Sunny Boy Control Light

User Manual

Issue 1.1

Intelligent Powerline Modem for PV-Plant Monitoring

SUNBCL-11:NE3400

Alteration Review

Document-Number SUNBCL	Issue and Alteration Review [1])		Comments	Author
-11:NE4899	1.0	A	First Edition, as translation from first German issue	Salisbury
-11:NE3400	1.1	A	First Revision	Salisbury

[1]) A: Alterations due to faulty documents or improvement of the documentation

B: Alterations maintaining full or upward compatibility

C: Alterations limiting or excluding compatibility

	Name	Date	Signature
Approved	L. Müller	08 / 14 / 2000	

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EG-Conformity Declaration

in accordance with EG-Regulation 89/336/EWG concerning Electromagnetic compatibility

Published in the "Amtsblatt der Europäischen Gemeinschaft" (AB1. No. L 139, 23.5.1989, page 19)

We declare that the component / device and the according product distributed by us, specified below complies to the standards listed in the following due to its design and type of construction.

Device type: **SBCOLI**

Device Description: **Intelligent Powerline-Modem "Sunny Boy Control Light"**

The device mentioned above complies to the following generic standards**:**

- **Generic Emission Standard EN 50 081, Part 1**
- **Generic Immunity Standard EN 50 082, Part 2**

Niestetal, August 2000

_____
P. Drews, managing director

Explanation of Symbols used in this Document

To enable optimal usage of this manual and safe operation of the device during installation, operation and maintenance routines, please note the following description of symbols:

This indicates a feature that is important either for optimal and comfortable usage or optimal operation of the system.

Example: „Useful C routines for this purpose are on the support disk.“

This indicates a fact or feature very important for the safety of the user and / or can cause a serious hardware defect if not appropriately applied.

Example: „Disconnect the mains plug before opening the case!“

This indicates an example.

Content

1 Introduction

Thank you very much for purchasing a ***Sunny Boy Control Light***. The ***Sunny Boy Control Light*** will continuously monitor the PV-plant performance and lets you modify the operating parameters of the Sunny Boy inverters.

We definitely know that there are very few people that actually appreciate reading technical documents - we therefore have kept this manual as short as possible. But the more you read this manual the more you can utilize the ***Sunny Boy Control Light*** and optimize your PV-plant. Nevertheless, if you find any topics hard to understand, please notify us and we will try to get things more understandable in the next issue of this manual. Thank you.

This "User Manual" is split in the following sections:

The ***Sunny Boy Control Light*** supports a firmware update function, which is easy to use without opening the device or similar. The firmware update is done with the PC program Sunny Data Control. The latest version of this software and additional information is available on http://www.sma.de. If you encounter trouble with the installation or have any serious problems feel free to contact SMA, simply send an email to sunnyboy@sma.de. SMA will be glad to help you.

1.1 Technical Requirements

Necessary for the usage of the ***Sunny Boy Control Light***:

- an electricity socket
- grid voltage and frequency must lie within the specified range (90..260 V, 50/60 Hz)
- for Powerline communication, all devices must be equipped with a Powerline modem

The parallel operation of the Powerline communication with a ***Sunny Boy Control Light*** and other devices that also use the mains for data transmission and do not comply to the standardized transmission protocol (e.g.: baby phone) is normally not possible.

For the operation of the ***Sunny Boy Control Light*** it is necessary that following safety measures are kept to:

1. The power supply socket must be equipped with a Protective Earth.
2. The grid plug must be accessible at any time.

Use the ***Sunny Boy Control Light*** only in dry and dust free environments!

1.2 Normal Operation

The ***Sunny Boy Control Light*** has no on/off switch. You can turn it off by pulling the plug-in out of the mains socket. You must enter the time and date after every restart.

Never pull out the grid plug while the ***Sunny Boy Control Light*** is saving data. Saving is indicated on the display.

During operation, the ***Sunny Boy Control Light*** switches to idle mode at night (when no device can be reached within 15 min). In 15 minute intervals the ***Sunny Boy Control Light*** activates itself and checks the communication line for other devices. If no device is available, the ***Sunny Boy Control Light*** falls back to standby, otherwise it goes into normal operation mode. The user may interrupt the idle mode any time by pressing any key. In case no key is pressed within 15 minutes, the ***Sunny Boy Control Light*** will drop back to standby mode again.

1.3 Security Notes

Sunny Boy Control Light may only be opened by qualified personnel and only when disconnected from the power supply.

Repairs of ***Sunny Boy Control Light*** are only to be done by the manufacturer.

1.4 Usage of the Sunny Boy Control Light

The operation of the ***Sunny Boy Control Light*** is done with 4 keys below the LC-Display.

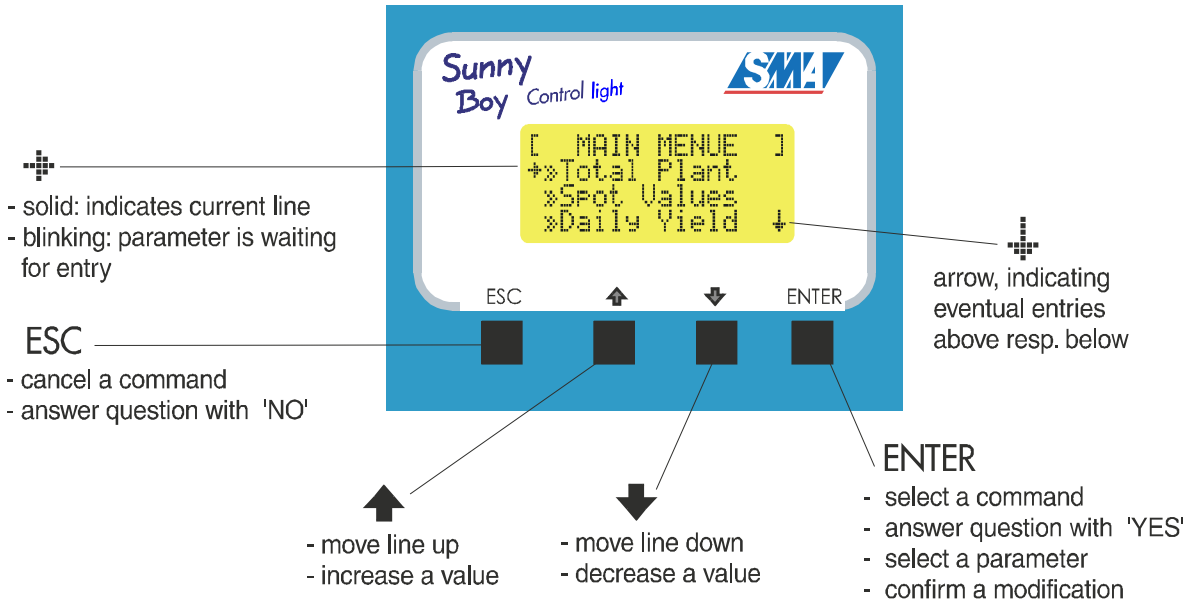


Fig. 1.1: Display and keys of the Sunny Boy Control Light

Description of the Symbols

Often information consisting of more than four lines is displayed. An indicator appears in the lower right of the display in this case, indicating that further lines are available above and below the actual display.

Character	Description
	more rows above the display
	more rows below the display
	more rows above and below the display

Fig. 1.2: Description of the arrow right bottom corner of the display

Display-Contrast

Independent from the selected menu: Changing the display contrast is done by pressing the **[ESC]** and the **[↑]** or **[↓]** keys simultaneously.

Key	Description
[ESC] + [↑]	- increase display-contrast
[ESC] + [↓]	- decrease display-contrast

Table 1.1: Modifying display-contrast

Description of Characters

The selection arrow indicates the active line

Character	Name	Description
→Warnings…	"normal" arrow	change lines with the **[↑]** and **[↓]** keys
+ …15 min	"selection" arrow	**[ENTER]** selects the menu item in the current line
+ …15 min	"selection" arrow but blinking	**[ENTER]** confirms selection **[ESC]** cancels selection
[MENU]		current menu, press **[ESC]** to leave
»submenu	"double" arrow	on the left: sub-menu
+49561952»	"double" arrow	on the right: more characters to come
Pac…	three points	more values follow
……1234W	points	continued line

Fig. 1.3: Description of the characters on the display

- **[↑]** and **[↓]** switch between the lines.
- Sub-menus are marked with " » " and are activated with **[ENTER]**.
- A " » " is on the end of lines that exceed 16 characters, more characters can be seen in "Edit" mode.

Edit mode

The edit mode enables modifications of specific settings or operation parameters.

You may activate the editing mode of the respective parameter (see selection arrow above) if you select it with the arrow keys and press the **[Enter]** key.

The edit mode will only be started if it is actually possible to modify the parameter. In that case the parameter begins to blink and you can make changes with both arrows **[↑]** and **[↓]**. Changing numerical values can be accelerated by holding the arrow key down. The longer you press the arrow key the bigger steps are used to change the value.

- **[Enter]** accepts and saves your current settings.
- **[ESC]** cancels the current modification.
- If a parameter was changed in the "Edit" mode, the selection arrow blinks until confirmed once more with the **[Enter]** key or is cancelled with the **[ESC]** key.
- If no further key is pressed the new setting will be automatically cancelled after 60 sec.

2 Commissioning the Sunny Boy Control Light

The initial installation and setting up of a ***Sunny Boy Control Light*** is quite simple (Plug & Play). This means that the installation can be done without any tools while the procedure is self-explaining.

For initial installation simply follow the configuration steps described in this chapter and the ***Sunny Boy Control Light*** will be ready for performance. After the hardware installation you will be systematically lead through the configuration dialogs in the remaining passages of this chapter. Most dialogs are simply confirmed by pressing the **[Enter]** key.

Please keep in mind that the initial installation is only done once. It defines basic settings like language, display settings, date and time and finally starts the automatic device detection. After the completion of the initial installation the ***Sunny Boy Control Light*** begins its normal startup sequence. The initial installation is also executed after resetting the device to the default values.

2.1 Switching on the Sunny Boy Control Light

The installation of the ***Sunny Boy Control Light*** is as simple as the connection of an electric household device. You simply plug the plug-in into the socket. During the initialization of the ***Sunny Boy Control Light***, "BOOT" appears on the display, the ***Sunny Boy Control Light*** display contrast is adjusted automatically. You will notice a short darkening of the display.

Fig. 2.1: Initialization of the Sunny Boy Control Light

The initialization phase is finished after 15 sec and the ***Sunny Boy Control Light*** shows the serial number and the software version number for 30 sec. After pressing any key you may start the configuration procedure.

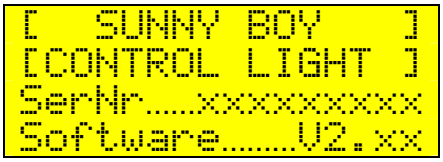


Fig. 2.2: Initial Message of the Sunny Boy Control Light

2.2 Plug & Play Setup

During the initial installation the ***Sunny Boy Control Light*** automatically starts the Plug & Play setup with the following message:

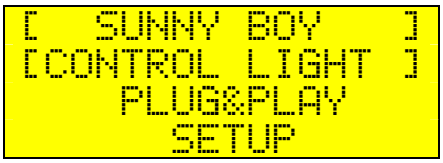


Fig. 2.3: Starting Display of the Plug & Play Setup

All settings necessary for the initial installation (language, date/time and device registration) will be displayed one after the other. Confirm the following configuration steps one after the other. During the Plug & Play setup you may return to the start message by pressing the key combination **[↑] + [↓]** and restart the initial installation any time.

2.2.1 Language Selection

The ***Sunny Boy Control Light*** supports several languages.

Fig. 2.4: Language selection

Choose the language with the **[↑]** and **[↓]** keys. Confirm your selection with **[Enter].**

After confirming, the selection arrow in front of the selected language blinks. The selection must be confirmed once again (**[Enter]** key) in order to save the current setting or can be cancelled with the **[Esc]** key. You may exit the dialog with the **[Esc]** key**.**

2.2.2 Setting Date and Time

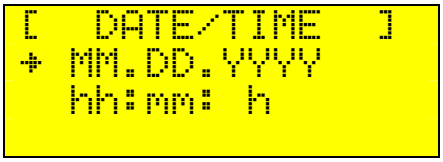


Fig. 2.5: Date / Time setting

Now you may adjust the clock of the ***Sunny Boy Control Light***. The **[↑]** and **[↓]** keys allow the selection of date or time. Input is possible after pressing **[Enter]**. Every digit can be set separately in the sequence day, month, year resp. hours and minutes with the **[↑]** and **[↓]** keys. The **[Enter]** key switches to the next input field. After the rightmost digit has been entered, the selection arrow in front of the adjusted value will start to blink. Now you can confirm the new setting by pressing **[Enter]** or cancel your new settings with **[ESC]**. You can exit the dialog by pressing the key **[ESC].**

2.2.3 Detection of Connected Devices

Usage of Powerline Transmission

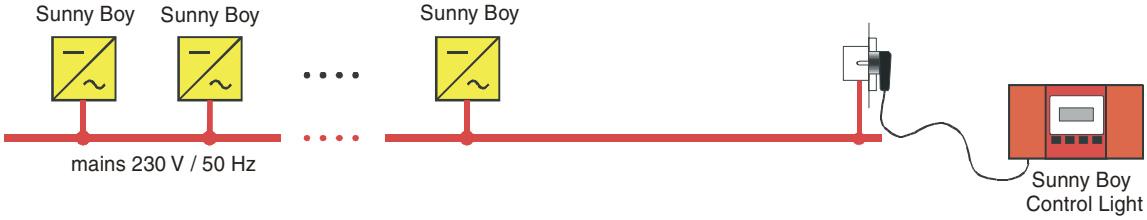


Fig. 2.6: Powerline Communication

The electricity facilities in buildings supply energy to electric devices with 230 V / 50 Hz (or e.g. 120 V / 60 Hz in the USA). This electricity distribution system is not optimized for the transmission of high frequency signals (approx. 132 kHz). Therefore the interference-free communication in this frequency range essentially depends on the selection of the transmission line between the units and the ***Sunny Boy Control Light***.

