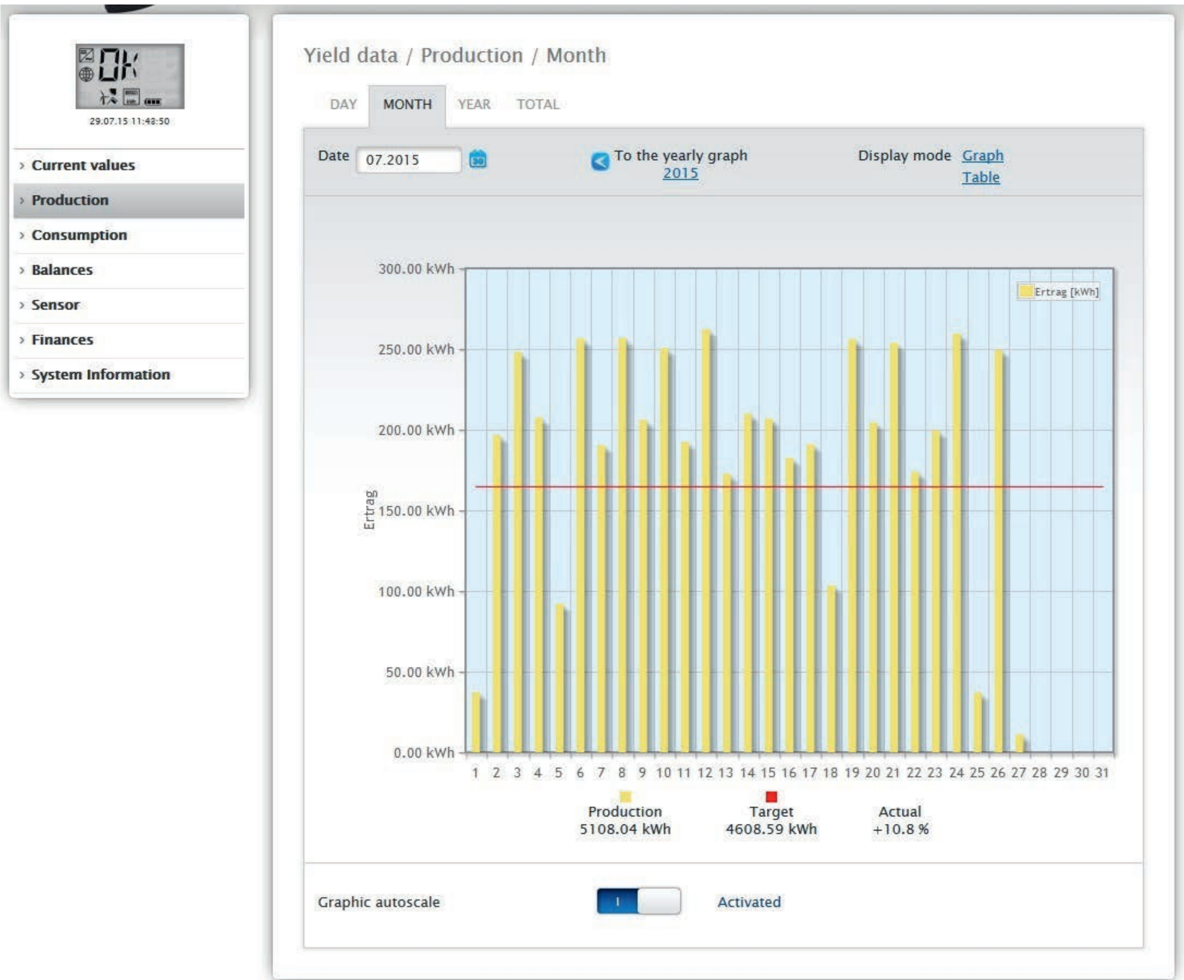
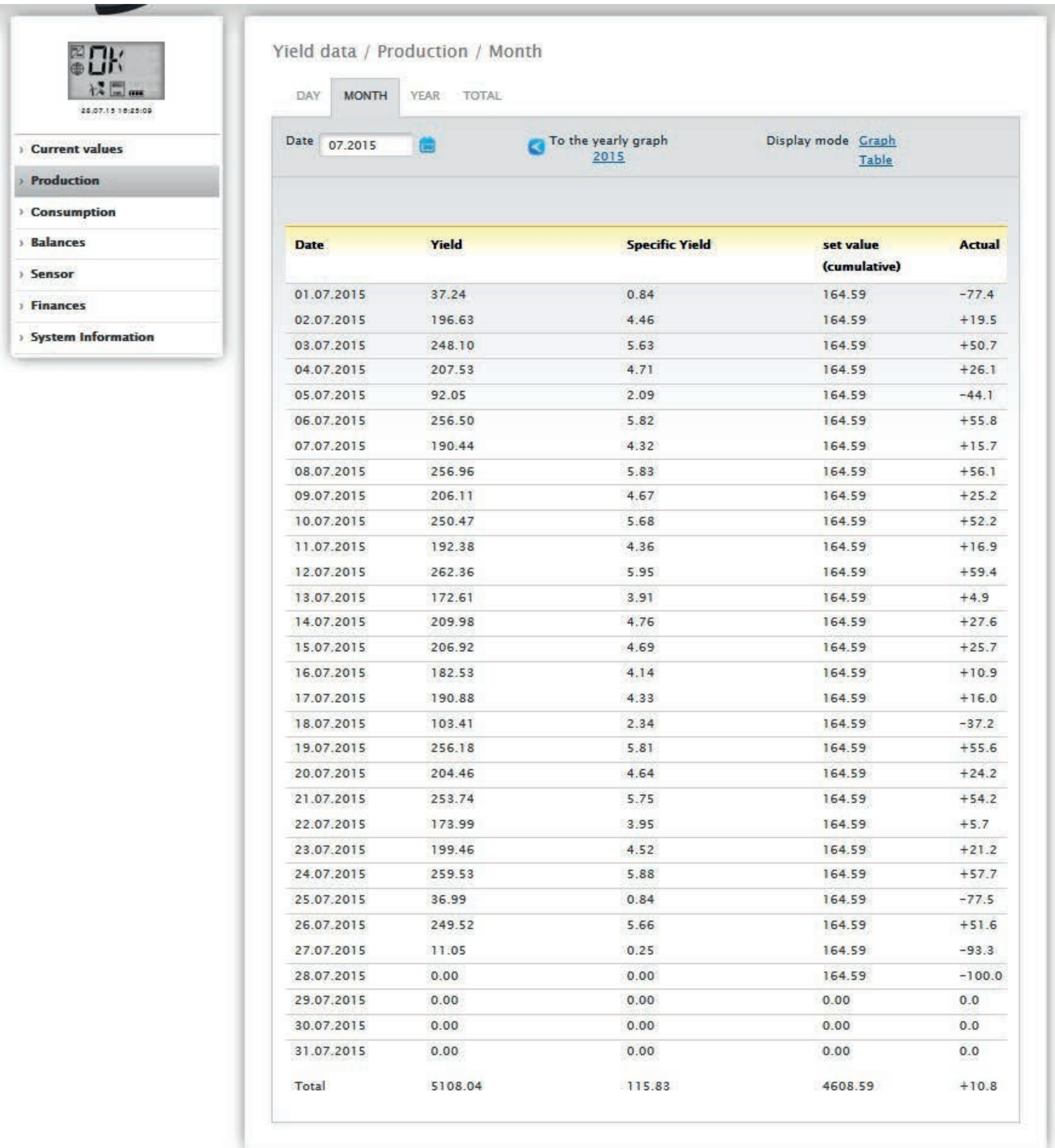


Fig.: Month view production graph



Date	Yield	Specific Yield	set value (cumulative)	Actual
01.07.2015	37.24	0.84	164.59	-77.4
02.07.2015	196.63	4.46	164.59	+19.5
03.07.2015	248.10	5.63	164.59	+50.7
04.07.2015	207.53	4.71	164.59	+26.1
05.07.2015	92.05	2.09	164.59	-44.1
06.07.2015	256.50	5.82	164.59	+55.8
07.07.2015	190.44	4.32	164.59	+15.7
08.07.2015	256.96	5.83	164.59	+56.1
09.07.2015	206.11	4.67	164.59	+25.2
10.07.2015	250.47	5.68	164.59	+52.2
11.07.2015	192.38	4.36	164.59	+16.9
12.07.2015	262.36	5.95	164.59	+59.4
13.07.2015	172.61	3.91	164.59	+4.9
14.07.2015	209.98	4.76	164.59	+27.6
15.07.2015	206.92	4.69	164.59	+25.7
16.07.2015	182.53	4.14	164.59	+10.9
17.07.2015	190.88	4.33	164.59	+16.0
18.07.2015	103.41	2.34	164.59	-37.2
19.07.2015	256.18	5.81	164.59	+55.6
20.07.2015	204.46	4.64	164.59	+24.2
21.07.2015	253.74	5.75	164.59	+54.2
22.07.2015	173.99	3.95	164.59	+5.7
23.07.2015	199.46	4.52	164.59	+21.2
24.07.2015	259.53	5.88	164.59	+57.7
25.07.2015	36.99	0.84	164.59	-77.5
26.07.2015	249.52	5.66	164.59	+51.6
27.07.2015	11.05	0.25	164.59	-93.3
28.07.2015	0.00	0.00	164.59	-100.0
29.07.2015	0.00	0.00	0.00	0.0
30.07.2015	0.00	0.00	0.00	0.0
31.07.2015	0.00	0.00	0.00	0.0
Total	5108.04	115.83	4608.59	+10.8

Fig.: Month view of the production table

When you click on Table, the values: date, yield, specific yield and target (cumulative), current and target are listed for the entire month.

18.2.3 Year view

The tab Year displays the monthly yields from the year as a total in a bar graph.

- Move the mouse above one of the bars to display the monthly yield with a comparison of the current and target values in regard to the annual forecast.
- Click on a bar to go to the corresponding month view.

Fig.: Year view graph

When you click on Table, the annual values for the entire year are allocated to each month according to the actual output generated.

18.2.4 Total view

The Total tab displays the annual yields as a total in a bar graph. The red line displays the calculated target balance based on the annual forecast.

- Move the mouse above one of the bars to display the annual yield with a comparison of the current and target values in regard to the annual forecast.
- Click on a bar to go to the corresponding year view.

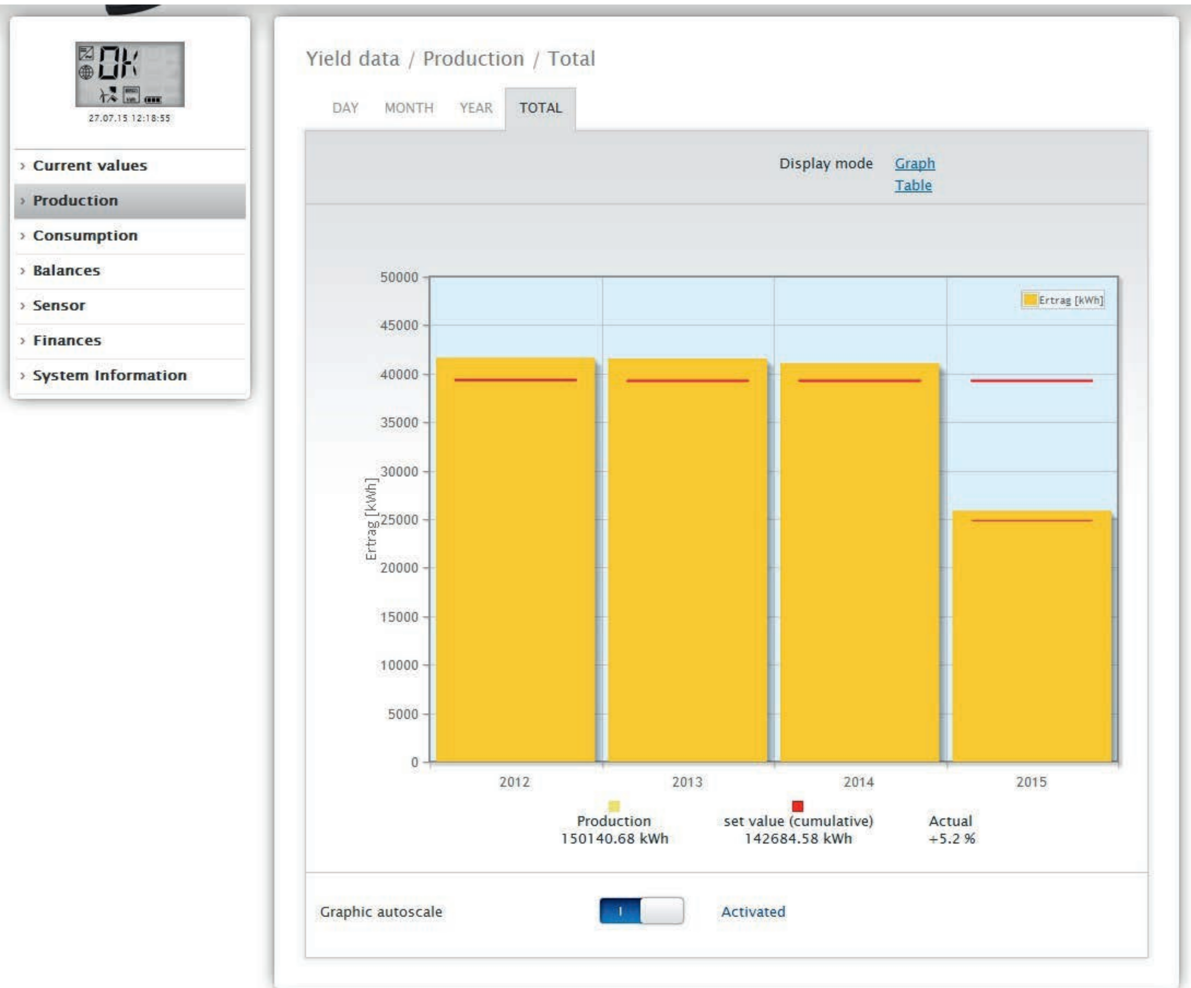


Fig.: Total view graph

Table:

The plant's total power output (since the monitoring started) is allocated every year according to the output generated.

The Date box is included in the day, month and year view and has a calendar function with which you can search for certain days, months or years according to the view selected. You can go backwards and forwards within the selected period with the arrow keys for the previous day or week, or for the following day or week.

18.3 Consumption (only when consumption meters are connected)

From the Consumption menu, you can view the exact consumption from appliances that are connected via networked “smart plugs” with the Solar-Log 1000, 1200 and 2000, relays or the Solar-Log™ Meter.

Note

Consumption is only displayed once a meter is connected.

The day view can be selected from the Consumption menu. The view appears as a Day Graph with the total consumption values.
As soon as sub-consumers are connected, e.g. a washing machine or freezer, the view expands to include the tab Details Sub-consumers.
All of the appliances consuming electricity are shown in different colors here and they are also displayed as in a pie chart at the bottom with the colors in the key.
It is also possible to display the Daily Consumption graphic as a line graphic. There is the option to display or hide the consumption from particular appliances in line graphic view.

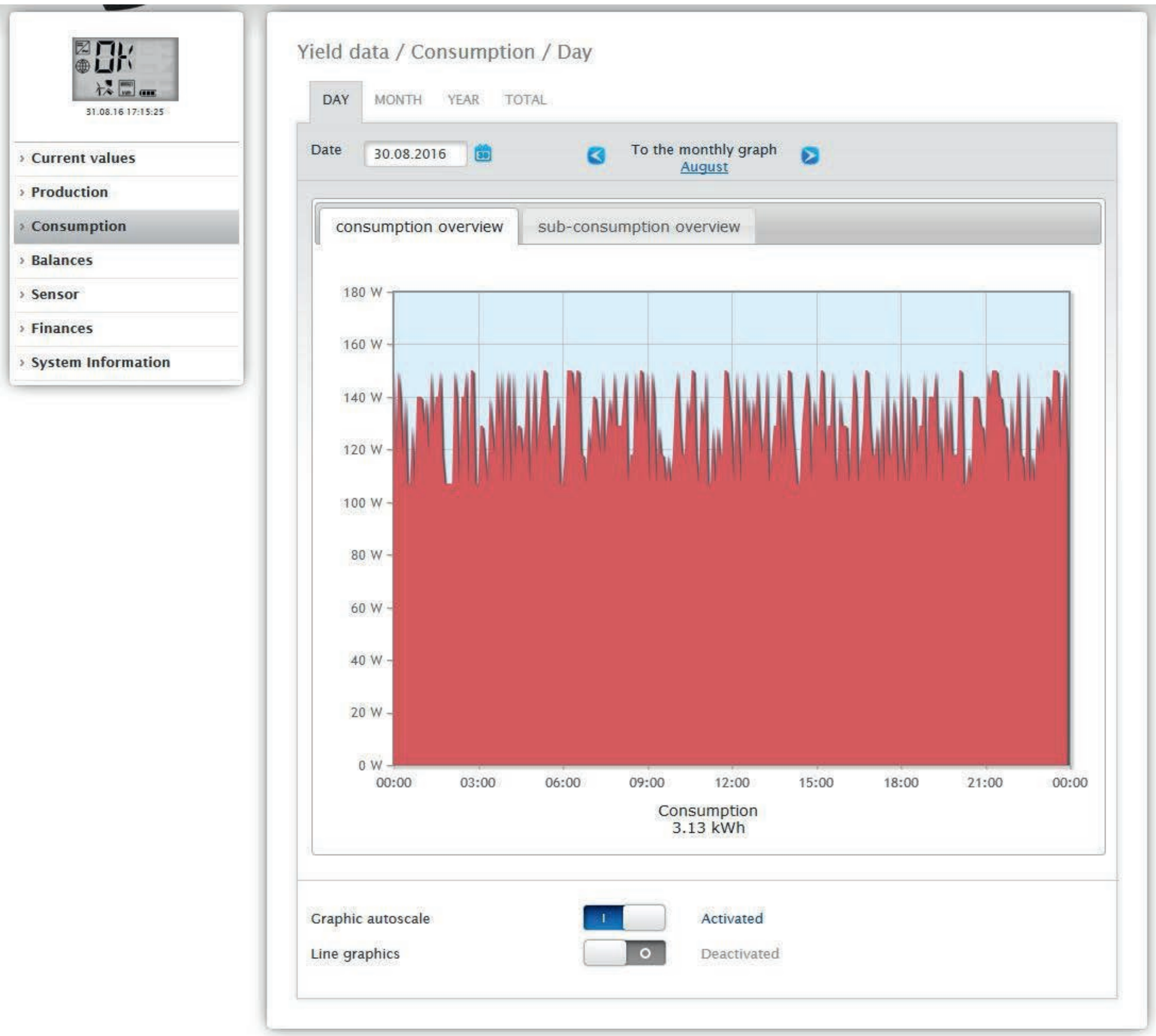


Fig.: Graph of daily consumption with meters connected

Fig.: Graph of daily consumption with meters connected and active line graphics

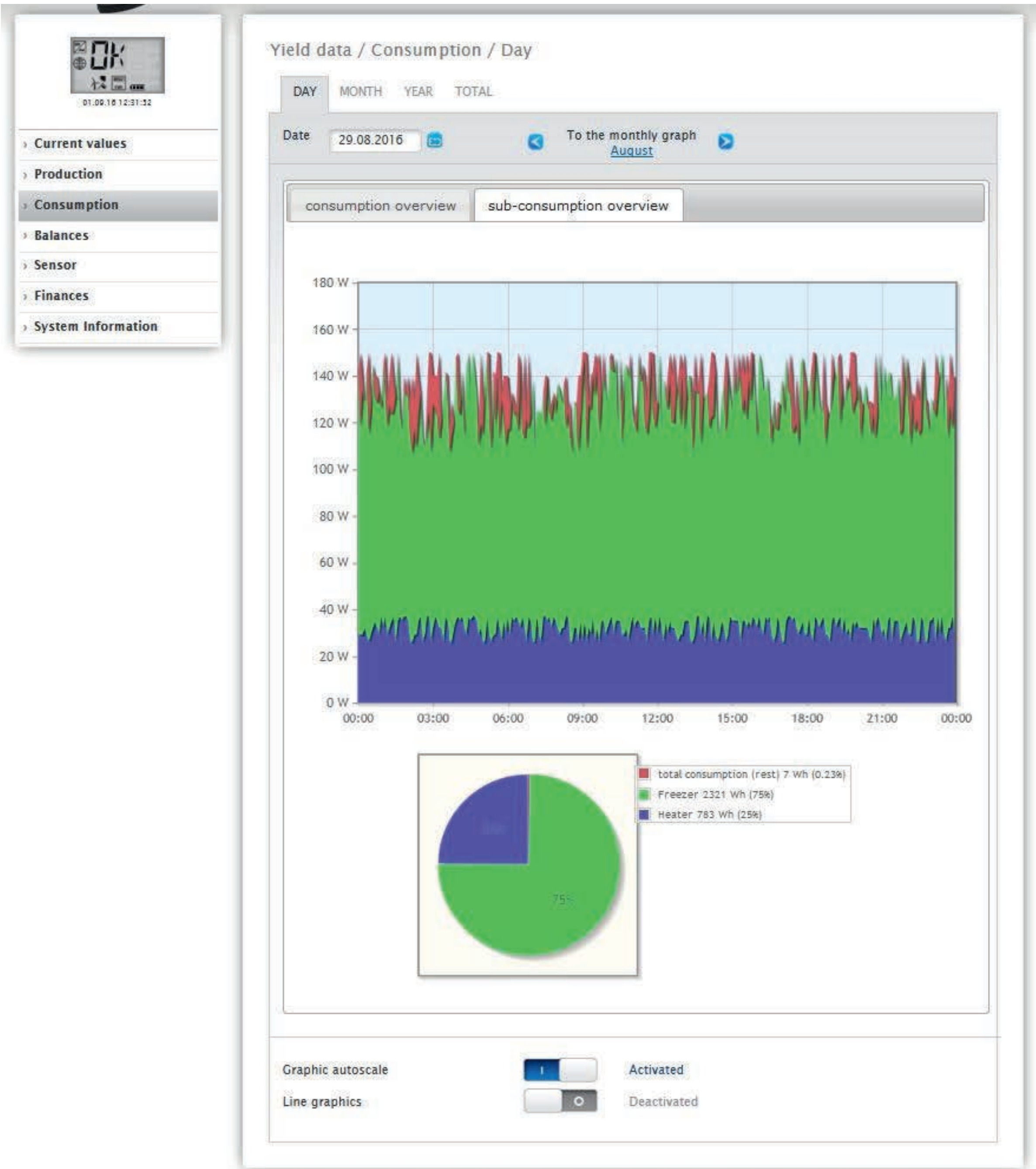


Fig.: Graph of daily consumption with connected appliances in the sub-consumer view

Fig.: Graph of daily consumption with connected appliances and active line graphics in the sub-consumer view

You have the option to select additional menu items in the consumption view.