The transmission link should:

- use only one phase and
- be as short as possible

Pay attention about connecting all devices that transmit and receive data to one phase or preferably even to the same line. Therefore you should choose a socket for the ***Sunny Boy Control Light*** installed on the same line resp. at least on the same phase as the device and is as near as possible to its feeding point.

In case the ***Sunny Boy Control Light*** and the according devices must be connected to different phases the installation of a phase coupler can be necessary. Phase couplers are available from ***SMA*** and must be installed on the site by a qualified technician.

Further information on optimizing the installation is available in chapter 7.2.1 "Transmission Errors".

If there are any other users of Powerline equipment in your neighborhood, you should have an eye on the device detection and pay special attention to the according dialogs in order to ensure that you detect your own devices only. ***Sunny Boy Control Light*** can run the device detection automatically if there is no special interference. All device detection dialogs will be confirmed automatically after 60 sec and therefore all devices found will be registered. All you have to do after the automatic device detection is done by ***Sunny Boy Control Light*** is to exit the device detection by pressing the **[ESC]** key and confirm the final security dialog with **[Enter].**

Automatic Device Detection

Sunny Boy Control Light begins with the detection of all accessible devices.

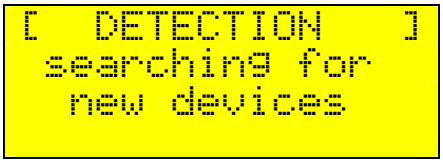


Fig. 2.7: Sunny Boy Control Light searching for new devices

This process may take several minutes depending on the number of devices that have to be detected. An hourglass in the lower right corner of the display shows that the program is active. In the bottom line of the display you will find the serial number of every detected device.

After each detection cycle all devices found by ***Sunny Boy Control Light*** will be displayed one after the other as follows:

Fig. 2.8: Sunny Boy Control Light detecting new device

Please compare the serial numbers of the devices found by ***Sunny Boy Control Light*** with the serial numbers of your devices, which you have written down before. Register the devices with **[Enter]** in the device list resp. remove devices that you do not want to register with **[ESC].** Please note that the respective detected device is registered automatically without confirmation if no key is pressed.

After this you will see the total number of newly registered devices. Please check if all installed devices were found by ***Sunny Boy Control Light***. If not, you should activate "search again" with **[Enter]**.

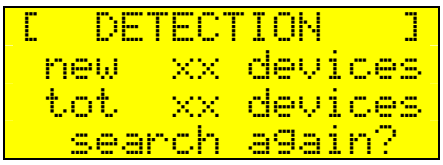


Fig. 2.9: Display Message on end Search

By pressing the **[Enter]** key you may re-run the search as it is possible that the ***Sunny Boy Control Light*** does not find all devices in the first search cycle. If no key is pressed the ***Sunny Boy Control Light*** will automatically begin a new detection cycle after 60 sec. If several attempts were unsuccessful, please check whether you have correctly installed the devices to be detected. If ***Sunny Boy Control Light*** does not detect a device in spite of a repeated search, please read chapter 7.2, "Troubleshooting Powerline Communication".

Finish the device detection with the **[ESC]** key.

After the automatic detection you will be prompted to confirm the configuration. During the initial installation the number of new devices corresponds with the total number of registered devices.

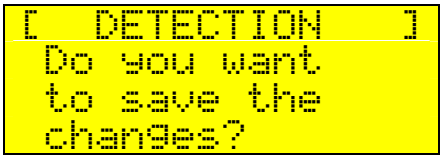


Fig. 2.10: Saving the detected Sunny Boys

- **[ESC]** cancels the detection sequence.
- **[Enter]** confirms the configuration and ***Sunny Boy Control Light*** begins standard operation.

3 Installation of the Connectors

In the following chapters we define all possible connections for the ***Sunny Boy Control Light***.

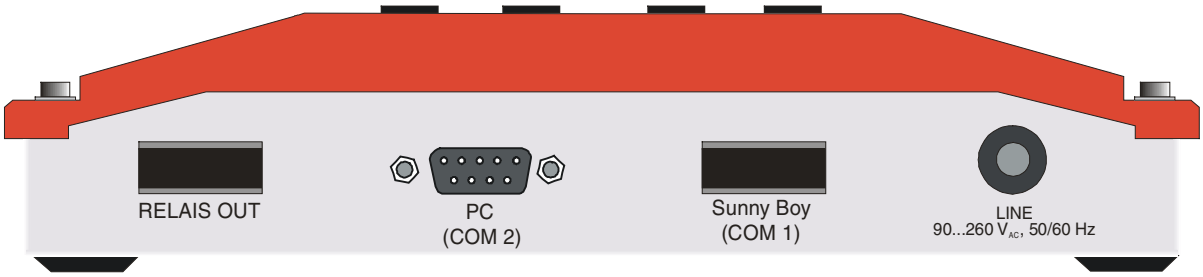


Fig. 3.1: Bottom View of the Sunny Boy Control Light with interfaces and connectors

3.1 Connection to Sunny Boy Inverters

The data transmission is done via Powerline Communication The ***Sunny Boy Control Light*** is therefore connected to the Sunny Boy inverters by simply inserting the plug into the electricity socket.

3.2 Connection to a PC

The PC is connected to the ***Sunny Boy Control Light*** directly with RS232 or a modem via telephone line for remote PV-plant management.

3.2.1 Cabling a PC with RS232

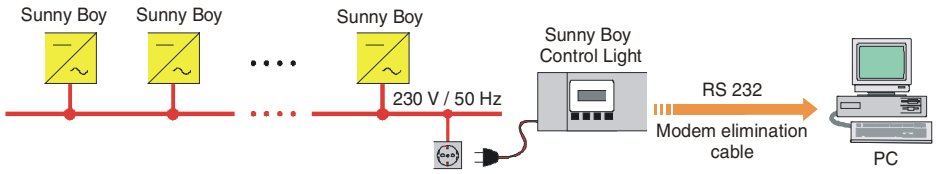


Fig. 3.2: Connection to a PC with RS232.

The PC is connected via RS232 with a PC data cable (SMA ordering No. 36-5001).

Note that is may be necessary to use a DB9 to DB25 adapter plug. (SMA ordering No. 35-5010)

Pin Layout

PIN	Signal RS232	Description
1	DCD	Data Carrier Detect
2	/RXD	Receive Data
3	/TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	/RTS	Ready To Send
8	/CTS	Clear ToSend

Fig. 3.3: Connecting Configuration Device PC (COM2)

Pin Layout of a DSUB9<>DSUB9 cable

DSUB9 socket			DSUB9 socket	
Signal	**PIN**		**PIN**	**Signal**
/RXD	2	<>	3	/TXD
/TXD	3	<>	2	/RXD
GND	5	<>	5	GND
		|	1	DCD
		|	6	DSR
RTS	7	<>	8	CTS
DCD	1	|		
DSR	6	|		
CTS	8	<>	7	RTS

Fig. 3.4: PIN designation of a PC data cable DSUB9<>DSUB9

<>: These pins are connected to each other. Additionally to this PIN 1, PIN 6 and PIN 8 have to be connected with a bridge.

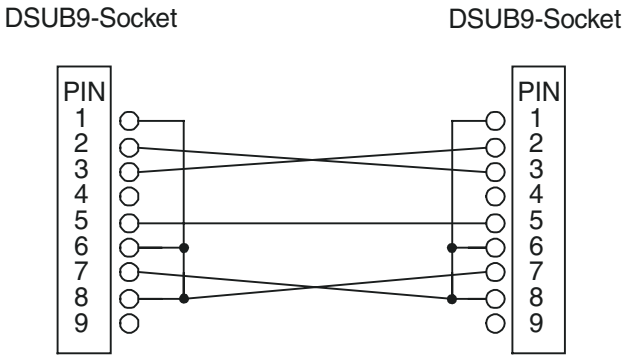


Fig. 3.5: PC data cable DSUB9<>DSUB9

Cabling of a modem elimination cable DSUB9<>DSUB25

DSUB9 socket			**DSUB25 socket**	
Signal	**PIN**		**PIN**	**Signal**
/RXD	2	<>	2	/TXD
/TXD	3	<>	3	/RXD
GND	5	<>	7	GND
RTS	7	<>	5	CTS
		I	6	DSR
		I	8	DCD
CTS	8	<>	4	RTS
DCD	1	I		
DSR	6	I		

Fig. 3.6: PIN designation PC data cable DSUB9<>DSUB25

<>: These pins are connected to each other
short circuits on PIN 1, PIN 6 and PIN 8 on the DSUB9 socket and PIN 5, PIN 6 and PIN 8 on the DSUB25 socket.

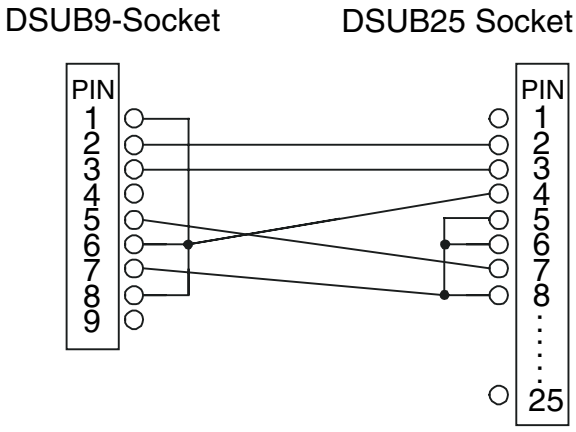


Fig. 3.7: PC data cable DSUB9<>DSUB25

3.2.2 Cabling a PC with Modem on RS232

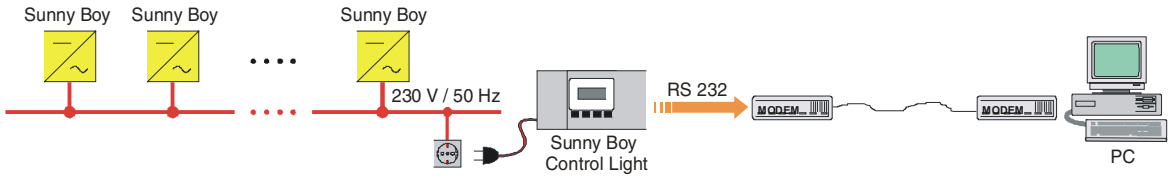


Fig. 3.8: Remote diagnosis via PC and modem

The modem is connected to the ***Sunny Boy Control Light*** with a standard 1 to 1 serial RS232 cable. The cables are connected to the "PC (COM 2)" port on the bottom of the ***Sunny Boy Control Light***.

Serial RS232 Cable DSUB9<>DSUB9

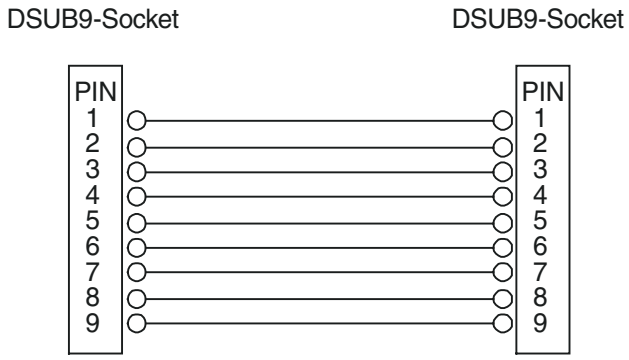


Fig. 3.9: Serial cable DSUB9<>DSUB9

For further information on how to connect a modem to the Sunny Boy Control please read chapter 3.3 "Connecting a Modem".

3.3 Connecting a Modem

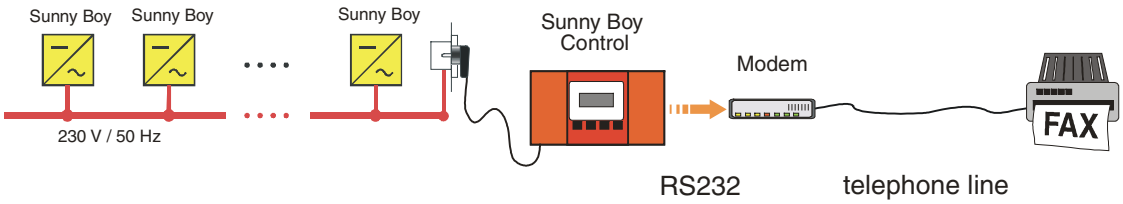


Fig. 3.10: Connecting a Modem

You need an external modem for connecting the ***Sunny Boy Control Light*** to the telephone line. We recommend „Microlink 56k“ from Elsa in most cases - check with SMA before you try to connect a modem. Note that the modem must be Fax class 2 compliant in order to reliably communicate with the ***Sunny Boy Control Light***. The list of used AT-commands is included in this installation guide (See chapter 7.5, AT-Commands).

Modem Cable to the *Sunny Boy Control Light*

Connect the modem (port: V24/RS232C) to the Sunny Boy Control Light (port: PC) with a RS232 cable. Use the cable supplied with the modem and not the cable that you use for connecting the Sunny Boy Control Light since these are different.

The cable for connecting the modem must be a standard "one to one" serial cable (V24). The PC data cable for connecting the Sunny Boy Control to a PC is a so-called modem elimination cable, where the signals are interchanged within the cable. The problem is, that the cables mostly look identical.

Connect the modem to the mains with the transformer and connect the modem to the telephone line with the provided telephone cable. Read the modem instructions carefully.

Detection of the Modem by *Sunny Boy Control Light*

Switch the modem and the ***Sunny Boy Control Light*** on at the same time. The ***Sunny Boy Control Light*** will automatically detect the modem after approximately 1 minute. The parameter COM2:PC automatically switches from **RS232** to **RS232 (Modem)**. Check the connection to the modem and the modem's power supply if the modem was not detected and turn the Sunny Boy Control Light on again, as it only conducts a modem detection cycle on power-up.

The init-strings should be accepted by any FAX class 2 or 2.0 modem - in certain cases it can be necessary to modify the init-strings. Do not modify the init-strings if you are not absolutely sure about what you are doing.

3.4 Connection of an External Display

All data currently acquired by the *Sunny Boy Control Light* can be displayed on an external display.

The following display types are supported:

- DATALITE (DX-series, 8 lines with 16 digits)
- HvG (PV-plant display)

- Siebert (PV-plant display or series S10, S30, S70)
- EnergieCom (mipan SI, one line, 2 to 15 digits)

Details concerning the different displays are available in the documentation of the manufacturer. The external display is activated in the “external display” menu, details about the activating are given in chapter 5.3.3.

3.4.1 DATALITE, HvG and Siebert

The external display is connected to the *Sunny Boy Control Light* with a serial cable, port „PC“ (COM2). The maximal cable length is 12 meters.

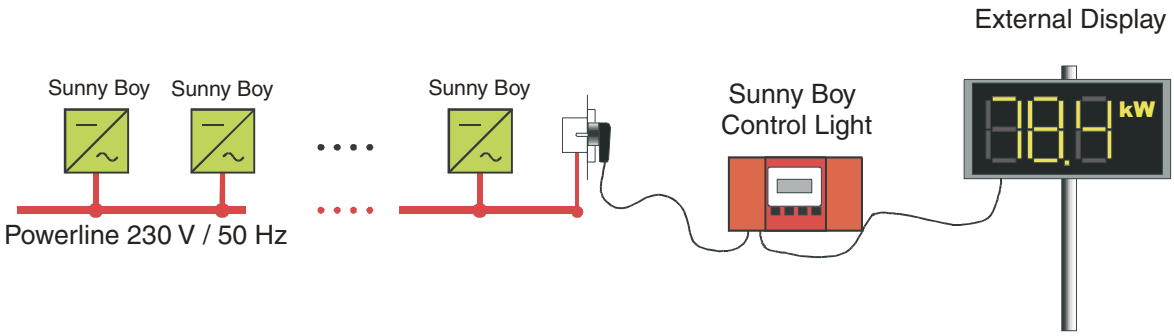


Fig. 3.11: Direct connection of an external display (DATALITE, HvG and Siebert)

3.4.2 EnergieCom

EnergieCom displays are connected to the *Sunny Boy Control Light*

- with RS232, ‘PC (COM 2)’ 3 up to 5 displays (see. Fig. 3.11)
- with a RS485 converter up to 99 displays (see Fig. 3.12)

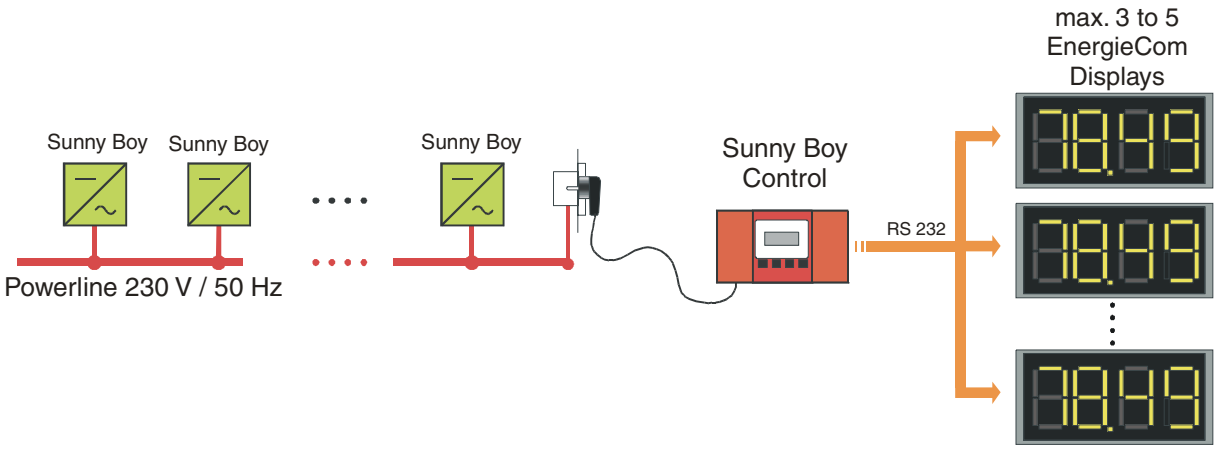


Fig. 3.12: Connection of EnergieCom displays with RS232

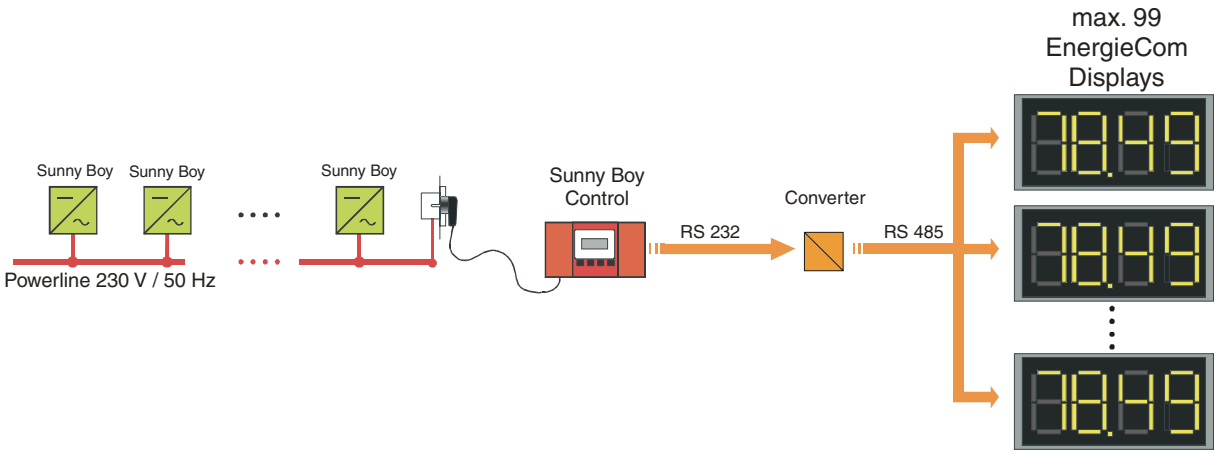


Fig. 3.13: Connection of EnergieCom displays with RS485

The cabling for both connection types is described in the following figure. Further details are available in the manufacturer documentation of the display and furthermore in the documentation of the interface converter. The web-sites of the manufacturers are available at www.microsyst.de and www.phoenixcontact.de.

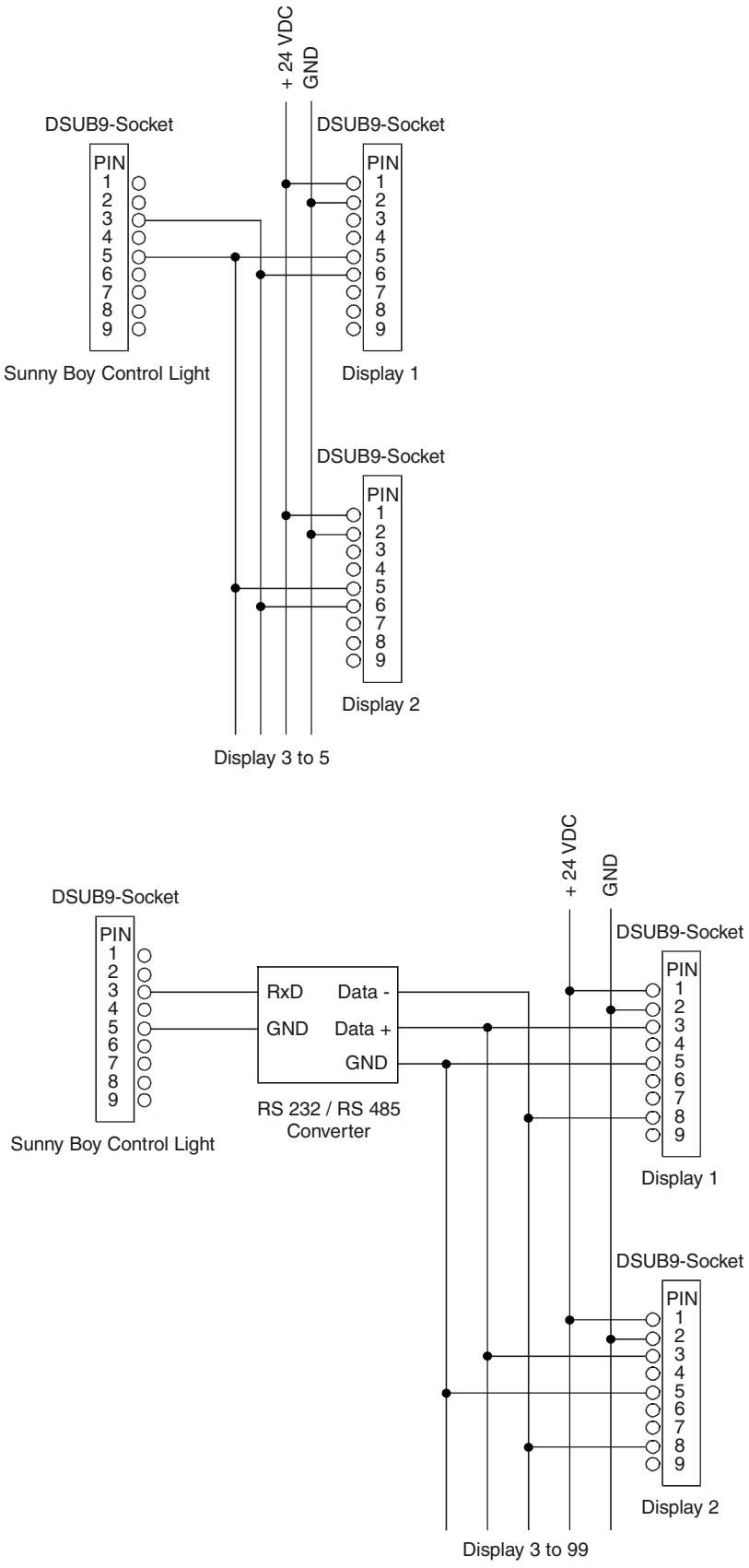


Fig. 3.14: Cabling EnergieCom displays RS232 and RS485

4 Working with the Sunny Boy Control Light

4.1 Display on Power-Up

The ***Sunny Boy Control Light*** executes an automatic self-test at every start. On error during this self-test, the according error or failure is indicated and - according to system settings - an external signal is sent out or the beeper is activated. If no errors are detected, the ***Sunny Boy Control Light*** will simply display its serial number and software version.

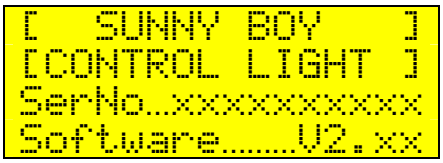


Fig. 4.1: Display on Power-Up

After this you have to input the date and time.

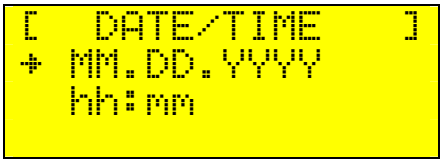
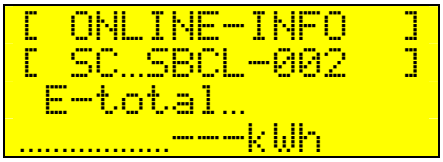


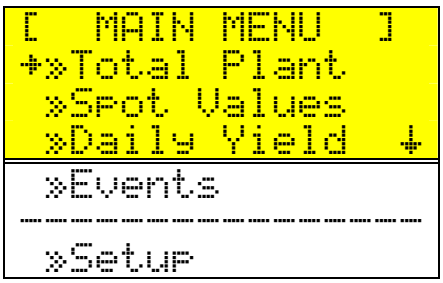
Fig. 4.2: Date/Time settings

After completing the settings the ***Sunny Boy Control Light*** switches into Normal Mode and starts "Online-Info".



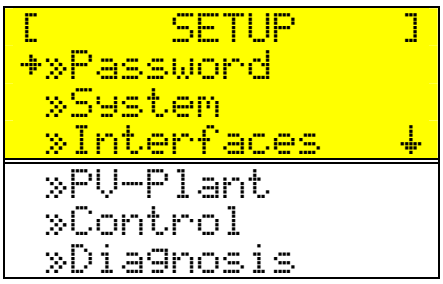
Cyclic display of information, faults and warnings concerning the plant — Chap. 4.2

↓ESC↑



← Sunny Boy Control Light main menu	Chap. 4.3
← total power, total energy yield etc.	Chap. 4.3.1
← spot values of selected device	Chap. 4.3.2
← measured daily data	Chap. 4.3.3
← Overview of failures and events	Chap. 4.3.4
← Setup menu (“see password”)	Chap. 5

↓ENTER ↑ESC



(only with password)	Chap. 5.1
← lock/unlock menu with password	Chap. 5
← language, date and time, “Online-Info” configuration	Chap. 5.2
← interface configuration	Chap. 5.3
← device registration, detection, parameter, energy-offset	Chap. 5.4
← tolerances, FAX-Info	Chap. 5.5
← reports, communication test	Chap. 5.6

Fig. 4.3: Menu structure of the Sunny Boy Control Light

4.2 Online Info

Online Info is the operating status of the ***Sunny Boy Control Light***. It cycles through various displays concerning the system status. The system status is continuously monitored and according error messages or other warnings sent out in case of a system malfunction.

"Online Info" cycles through the different displays automatically - it is additionally possible to manually scroll through the display with the **[Enter]** key.

Messages	Information	Pause
start-up message	serial number and software version	5 s (only once)
date/time	date and time	5 s (only once)
plant data	P_{AC} and E today of the plant	10 s
warnings	various warnings	10 s
malfunctions	various errors	until acknowledged

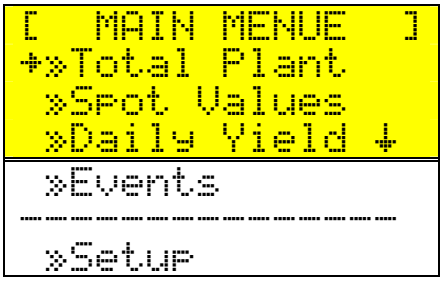
Fig. 4.4: Data from the „Online Info“

[ESC] exits „Online Info“. As long as you are in the main menu error displays are suppressed.