- Month:

displays the Month Graph View as a bar graph. There are two tabs in the Month View, the same as in the Day View:

The Consumption Overview and the Sub-consumer Overview.

The total consumption values are displayed in the Consumption Overview as a bar graph.

In the Sub-consumer Overview, you see the devices connected as a bar graph with the power consumption displayed in different colors. Below this, the values are also displayed in a pie chart with the colors in the key.

There is the option from both views to select the individual days directly from the individual bars and sections.

- Year:

displays the Year Graph View as a bar graph. There are two tabs in the Year View, the same as in the Month View:
The Consumption Overview and the Sub-consumer Overview.
The total consumption values are displayed in the Consumption Overview as a bar graph.
In the Sub-consumer Overview, you see the devices connected as a bar graph with the power consumption displayed in different colors. Below this, the values are also displayed in a pie chart with the colors in the key.
There is the option from both views to select the individual months directly from the individual bars and sections.

- Total:

displays the Total Graph View as a bar graph. There are two tabs in the Total View, the same as in the Year View:
The Consumption Overview and the Sub-consumer Overview.
The total consumption values are displayed in the Consumption Overview as a bar graph.
In the Sub-consumer Overview, you see the devices connected as a bar graph with the power consumption displayed in different colors. Below this, the values are also displayed in a pie chart with the colors in the key.
There is the option from both views to select the individual years directly from the individual bars and sections.

18.4 Balances

You can see the relationship between your plant's production and consumption from the Balances menu.
The following points are displayed in all of the views (day, month, year and total):

- Production
- Consumption
- Self-consumption

The following points are additional displayed when a battery system is connected (see Fig.: Day Balance graph with battery system):

- Self-consumption Battery (kWh)
- Charge (kWh)
- Discharge (kWh)

Note

The consumption as well as the values from the battery are only displayed once the systems are connected (consumption meter + battery system).

Note

The auto scaling option always scales the graphics up as much as possible. The auto scaling can be manually disabled for the respective graphics. Then the scaling is done based on the value defined in the device configuration. Please refer to the the chapter on configuring inverters in the Installation Manual.
The selected section can be enlarged by clicking on the graphic and dragging it.

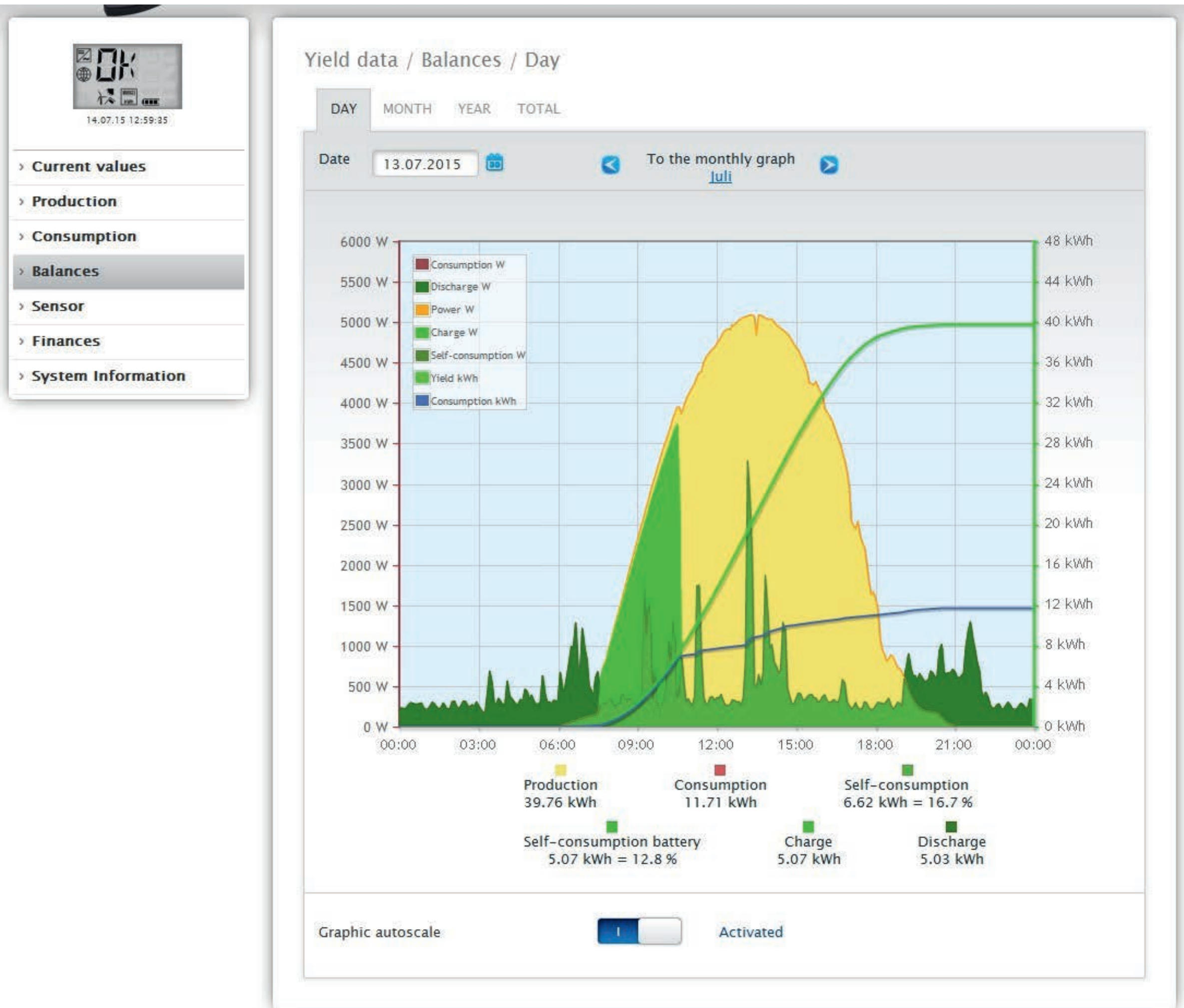


Fig.: Day Balance graph with battery system

The following tabs can be selected:

- Day
- Month
- Year
- Total

The start view displays the current daily values as a graph.

18.4.1 Day balance

The Day tab under Balances displays the production, consumption and self-consumption side-by-side as a day curve. The values in the diagram key, can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves).
With a right-click, all of the values (curves) other than the one selected can be hidden.
Different values with different units are displayed in the graph. The units used and their colors are defined in the key at the top.
The different values throughout the day can be displayed by moving the mouse along the curve.

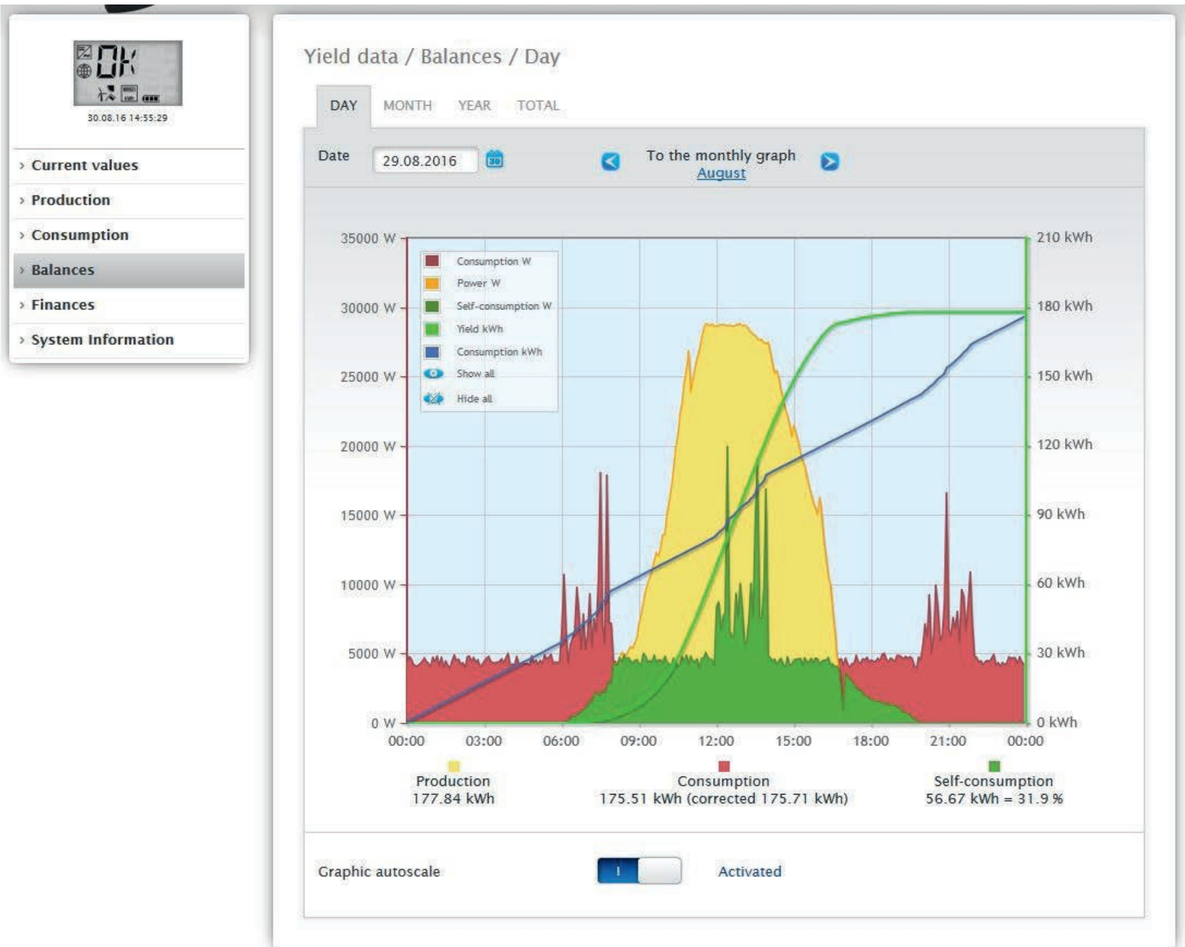


Fig.: Daily Balance Graph with the Auto Scaling activated

The following data is graphically displayed in the daily balance:

- Production (kWh)
- Consumption (kWh) (If the daily consumption value is modified with the data correction function, the modifications are displayed in brackets.)
- Self-consumption

The meaning of the colored areas in the day curve:

The green areas display the amount of consumption that was covered with PV power. The yellow areas display the surplus of PV-generated power and the red areas display the amount of consumption that was not covered with PV power.
You have a choice between the Graph and Table display mode.

General definition of the different colored areas within the balance graphs:

(see figure: Daily Balance Graph)

- Yellow areas - Production
- Red areas - Consumption (Total = not covered by production (red in the graph) + covered by production (green in the graph).
- Green area - self-consumption (covered by production - green in the graph) with a percentage (in relation to production).

18.4.2 Month balance

The Month tab under balances displays the production and consumption side-by-side in a bar graph.

- Move the mouse above one of the bars to view either the daily yield or consumption.
- Click on one of the bars to go to the corresponding day view.

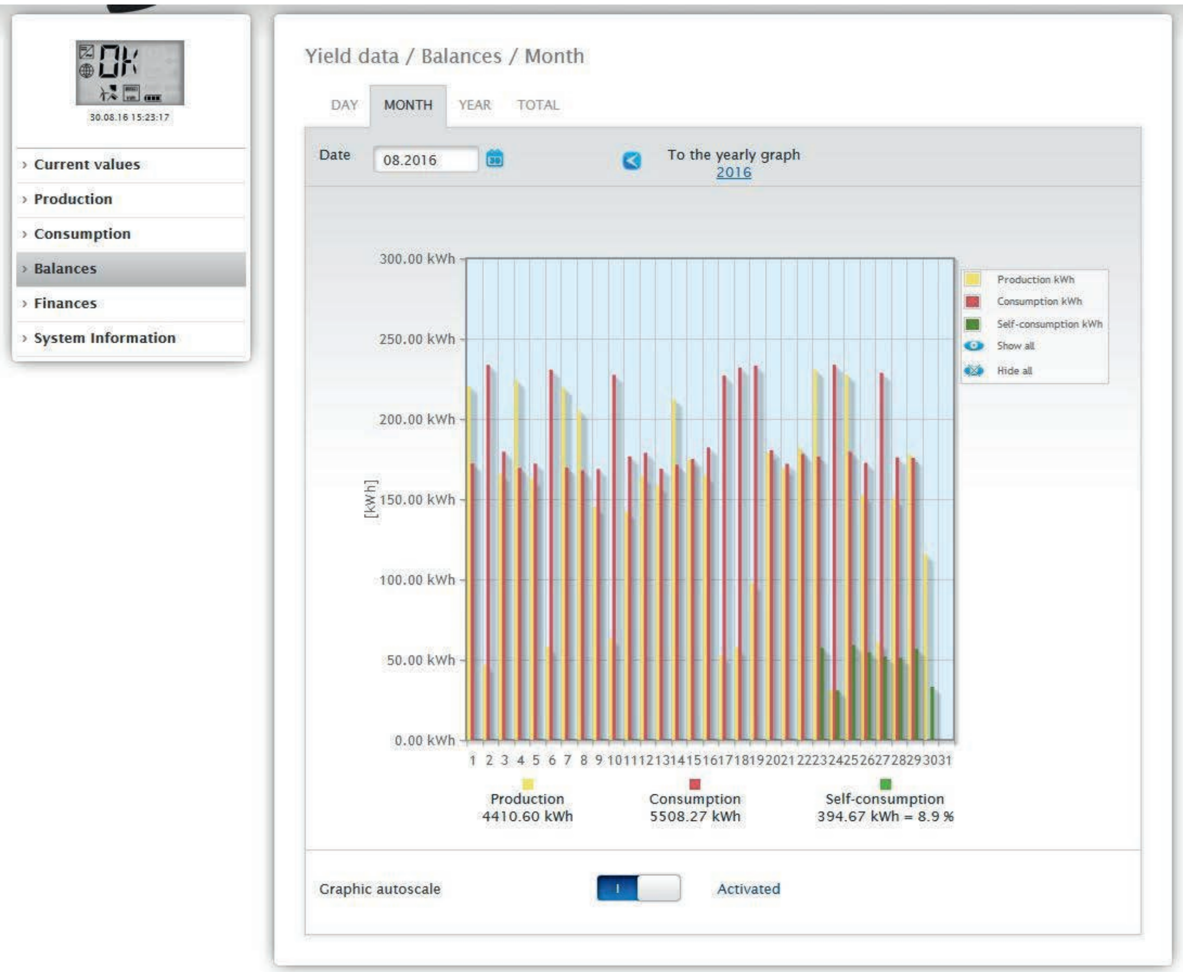


Fig.: Month view balance graph

18.4.3 Year balance

The Year tab under Balances displays the production and consumption side-by-side in a bar graph.

- Move the mouse above one of the bars to view either the monthly yield or consumption with a comparison of the current and target values in regard to the annual forecast.
- Click on one of the bars to go to the corresponding month overview.

Fig.: Year view balance graph

18.4.4 Total balance

The Total tab under Balances displays the production and consumption side-by-side in a bar graph.

- Move the mouse above one of the bars to view either the annual yield or consumption with a comparison of the current and target values in regard to the annual forecast.
- Click on one of the bars to go to the corresponding annual overview.

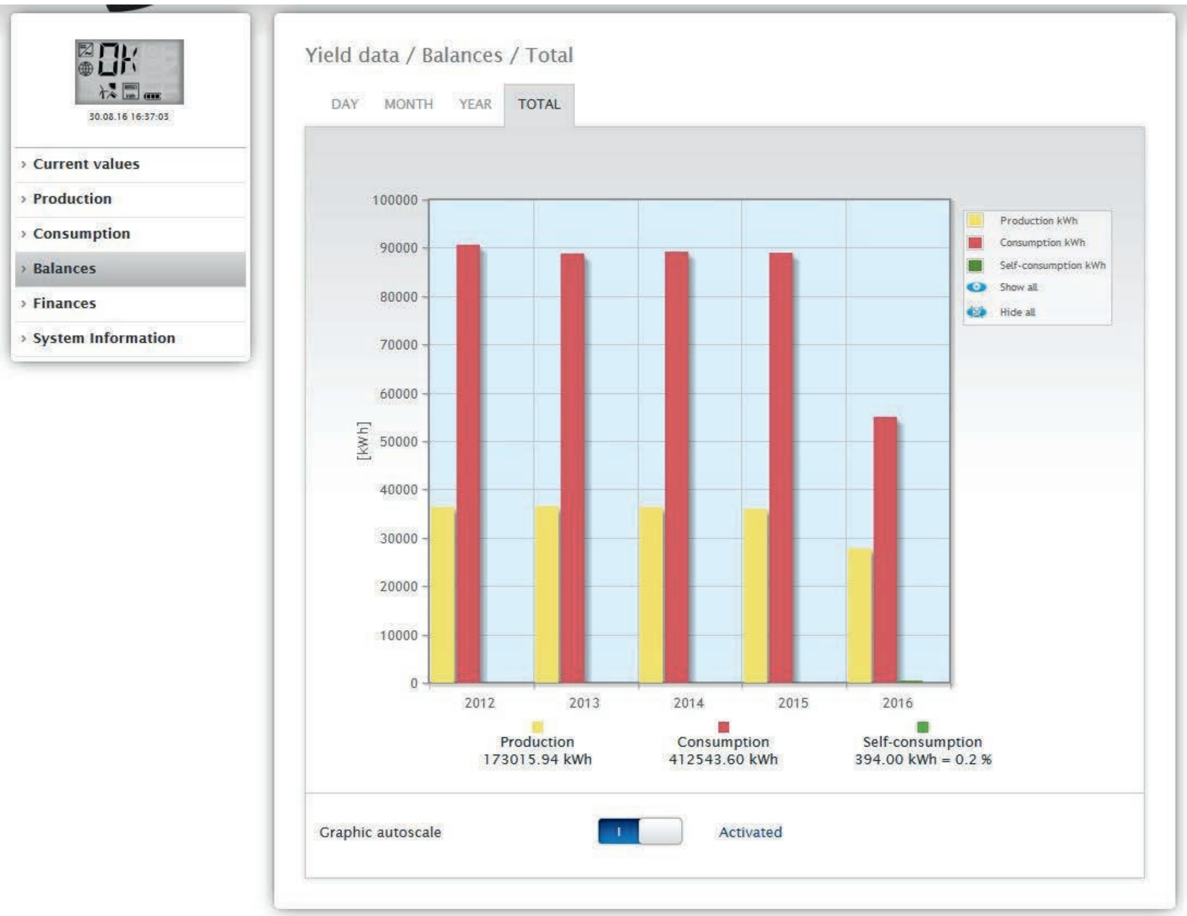
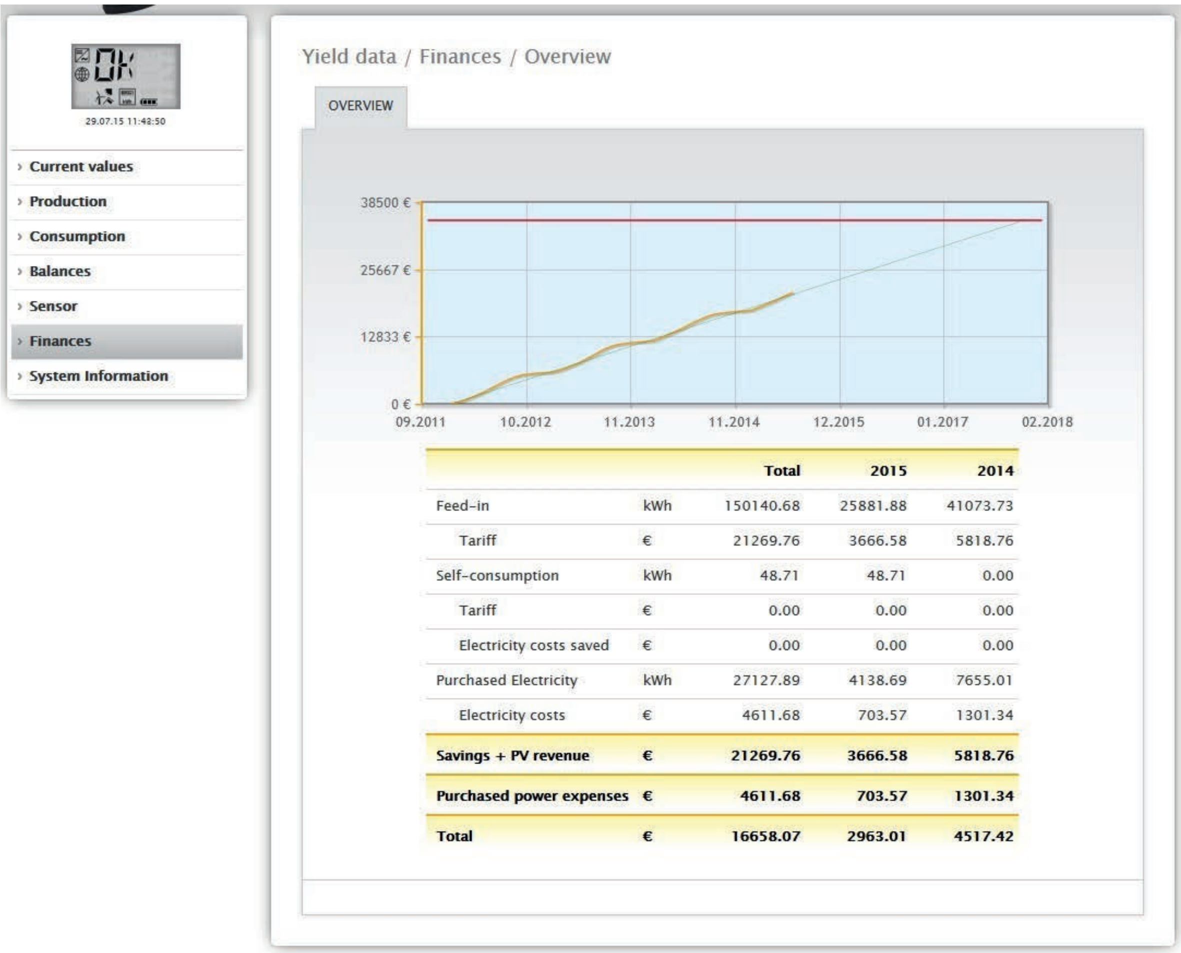


Fig.: Total balance graph

18.5 Finances

Your plant's financial performance can be displayed as a graph or table from the Finances menu. (You can find the configuration of the values for feed-in tariffs and consumption in the chapters:"Define electricity costs" and „Define feed-in tariffs).