Return to ”Online Info“ from almost every menu entry by using the key combination **[↑] + [↓],** or the key **[ESC]** in the main menu. If no key is pressed in the menu, the system returns to ”Online Info“ after 15 minutes. For selecting the displayed channel see chapter 5.2.3.

4.3 Main Menu

You may select all available functions of ***Sunny Boy Control Light*** from the main menu, and you may return to "Online Info" by pressing the **[ESC]** key any time.

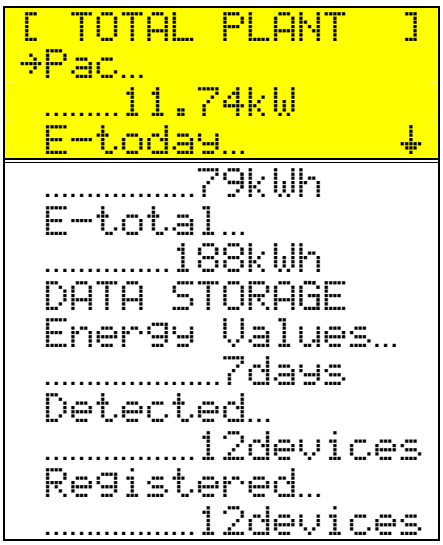


← Sunny Boy Control Light main menu
← Total yield, total power etc. Chap. 4.3.1
← Spot values for single devices Chap. 4.3.2
← stored values for every device Chap. 4.3.3
← events and failures Chap. 4.3.4
← Setup menu Chap. 5

Fig. 4.5: Main Menu

The ***Sunny Boy Control Light*** will automatically return to "Online Info" if no key is pressed within 60 sec in the main menu.

4.3.1 Total Plant



← Total current output power
← Total energy yield today
← Total energy yield
← Stored energy values
← Number of detected inverters
← Number of registered inverters

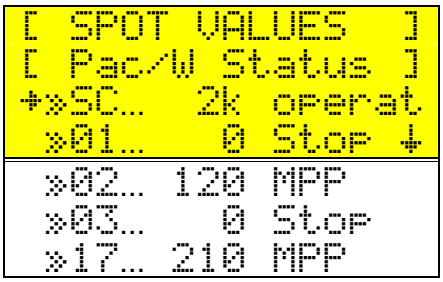
Fig. 4.6: Total plant

The function "Total Plant" gives you an overview of the operating condition of your entire plant.

☞ The ***Sunny Boy Control Light*** saves the data of the PV-plant of up to the last 200 days. After this the oldest data is overwritten. Save the data to a PC regularly in order to obtain a continuous overview of your PV-plants performance.

4.3.2 Spot Values

The function "Spot Values" enables to show all accessible values of every single device. At first you will enter the following dialog, in which you may see the present state of every single device.

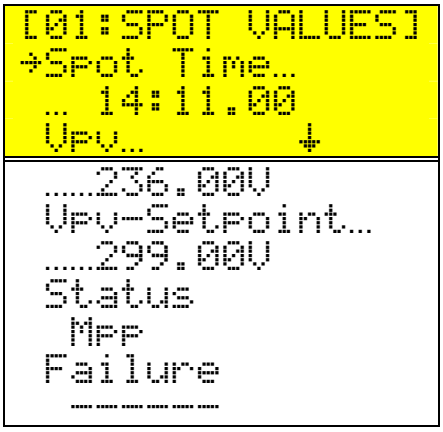


← Device ID, current power (here 2 kW), status

← Device ID, current power (here 120 W), status

Fig. 4.7: Device selection for Spot Value display

Select a device with **[Enter]** and all current values acquired in this device are displayed. Scroll through the list with the **[↑]** and **[↓]** keys**.**



[Device ID: Spot Values]

Fig. 4.8: Display of Spot Values for selected device

4.3.3 Daily Yield

The daily energy values will be saved for at least one year for every connected device. The device with the identifier 'SC' is the ***Sunny Boy Control Light*** itself and therefore represents the total plant.

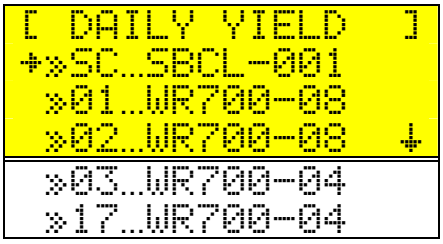


Fig. 4.9: Device Selection

Select a device with **[Enter]** and the daily energy values are displayed:

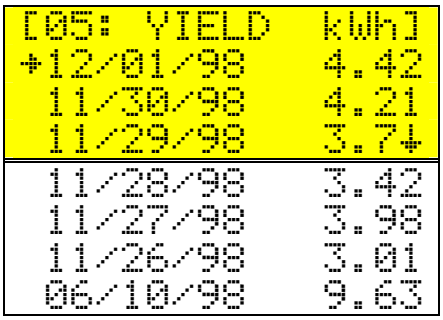


Fig. 4.10: Daily Energy Values

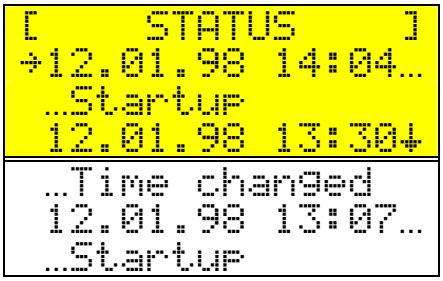
[↑] and **[↓]** scroll through all available daily energy values.

4.3.4 Events

The ***Sunny Boy Control Light*** logs all events with date and time of occurrence. Events are split in

- "Status"
- "Warnings"
- "Failures"

Fig. 4.11: Sub menu "Events"



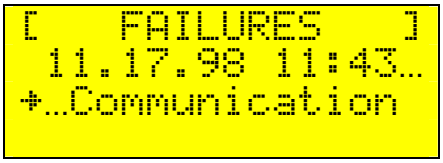
← Sunny Boy Control was restarted and connected to grid

← Date / Time was modified

Fig. 4.12: Logged status messages

← FAX transmission failure

Fig. 4.13:: Logged Warnings



← Communication failure

Fig. 4.14:: Logged failures

All events with a " ⊕ " (filled arrow) in the beginning have additional information in the detailed view. Select the event and press **[ENTER]**.

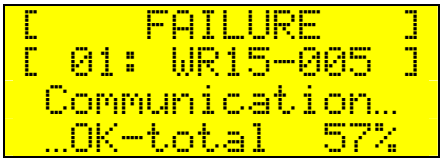


Fig. 4.15: Details on failure

[ESC] exits the detailed view of the logged event.

Summary of all Events

Event	Type	Description
Startup	Status	Power on / system startup
Time Changed	Status	Time or date was changed by user
Failure Conf.	Status	The user confirmed a failure or warning
System Reset	Warning	System was restarted after a failure
Device Failure	Warning	A connected device reported a failure
Offline	Warning	A connected device does not reply
CommSpot20	Warning	Communication is partially disturbed
Communication	Failure	Communication is disturbed over a longer time
Yield	Warning	Energy yield of a single device is below threshold
24h Offline	Failure	Device was offline for longer than 24 hours
FAX Plant-Inf.	Status	FAX PV-plant info was sent
FAX Error/War.	Status	FAX failure warning fax was sent
FAX Retry	Warning	FAX transmission failure
FAX Error	Failure	FAX transmission was not possible

Fig. 4.16: List of events

5 Menu Functions for Configuration

The "Setup" menu has all functions that exceed the normal operation of the ***Sunny Boy Control Light***.

Please note that the usage of the functions in the "Setup" menu can have influence on the operational safety and the operation of the entire plant. Use this menu carefully.

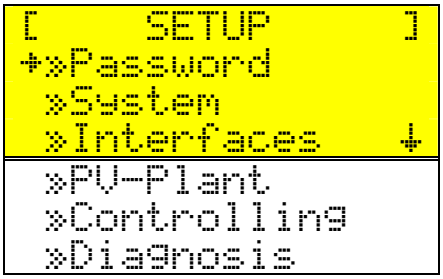
5.1 Password

The passwords for the ***Sunny Boy Control Light*** are on a separate sheet that was shipped together with your "User Manual". The password level is automatically set to "No Password" level

- at 00:00 h
- after a system reset or a restart
- or after entering a wrong password of none at all

The "Installer" password lets you change the operating parameters of the Sunny Boy Inverters - THIS CAN INVALIDATE THE OPERATING PERMISSION OF YOUR PV-PLANT**.** Use this parameter carefully.

The "User" password gives access to several sub-menus in the [SETUP] menu:

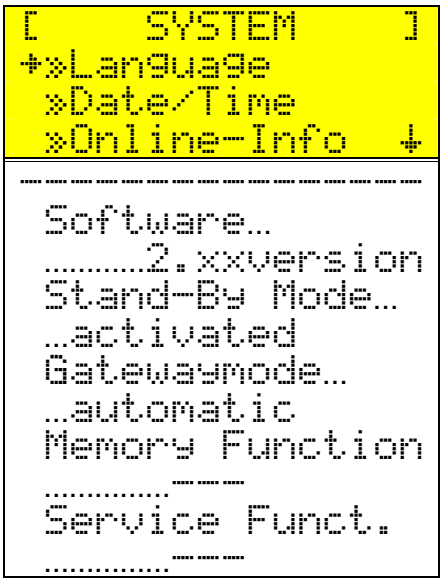


← Locks 'SETUP' menu		Chap. 5
← Language Date and Time		Chap. 5.2
← Interface Configuration		Chap. 5.3
← device registration, detection, parameter, energy-offset		Chap. 5.4
← Thresholds, Signaling and Switching Contacts, Fax Info		Chap. 5.5
← Reports, Communication Test		Chap. 5.6

Fig. 5.1: Setup Menu

5.2 System

The menu "Setup-System" defines basic settings of the ***Sunny Boy Control Light*** such as Date/Time, Language etc.



← select language — Chap. 5.2.1
← set date and time — Chap. 5.2.2
Chap. 5.2.3
← installed software version
← (only with Installer's password)
← energy saving mode on/off
← select Gateway mode
← (only with Installer's password)

Fig. 5.2: Setup System

Description of the "Setup-System" Parameters

"Software" is a fixed value and depends on the version installed on the ***Sunny Boy Control Light***. You cannot change it.

"Stand-By Mode" activates or deactivates the standby function, which sends the ***Sunny Boy Control Light*** into "standby" when no device is present for more than 15 minutes.

The "Gatewaymode" takes effect on the ***Sunny Boy Control Light*** as follows:

- Requests of ***Sunny Data Control*** were answered directly ('automatic')
- No packet forwarding to a connected PC ('blocked')
- Forwarding to a connected PC ('transparent')

"Memory Function" sets

- the parameters to factory defaults ("Default Param.")
- saves the parameter settings ("save parameter")
- the channels shown in 'Online-Info' to factory defaults ("Default O.Info")

Beyond this the "Memory Function" lets you

- delete the stored daily values ("del Daily Val.")
- delete the stored device channel information ("del Chan.Infos")
- reset the error counter and operation data ("reset op.data")
- reset only the error counter ("reset errors")
- delete all data and set all parameters to factory default ("reset system")

5.2.1 Language Definition

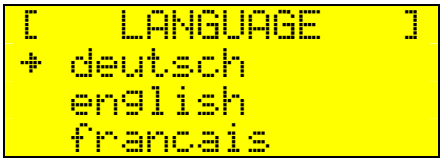


Fig. 5.3: Selection of the language

Select the language with the arrow keys and confirm with **[ENTER]**.

5.2.2 Date / Time

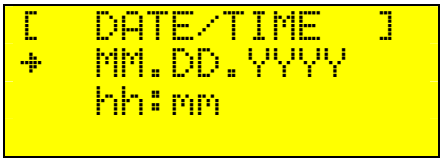


Fig. 5.4: Setting date and time

Define the new date and time with the arrow keys and confirm with **[ENTER].**

5.2.3 Online-Info

The Message 'Channel Cnt.…' specifies the number of displayed Channels (see Chapter 4.2).

Fig. 5.5: Configure 'Online-Info'

To change the configuration choose 'Chan. Select'. The list of available devices appears in the display.

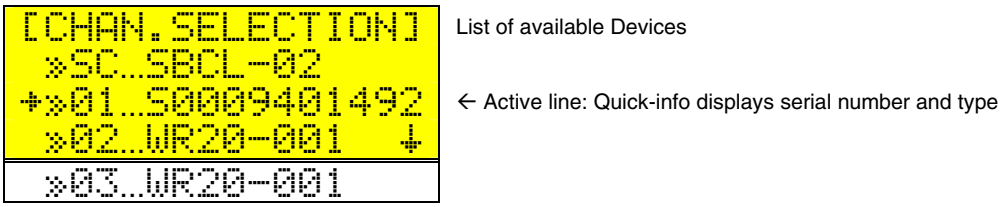


Fig. 5.6: Device- and Channel-Selection

Select a line of a device using the keys **[↑]** or **[↓]**. For 2 seconds the serial-number of each device is shown in the active line. Choose **[ENTER]** for selecting a Channel.

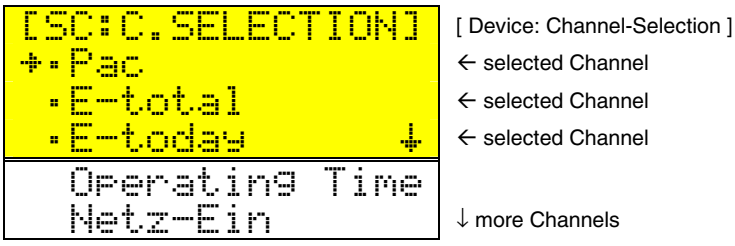


Fig. 5.7: Channel-Selection

Channels shown in the 'Online-Info' are marked with a point. Use **[ENTER]** to change the selection.

Choose **[ESC]** to reach the higher menus. When leaving "ONLINE-INFO" all changes must be confirmed in order to take effect.

5.3 Interfaces

Fig. 5.8: Setup Interfaces

5.3.1 Communication

The installed interfaces are automatically detected by the ***Sunny Boy Control Light*** and displayed in this menu.

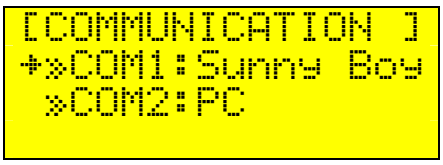


Fig. 5.9: Selection of an interface

The Baud-rate can be defined for both interfaces. Powerline communication is limited to 1200 Baud. COM2 can be set to 19200 Baud for RS232 connections.

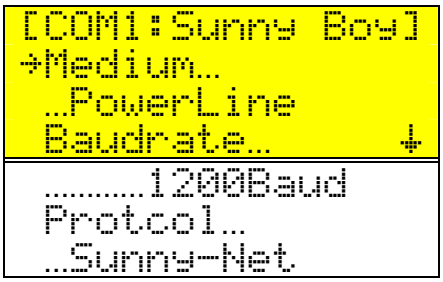


Fig. 5.10: COM1 Interface

5.3.2 Modem

Switch the modem and the Sunny Boy Control on at the same time. The ***Sunny Boy Control Light*** will automatically detect the modem after approximately 1 minute. The parameter COM2:PC automatically switches from **RS232** to **RS232(Modem)**. Check the connection to the modem and the modem's power supply if the modem was not

detected and turn the Sunny Boy Control on again, as it only conducts a modem detection cycle on power-up.

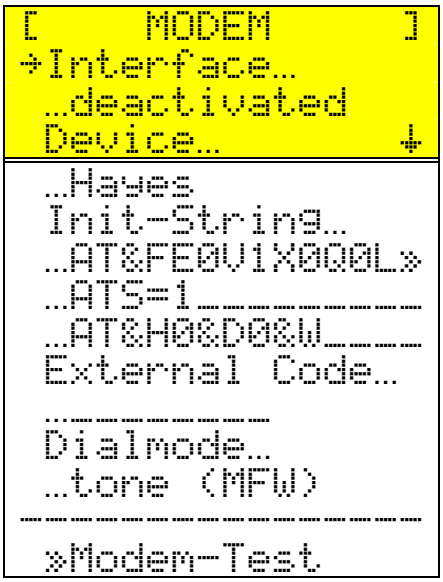


Fig. 5.11: Fax-Modem Configuration

The "Hayes" init-strings should be accepted by any FAX class 2 or 2.0 modem - in certain cases it can be necessary to modify the init-strings. For this use the setting "user defined". Do not modify the init-strings if you are not absolutely sure about what you are doing. For operation with a private branch exchange (PBX) enter the Dial out Code in field "External Code…". I.e. choose "0W" if it may be necessary that there is short break after dialing out.

When using the "Siemens GSM" you'll have to adapt the setting of "PIN" in the third sequence.

Select "Modem-Test" to check the proper function. The Sunny Boy Control sends the init strings one after the other to the modem and checks the modem's response. Beside the Init-strings the Sunny Boy Control checks the dialtone detection. The init strings must be modified - or the modem is not suitable if an error occurs. Some Modem-types could respond an "Error". This is not relevant for remote diagnosis via PC and modem.

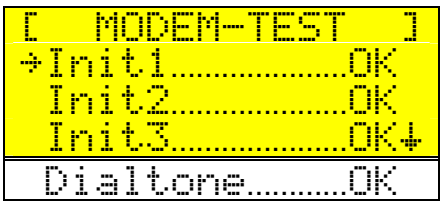


Fig. 5.12: Result of Modem-test

If you want to use the FAX-Function check with "Test-FAX" whether the connection is built up right (see Chapter 5.5.2).

☞ ISDN: Make sure that the ISDN system is correctly configured for the Sunny Boy Control fax transmission. The recommended setting is "multifunctional" or similar.

5.3.3 External Display

This menu defines the port for connecting the external displays. Further sub-menues are available, depending on the selected display type.

Fig. 5.13: Activating the external display and defining the type

The following displays are available in the menu-entry "Type":

- HvG
- Siebert
- EnergieCom
- DATALITE

The channel selection and the numeric format for the HvG, Siebert and DATALITE cannot be changed.

Sunny Boy Control detects a connected PC. So the port need not be stopped for operation with an external display. If there are no requests for 60s the Sunny Boy Control sends Display-Data to COM2.

HvG and Siebert

Definition of the ASCII string:

Start	E-Total [kWh]	E-today [kWh]	Pac [kW]	Iac-Ist [A]	Upv-Ist [V]	Uac [V]	E-today [Wh]	End (Siebert)
#	LLLLLL	LLLL	LLRR	LLRR	LLLL	LLLL	LLLL	CR,LF

L = left of the decimal point R = right of the decimal point

The ASCII string is sent with 2400 Baud (no parity, 8 bit, 1 stop bit) on the port 'PC (COM 2)' and is updated regularly.

Example for the ASCII string
The string '#0011040018024703140189023018 27'
results in the following data to be displayed:

	Start	E-Total [kWh]	E-today [kWh]	Pac [kW]	Iac-Ist [A]	Upv-Ist [V]	Uac [V]	E-today [Wh]	End (Siebert)
Value		1104	18	2,47	3,14	189	230	1827	
ASCII	#	001104	0018	0247	0314	0189	02 30	1827	CR,LF

EnergieCom

Selecting EnergieCom as type results in various configuration possibilities. Measured values of the ***Sunny Boy Control Light*** and the registered **Sunny Boys** can be displayed. Up to 99 different displays can be generated in EnergieCom format. The number of the display is the same as the two address bytes in the serial telegram. Examples are given in Fig. 5.17.

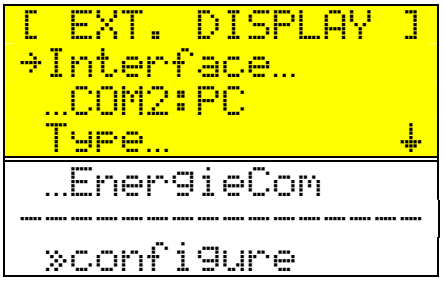


Fig. 5.14: External display “EnergieCom”

Configuration

The line selected with the cursor additionally shows the selected device and the measured channels. Dot on the left indicates if the display is activated or not (dot = selected; no dot = not selected).

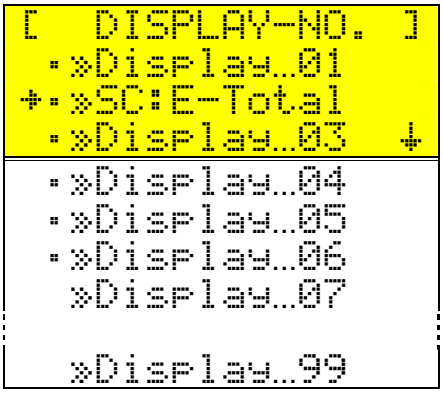


Fig. 5.15: Overview of the 99 possible displays

[ENTER] confirms the selection and displays an overview of the defined parameters.

Overview of the defined parameters

This sub-menu shows all settings of the selected display.

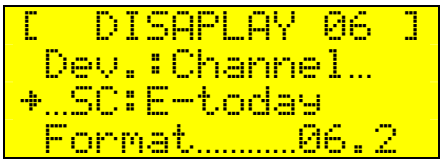


Fig. 5.16: Display settings

The numeric format can be edited in the bottom line.

- The number left of the decimal point defines the total number of digits
- The number right of the decimal point defines the number of digits right of the decimal point.

The example above, in Fig. 5.14 could result in the display of **1240.35** kWh.

Selecting the line above lets you select the channel for displaying data.

Device Selection

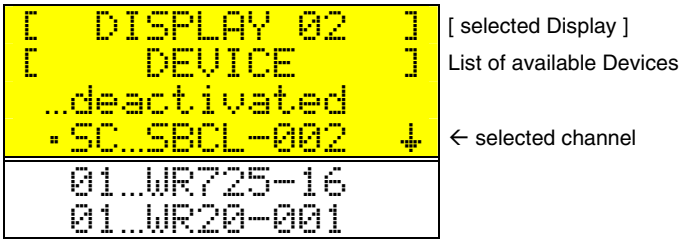


Fig. 5.17: Device selection

The selected device is marked with a dot on the left, the line with the cursor additionally shows the serial number of the selected device. Different devices are selected by moving to the respective device with the cursor and pressing **[ENTER]**. This moves the dot on the left to the new selected device. Pressing **[ENTER]** once more puts you to channel selection. Setting the dot to the upper line deletes the settings for the deletes the settings for the display and deactivates it.

Channel Selection

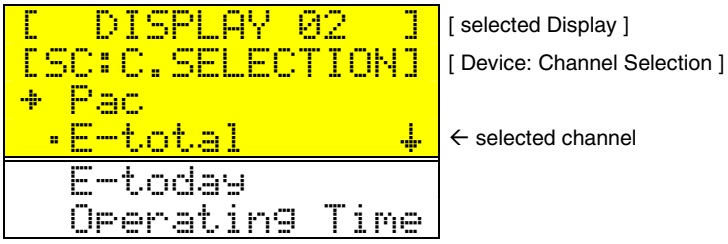


Fig. 5.18: Channel selection

The cursor buttons move the selection within the available channels. **[ENTER]** selects the channel while the dot on the left indicates this. The display is now

configured. **[ESC]** leaves the menu. All changes must be confirmed in order to take effect.

The following example shows the first 6 displays while the default values are used for device, channel and format.

Display	Device:Channel	Format	EnergieCom Display
01	SC:Pac	4.0	7
02	SC:E-total	4.0	4 8 2 8
03	SC:E-today	4.0	2 3
04	SC:Pac	6.2	6. 5 4
05	SC:E-total	6.2	4 8 2 8. 4 7
06	SC:E-today	6.2	2 3. 3 5

Fig. 5.19: Example for EnergieCom displays

- Zeros on the left are not displayed.
- The unit for Pac always is kW (even when the unit on the ***Sunny Boy Control Light*** is “Watt”). Display in Watt is done by setting the format to “4.3”.
- Too large numbers are indicated with “o.Error” (overflow).
- The ASCII string is sent via port ‘PC (COM 2)’ (8, 1, N).

Example

05B@@482847 results in the following hexadecimal output

02 30 35 42 40 40 34 38 32 38 34 37 03

	Start	Address	Format P1 P2 P3	Value	End
Hex	02	30 35	42 40 40	34 38 32 38 34 37	03
ASCII		0 5	B @ @	4 8 2 8 4 7	
Description		Display 05	Point at digit 4	4828,47	

Definition of the decimal point with P1, P2, P3

- P1 defines the decimal point for the digits 1 to 5,
- P2 defines the decimal point for the digits 6 to 10
- P3 defines the decimal point for the digits 11 – 15

Only one of the 3 bytes is set, the other two bytes are set to @. No decimal point is defined with @@@.

Example: The decimal point is defined to the 8th digit with '@ D @'.

Decimal point at digit:			ASCII	Hex	Binary
P1	P2	P3			
1	6	11	80 P	x50	010 10000
2	7	12	72 H	x48	010 01000
3	8	13	68 D	x44	010 00100
4	9	14	66 B	x42	010 00010
5	10	15	65 A	x41	010 00001
-	-	-	64 @	x40	010 00000

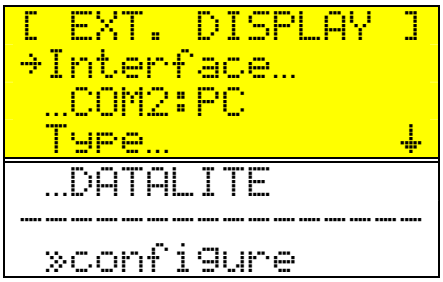
Fig. 5.20: Definition of the decimal point

Example for the first six Display-Addresses

Telegram	Adr.	Display	Format	Value / Unit	Channel
02 30 31 40 40 40 30 30 30 37 03	01	7	4.0	0,654 kW	Pac
02 30 32 40 40 40 34 38 32 38 03	02	4828	4.0	4828 kWh	E-total
02 30 33 40 40 40 30 30 32 33 03	03	23	4.0	23 kWh	E-today
02 30 34 42 40 40 30 30 30 30 36 35 03	04	0.65	6.2	0,654 kW	Pac
02 30 35 42 40 40 34 38 32 38 34 37 03	05	4828.47	6.2	4828,47 kWh	E-total
02 30 36 42 40 40 30 30 32 33 33 35 03	06	23.35	6.2	23,35 kWh	E-today

DATALITE

The ***Sunny Boy Control Light*** supports DATALITE DX systems with 8 lines and 16 columns. The display is activated by selecting the interface. After you select DATALITE the ***Sunny Boy Control Light*** displays the following:



← Activation by selecting an interface

← Display-type

← Menu 'Set time' (only with type DATALITE!)

Fig. 5.21: External display 'DATALITE'

The internal date and time of the DATALITE display can be adjusted with the ***Sunny Boy Control Light*** - e.g. for daylight saving time adjustment.

The internal time of the DATALITE display is adjusted as follows:

- Connect the DATALITE display to the serial port of the ***Sunny Boy Control Light***
- Activate the serial port
- Select "configure" and press [ENTER] – The ***Sunny Boy Control Light*** displays '…O.K.'.

← appears if information has been sent

Fig. 5.22: Adjusting internal time

The internal time of the DATALITE display is then synchronized with the internal time of the ***Sunny Boy Control Light***. **[ESC]** brings you back to the upper level menues.

☞ The internal clock of the DATALITE display keeps running even when

there is no connection to the ***Sunny Boy Control Light*** . A time adjustment after a power failure is not necessary.