		Total	2015	2014
Feed-in	kWh	150140.68	25881.88	41073.73
Tariff	€	21269.76	3666.58	5818.76
Self-consumption	kWh	48.71	48.71	0.00
Tariff	€	0.00	0.00	0.00
Electricity costs saved	€	0.00	0.00	0.00
Purchased Electricity	kWh	27127.89	4138.69	7655.01
Electricity costs	€	4611.68	703.57	1301.34
Savings + PV revenue	**€**	**21269.76**	**3666.58**	**5818.76**
Purchased power expenses	**€**	**4611.68**	**703.57**	**1301.34**
Total	**€**	**16658.07**	**2963.01**	**4517.42**

Fig.: Finances overview

The total financial performance of your plant is displayed as a graphic with the actual/target value curve in the overview.

The following values (split up in total and the last two years) are contained in the table.

- Feed-in:

This displays the amount of generated power in kWh that has been fed into the public grid.

- Tariff:

The tariff calculates the financial compensation for the feed-in amounts based on the rate and currency defined in the Configuration | Plant | Tariff settings.

- Self-consumption:

This displays the amount of generated power in KWh that has been consumed locally.

- Tariff:

Based on the rate in the settings for the tariff under Feed-in, this displays the financial compensation for the self-consumption refund (when such a compensation is allowed).

- Electricity costs saved:

Under electricity costs saved, the total amount saved based on all of the available data such as that from self-consumption (power not obtained from the grid) and from a battery storage system is displayed.

- Purchased electricity:

This displays the amount of power consumed that was obtained from the grid.

- Electricity costs:

The calculations are based on the rate defined in the Configuration | Plant | Electricity Costs settings.

- Savings + PV revenue:

This includes all of the revenue generated by the PV plant from the feed-in tariff and self-consumption. In addition to self-consumption, the amount of electricity saved by not obtaining it from the grid, such as from a battery system, is included.

- Purchased power expenses:

This displays the total expenses for the power obtained from the grid.

- Total:

This is the total after the purchased power expenses have been subtracted from the PV revenue.

Note!

The overview curve is only visible in the Yield Data | Finances section after several weeks of data recording.

18.6 Sensor (only when a sensor is connected)

A graphic evaluation from the connected sensors can be displayed from the Senor menu.

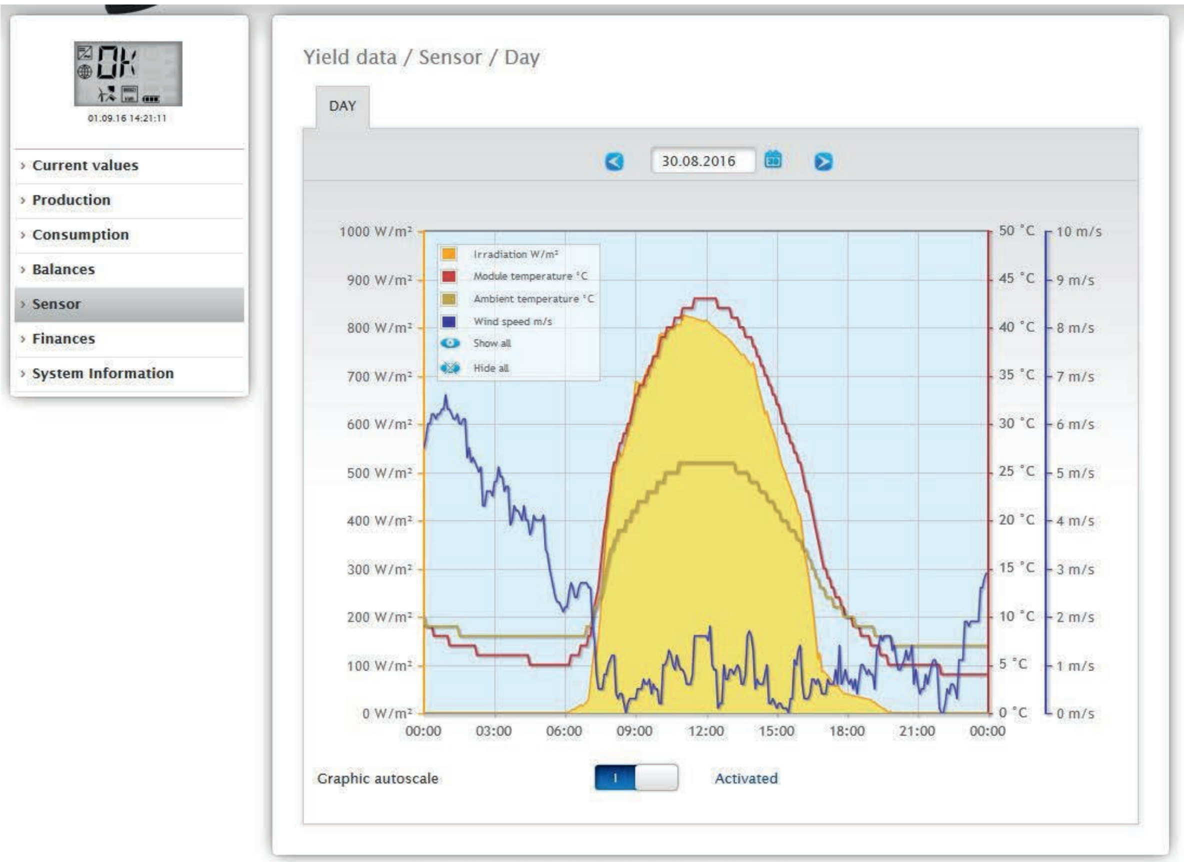


Fig.: Graph of Sensor Box values

The following values can be displayed individually:

- Irradiation W/m
- Module temperature C°
- Ambient temperature C°
- Wind speed m/s

Different values with different units are displayed in the graph. The units used and their colors are displayed in the key at the top.
All of the values displayed can be selected and deselected at anytime with a left-click to display individual values (curve) or to display or hide all values (curves). With a right-click, all of the values (curves) other than the one selected can be hidden.
You can select and subsequently evaluate certain days with the Date box.

Note!

The menu is only visible once a meter is connected.

18.7 System Information

Go to the System information menu to view plant and system information.

Yield data / System Information

About this Solar-Log™	
Model	Solar-Log 1200 Wifi/BT
Serial number	[illegible]
Firmware version	3.6.0 Build 89 - 08.08.2017
Plant data	
Plant size	44100 Wp
Detected devices	
Inverters	
	RS485-A: 3 x Diehl AKO EIA485
Power meters	
	RS485-A: 4 x Janitza
Sensors	
	RS485/422-B: 1 x Mencke&Tegtmeyer Sensor Full/Light
Data transfers	
Portal transfer	21.08.17 10:32:12 - OK
Export (FTP)	Deactivated
E-mail	21.08.17 10:40:10 - OK
Performance and Failure Monitoring	
Monitoring period	11 o'clock - 13 o'clock
Maximum deviation	10%
Minimum feed-in power for power comparison	20%
Fault duration before message will be generated	30Min.
Maximum number of message to be sent per day	3
Messages via	E-mail

Fig.: System information from an example plant

The following information is displayed:

About this Solar-Log™:

- Model
- Serial number
- Firmware version

Plant data:

- Plant size

Detected devices:

- Inverters

- Power meters
- Sensors
- Hybrid System
- Heating rod
- Heat pumps
- Charging station
- Switch

Data transfers:

- Portal transfer Last transfer with the time and date and state message (in the example: deactivated).
- Export (FTP): Last transfer with the time and date and state message (in the example: deactivated).
- E-Mail: Last transfer with the time and date and state message (in the example: deactivated).

Performance and Failure Monitoring Failure Messages (only visible with an active status):

- Monitoring period
- Maximum deviation
- Minimum feed-in power for power comparison
- Fault duration before message will be generated
- Maximum number of message to be sent per day
- Messages via

19 Direct Device Configurations (Solar-Log 1200 and 2000)

The Solar-Log 1200 and 2000 come with a touchscreen that displays information such as output, yield history (balance, consumption or production – depending on the configuration) and the environmental contribution and that allows adjustments to the configuration to be made directly on the device.

Note!

Never use a sharp, pointed object on the touch screen!
This will damage the screen's delicate surface.

19.1 Navigating from the touch screen

After the Solar-Log 1200 or 2000 has started, the overview view is displayed.

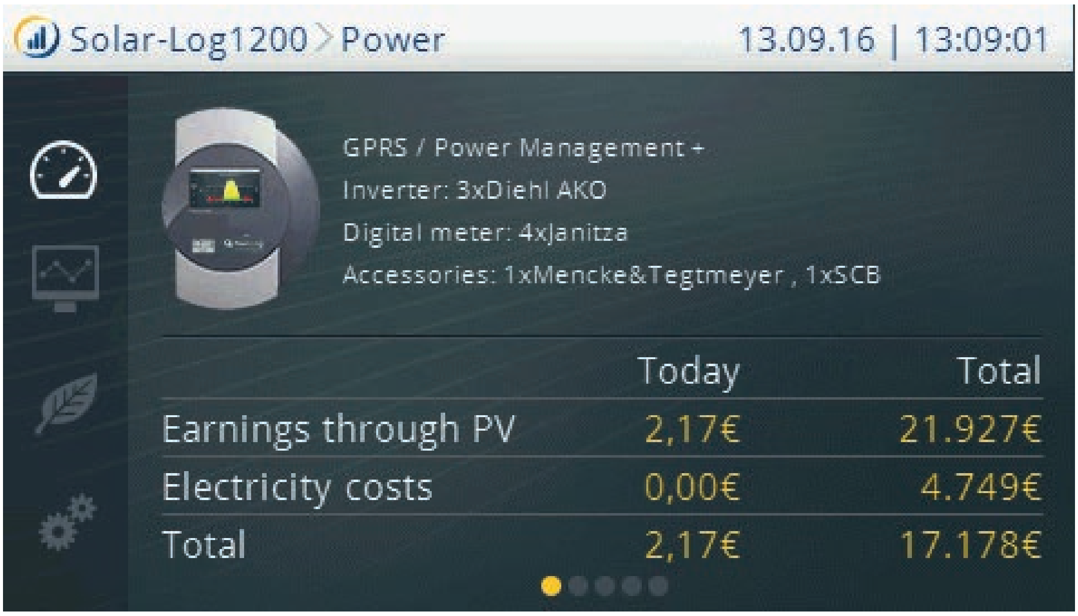


Fig.: Start page of the display

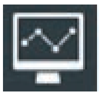
The following is displayed in this view:

The header bar with:

- the Solar-Log™ module
- navigation heading
- date
- Time

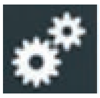
The following symbols are displayed in the left-side navigation menu and can be selected for additional options:

Power



Yield History (Balance, Consumption or Production is displayed depending according to the configuration)

Environmental performance



Settings

The display window with:

- Solar-Log™ type
- the connected devices (inverter, power meter etc.)
- A table with the following values: earnings from PV, purchased power (only with connected meters) and the total for the day and overall.

Swipe your fingers on the display, either from right to left or left to right, to switch to the next view.
There is a split-screen window for the energy balance, environmental performance and yield history menus.
The dots at the bottom of the screen() indicate the current page of the menu.
You can always view the power output for the current day by tapping on the top area with the time and date. The current Dashboard is displayed by tapping on it twice.

19.1.1 Accessing the Dashboard

From the Power menu, you can swipe to go from the start page to the Dashboard.

Fig.: Dashboard view

In the view from left-to-right:
Current consumption and today's consumption high (only with connected meters).
Current production and today's production high.
Current grid feed and today's grid feed high (only with connected meters).

19.1.2 Access Energy flow

From the Power menu, you can swipe from the Dashboard's start page to go to the Energy flow.

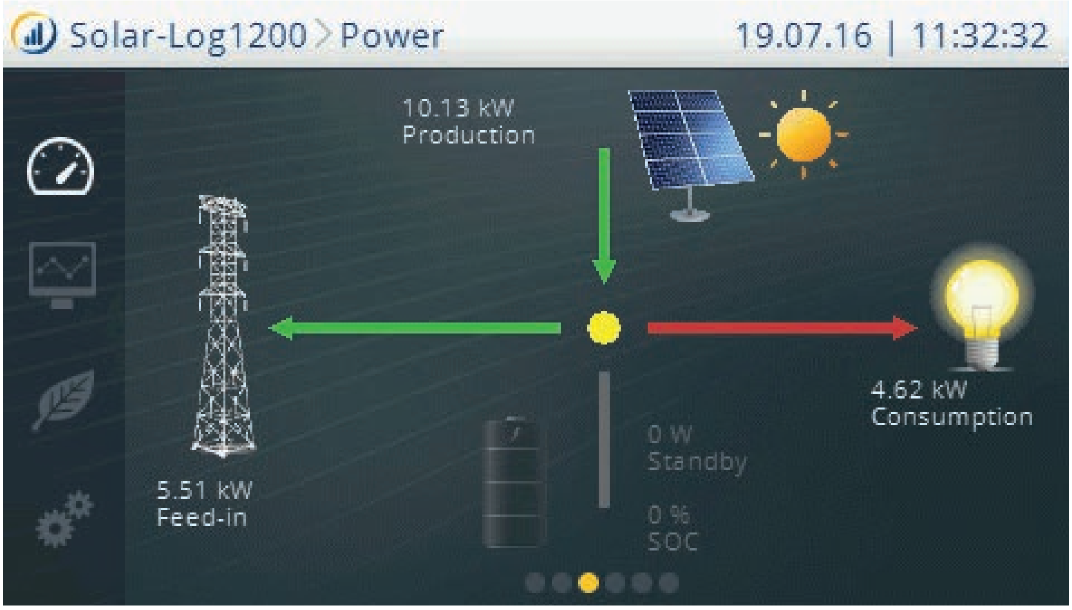


Fig.: Energy flow view

The plant is displayed as a flow graphic in this view.
Depending on the particular devices connected, the following values are displayed in the flow graphic in real time:

- Production (W)
- Consumption (W)
- Grid fed (W)
- Battery Status
  - Charge Status (%)
  - Standby (W)

19.1.3 Accessing the Energy Balance

From the Power menu, you can swipe from the start page to go to the Energy Balance.

Fig.: Energy Balance view

The energy balance is a split-screen window. The top part of the window displays the following values:

Production:

- Current plant production.

Consumption:

- Current power consumption (only with connected meters).

Surplus:

- Current grid feed (only with connected meters).

The bottom window displays the connected appliances with their current consumption values. Use the arrows to display additional appliances.

Note!

All of the devices that are configured as sub-consumers are displayed in this view.

Note!

A maximum of 10 smart plugs can be recognized.

19.1.4 Start Smart Energy

Swipe in the Power menu to go to the Smart Energy section.

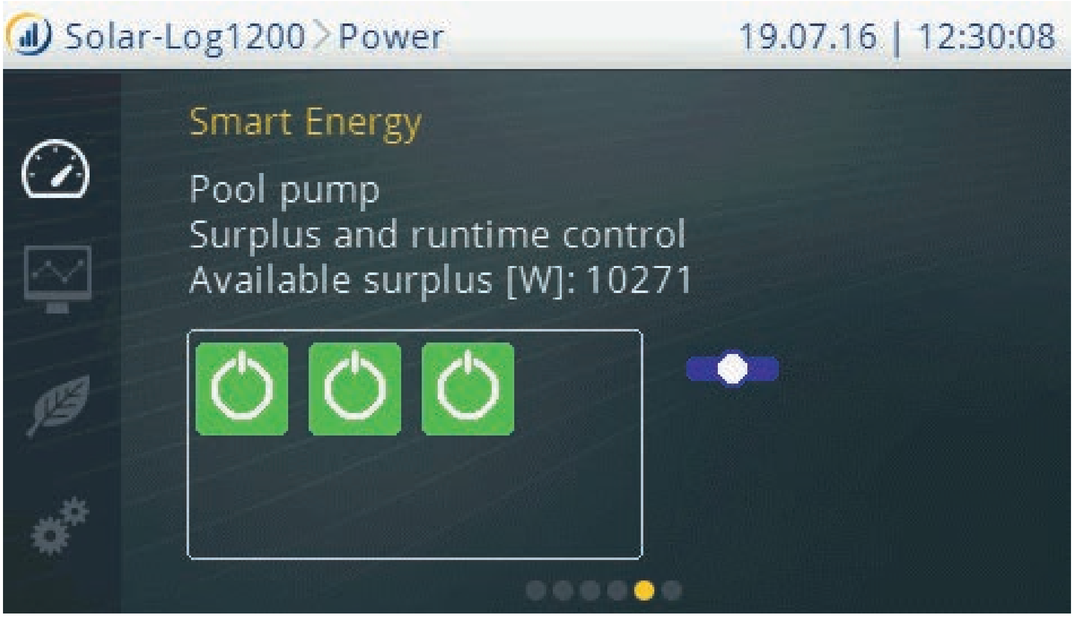


Fig.: Smart Energy view

The switching groups configured in the Smart Energy menu are displayed individually with the following information is this view:

- Switching group name
- Logic type
- Available surplus [W]

Below that, the state of the switching contacts within this switching group are visualized with a colored symbol (refer to Installation Manual, chapter 23.2.1 “Switch states / Color Definition”).

There is a slide switch to the right of the switching contacts to switch the displayed switching group:

- All of the contacts are permanently switched off (switch position “left”).
- The contacts are switched on according to the configured automatic switching rule.
- All of the contacts are permanently switched on (switch position “right”).

Use the arrows to display additional defined switching groups

19.1.5 Accessing Forecast

Swipe in the Power menu to go to the forecast.