The information is transmitted to the DATALITE display every 10 seconds as shown in Fig. 5.21.

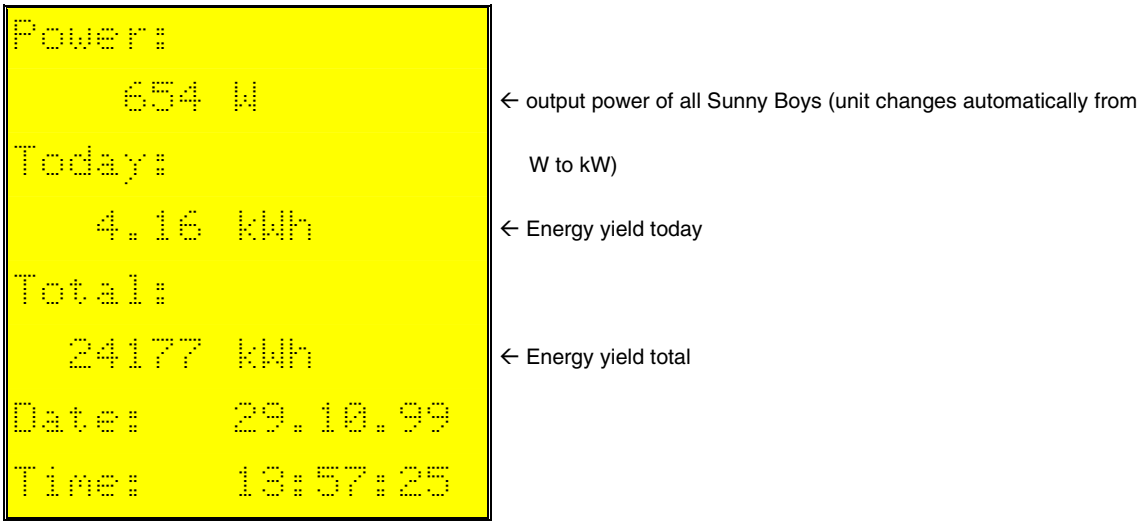


Fig. 5.23: Example for the DATALITE display

The output power is displayed in kW with two decimal points whenever the power exceeds 999 W.

This results in the following maximal values:

- 9 999.99 kW for Pac
- 9 999.99 kWh for E-today
- 9 999.999 kWh for E-total

The ASCII string is sent to the DATALITE display with 4800 Baud (8, N, 1) via ‚PC (COM 2)'.

Example DATALITE Display

Telegram (Hex)	Meaning / Display
01 20 1C	Start, Controller-Address, Field Separator
30 41 6B 74 75 65 6C 6C 3A 1C	Power:
31 20 20 20 20 36 35 34 20 57 20 1C	654 W
32 48 65 75 74 65 3A 1C	Today:
33 20 20 20 34 2E 31 36 20 6B 57 68 1C	4.16 kWh
34 47 65 73 61 6D 74 3A 1C	Total:
35 20 20 32 34 31 37 37 20 6B 57 68 1C	24177 kWh
36 44 61 74 75 6D 3° 20 20 25 44 2E 25 4D 2E 25 59 1C	Date: %D.%M.%Y
37 5A 65 69 74 3A 20 20 20 25 48 3A 25 6D 3A 25 53 1C	Time: %H:%m:%S
16 0D 01 30 1C	Synchronisation
0D	End (CR)

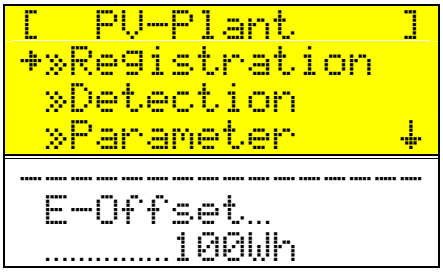
Example for setting the internal time

at 30/11/1999 14:18:58

Telegramm (Hex)	Meaning
01 7F 1C	Start, Controller-Address, FS
1B 54	Adjust Real-Time-Clock
33	Year 1999: x33 = d51 = d**99** + d32 – d80
2B	Month 11: x2B = d43 = d**11** + d32
20	No
3E	Day 30: x2E = d62 = d**30** + d32
2E	Hour 14: x2E = d46 = d**14** + d32
32	Minute 18: x32 = d50 = d**18** + d32
5A	Second 58: x5A = d90 = d**58** + d32
0D	End

Further details are available in the user manual of the display and on the internet pages of the DATALITE manufacturer (www.datalite.nl).

5.4 PV-Plant - Setup



Chap.5.4.1
Chap.5.4.2
Chap.5.3

see below.

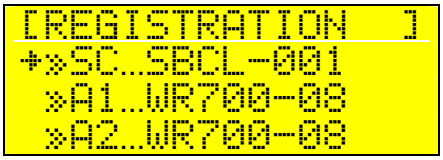
Fig. 5.24: "PV-Plant" - SETUP

Energy - Offset

E-Offset is used to define a difference between the display of your energy counter and the displayed value "E-total": This value is added to the value the ***Sunny Boy Control Light*** computes.

5.4.1 Registration

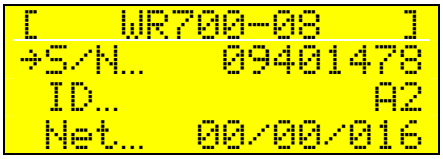
The device registration displays all detected devices with the device ID and the device type.



← device ID, device-type - serial no

Fig. 5.25: "Registration" - PV-Plant

Select a device and press **[Enter]** in order to get detailed information consisting of device ID, device type and network address of the device.



[device type]
← serial no. of Device
← device ID
← (bus address / string address / device address)

Fig. 5.26: Device ID and network address

Every device has an unique net address for identification within the network.

Device ID

You may modify the device registration (01 .. 50) and net address automatically placed by the ***Sunny Boy Control Light*** for every device separately, by pressing the **[Enter]** key in order to select it and then to alter the settings with the keys [↑] and [↓]. Confirm every single character with the **[Enter]** key.

By using structured device registrations you can achieve a simple identification of the specific devices within ***Sunny Boy Control Light*** menu. For example a device registration indicates 'AL' for Above Left' or 'A1' for surface A, device 1'. In some cases it makes sense to mark the according system components with according signs or similar.

Please note that the device registration 'SC' is reserved by the ***Sunny Boy Control Light***.

Special device registration '99'

If you want to delete a device from the registration (e.g. to replace by another one) give the device registration '99'. The device will be deleted after confirming.

Net Address

Within the network each device has to have an individual net address which is divided in a bus address (0..15), a string address (0..15) and a device address (0..255).

Bus Address and String Address

The bus address and the string address are identical for all devices monitored by the ***Sunny Boy Control Light***. They may adjusted with the ***Sunny Boy Control Light*** (Fig. 5.12 select device 'SC') and modified for all devices on the plant simultaneously.

The default setting of the bus address and string address is 00/00. An alteration of the bus- or string address is only necessary in the following cases:

- Separation from another plant
  You should change the bus address of your system if you detect units from other plants in the neighborhood. This ensures that the acquired data is correct and the transmission is stabile.
- Large Plants
  If your plant consists of several strings controlled by several ***Sunny Boy Control Light*** each string must have a different address.

Device Address

Every device in your PV-plant has to have an unique device address in order to prevent erroneous data transmission. During the detection of the PV-plant units the single ***Sunny Boy Control Light*** automatically receive individual device addresses, in recognition of eventual previous detection cycles. In case, however, a device is registered with the same address, the new device gets a new individual device address.

5.4.2 Detection - Setup

The ***Sunny Boy Control Light*** detects all accessible devices. The status informs you of the current progress.

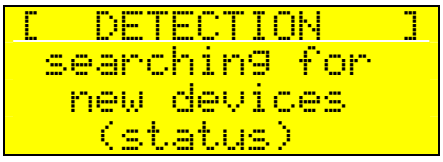


Fig. 5.27: Sunny Boy Control Light device detection procedure

After each detection cycle all devices found by ***Sunny Boy Control Light*** will be displayed one after the other as follows:

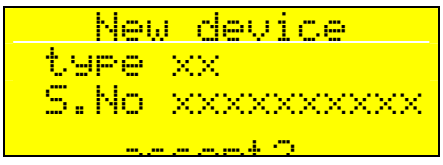


Fig. 5.28: New devices found

Please compare the serial numbers of the devices found by ***Sunny Boy Control Light*** with the serial numbers of your devices, which you have written down before. Register the devices with **[Enter]** in the device list resp. remove devices that you do not want to register with **[ESC].** Please note that the respective detected device is registered automatically without confirmation if no key is pressed.

After this you will see the total number of newly registered devices. Please check if all installed devices were found by ***Sunny Boy Control Light***. If not, you should activate "search again" with **[Enter].**

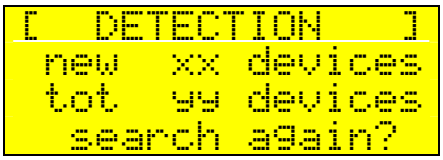


Fig. 5.29: End of detection procedure

By pressing the **[Enter]** key you may re-run the search as it is possible that the ***Sunny Boy Control Light*** does not find all devices in the first search cycle. If no key is pressed the ***Sunny Boy Control Light*** will automatically begin a new detection cycle after 60 sec. If several attempts were unsuccessful, please check whether you have correctly installed the devices to be detected. If ***Sunny Boy Control Light*** does not detect a device in spite of a repeated search, please read chapter 7.2, “Troubleshooting Powerline Communication”.

Finish the device detection by pressing the **[ESC]** key.

After this you will be prompted to confirm the configuration. During the initial installation the number of new devices corresponds with the total number of registered devices.

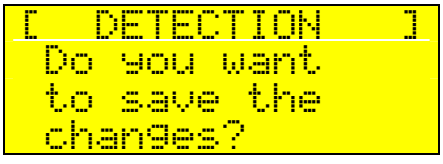
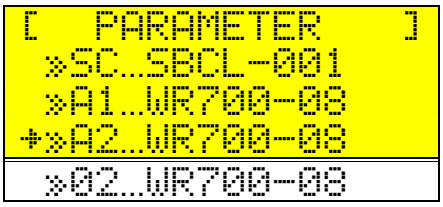


Fig. 5.30: Saving the detected Sunny Boys

- **[ESC]** cancels the detection sequence.
- **[Enter]** confirms the configuration and ***Sunny Boy Control Light*** begins standard operation.

5.4.3 Parameter Setup

The parameter setup function is used for changing the default operating parameters of the connected Sunny Boy String Inverters. Select a device before changing the parameters:



← device ID, device-type - serial no

Fig. 5.31: Device selection for parameter changing

Example of a Parameter List

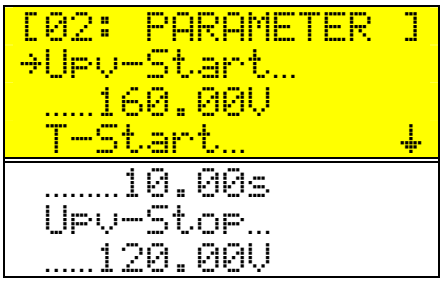


Fig. 5.32: Parameter display and modification

The parameters available for this device are displayed. The [↑] and [↓] keys scroll through the different parameters. **[Enter]** selects the parameter for the according modification and is then changed digit by digit.

This can invalidate the operating permission of your PV-Plant.

5.4.4 Adding a New Device

If you want to add a new device to an existing plant, proceed according to the following steps:

- install the device
- start the configuration menu "Setup…PV-Plant…Detection" (you will see the serial number on the display).
- when the new device appears on the display and you are prompted to confirm this device. Please confirm this in order to add the according device to your plant.

If the new device is not detected check the cabling and the connection.

5.4.5 Removing a Device

You may remove a device from the plant by giving it the identifier '99' in the "Setup…PV-Plant…Registration" menu.

5.5 Control

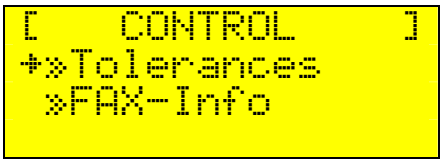


Fig. 5.33: Sub menu "Control"

5.5.1 Tolerances

"Tolerances" defines the thresholds for generating warnings concerning the operation of the PV-plant.

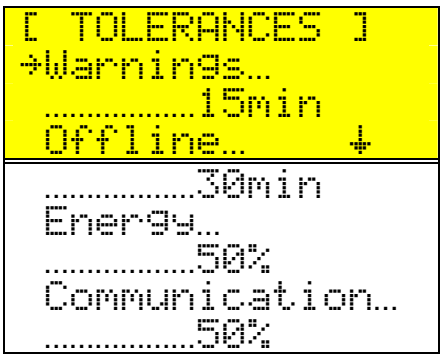


Fig. 5.34: Definition of the thresholds for the "Control"

"Warnings" defines how long the failure must be occurring before a warning is generated by the ***Sunny Boy Control Light***.

"Offline" defines the maximum period of time a device may be off-line before a warning is generated. (This is based on the entire operating time of the plant as "online time" of the first device and the shutdown of the last device). The minimal time is 15 minutes.

"Energy" defines the deviation of a single device from the average yield of the entire plant in percent. Be generous with this parameter (or let's say more tolerant, as it is in the tolerance menu) due to the fact that there are always slight deviations resulting from different panels, panel geometry and temperature. See the below example for details. And note that the "energy" controlling function naturally does not make sense for plants with only one Sunny Boy Inverter since single inverters in a PV-plant with only one inverter simply do not deviate from the average of the entire plant.

0% deactivates the "Energy" controlling function.

The following example is a PV-plant with 4 inverters (A, B, C and D) with a defined tolerance of 90%:

Device	Yield	Warning	Remarks
A	2,2 kWh	none	The device is operating optimally
B	1,7 kWh	failure	Yield is below the tolerated value -> warning
C	0 kWh	offline	Device is offline
D	2,1 kWh	none	The device is operating optimally
total	**6,0 kWh**		
average	2,0 kWh		Average computed from the active inverters
tolerance	1,8 kWh		Minimum yield for not generating a warning

Fig. 5.35: Tolerancing 4 Sunny Boy inverters

Inverters that are offline do not influence the calculation of the average yield.