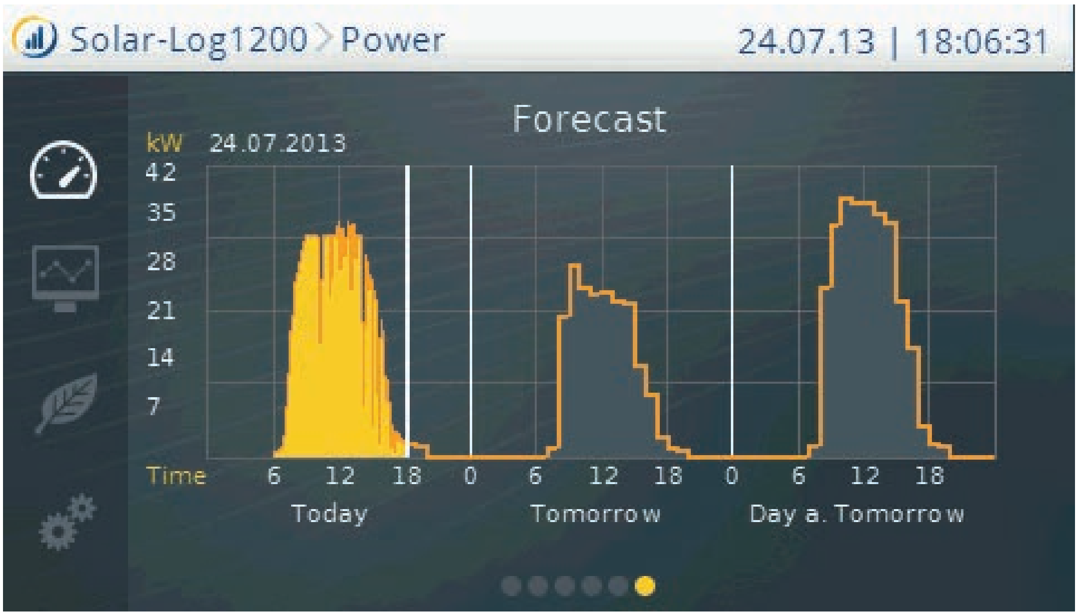


Fig.: Forecast view

The weather data is updated in the morning and in the evening with the Forecast view. The values for the current day and the next two days are calculated based on this data and shaded in gray.

Note!

It is required to be registered and logged into our portal Solar-Log WEB Enerest™ to display the forecast on the Solar-Log™ .

Note!

Plant location and the alignment and inclination of the module need to be configu-red in the portal to receive daily weather updates.
The weather data is transfer to the Solar-Log™ in the morning and in the evening.

19.2 Accessing Yield history

The Yield history is accessed in the left navigation with the Yield History symbol.

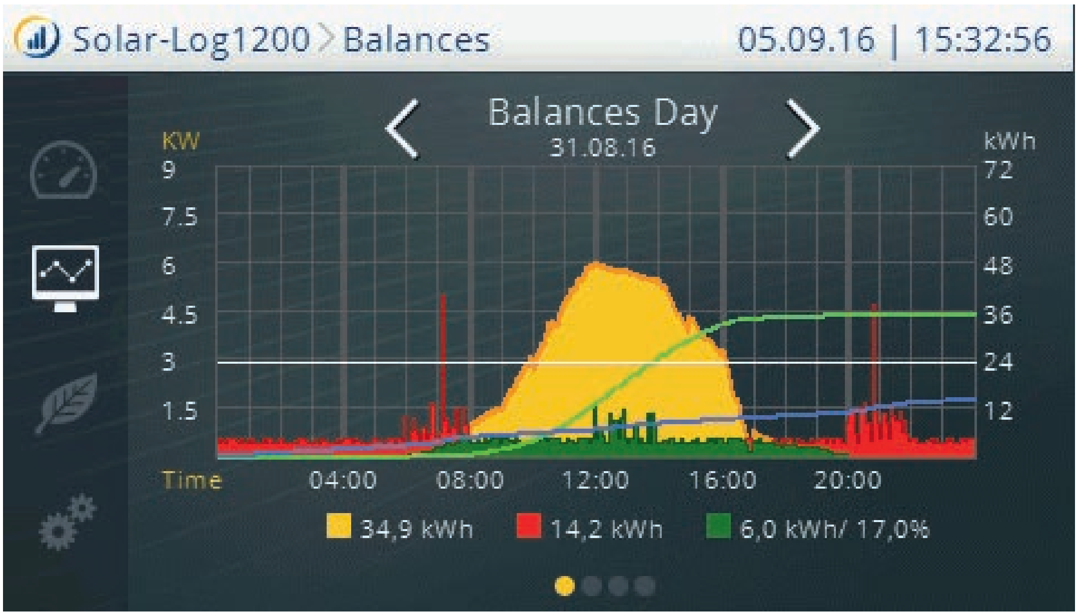


Fig.: Yield History - Balance - Day

The Yield history view is displayed in two sections:
In the top part, you have the option, depending on the display mode (year, month, year), to swipe on the display to go to the exact date.
In the bottom part, you can swipe to the next display mode: day, month, year or total.

19.3 Accessing Environmental performance

The Environmental performance is accessed in the left navigation with the Environmental performance symbol.

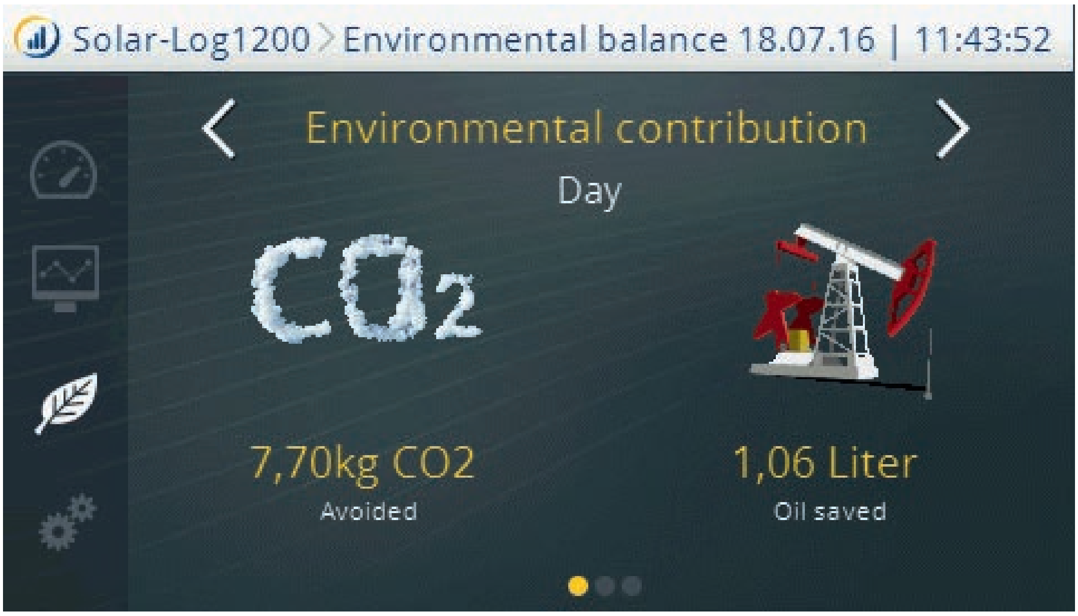


Fig.: Environmental performance - Day view

The Environmental performance view is displayed in two sections.

The top display contains:

- Day
- Month
- Year
- Total

The bottom display contains the values for your plant's environmental contributions:

- Avoided CO2 emissions
- Oil saved
- Reduced nuclear waste
- Trip with an electric car in kilometers
- Trees saved
- Households (energy needs for a family of four)

19.4 Settings on the device

The Settings menu is divided into the following sub-sections:

- Start (only Solar-Log 1200)
- Basic settings
- USB
- Advanced settings

19.4.1 Start menu (only Solar-Log 1200)

The Start menu is divided into the following sub-sections:

- Initial configuration
- Device Detection
- Easy Installation

Initial configuration (only Solar-Log 1200)

The initial configuration is automatically started for the initial setup. However, it can also be started at any time from the Start | Initial Configuration menu.

Procedure:

- After the Solar-Log 1200, 1200 starts, select the system language

Fig.: Display: Initial configuration language selection

- Enter the IP address for the Solar-Log™ in the second step.
  Alternately, check obtained IP address automatically if the Solar-Log™ is connected to a router with the DHCP service enabled.

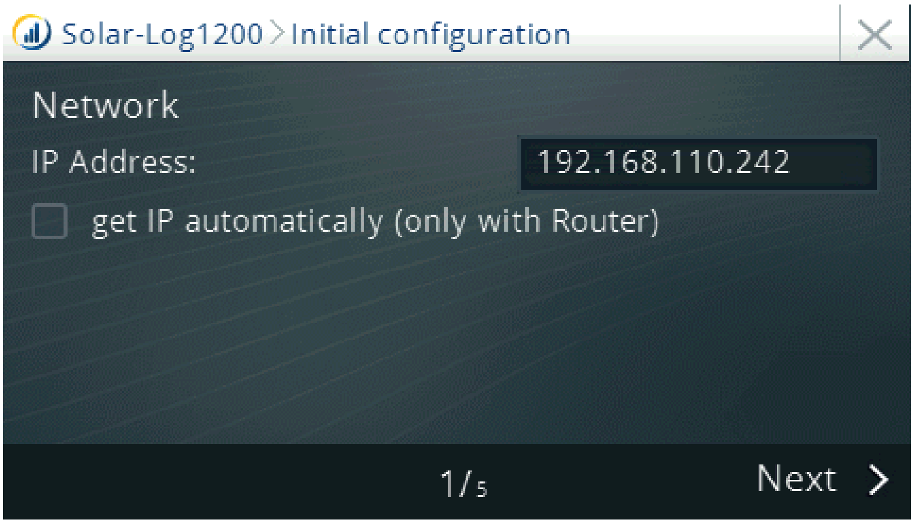


Fig.: Display: IP address settings in the initial configuration

In the next step, select the device class that it to be connected to the interface.

- Go to Add (see illustration "Initial Configuration – Device Selection").
- Select the device or manufacturer in the next window (see illustration "Device Class – Definition").
  Selectable device classes
  - Inverter
  - Sensor
  - Power meter
  - SolarLog Interface
  - Battery
  - Hybrid System

Fig.: Initial configuration – Device selection

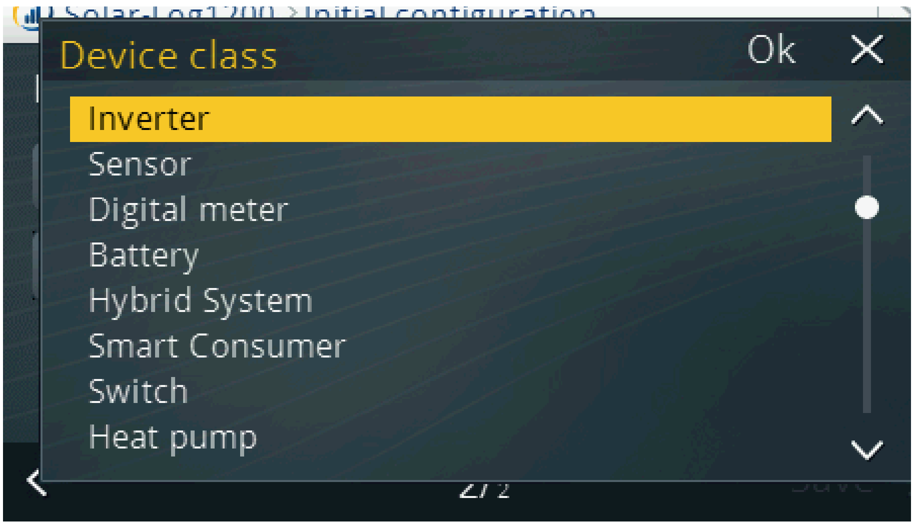


Fig.: Device classes – Definition

The currently supported modules and manufacturers are found in every class type.
Refer to our supported components database on our website for more information:
https://www.solar-log.com/en/support

Note!

For the interface definition, tt is important to note that devices from different manufactures cannot be connected to the sam bus since this can lead to communication problems.

Device class selection based on an example

Inverter selection (example: Bonfiglioli)

Procedure:

- Select the inverter.

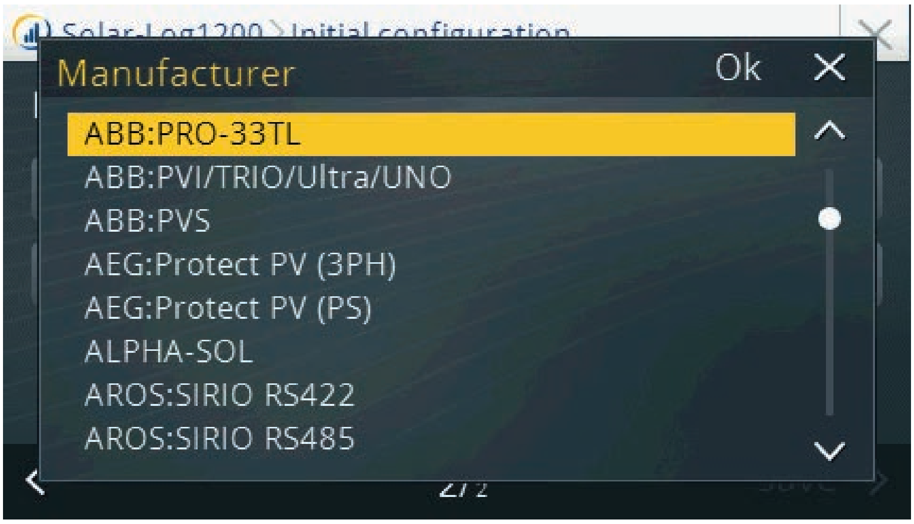


Fig.: Inverter selection

- Defining the interface

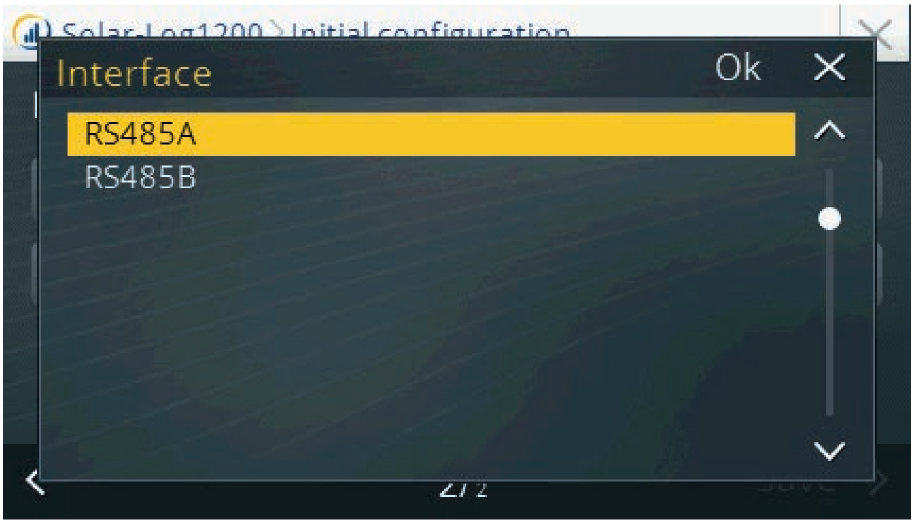


Fig.: Interface definition

- Confirm the inquiry about a possibly connected Wireless Package.

Fig.: Inquary about a connected Wireless Package.

- Configuring the baud rate

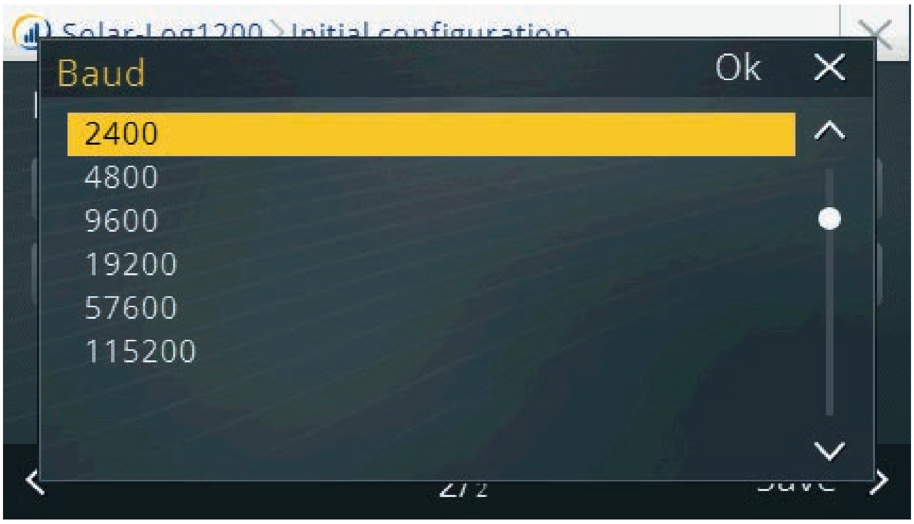


Fig.: Configuring the baud rate

- Click on save after the device definition is completed.

Device Detection (only Solar-Log 1200)

- Access this function from the Configuration | Start | Device Detection menu.
- The components entered during the initial configuration are searched for on each interface of the Solar-Log™.

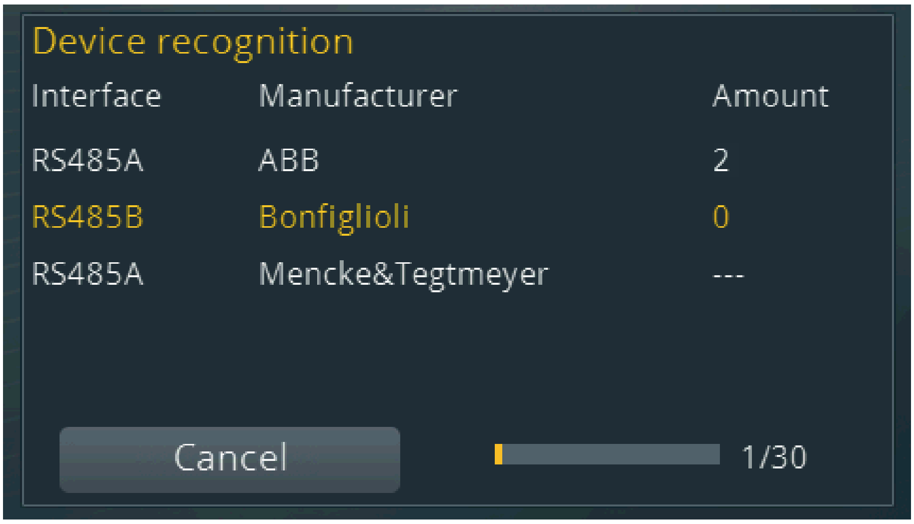


Fig.: Display: Device Detection

- The display Diehl AKO 2 means that two Diehl AKO inverters have been detected. The yellow typeface indicates that additional SMA inverters are being searched for on RS485 B.

- This is also shown in the LCD Display.
  When the inverter symbol is blinking, the number of recognized inverters is displayed.

Fig.: LCD: Number of detected inverters

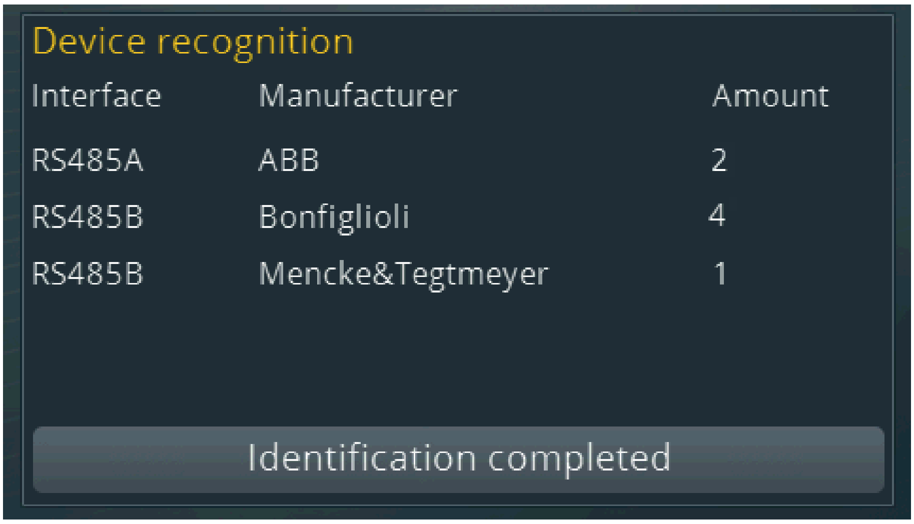


Fig.: Display: Device detection completed

Easy Installation (only Solar-Log 1200)

After selecting the language and country, the initial setup can be carried out with the Easy Installation configuration wizard. Easy Installation can be started for initial setup and carries out the initial set up intuitively step by step.

The Easy Installation can also be performed at any time from the Configuration | Start | Easy Installation menu on the display.

Easy Installation contains the following configuration steps:

Automatic Device Detection

To do this, the inverters must be connected to the Solar-Log™ and feeding into the grid so that the communication module is working. Please note chapter „Country specific inverter detection with Easy Installation“ on page 299.

- Solar-Log™ WEB Internet registration – the device must be connected to a router with the DHCP service enabled.

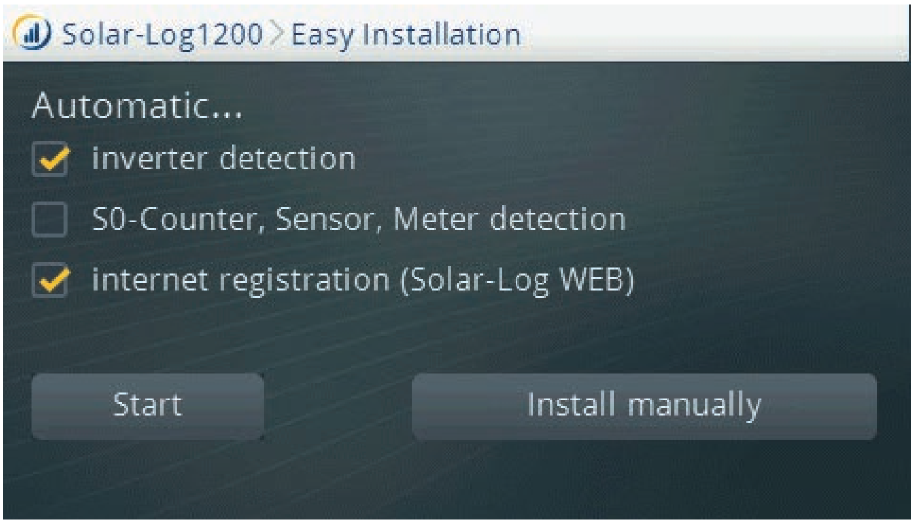


Fig.: Display: Start Easy Installation

For more information, please refer to the Quick Start Guide that came with the device.

19.4.2 Basic settings menu

The Basic settings is divided into the following sections:

- Network
- Portal

Basic Settings | Network menu

The menu Configuration | Basic Settings | Network menu consists of two configuration pages.

Page 1 is divided into the following sections:

- IP Address and Subnet Mask
- Internet access

Page 2 is divided into the following sections:

- Network Router – Obtain IP address automatically (DHCP)
- Gateway and alternate DNS

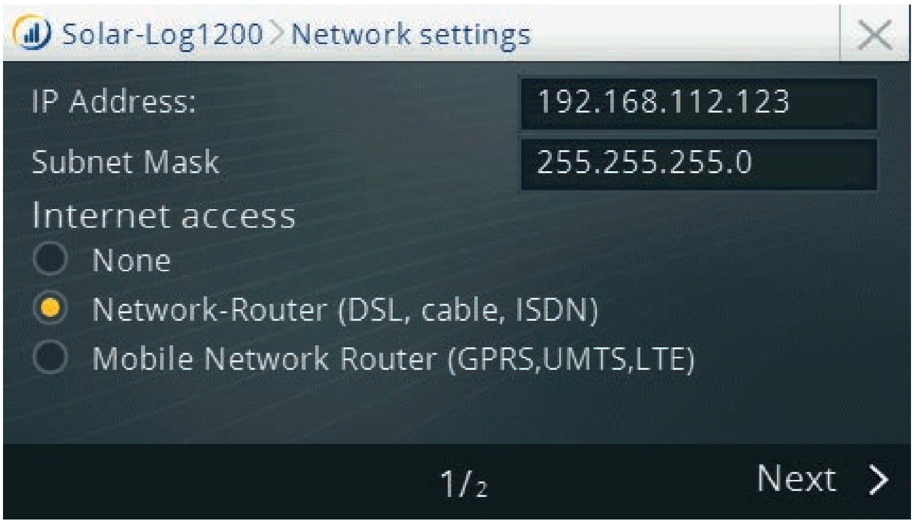


Fig.: Network settings Page1 on Solar-Log 1200 display

Procedure

Configuring the IP Address and Subnet Mask

- Touch the IP address and/or Subnet Mask input box with your finger.
- A virtual numeric keypad appears.
- Enter the desired IP address or Subnet Mask by tapping on the corresponding numbers.
- Tap on OK.
- The values entered are shown in the display.
- Tab on Next or
- End the settings with .
  Then tab the desired option (Save, Discard or Back).

By tapping on Next, the second page of network settings appears.

On the second page of the menu, the

- network router,
- gateway and alternate DNS server can be configured.

The configuration can be saved and ended by tapping on Save or .

Basic Settings | Portal menu

The following selections can be made from this menu:

- Solar-Log WEB Enerest™ transmission activated (the check mark is set by default)
- Server

An HTTP test transmission can be performed from the Server.

Procedure:

1. Enter the address listed in the „Access data“ received in the Server field.
2. Click on Next.
3. After that, start the test transmission by click on the „Connection Test“ button.
   A window with „The transfer is in progress.“ is displayed.
4. After the test is successful, „Status 0 = OK, no error“ is displayed in the same window. Click on Next.
5. In the Status & Test section, now the date and time of the last export are listed in the Date field and „OK“ in the Error (last export) field.

19.4.3 USB menu

The USB connection on Solar-Log™ devices allows data such as firmware, configurations and yield information to be imported and backups to be saved.

The USB menu contains the following functions:

- Save all data
- Import yield data
- Import configuration
- Firmware update

Saving all data section

The function saves all of the inverter data and the configuration file to the USB stick.

Procedure:

- Select Save all data.
- Start Data backup.
- Data is prepared.
- The data is copied to the \backup directory on the USB stick.
- The following files are now saved in the backup folder on the USB stick:
  solarlog_backup.dat
  solarlog_config.dat
- This data can be saved elsewhere as a backup or imported into the Solar-Log™ again.

Importing the yield data section

This function imports the yield data from the solarlog_backup.dat file into the Solar-Log™.

Note!

The Solar-Log™ has to be configured or the configuration file needs to be imported before yield data can be imported.

Procedure:

- Select Import yield data.
- Backup files are searched for on the USB stick that is directly plugged into the Solar-Log™.
- Start this search.
- When a backup is found on the USB stick, click on Next to import it.
- The data is being imported.
  Please wait.
- The Solar-Log™ reboots itself.
- The yield data has been imported.

Importing configuration section

This function imports the configuration file from the solarlog_config.dat file into the Solar-Log™.

Note:

The firmware file needs to be in the USB stick's root directory.

Procedure:

- Select Import configuration.
- Backup files are searched for on the USB stick that is directly plugged into the Solar-Log™.
- Start this search.
- When a configuration file is found on the USB stick, click on Next to import it.
- The data is being imported.
  Please wait.
- The Solar-Log™ reboots itself.
- The configuration file has been imported.

Firmware update section

This function imports a new firmware version into the Solar-Log™ without using a computer.

Solar-Log™ firmware files have the following names:
firmware_2000e_3.6.0-91-18xxx.bin
Note:
The firmware file needs to be in the USB stick's root directory.

Procedure

- Select firmware update.
- A firmware file is searched for on the USB stick that is directly plugged into the Solar-Log™.
- Start this search.
- When a firmware file is found on the USB stick, click on Next to import it.

- The data is being imported.
  Please wait.
- The Solar-Log™ reboots itself.
- The new firmware has been imported

Note!

For technical reasons, only the last 30 days of minute values are saved in a backup. To maintain a permanent record of your data (including minute data), we recommend registering your Solar-Log with our Solar-Log WEB Enerest™ portal.

Note!

As soon as a USB stick has been plugged in, the folder named "Backup" is automatically created on the USB stick. At the end of the day, the Solar-Log™ saves a daily backup with the date in this folder.
=> Up to 10 backups are stored consecutively. Additional backups overwrite the oldest backup. Thus the last 10 days are always saved on the USB stick.

Important!

When importing data from the USB stick, all of the data on the device is deleted and replaced.

Note!

Import the current configuration before importing saved yield data.

19.4.4 Advanced settings menu

The Advanced settings menu is divided into the following sub-sections:

- System
- Firmware
- Language settings
- Date/country settings

System section

The System section contains the following configuration options:

- Page 1
  - Display brightness
- Page 2
  - Slide show dialog
- Page 3
  - Display access control
- Page 4
  - Initializing yield data
  - Initializing device configuration
  - Restore factory settings

Page 1 - Display brightness

The following configurations can be made:

- Turn on at (time)
- Turn off at (time)
- 50% dim (min.)
- 100% dim (min.)
- Dimming when all inverters are offline

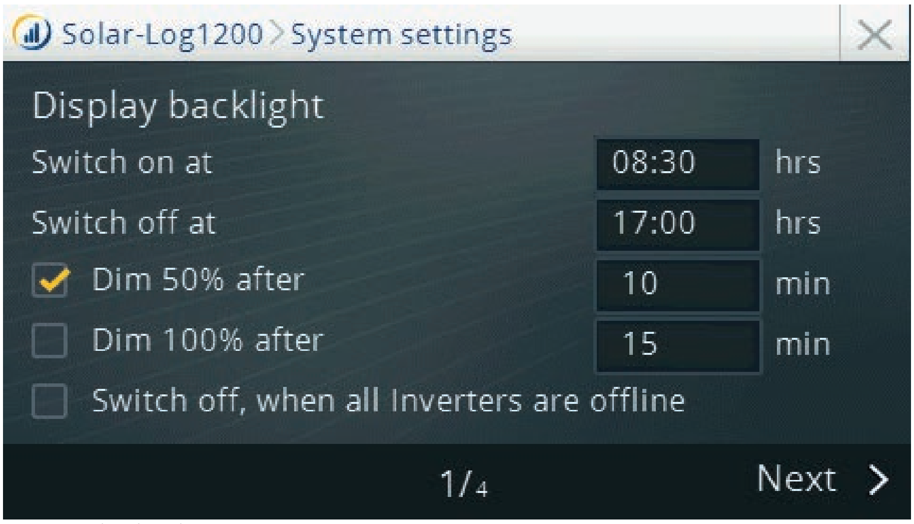


Fig.: Display brightness

Page 2 - Slide show dialog

The following settings are possible:

- Slide show dialog after (min)
- Start screen (screen that is to be displayed when the Solar-Log™ starts)
- Test LCD (test function to see if all of the symbols are displayed on the LCD display)

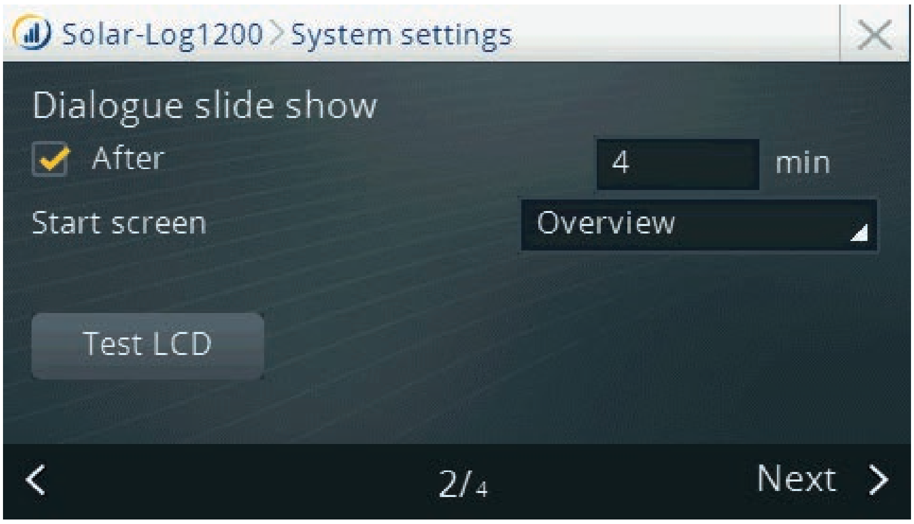


Fig.: Slide show dialog

Page 3 - Display access control

This section offers the following three options for access control:

- PIN code (freely defined PIN code for access to the display. This has to be entered again.)
- Complete display
  The complete display is protected with PIN code entry.
- Settings
  The configuration section is protected with PIN code entry.
- Activate now
  The access control is activated.

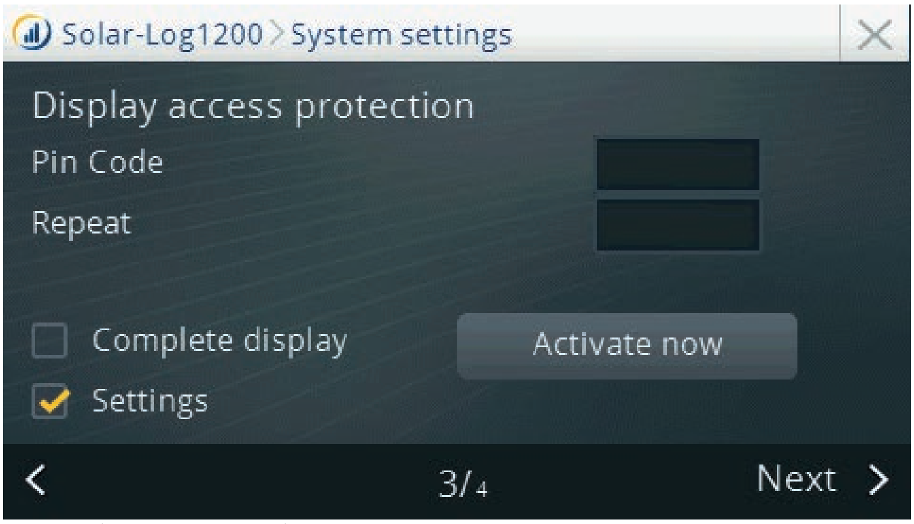


Fig.: Display access control

Page 4

The following functions can be performed from this section:

- Initialize yield data
  All the yield data is deleted.
- Initializing device configuration
  The entire device configuration is deleted.
- Restore factory settings
  The Solar-Log™'s factory settings are restored, all of the settings, yield data and device configurations are lost.

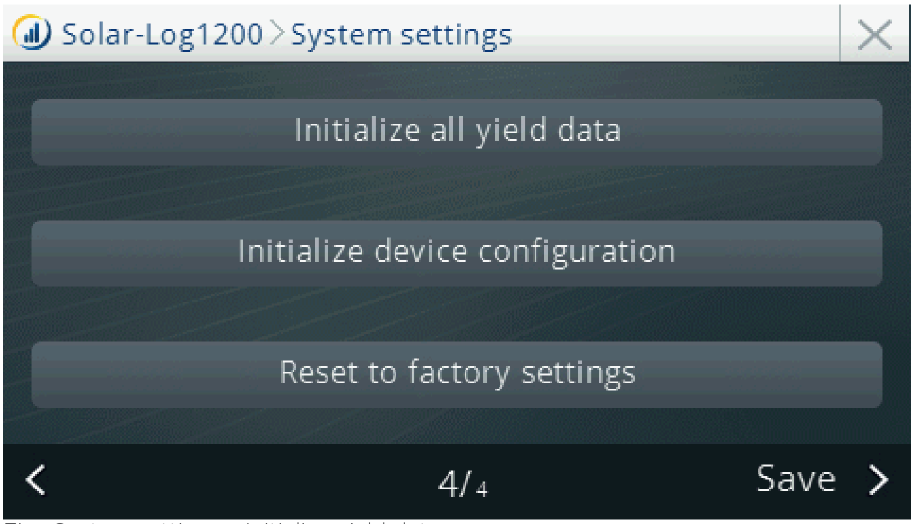


Fig.: System settings – Initialize yield data

Firmware section

This section displays the following information:

- Solar-Log™ serial number
- Installed firmware version

The section has the following functions:

- Check Firmware version automatically
  After activating this function, a firmware version with bugs is automatically updated.
- Check for new firmware now
  When an Internet connection is available, it checks if the device's current firmware version is up-to-date and performs an update if needed.

Fig.: Display Firmware

Language section

The language for the Solar-Log™ can be changed in this section.

Fig.: Language selection

Date/country settings section

The following configuration options are available in this section:

- Country settings
- Timezone GMT
- Date / Time
- Day Light Saving Time settings

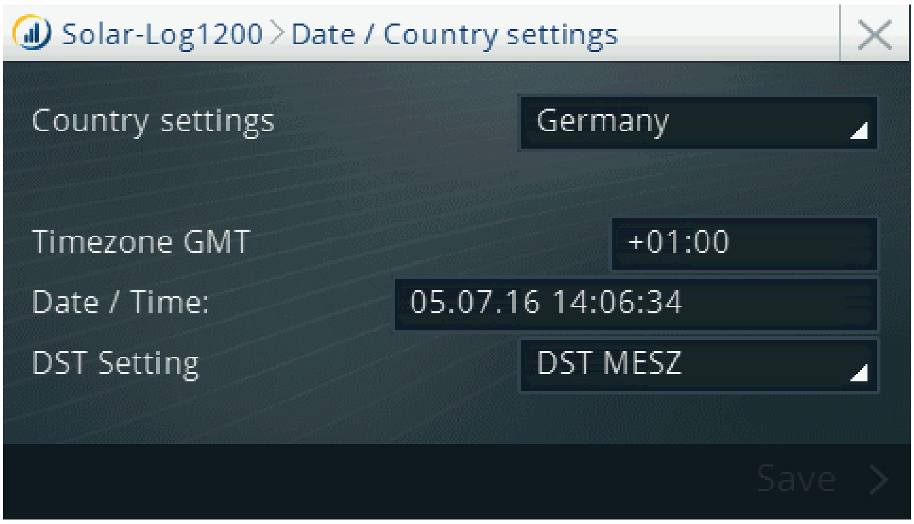


Fig.: Country settings

19.5 Error and Fault Messages on the Display

Error and fault messages on the display can be recognized with the blinking red triangle. (Refer to the figure below.) To view these message, tap on this triangle. A window with the messages opens and includes additional details. Select a message and confirm with OK.
It is enough to just tap on the blinking triangle to acknowledge a relay message.

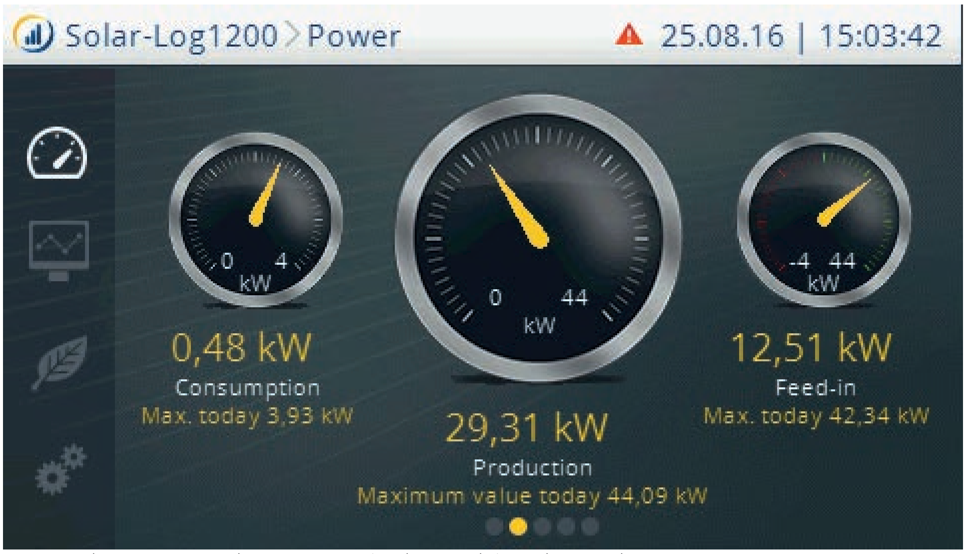


Fig.: Tachometer – with a warning (red triangle) in the top line

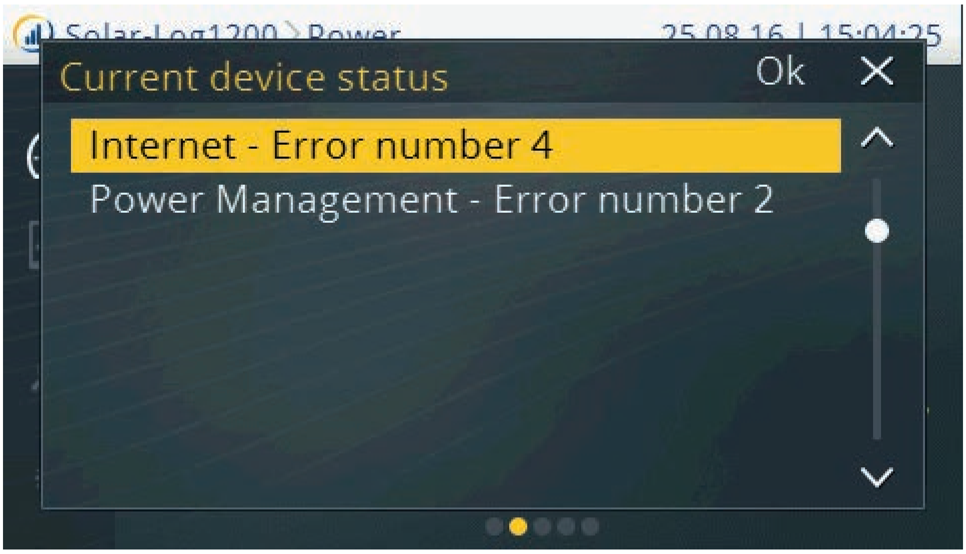


Fig.: Loaded notifications

20 Notifications on the LCD Status Display (Solar-Log 250, 300, 1200 and 2000)

The Solar-Log 250, 300, 1200 and 2000 have an LCD status display for notification on the during installation and operation.