'Communication' defines the tolerable percentage of corrupt data packages.

5.5.2 FAX-Info

The ***Sunny Boy Control Light*** can send fax messages if desired. An external fax-modem must be installed on the COM2:PC port.

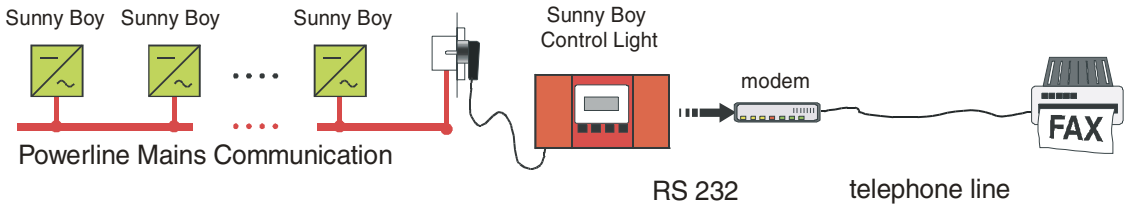


Fig. 5.36: Schematic cabling of the fax-modem connection

A detailed description of the connection of the modem is in the "Installation Guide".

"FAX-Info" activates / deactivates the Fax message function:

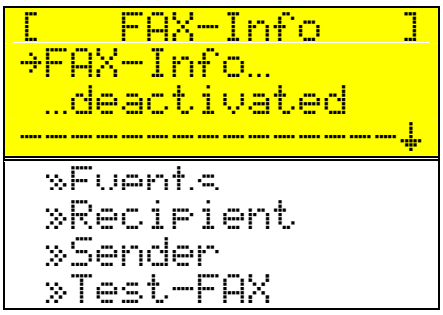


Fig. 5.37: "FAX-Info" configuration menu

Events

Fax messages can be sent as follows:

- "Plant-Info" as report of energy yield of the plant
- "Errors / Warnings": as report of occurred failures and warnings

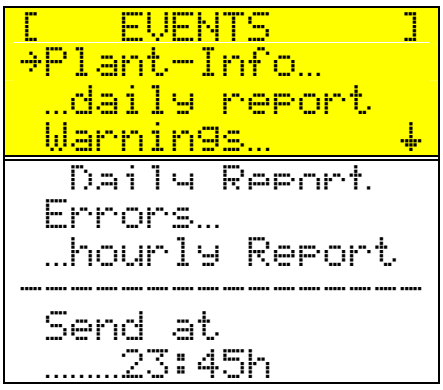


Fig. 5.38: Definition of events for fax message

Recipient

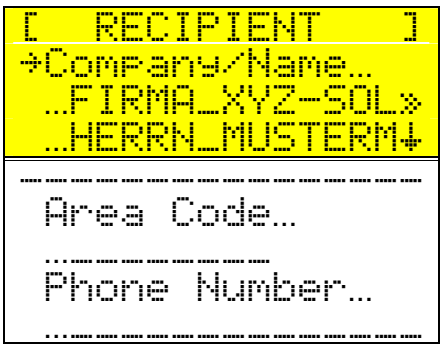


Fig. 5.39: Configuration of fax message recipient

"Company/Name": Two lines are available for identifying the recipient.

"Area Code" and "Phone Number" define the number of the fax machine you want to send the fax messages to.

Sender

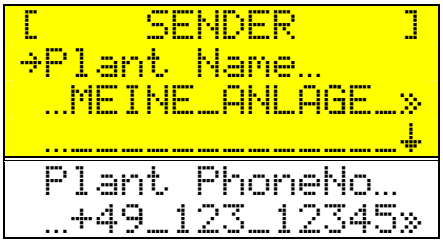


Fig. 5.40: Configuration of fax sender

"Plant Name": Two lines are available for identifying the fax header.

"Plant PhoneNo" appears in the fax-header, too.

Test-FAX

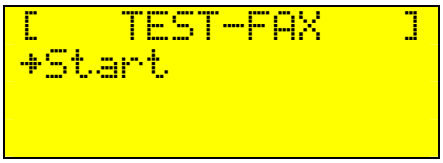
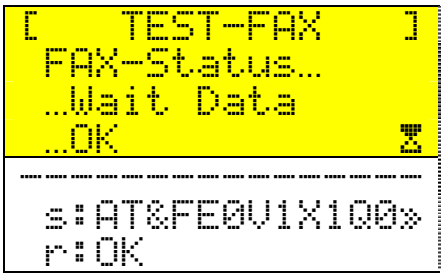


Fig. 5.41: Send Test messages

This function can be used to generate Fax-messages in order to check the settings you defined. Detailed information is then displayed on the ***Sunny Boy Control Light*** step by step. In case you have trouble with the fax transmission, check the settings i.e. modem configuration and init string.



...Init Com, ...Init Modem, ...Init FAX, ...Dial, ...Send...
← when OK or ERROR with [↓] to the sequences

← sent
← received

Fig. 5.42: Send / receive test messages

The test fax looks like this:

```
04/01/1998 16:15          +49 561 9522422          => 295                01/01

Sunny Boy Control        FAX-Information

FROM      :  MY PLANT

TO        :  XYZ-SOLARTEC
             MR. SUNSHINE

                      D A I L Y   R E P O R T  04/01/1998

P L A N T - I N F O :

ID  DEVICE    SERIAL NO.       ENERGY   ONLINE
SC  SunBC-06  0100420118      4.33kWh
03  WR1500-2  0000404879      1.93kWh   09:24h
04  WR1500-2  0000404866      2.40kWh   09:25h

END OF FAX-INFORMATION
```

Fig. 5.43: Example for a test fax

Here two simple examples of the fax messages:

Failures / Warnings

```
04/02/1998 12:00          +49 561 9522422          => 295                01/01

Sunny Boy Control        FAX-Information

FROM      :  MY PLANT

TO        :  XYZ-SOLARTEC
             MR. SUNSHINE

                      H O U R L Y   R E P O R T  04/02/1998 12:00

E R R O R S :
ID  DEVICE    SERIAL NO.    DATE     TIME   MESSAGE
04  WR1500-2  0000404866    04/02/98 11:43  TOLERANCE COMMUNICATION 99%
03  WR1500-2  0000404879    04/02/98 11:44  ENERGY VALUE 88%

W A R N I N G S :
ID  DEVICE    SERIAL NO.    DATE     TIME   MESSAGE
04  WR1500-2  0000404866    04/01/98 12:14  NO CONTACT SINCE 11:14
03  WR1500-2  0000404879    04/01/98 18:11  TOLERANCE COMMUNICATION SPOT20 80%
03  WR1500-2  0000404879    04/01/98 18:12  NO CONTACT SINCE 18:09
03  WR1500-2  0000404879    04/01/98 18:31  TOLERANCE COMMUNICATION SPOT20 80%
03  WR1500-2  0000404879    04/01/98 18:36  NO CONTACT SINCE 18:33
03  WR1500-2  0000404879    04/01/98 18:43  NO CONTACT SINCE 18:40
03  WR1500-2  0000404879    04/01/98 18:51  TOLERANCE COMMUNICATION SPOT20 35%
03  WR1500-2  0000404879    04/01/98 18:57  NO CONTACT SINCE 18:53
03  WR1500-2  0000404879    04/01/98 19:18  TOLERANCE COMMUNICATION SPOT20 75%

END OF FAX-INFORMATION
```

Daily Plant-Info

04/01/1998 16:15 +49 561 9522422 => 295 01/01

Sunny Boy Control FAX-Information

FROM : MY PLANT

TO : XYZ-SOLARTEC
MR. SUNSHINE

D A I L Y R E P O R T 04/01/1998

P L A N T - I N F O :

ID	DEVICE	SERIAL NO.	ENERGY	ONLINE
SC	SunBC-06	0100420118	4.33kWh	
03	WR1500-2	0000404879	1.93kWh	09:24h
04	WR1500-2	0000404866	2.40kWh	09:25h

END OF FAX-INFORMATION

5.6 Diagnosis

The "Diagnosis" function will help you get information about the status of the connected Sunny Boy inverters.

Fig. 5.44: "Diagnosis" function

5.6.1 Report

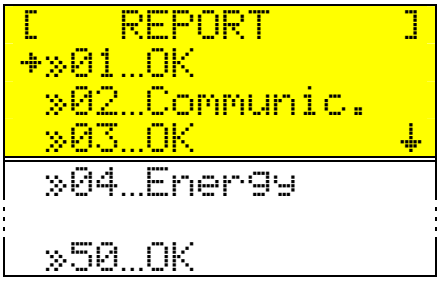


Fig. 5.45: Device selection for report

The report for the devices is split in three sections:

Communication: Total transmitted data packages and transmitted data packages with failures in %. (The status is "Offline" whenever the value set in Setup-Tolerances-Offline is reached.)

Accessible: Activity this day and the time the device was offline

Yield: The device's yield yesterday and the average yield of all devices yesterday

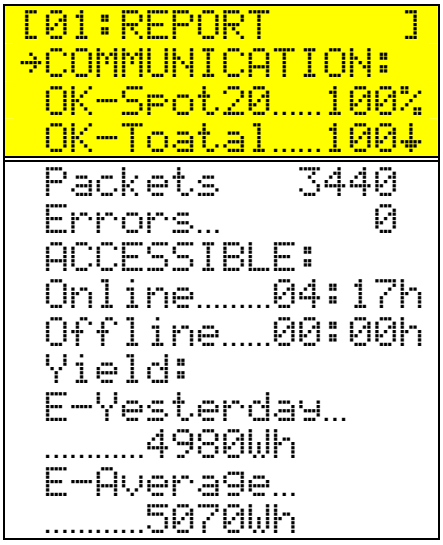


Fig. 5.46: Diagnosis report for single device

The communication status is set to "Communic." if the communication is lower as defined in "Tolerance".

5.6.2 Communication

"Communication" helps you diagnose the communication with the Sunny Boy inverters. Select a single inverter for diagnosis first.

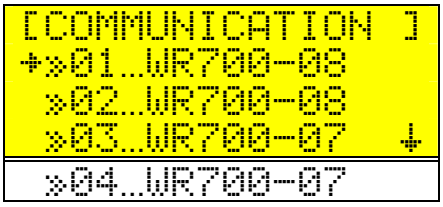


Fig. 5.47: Device Selection

The ***Sunny Boy Control Light*** then sends data requests to the selected Sunny Boy and evaluates the communication. The percentage of correct transmitted packages is calculated from the last 20 transmissions.

Fig. 5.48: Communication test

6 PC and Sunny Data Control

The Windows(TM) based program Sunny Data Control offers a full graphical user interface and all positive features known from Windows 95(TM).