20.1 Meaning of the symbols on the LCD display

The following symbols are shown on the Solar-Log™ LCD display:

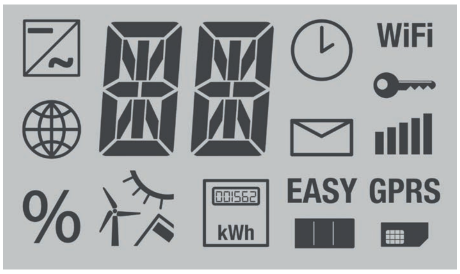
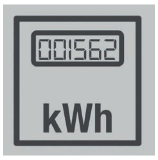


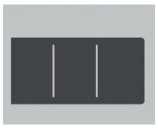
Fig.: LCD display - All symbols active

Meaning of the symbols on the LCD display

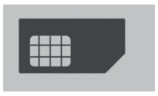
Symbol	Meaning
	Inverter
	Internet or Network
	Firmware update progress
	Sensors for - Irradiation - Wind - Temperature



Meter



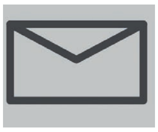
Booting progress



SIM card

Easy Installation active

GPRS available



Notifications from the Solar-Log™

Signal strength
in combination with GPRS,
WiFi or Bluetooth

Encrypted WiFi connection

Wireless Internet

Time

Input box for fault codes

Fig.: LCD Display - Meaning of the symbols

In this manual, the blinking symbols are depicted like this:

Fig.: Blinking Internet symbol

20.1.1 Fault messages

Fault messages from the connected devices

If a device cannot be contacted by the Solar-Log™ (offline), the respective symbol blinks.
OK is not displayed.

Fault codes for connected devices

The respective component symbol blinks and an "E" is in the first position of the text box.
A blinking code is displayed in the second position of the text box. The fault code sequence always starts with "R." That is followed by a blank and then the code numbers are displayed in the sequence.

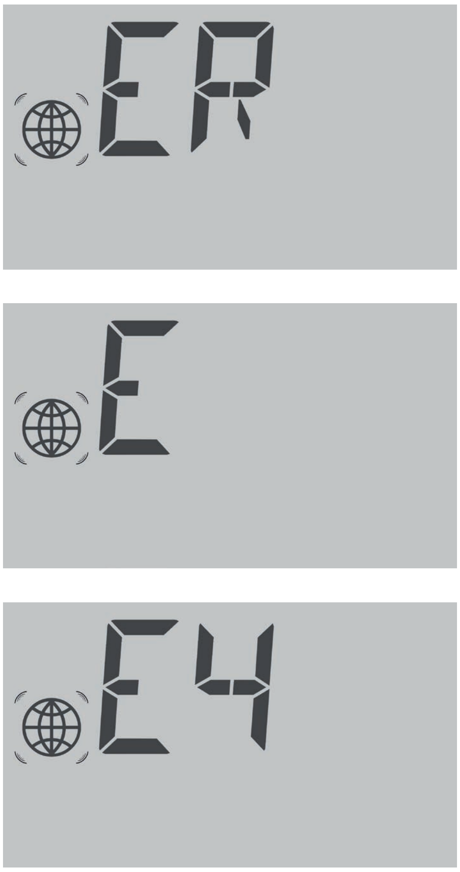


Fig.: Example for a blinking code sequence for Internet - Fault 4

20.2 Notifications on the LCD display

There is a difference between the Easy Installation mode and normal operation in regard to the notifications on the LCD display.

20.3 Normal operation

The symbol for the connected components is continuously illuminated.
When there are no problems or faults, OK is displayed.

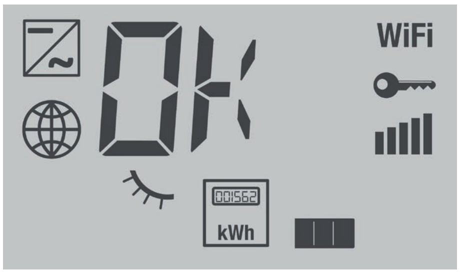


Fig.: LCD display during normal operation

Explanation:

The following devices are connected: inverter, irradiation sensor and meter
Communication: WiFi encrypted, strong signal and Internet communication established.

20.4 Power reduction

When a power reduction (<100%) is active, this is indicated on the LCD or VLC display (left display field of the Solar-Log™ WEB interface). It is indicated even when it is just a fixed reduction.

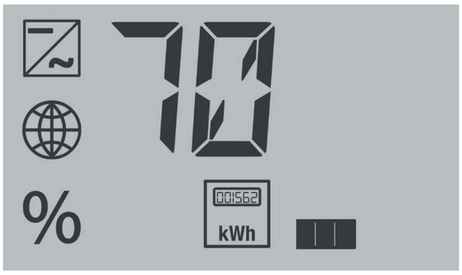


Fig.: Display 70% fixed reduction

21 Faults

21.1 Restarting and resetting

21.1.1 Reset buttons

Effects of reset button:

- Device is restarted (reset)
- Factory settings are restored

The reset button is located on the top of the housing.

If the cover is in place, it must be removed to allow access to the reset button.

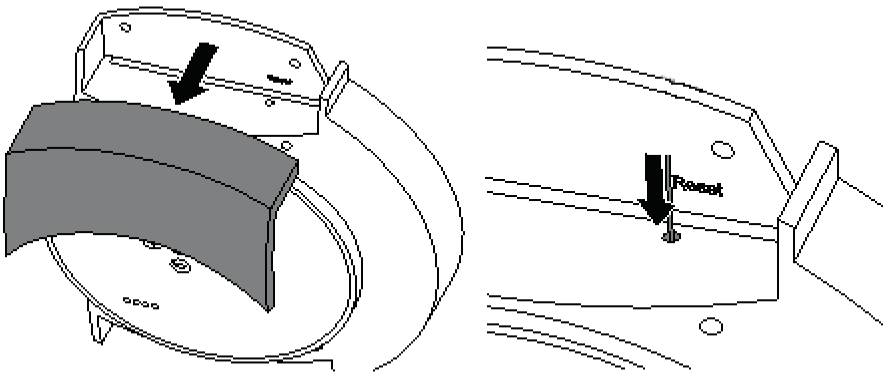


Fig.: Reset buttons

21.1.2 Reset

A reset is necessary if Solar-Log™ is no longer responding to inputs from control buttons or from the PC. All settings made on the unit are maintained, as well as all data collected during run-time.

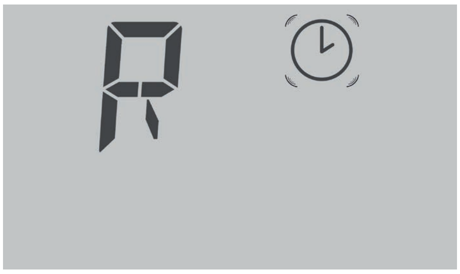
Note!

If the IP address is changed, Solar-Log™ restarts automatically when the new address is saved.

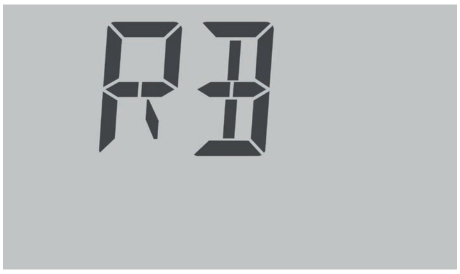
Restarting

Press the reset button with a paper clip or similar pointed object

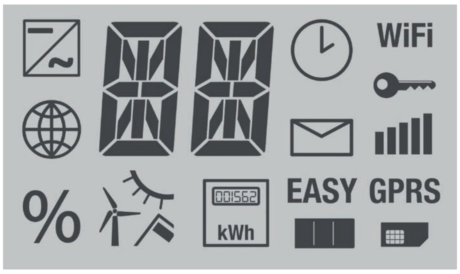
- The Solar-Log™ beeps and the following is displayed on the LCD:



- After about 5 seconds, the Solar-Log™ beeps three times and the following is displayed:



- Now release the button, the following is then displayed



- The Solar-Log™ reboots itself.

Under no circumstances should the power plug simply be disconnected. Do not restart by pulling out the power plug!

21.1.3 Restoring the factory settings

Restoring the factory settings is necessary if Solar-Log™ is to be used on another system or if an incorrect configuration is being deleted.
All settings made on the unit are lost, as well as all data collected during run-time. It is therefore advisable to back up the data before resetting:

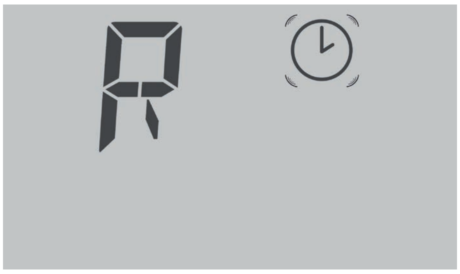
- System (See Chapter 16.5.3).
- Data (See Chapter 16.5.4);

Status after restoring factory settings
Time: Retained
IP address: Retained with Solar-Log 1200 and 2000, DHCP active with Solar-Log 300
Passwords: Deleted
Configuration data: Deleted
Yield data: Deleted

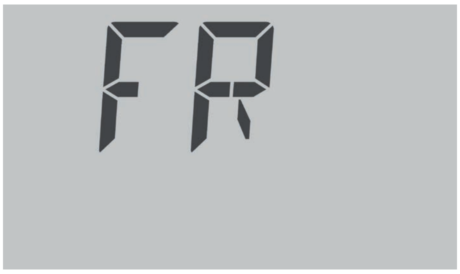
Restoring the factory settings

Press and hold the reset button with a non-conducting pointed object

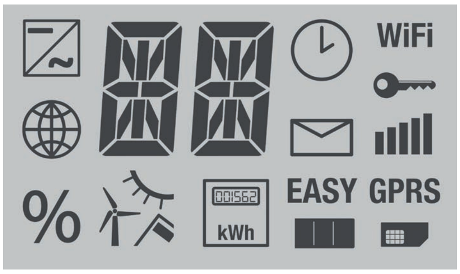
- The Solar-Log™ beeps and the following is displayed on the LCD:



- After about 15 seconds, the Solar-Log™ beeps three times and the following is displayed:



- Now release the button, the following is then displayed



- The Solar-Log™ is reset to the factory settings
- Reboot the Solar-Log™ with the new initial configuration

After the reset button is released, it is still possible to stop the reset to factory settings:

- Press the reset button again within the first 5 seconds of the initialization phase.

21.1.4 Rebooting and Resetting via the web menu

Resetting the inverter configuration and deleting yield data:

See Chapter 16.5.5.

21.2 Fault messages

21.2.1 Fault messages GPRS

These fault messages are shown in the LCD display and also in the Status box under Configuration | Network | GPRS.

Fault messages GPRS

Error code	Message	Possible cause/remedy
		
-101	Too many failed attempts	After several failed attempts, the modem goes into an error state. Reboot the device and observe which fault code is displayed first.
-111	Wrong parameter	No SIM pin, user name or password was entered. Enter these parameters even if they are not needed. (e.g. 0000 for the pin or "user" for the user name)
-135	Connection error	There is no GSM network coverage or the signal is too weak. The antenna has not been properly attached.
10	No SIM card	No SIM card has been inserted. The SIM card has not been inserted correctly.
11	Pin required	No pin or the wrong pin has been entered. The pin lock has not been removed.
12	PUK required / card locked	Possible causes: • The wrong pin has been entered three times. • The SIM card has not yet been unlocked.
16	Wrong password	Enter the correct APN password.
111	Connection to the network not allowed	The SIM card cannot find an allowed network. Try connecting to other providers.
268	Roaming required	To connect to the network the roaming option is required, but is currently deactivated.

21.2.2 Fault messages time

These fault messages are displayed on the LCD display

Fault messages Time		
Error code	Message	Possible cause or remedy
		
1	No time/date set	Set the time and date or use the automatic time synchronization function
TM		Just like error 1 The names have been changed with Firmware 3.0.2.

21.2.3 Fault messages WiFi

These fault messages are shown in the LCD display and also in the Status box under Configuration | Network | WiFi.

Fault messages WiFi		
Error code	Message	Possible cause/remedy
		
10	Initialization error	
11	Incorrect WiFi configuration	Please check if all of the required parameters were configured.
12	Error while initializing the wireless LAN module	Potential hardware failure. Contact technical support
20	Error while connecting	The signal is too weak. Other network signals are interfering with the connection.
21	No access point found	The access point is turned off or not available. The SSID was entered incorrectly.
30	Authentication failure	The network key entered is incorrect. The encryption type entered is wrong.
99	Unknown error	An unexpected error occurred. If this error continues to occur, contact our technical support.

21.2.4 Fault messages Internet

These fault messages are displayed on the LCD display.
The Internet symbol blinks and the corresponding error code is displayed.

Fault messages Internet

Error code	Possible cause or remedy
	
1	Check the Internet connection and network configuration.
2	The active DNS server configured under Configuration | Network | Ethernet is not available. Check the configurations.
3	No DNS server available Check the configurations and make sure that the correct DNS server has been entered.
4	The configured DNS server is not available. Please enter the correct DNS server.
5	DNS server could not resolve the server address. Check the DNS server and the server address.
7	Wrong APN entered. (Only GPRS devices)

21.2.5 Fault messages Export to External Server and Backup

These messages are shown in the Status box under Configuration | Network | Export and Configuration | Network | Backup .

Fault messages export (FTP)

Error code	Message	Possible cause or remedy
101	The server address could not be resolved.	The access type was not configured. An alternative DNS server is required. The wrong server was entered. The network connection was disconnected and could not be reestablished.
102	Cannot open socket.	Possible causes: Unknown. If this error continues to occur, contact our technical support.
103	Cannot connect to the socket.	Possible causes: The connection is blocked by a firewall or a router. The wrong server was entered. The server is offline.
104	"No response from the server."	There is a fault on the FTP server.
105	Wrong response from the server.	The FTP server used is not supported or not configured properly.
106	User / password incorrect.	The user name or password for FTP access was entered incorrectly.
107	Wrong directory.	An incorrect directory was set for the transfer.
108	Unable to send the backup file	The connection was closed. The speed was too limited. Not enough disk space is available.
109	Too many users	Too many users are logged in with this account.
110	Log in error	Unspecified log in error
111	Error with the remote file names	This is an internal error. Contact support.
112	Error when setting the representation type.	The FTP server used is not supported or not configured properly. Use another FTP server or check the configuration.
113	Error when setting the passive mode.	The FTP server used is not supported or not configured properly. Use another FTP server or check the configuration. The connection is being blocked by a firewall => make the necessary firewall configurations to allow the connection. There is a problem with the Internet connection => check if there is a problem with the settings or with the connection in general.
114	Socket could not be opened.	This is an internal error => create a diagnosis report from the Diagnosis | Report and send it to support.
115	IP address could not be changed.	This is an internal error => Contact support.

Fault messages export (FTP)

Error code	Message	Possible cause or remedy
116	Socket could not be connected.	The connection is being blocked by a firewall => make the necessary firewall configurations to allow the connection. Server overloaded => try again later.
117	Unknown error	
118	STOR failed.	There is a fault on the FTP server => try again later. => Restart the server. => Check free space on the server.
119	File could not be opened.	This is an internal error => Contact support.
120	Time exceeded, no answer	Server overloaded => try again la-ter. The connection is being blocked by a firewall => make the necessary firewall configurations to allow the connection.
121	Time exceeded, transmissi-on error	Server overloaded => try again later. The Internet connection has been disrupted. => Check the Internet connection.
122	No answer	
123	Transmission failed.	An FTP server error occurred => try again later. Restart the server. => Check free space on the server.
124	Incorrect number of bytes transferred.	Server overloaded => try again later. There is a problem with the Internet connec-tion => check if there is a problem with the settings or with the connection in general.
131 - 144	Connection error	This can occasionally happen with GPRS connections. Try it again. The network cable has a loose connection. There are problems with your Internet connection.
150	Error when renaming the remote file	Multiple access attempts => ter-minate other connections to the FTP server.
160	The proxy NTML domain is not in the user name	The user name with NTML authentication has to have the format domain\user.
161	Proxy NTLM authentication failed	There is a problem with the NTLM authentica-tion. Check the proxy user and password.
162	No proxy NTLM challenge received	The proxy server did not send a challenge. Check the proxy settings.
163	Proxy could not reserve the buffer	Internal error. Create a diagnosis report and contact support.
164	Proxy basic authentication failed	There is a problem with the authentication. Check the proxy user and password.

Fault messages export (FTP)

Error code	Message	Possible cause/remedy
165	Proxy no authentication header	The proxy server did not request a supported authentication set to switch to basic or NTLM.
166	Proxy unexpected server reply	Check the proxy settings.
199	Last transmission attempt failed but no known error.	This is an internal error. => Contact support.
200	Error when creating files	Incorrect serial number. Error during firmware update.
222	HTTP transfer to the same server	The HTTP and FTP transfer have been confi-gured with the same server. Please enter only the transfer type that was configured for the portal.

21.2.6 Fault message e-mail transfer

These fault messages are shown in the LCD display and also in the Status box under Configuration | Net-work | E-mail.

Fault message e-mail transfer

Error code	Message	Possible cause/remedy
		
General error when sending e-mail		
1	DNS error	Type of Internet access set to "None" => Set the correct access type. An extra DNS server must be entered. => Enter correct DNS. There is no connection to the network. => Check the cable.
2	User / password incorrect.	The user name or password for SMTP access was entered incorrectly => Double check the password if entered correctly
3	Cannot connect to the socket.	The connection is blocked by a firewall. => Adjust the firewall settings. The server is overloaded. => Try again later.

Error when sending e-mail via a secure connection		
51	SSL session could not be established.	This is an internal error. => Contact support if this error continues to occur.
52	Could not set SSL proposals	This is an internal error. => Contact support if this error continues to occur.
53	Could not set TCP option SSL_CLIENT	This is an internal error or the e-mail server or security settings do not support the port entered. => If this error continues to occur, contact support or use a supported e-mail server.
54	Could not set TCP option SSL_SESSION	This is an internal error or the e-mail server or security settings do not support the port entered. => If this error continues to occur, contact support or use a supported e-mail server
55	Could not start SSL client	This is an internal error or the e-mail server or security settings do not support the port entered. => If this error continues to occur, contact support or use a supported e-mail server
56	Error with SSL Handshake	The e-mail server or security option is not supported at the port entered. => Use a supported e-mail server or check the options for sending secure e-mail.
57	No SSL port?	The e-mail server or security option is not supported at the port entered. => Use a supported e-mail server or check the options for sending secure e-mail (wrong port?).
General / Group error when sending e-mail		
98	Canceled due to previous errors	E-mail send aborted due to previous errors (there are several e-mails to send, but the send failed with the first e-mail. This error is entered for all of the following e-mails rather than trying to send them as well). => Try to solve the problem based on the error message from the first e-mail sent.
99	Unknown error	The cause of this problem could not be determined. => Contact support if this error continues to occur.

21.2.7 Portal Transfer Fault messages

Portal Transfer Fault messages

Error code	Message	Possible cause/remedy
101	The server address could not be resolved.	The access type was not configured. An alternative DNS server is required. The wrong server was entered. The network connection was disconnected and could not be reestablished.
102	Cannot open socket.	Possible causes: Unknown. If this error continues to occur, contact our technical support.
103	Cannot connect to the socket.	Possible causes: The connection is blocked by a firewall or a router. The wrong server was entered. The server is offline.
104 and 106	Connection error	This can occasionally happen with GPRS connections. Try it again. The network cable has a loose connection. There are problems with your Internet connection.
220	Authentication failure (portal)	The portal registration was done incorrectly. The portal was not configured for HTTP transfers. The wrong server was entered.
222	Connection to the server, but not response to request	Check the portal server entered. This can occasionally happen with GPRS connections. Try it again.
Other	General errors	There is detailed description of this error. If this error continues to occur, contact our technical support.

.

21.2.8 Fault messages Feed-in Management

These fault messages are displayed on the LCD display.

The percentage symbol blinks and the corresponding error code is displayed.

Fault messages
Feed-in Management

Error code	Possible cause/remedy
	
1	Undefined status for the PM+ interface or an invalid channel setting for the active and reactive power management. => Check the wiring and configuration.
2	Communication error with the I/O Box => Check the wiring and the power supply for the I/O Box. => Check the interface selected under Configuration | Special Functions | Feed-in Management | Profile.

21.2.9 Special cases

The e-mail symbol blinks

There are unread notifications. These can be read from

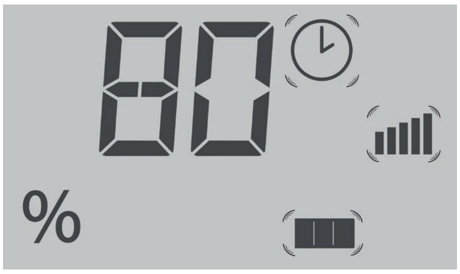
- the  display (only Solar-Log 1200 and 2000) or
- in the browser from the Diagnostic | Event Log

menu.

Firmware update

During a firmware update, the installation status is shown on the LCD display.

Step 1 of the firmware update:



Step 2 of the firmware update: The progress is displayed as a percentage.

After the firmware has been completely imported, the Solar-Log™ reboots itself and BOOT in displayed in the text field.

22 Cleaning and care

22.1 Cleaning tips

Important!

Be sure to unplug the device prior to cleaning it!

- Clean the device on the outside only with a dry, lint-free cloth.
- If the device is very dirty, it can be cleaned with a slightly damp cloth and a commercially available household cleaner.

Important!

When cleaning, make sure that no moisture gets into the device!

22.2 Care tips

- Make sure that the device is not exposed to any moisture at the location where it is kept.
- Make sure that the device is not exposed to any heat or strong sunlight at the location where it is kept.
- Please take note of the Technical Data.

23 Disposal

Warning!

Solar-Log™ contains electronic components that can release highly toxic substances if burned or disposed of along with domestic waste.

Please send the Solar-Log™ back to the manufacturer:

Solare Datensysteme GmbH
Fuhrmannstraße 9
72351 Geislingen-Binsdorf
Germany

24 Technical Data

	Product comparison	Solar-Log 300	Solar-Log 1200	Solar-Log 2000
Basic functions	PM+ [2]	●	●	●
	PM+ / WiFi [2]	●	●	-
	PM+ / GPRS [2]	●	●	●
	Bluetooth (BT) [2]	●	●	-
	WiFi (Wireless LAN)[2]	●	●	-
	Bluetooth (BT) / WiFi [2]	●	●	-
	GPRS [2]	●	●	●
	Solar-Log™ Meter (CT)	●	●	-
	Central inverter SCB and SMB	-	-	●
	Communication interface	1 x RS485 / RS422 (one INV manufacturer per bus)	1 x RS485 1 x RS485 / RS422 (one INV manufacturer per bus)	1 x RS485, 2x RS485 / RS422, 1 x CAN (one INV manufacturer per bus)
	Max. plant size	15 kWp / one INV manufacturer	100 kWp max 2 inv. manufacturer	2000 kWp up to 3 inv. manufacturer
	max. cable length	max. 1000 m [1]	max. 1000 m [1]	max. 1000 m [1]
Plant monitoring	MPP tracker monitoring (depending on inverter type)	●	●	●
	Inverter failure, status of fault and power monitoring	●	●	●
	Sensor system connection (irradiation/ temp./ wind)	● [3]	● [3]	● [3]
	E-mail and Text Message (SMS) Alarm	●	●	●
	Alarm (local)	-	-	●
	Yield forecast and degradation calculation	●	●	●
	Self-produced energy consumption: Digital electricity meter	●	●	●
	Self-produced energy consumption: Managing external appliances	●	●	●

	Product comparison	Solar-Log 300	Solar-Log 1200	Solar-Log 2000
Visualization	Integrated web server	●	●	●
	Graphic visualization – PC local and Internet	●	●	●
	LCD Status Display	●	●	●
	Display on the device	-	4.3″ TFT color display	4.3″ TFT color display
	Controls on the device	-	via touch screen	via touch screen
	Large external display RS485 / S_0 pulse	●	●	●
Interface	Ethernet network	●	●	●
	USB flash drive	●	●	●
	Potential-free contact (relay)	-	●	●
	Alarm contact (anti-theft)	-	-	●
General Data	Input / Output voltage Power consumption	115 V – 230 V / 12 V / 3 W		
	Ambient temperature	-10 °C to +50 °C		
	Housing / dimensions (W x D x H) in cm / Mounting / protection level	Plastic / 22.5 x 4 x 28.5 / Wall-mounted / IP 20 (indoor use only)		
	Connection to Solar-Log™ WEB "Commercial Edition"	●	●	●
	Multi-lingual (DE, EN, ES, FR, IT, NL, DK)	●	●	●
	Memory, Micro-SD, 2 GB, Endless-loop data recording	●	●	●
	Warranty	2 years		

1) Depending on the inverter used, and the cable length (details can also vary from one type of device to another).
2) Other important information about Bluetooth and compatibility, Power Management, self-consumption and SCB and SMB inverters can be found on our website www.solar-log.com.
3) Using every inverter on the same bus is not always possible, please see the inverter database at solar-log.com.

Top Features	Solar-Log 300	Solar-Log 1200	Solar-Log 2000
LCD Status Display	Status display for installation and operations		
Easy Installation	Installation is possible without PC and installation expertise.		
	The inverter detection and Internet registration is enabled by default and is started automatically.	Query for additional information, then automatic inverter detection and Internet registration.	-
Network recognition	Automatic search for the DHCP server and assignment of a valid IP address on the local network.		
Local network accessibility	Registration is done with its name. The IP address of the Solar-Log™ no longer needs to be known unless there are several Solar-Logs in the network. The Solar-Log™ can be accessed directly from a web browser with this address: http://solar-log.		
Additional functions	Monitoring, optimization and managing of self-consumption with a fixed regulation of active power including the calculation of self-consumption.		
	Evaluation of Sensor Box Commercial data		
	-	-	Monitoring of central inverters
Solar-Log™ Meter	Monitoring, feed-in management and power meter.		-
Support for the Solar-Log™ SCB/SMB	-	-	Individual string monitoring
Solar-Log™ PM+ functionality	Remote controlled active power reduction and reactive power adjustments		Monitoring large plants with support from the Solar-Log 2000 or Solar-Log 2000 PM+ with active power reduction and reactive power control along with response signals.

	Interfaces	Solar-Log 300	Solar-Log 1200	Solar-Log 2000
Inverter interface	RS485/RS422 – interface usage	RS485 / RS422 – combined interface usage	RS485 – interface, RS485 / RS422 – combined interface usage	RS485 A – interface, RS485 / RS422 B – / RS485 / RS422 C* - combined interface usage
	RS485 – interface usage	Inverter connection		
		Connection of a Sensor Basic to record environmental data (irradiance and module sensor)	Connection of a Sensor Box Commercial to record environmental data (irradiance, module and ambient temperature, wind sensor)	
		Connection of meter for self-consumption according to IEC 60870		
		-	Connection of the display panels produced by Schneider Displaytechnik, Rico or HvG	
		-	-	Connecting the Utility Meter and I/O Box for PM remote control technology
	RS422 – interface usage	RS 422 Fronius / Sunville connectible without additional interface converters		
	CAN bus	-	-	For example, connecting Voltwerk INV
Additional function interfaces	2x S_0 In / 1x S_0 Out	S_0 pulse input – for optional recording and calculation of self-produced power consumption.		
		Second input to connect an additional power meter.		
		S_0 pulse output to connect large external displays, pulse factor can be set to any value.		
	Relay	-	External switch control e.g. heat pumps	
	Alarm	-	-	Connection for anti-theft protection via contact loop for external alarms via potential-free contact
	USB connection	To access data		
		Import firmware updates at plants		
	PM+ interface (optional)	PM+ (Power Management)		
		For the connection of a ripple-control receiver to regulate the plant.		
		Fulfills the EEG 2012 requirements.		
	Solar-Log™ Meter (optional)	Current measurements via transformers (extra accessory) up to 2 x 3 phases or 6 single phases.		
Network	Network	Connection to the Internet (Ethernet, fixed IP address or DHCP)		
	GPRS (optional)	Antenna connection and SIM card slot for Solar-Log™ with integrated GPRS.		

* not with GPRS models

25 Appendix

25.1 Internet ports

If the Solar-Log™ is connected to the Internet via a router, you must ensure that the following ports on the router have been unblocked for the Solar-Log™:

Function	Protocol	Port (outgoing)	Server used	Notes
Name resolution	DNS	53	According to the network configuration or 8.8.8.8 (Google Public DNS) when the name cannot be resolved with the dedicated DNS.	Normally, only the name server from the local network is used.
Time synchronization	NTP	123	0.pool.ntp.org to 3.pool.ntp.org ntps1-1.cs.tu-berlin.de bonehed.lcs.mit.edu navobs1.gatech.edu 130.149.17.8 130,207,244,240	This function ensures that the correct time is always in the logs. The Solar-Log™ has an internal clock, but it losses the time during a long power outage.
Easy Installation (WEB)	HTTP	80	pool0.solarlog-web.com to pool9.solarlog-web.com	A ping test is performed by the Easy Installation to test the Internet connection and if the DNS server functions.
	ICMP	-	solar-log.com	
FTP Export	FTP	21 (and others)	According to the configuration.	Since it is a passive FTP connection, additional ports beyond 21 are required, depending on which FTP server is used (High Port > 1023).
FTP Backup	FTP	21 (and others)	According to the configuration.	Since it is a passive FTP connection, additional ports beyond 21 are required, depending on which FTP server is used (High Port > 1023).
HTTP Export	HTTP	80	According to the configuration.	
Sending E-mails	SMTP	25 or 465 or 587	According to the configuration.	Depending on which SMTP server is used, other ports could also be required.
Firmware update	HTTP	80	pool0.solarlog-web.com to pool9.solarlog-web.com	

25.2 Country specific inverter detection with Easy Installation.

After selecting the language and country, the initial set up can be carried out with the "Easy Installation" configuration wizard.
This configuration wizard automatically detects connected inverters and completes the Internet configuration.
Please refer to the table below for the available countries and corresponding inverters.
If a particular country is not listed, the "Easy Installation" configuration wizard searches for all compatible inverters (This process may take some time).
For GPRS devices, the inverter detection is only carried via "Easy Installation" and no Internet configuration is performed.

Country	Inverter brand
Germany	SMA/PowerOne/Kaco/SolarMax/Fronius
Spain	SMA/Fronius/PowerOne/SolarMax
France	SMA/Fronius/PowerOne/RefuSol/SolarMax
Italy	SMA/PowerOne/Fronius/Kaco/SolarMax
Switzerland	SMA/SolarMax/Kostal/Fronius/PowerOne
Luxembourg	SMA/PowerOne/Kostal/Danfoss/Sunways
Belgium	SMA/PowerOne/Kostal/Danfoss/Sunways
Netherlands	SMA/PowerOne/Kostal/Danfoss/Sunways
United Kingdom	SMA/PowerOne/Fronius
Poland	SMA/PowerOne/Platinum/Kaco
Czech Republic	SMA/PowerOne/Platinum/Kaco
Slovakia	SMA/PowerOne/Platinum/Kaco
Austria	SMA/PowerOne/Kaco/SolarMax/Fronius
Slovenia	SMA/PowerOne/Platinum/Kaco
Bulgaria	SMA/PowerOne/Platinum/Kaco
Greece	SMA/PowerOne/Platinum/Kaco
Israel	SMA/Platinum/Fronius/Kaco/PowerOne
United States	SMA/Fronius/PowerOne/Kaco
Canada	SMA/Fronius/PowerOne/Kaco
Australia	SMA/PowerOne/Fronius/Delta
Finland	SMA/Danfoss/PowerOne/Fronius
Denmark	SMA/Danfoss/PowerOne/Fronius
Malaysia	SMA/Delta
Liechtenstein	SMA/SolarMax/Kostal/Fronius/PowerOne
Japan	SMA
Ireland	SMA/PowerOne/Fronius

25.3 Wiring meters to record self-consumption

To record self-consumption, an additional meter also has to be installed. There are two options on how to install the meter.

25.3.1 Meter connection options to record the total consumption via an RS485/S0 interface.

This meter has to measure the total consumption of the house.
The meters installed by grid operators, or two-way meters, cannot be used to implement this function.

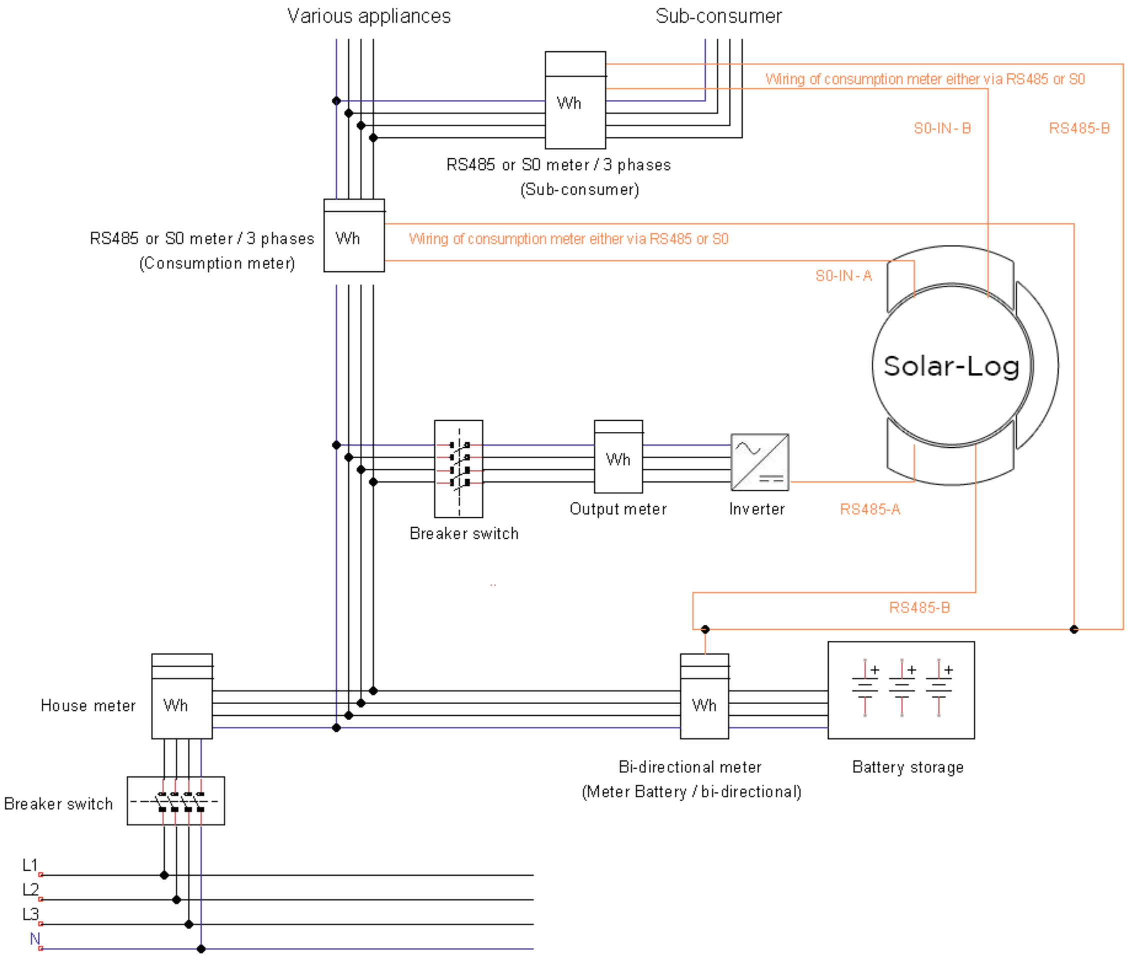


Fig.: Wiring diagram for recording self-consumption

The PV output meter displayed is optional.

25.3.2 Meter connection options for bi-directional recording of the total consumption via only an RS485 interface.

If there is feed-in in a sub-distribution, the option mentioned above can be used. In this case, the the amount of feed-in power and power obtained from the grid can be recorded with a bi-directional meter. With this,
the Solar-Log™ can calculate the consumption.

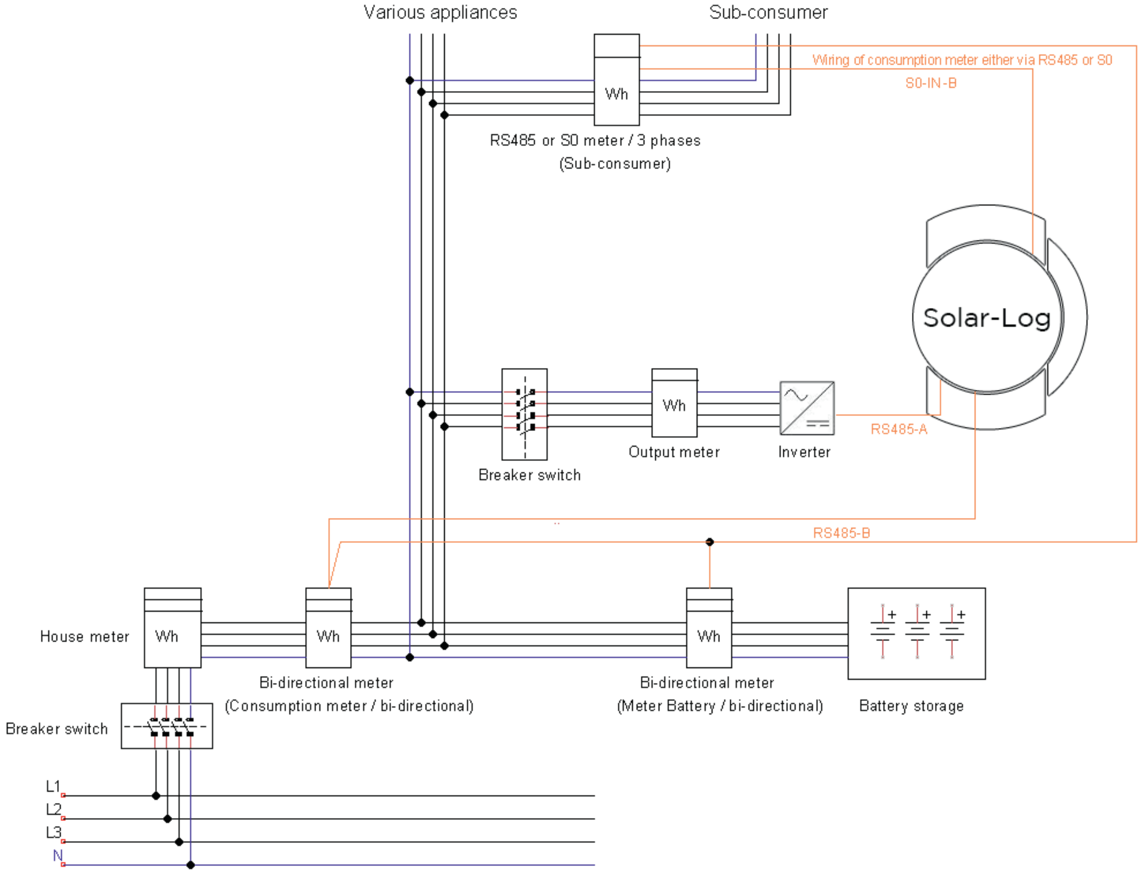


Fig.: Wiring diagram for recording self-consumption – bidirectional meter

25.4 Connection examples for ripple control receivers

Grid operators have not agreed on a universal standard for ripple control receiver signals. As result, there are several variations with the respective wiring and configuration in the Solar-Log™ firmware.
All of the examples refer to active power reduction. When ripple control receivers are used for reactive power, they are configured in the same way.

Note!

The following connection examples are requirements from different grid operators. The labels for the relays in the wiring diagram and in the Solar-Log™'s configuration matrix can differ.

Warning!

Please note the specifications for the load of the ripple control receiver's relays. In certain circumstances, the relays have to be connected to intermediate relays.
In any case, the inputs D_IN_X have to be supplied with the control voltage (5V DC) from the Solar-Log™ (PM+ interface Pin 1 and 6).

Warning!

When connecting two ripple control receivers: If the ripple control receiver uses binary signal coding, signal feedback via the ripple control receiver for the reacti-ve power must be prevented by fitting diodes.

Warning!

Emergency stop commands may not be processed via the Solar-Log™ These commands have to function directly with the corresponding protection equip-ment such as grid and plant protection, section switches and Q/U protection.

25.4.1 Variation with 4 relays (ENBW >100kWp)

Specifications

Ripple control receiver signals					
Level	K1	K2	K3	K4	Power output
1	On	Off	Off	Off	100%
2	Off	On	Off	Off	60%
3	Off	Off	On	Off	30%
4	Off	Off	Off	On	0%

Wiring

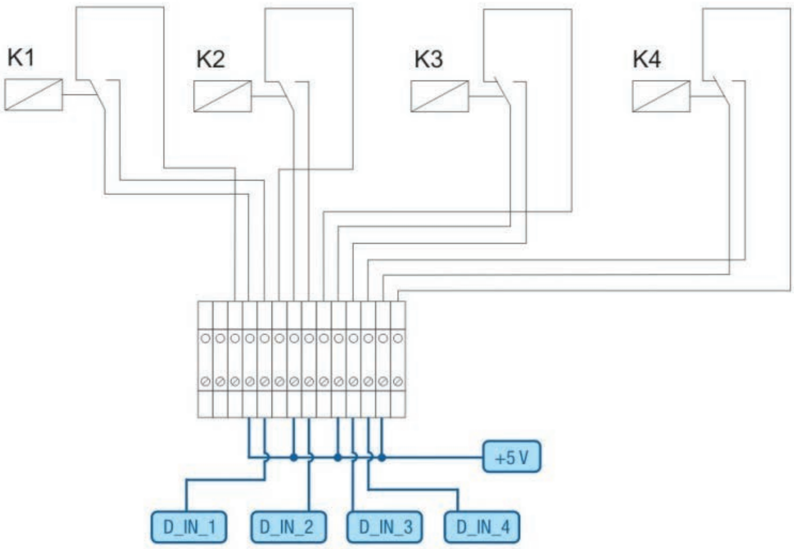
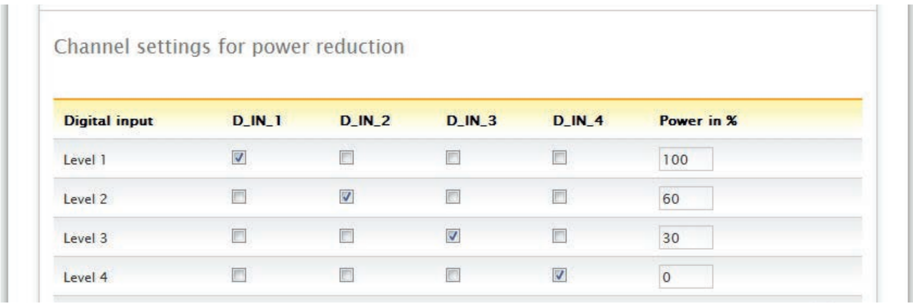


Fig.: Wiring a ripple control receive with two relays - example 1

Connecting PM+ terminal connector and ripple control receiver		
PIN	Assignment	Meaning
1	+5V	Control voltage for active power
2	D_IN_1	Level 1 100%
3	D_In_2	Level 2 60%
4	D_In_3	Level 3 30%
5	D_In_4	Level 4 0%
6	+5V	Control voltage for reactive power (unused)

Configuration in browser menu

Remote controlled active power reduction Configuration | Feed-in Management | Active Power



Channel settings for power reduction

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Power in %
Level 1	☑	☐	☐	☐	100
Level 2	☐	☑	☐	☐	60
Level 3	☐	☐	☑	☐	30
Level 4	☐	☐	☐	☑	0

Fig.: Channel settings for active power reduction - example 1

25.4.2 Variation with two relays

Specifications

Ripple control receiver signals

Level	K5	K6	Power output
1	Off	Off	100%
2	On	Off	60%
3	Off	On	30%
4	On	On	0%

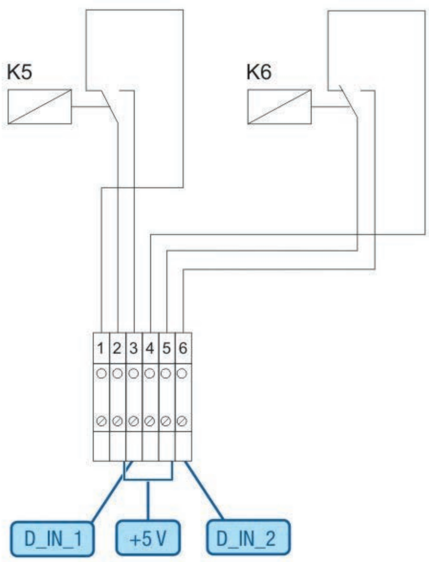


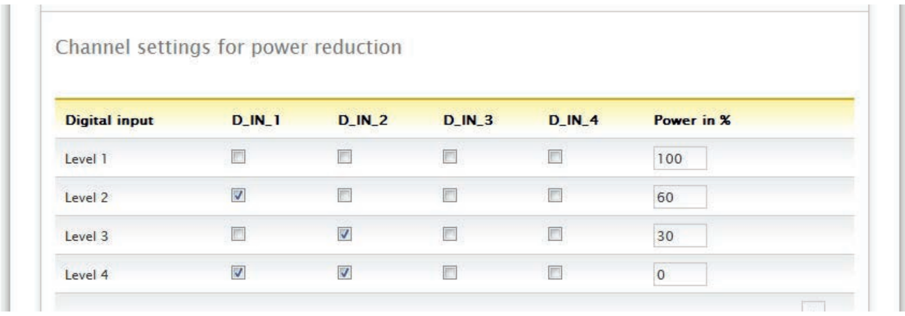
Fig.: Wiring a ripple control receive with two relays - example 2

Connecting PM+ terminal connector and ripple control receiver

PIN	Assignment	Meaning
1	+5V	Control voltage for active power
2	D_IN_1	K5 switched
3	D_In_2	K6 switched
6	+5V	Control voltage for reactive power (unused)

Configuration in browser menu

Remote controlled active power reduction Configuration | Feed-in Management | Active Power


Channel settings for power reduction

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Power in %
Level 1	☐	☐	☐	☐	100
Level 2	☑	☐	☐	☐	60
Level 3	☐	☑	☐	☐	30
Level 4	☑	☑	☐	☐	0

Fig.: Channel settings for active power reduction - example 2

25.4.3 Variation with three relays

Specifications

Ripple control receiver signals

Level	K2	K3	K4	Power output
1	Off	Off	Off	100%
2	On	Off	Off	60%
3	Off	On	Off	30%
4	Off	Off	On	0%

Wiring

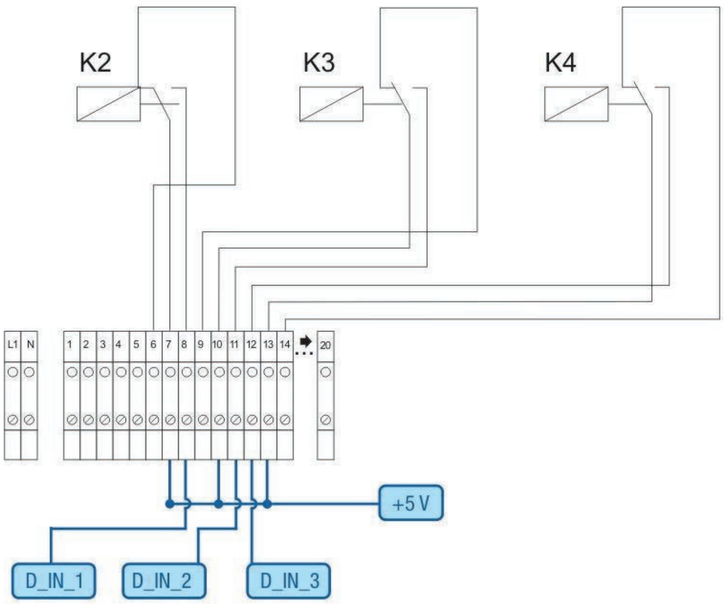


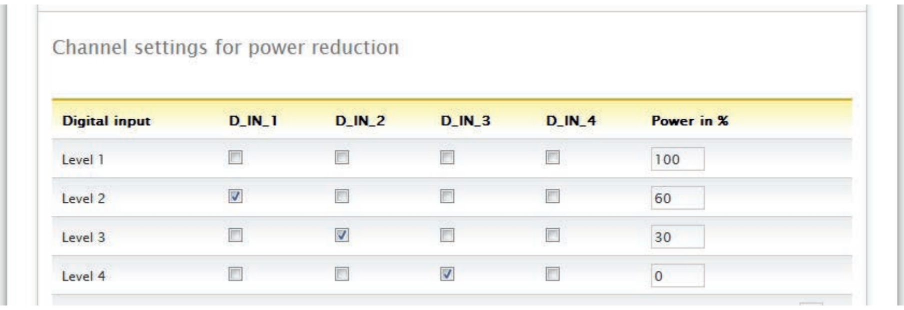
Fig.: Wiring a ripple control receive with two relays - example 3

Connecting PM+ terminal connector and ripple control receiver

PIN	Assignment	Meaning
1	+5V	Control voltage for active power
2	D_IN_1	Level 2 60%
3	D_In_2	Level 3 30%
4	D_In_3	Level 4 0%
5	D_In_4	unused
6	+5V	Control voltage for reactive power (unused)

Configuration in browser menu

Remote controlled active power reduction Configuration | Feed-in Management | Active Power



Channel settings for power reduction

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Power in %
Level 1	☐	☐	☐	☐	100
Level 2	☑	☐	☐	☐	60
Level 3	☐	☑	☐	☐	30
Level 4	☐	☐	☑	☐	0

Fig.: Channel settings for active power reduction - example 3

25.4.4 Variation with 5 relays (including emergency stop)

Specifications

Ripple control receiver signals						
Level	K1	K2	K3	K4	K5	Power out-put
1	On	Off	Off	Off	Off	100%
2	Off	On	Off	Off	Off	60%
3	Off	Off	On	Off	Off	30%
4	Off	Off	Off	On	Off	0%
5					On	Emergency stop

The relay is continuously activated for a particular level (condition). There is always only one relay that is activated.

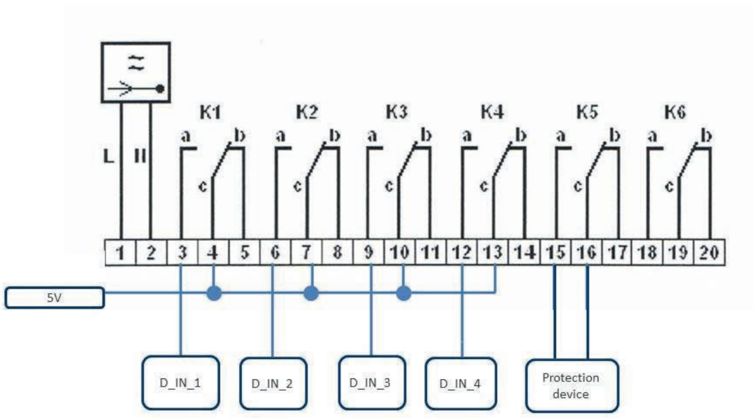


Fig.: Wiring a ripple control receive with two relays - example 4

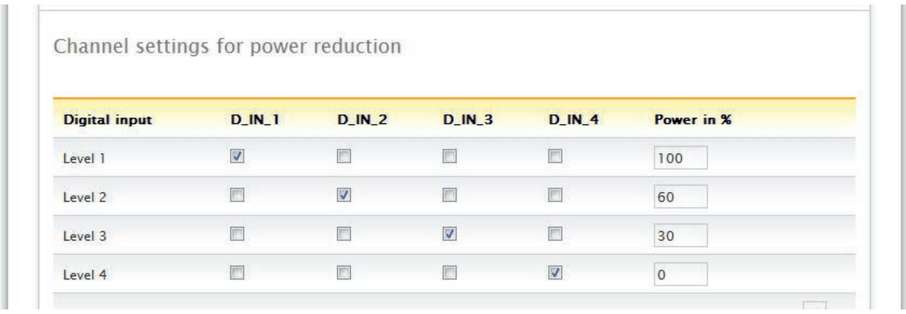
Warning!

Emergency stop commands may not be processed via the Solar-Log™ These commands have to function directly with the corresponding protection equipment such as grid and plant protection, section switches and Q/U protection.

Connecting PM+ terminal connector and ripple control receiver		
PIN	**Assignment**	**Meaning**
1	+5V	Control voltage for active power
2	D_IN_1	Level 1 100%
3	D_In_2	Level 2 60%
4	D_In_3	Level 3 30%
5	D_In_4	Level 4 0%
6	+5V	Control voltage for reactive power (unused)

Configuration in browser menu

Remote controlled active power reduction Configuration | Feed-in Management | Active Power


Channel settings for power reduction

Digital input	D_IN_1	D_IN_2	D_IN_3	D_IN_4	Power in %
Level 1	☑				100
Level 2		☑			60
Level 3			☑		30
Level 4				☑	0

Fig.: Channel settings for active power reduction - example 4

25.5 Digital Interfaces

Solar-Log™provides two interfaces for exporting the current data.
The data is updated every 15-60 seconds.

Warning!

The following descriptions for two interfaces are intended for users with a technical background. Solare Datensysteme provides these interfaces without any guarantee and with the exclusion of any legal liability.
We do not offer any telephone support for these two interfaces.

Wikipedia is a source for general information:
http://en.wikipedia.org/wiki/Ajax_(programming)

25.5.1 Modbus TCP

The intention of this interface is to give easy access to the Solar-Log™ internal data for external SCADA like systems. The interface is designed to read out live data of the attached PV-system.

The interface is not designed to configure the Solar-Log™ or the attached devices. All configuration must be done via the standard Solar-Log™ Web access either local or remote.

ModbusTCP port:
- 502

Required Solar-Log™ firmware:
- 2.8.1 Build 49

Slave ID:
- 1

Implemented Modbus functions:
- 04 to read one or multiple 16 bit words
- 06 to write one 16 bit word
- 16 to write multiple 16 bit words

The Solar-Log™ Modbus implementation uses different byte and word orders. The Modbus protocol byte order follows the big-endian Modbus specification and is thus compatible with standard Modbus implementations. Therefore, the higher byte in value is transferred first.

The proprietary-specific register order for 32-bit values uses a little-endian word order. For a 32-bit value, the lower value word is stored in the first register and the higher value word in the second register.

25.6 Live data compact – summarized (complete plant)

Live data “compact” summarized is mapped from register 3500-3999.

Data	Unit	Value-Range	Adress	Number Reg.	Func Code	Since Firmware	Description
lastUpdateTime	Sec	32bit unsigned	3500	2	04		Unixtime when last register update has happened. 0=no live data yet
Pac	W	32bit unsigned	3502	2	04		Total Pac of all inverters and inv-type meters
Pdc	W	32bit unsigned	3504	2	04		Total Pdc of all inverters
Uac	V	16bit unsigned	3506	1	04		Average Uac of all inverters
Udc	V	16bit unsigned	3507	1	04		Average Udc of all inverters
Daily yield	Wh	32bit unsigned	3508	2	04		Summarized daily yield of all inverters
Yesterday yield	Wh	32bit unsigned	3510	2	04		Summarized daily yield of all inverters
Monthly yield	Wh	32bit unsigned	3512	2	04		Summarized monthly yield of all inverters
Yearly yield	Wh	32bit unsigned	3514	2	04		Summarized Yearly yield of all inverters
Total yield	Wh	32bit unsigned	3516	2	04		Summarized Total yield of all inverters
Pac consumption	W	32bit unsigned	3518	2	04		Total Pac of all consumption meters
Daily yield cons.	Wh	32bit unsigned	3520	2	04		Summarized daily yield of all consumption meters
Yesterday yield cons.	Wh	32bit unsigned	3522	2	04		Summarized daily yield (yesterday) of all consumption meters
Monthly yield cons.	Wh	32bit unsigned	3524	2	04		Summarized monthly yield of all consumption meters
Yearly yield cons.	Wh	32bit unsigned	3526	2	04		Summarized Yearly yield of all consumption meters
Total yield cons.	Wh	32bit unsigned	3528	2	04		Summarized Total yield of all consumption meters
TotalPower	Wh/Wp	32bit unsigned	3530	2	04		Total installed generator power

25.6.1 Open JSON Interfaces

The JavaScript Object Notation (JSON) is a compact data format to transmit data between applications. The objects documented here can be used in connection with other programs.

The open JSON interface can be activated and deactivated from the Configuration | System | Access control menu. When activating the interface, a red warning triangle with security information and risks is displayed.

Note

The open JSON interface is deactivated after updating to firmware 3.5.3 build 86 and a factory reset. To activate the open JSON interface, the user password has to be defined first.

The current data can be accessed via HTTP protocol. To do this an HTTP Post Inquiry needs to be sent to the Solar-Log™. The object requested has to be in the body:

```
POST /getjp HTTP/1.1
Host: solar-log-xxxx
...
Content Length: 20
Connection: keep-alive
Pragma: no-cache
Cache Control: no-cache

{„801“:{„170“:null}}
```

The reply contains a JSON object as a character string in the body:

```
HTTP/1.1 200 OK
Date: Mon, 31 Mar 2014 10:42:32 GMT
Server: IPC@CHIP
Content-Type: text/plain
Transfer-Encoding: chunked

{„801“:{„170“:{„100“:“31.03.14 10:42:15“,“101“:0,“102“:0,“103“:0,“104“:0,“105“:0,“106“:0,“107“:3527647,
“108“:0,“109“:0,“110“:0,“111“:0,“112“:0,“113“:1132434,“114“:0,“115“:0,“116“:45000}}}
```

The JSON character sting needs to be converted to an object first before it can be data can be processed in a Java script. For example, when the JSON character string contains the variable "tdata" the conversation looks like this:

```
var LiveDaten=JSON.parse(tdata)[801][170];
```

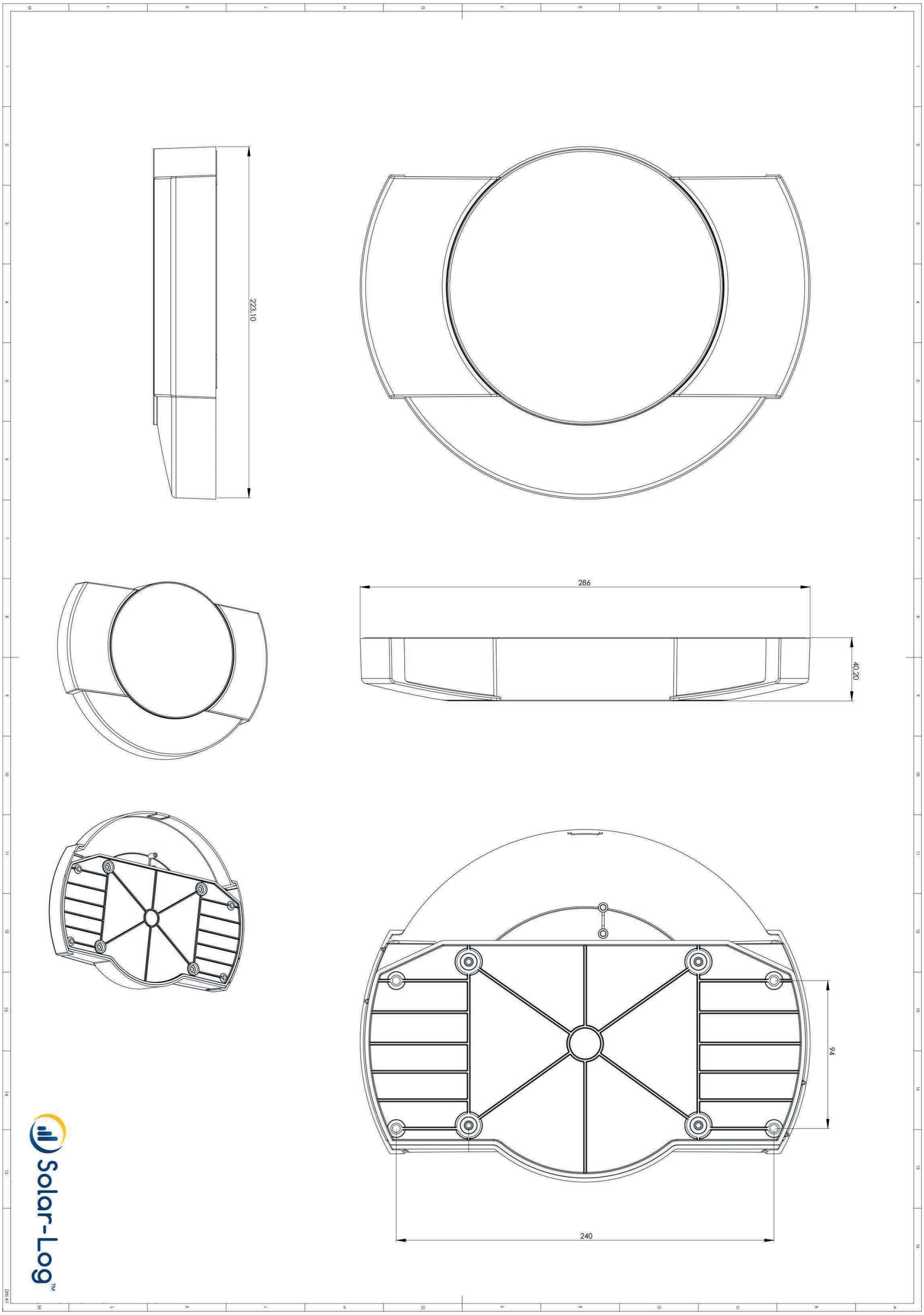
After that the individual data fields can be accessed via the indexes specified in the following table. For example, the current P_{AC} output is displayed as follows:

```
alert(„The current AC output is: „ + LiveDaten[101] + „ W“);
```

JSON Objects

Data point	Value range	Unit	Index	Description
lastUpdateTime	DWORD	Time in the format dd.mm.yy; hh.minmin, secsec	100	Time
Pac	DWORD	W	101	Total output PAC from all of the inverters and meters in inverter mode
Pdc	DWORD	W	102	Total output PAC from all of the inverters
Uac	WORD	V	103	Average voltage UAC from the inverter
DC voltage:	WORD	V	104	Average voltage UDC from the inverter
yieldDay	DWORD	Wh	105	Total yield for the day from all of the inverters
yieldYesterday	DWORD	Wh	106	Total yield for the previous day from all of the inverters
yieldMonth	DWORD	Wh	107	Total yield for the month from all of the inverters
yieldYear	DWORD	Wh	108	Total yield for the year from all of the inverters
yieldTotal	DWORD	Wh	109	Total yield from all of the inverters
consPac	DWORD	W	110	Current total consumption PAC from all of the consumption meters
consYieldDay	DWORD	Wh	111	Total consumption from all of the consumption meters
consYieldYesterday	DWORD	Wh	112	Total consumption for the previous day; all of the consumption meters
consYieldMonth	DWORD	Wh	113	Total consumption for the month; all of the consumption meters
consYieldYear	DWORD	Wh	114	Total consumption for the year; all of the consumption meters
consYieldTotal	DWORD	Wh	115	Accumulated total consumption, all Consumption meter
totalPower	DWORD	Wp	116	Installed generator power

25.7 Dimensions



26 List of Figures

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