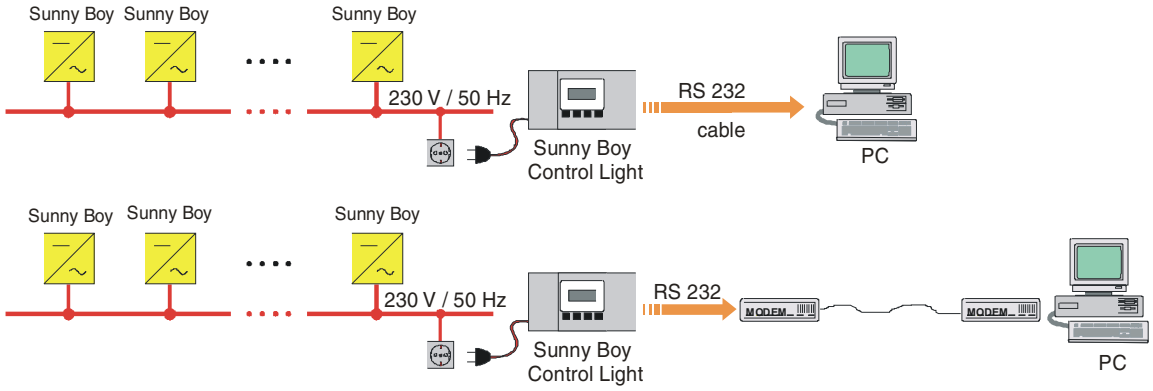


Fig. 6.1: Remote diagnosis via PC and Sunny Data Control

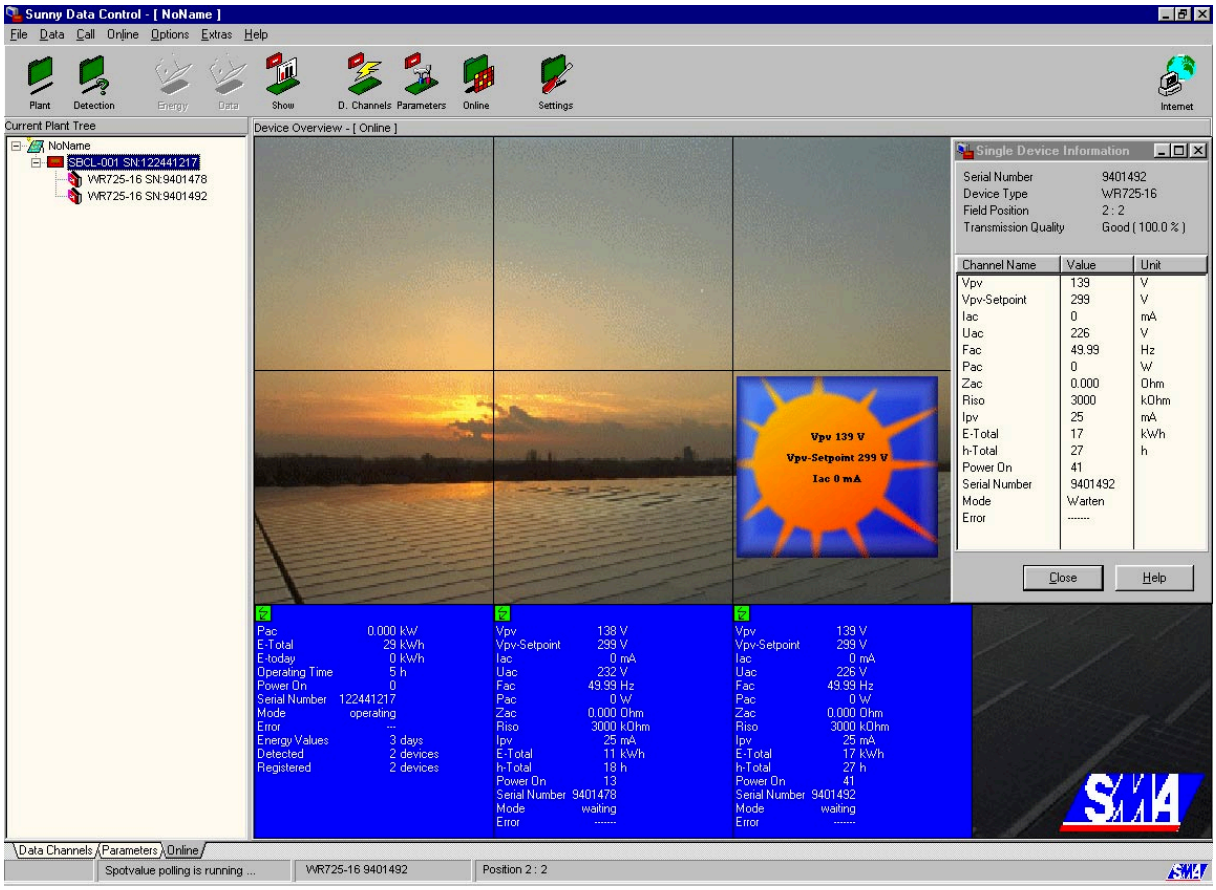


Fig. 6.1: Sunny Data Control

You may acquire and evaluate the data (daily energy value and measuring channel data) from a ***Sunny Boy Control Light*** with a PC and Sunny Data Control. Additionally, all configurations of a ***Sunny Boy Control Light*** can be displayed and modified with Sunny Data Control. This is independent from the PC's connection to the ***Sunny Boy Control Light*** (serial interface or modem). For further information concerning Sunny Data Control refer to the Sunny Data Control manual.

Parameter		**Entry**	**Description**
CO_COM1	*	PowerLine	Interface type COM1
CO_COM1 Baud	*	1200Baud	Data transmission to PV-plant
CO_COM1-Prot.	*	Sunny-Net	Used transmission protocol
CO_COM2	*	RS232	Interface type COM2
CO_COM2 Baud	*	19200Baud	Data transmission to PC
CO_COM2-Prot.		Sunny-Net	Used transmission protocol
DA_Data Reading	*	ON	"ON/OFF"
DA_Storage		ON	"ON/OFF" when system active, permanent: '24h'
ED_InterfacePort	*	deactivated	Interface for external display
ED_Type	*	EnergieCom	External Display type
FI_Area Number			FAX-Info 'area number'
FI_Company/Name		Firma XYZ-SOLAR	FAX-Info recipient 1. line
FI_FAX-Info		Deactivated	FAX-Info activated / deactivated
FI_Phone Number			FAX-Info 'area code' recipient
FI_Plant Name1		My Plant	FAX-Info sender 1. Line
FI_Plant Name2			FAX-Info sender 2. Line
FI_Plant PhoneNo		+49 123 1234567890	FAX-Info sender identification
FI_Plant-Info		Daily report	FAX-Info plant info / daily activated
FI_Recipient		HERRN MUSTERMANN	FAX-Info recipient 2. line
FI_RepError		hourly report	FAX-Info failure messages
FI_Report at		1425.00 h	FAX-Info daily report at 23:45h (Value in minutes)
FI_Warnings		daily report	FAX-Info failures hourly report / deactivated
Firmware		2.07 Version	Firmware version
MO_Dialmode	*	Tone dialing	Dialing method
MO_External Code	*		Dial out code
MO_Interface	*	Deactivated	Modem Interface (COM2)

Parameter		Entry	Description
MO_Modem-Init1	*	AT&FE0V1X0Q0L2M1	Modem initialization sequence
MO_Modem-Init2	*	ATS0=1	Modem initialization sequence
MO_Modem-Init3	*	AT&H0&D0&W	Modem initialization sequence
MO_Type	*	Hayes	Used Modem type
PL_AddDevice	*	0	Adds device with certain number
PL_Auto-Install	*	Deactivated	Activated: Autom. search for devices
PL_DelDevice	*	0	Deletes device with certain number
PL_Energy_Offs	*	0,00 kWh	Energy-offset value for E-Total display
SY_Gatewaymode	*	automatic	Transmission Packet handling
SY_Idle Mode		Activated	Energy saving mode activated/deactivated
SY_Language		Deutsch	Language English, French, German
SY_Memory Function		---	Reset / store parameter
SY_Service Function	*	---	Delete stored values of daily yield / Channel info / operating data / online-Info and Reset System
TO_Communication		50.00 %	Threshold for communication failure
TO_Energy		50.00 %	Tolerance of energy yield monitoring
TO_Offline		30.00 min	Threshold for offline time of device
TO_Warnings		15.00 min	Threshold for message generation

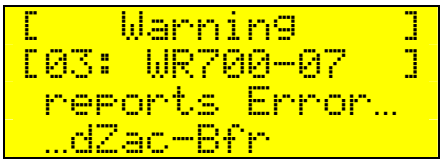
Fig. 6.2: List of parameters, * only available with installer password

7 Appendix

7.1 Error Messages

Error messages can occur, most times there is a simple solution for them. Sometimes the parameter "Tolerance" is simply not tolerant enough. In the following there is a brief description of all possible error messages.

Warning: (Device-) Error: Device reports error xy



[Device ID: Device Type]

← description of the reported failure

Fig. 7.1: Example for a device failure

Check the user manual of the device that reports this error.

Warning: 'Communication - Spot20'

[Device ID, Device type]

← Communication quality of the last 20 packages

Fig. 7.2: Example for "Warning Communication"

Possible Reasons:

- Sunny Boy is defective or not installed right
- Communication on the transmission line is disturbed.
- The tolerance defined in chapter 5.5.1 for "Communication" is too small

Warning: "No contact since ... "

[Device ID: Device type]

Fig. 7.3: Example for Warning "No Contact since:..."

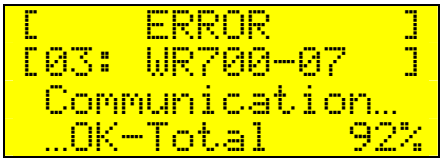
The period of time the device could not be reached exceeded the allowed value.

Possible Reasons:

- Sunny Boy is defective or not installed right
- Communication on the transmission line is disturbed
- The tolerance defined in "Offline" is too small (chapter 5.5.1).

Use the "Diagnosis-Communication" function for details of this error message. (chapter 5.6.2)

Error: "Communication - Total"



[Device ID, Device type]

← Communication was below the defined "Tolerance" level.

Fig. 7.4: Example for Error "Communication-Total"

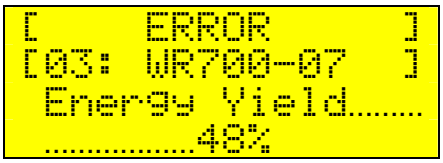
The number of communication failures was higher as defined in "Tolerance".

Possible Reasons:

- Sunny Boy is defective or not installed right
- Communication on the transmission line is disturbed.
- The tolerance defined in "Communication" is too small (5.5.1)

Use the "Diagnosis-Communication" function for details of this error message.

Error: Energy Yield xx %



[Device ID: Device Type]

Fig. 7.5: Example for Error "Energy Yield"

The energy yield of the device is below the tolerance of the average yield of the entire PV-plant.

Possible Reasons:

- Sunny Boy is defective or not installed right
- The tolerance defined in "Energy" is too small (chapter 5.5.1)

Error: "No contact since 24h"

[Device ID: Device type]

Fig. 7.6: Example for Warning "No Contact since:..."

The period of time the device could not be reached exceeded 24 hours.

Possible Reasons:

- Sunny Boy is defective or not installed right
- Communication on the transmission line is disturbed

7.2 Troubleshooting Powerline Communication

The Powerline Communication is covered in the Powerline Communication Manual "SBKOMM-11-ED". This file is available on our internet server http://www.sma.de. In

the following you will find an overview on how to manage problems you might have with Powerline Communication.

7.2.1 Transmission Errors

Reasons for communication interference can be:

- Strong damping of the transmission signal
  - The transmission line is too long
  - The cabling layout is not suitable

- Damping by other connected electrical devices
  - e.g. capacitors in fluorescent lamps

- Insufficient phase coupling
  - The ***Sunny Boy Control Light*** and the Sunny Boy Inverters are connected to different phases
  - Interference by other communication signals
  - Babyphone etc. in neighboring households

- Failures due to different signals
  - Babyphone
  - Interphone

Each of the mentioned failure sources has effect on the quality of the transmission line. However, this must not necessarily prevent Powerline Communication. In one household mains the data transmission is possible without any problem via several phases with 100 m total transmission distance, and in another installation there is a strong interference on one line with 30 m on the same phase.

In the following please find the most important causes for Powerline transmission faults and an overview of possible counter-measures (interference suppression). In case of transmission errors between ***Sunny Boy Control Light*** and the connected devices please read this chapter first and try to find the failure source by carrying out the steps described in chapter 7.2.2: "Interference Suppression".

Strong Damping of the Carrier Signal

Most frequently transmission errors result from carrier signal damping. The reason for this may be a too long distance between the inverters and ***Sunny Boy Control Light*** however, often there are electric devices connected to this cable. Devices with a high input capacity may dampen the carrier signal strongly, and it is not necessarily important whether the device is on or off. Examples are washing machines, electric ranges, microwave ovens, PCs, fluorescent lamps etc.

The easiest counter-measure is to connect the respective electrical devices to another line resp. to another phase. Another possibility is to install a special filter in the power supply of the interfering electrical devices.

If, in extreme cases, the wiring length resp. wiring arrangement is the cause for a disturbed communication, the installation of a separate line from the inverters to the ***Sunny Boy Control Light*** can be necessary.

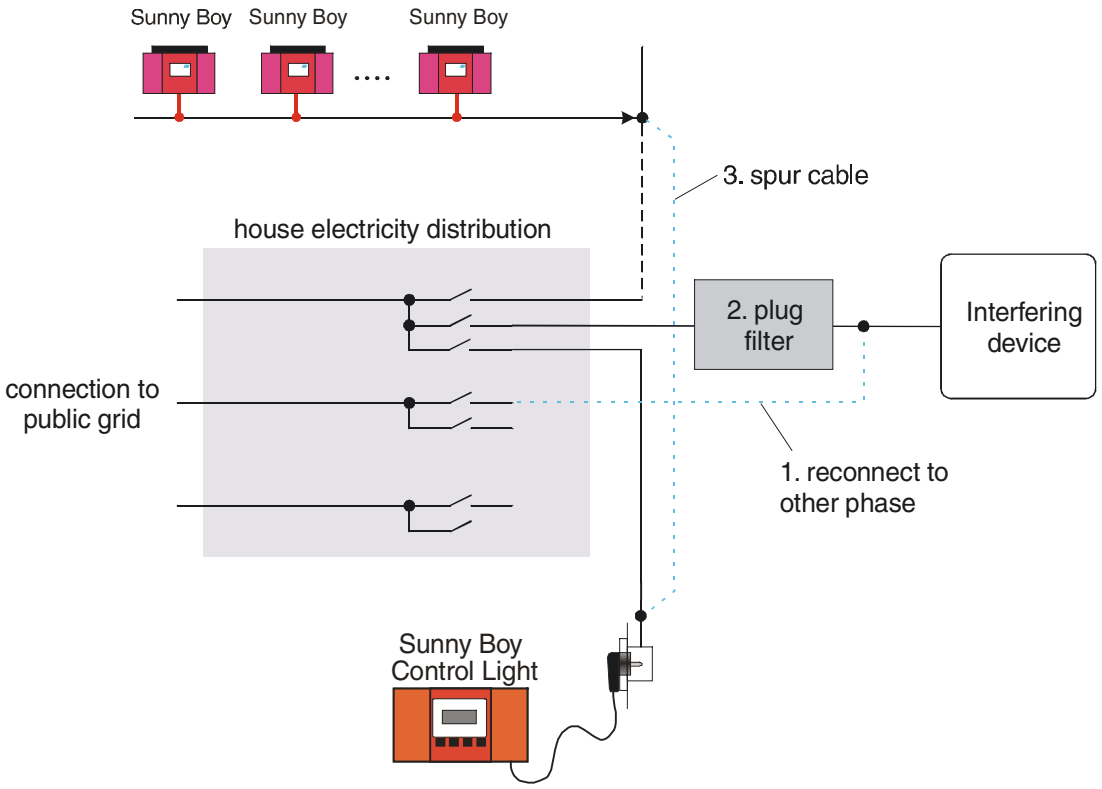


Fig.7.7: Interference suppression at strong signal damping

Phase Coupler

If the communication is done with several phases, you have to consider a strong damping resp. a significantly lower range for the data signal. If the string inverter, contrary to our recommendation, is connected to another phase (e.g. L2) than ***Sunny Boy Control Light*** (e.g. L1), the data transmission can only be successful if the phases are coupled with sufficiently high frequency. In many households this is the case by already installed three-phase current consumers (electric range, flow-type heater and similar).

Additionally, the transmission line may be improved by the installation of a phase coupler in the mains distribution. However, the communication over several phases remains problematic:

Very long transmission paths result from the detour via the phase coupler, and by the high-frequency coupling of the three phases the damping influence of electrical devices connected to the other two phases is boosted.

- Larger facilities: The optimal position of the phase coupler is sometimes difficult to find. Main distribution and sub distribution are sometimes very far apart and result in different reasonable positions of the phase coupler.

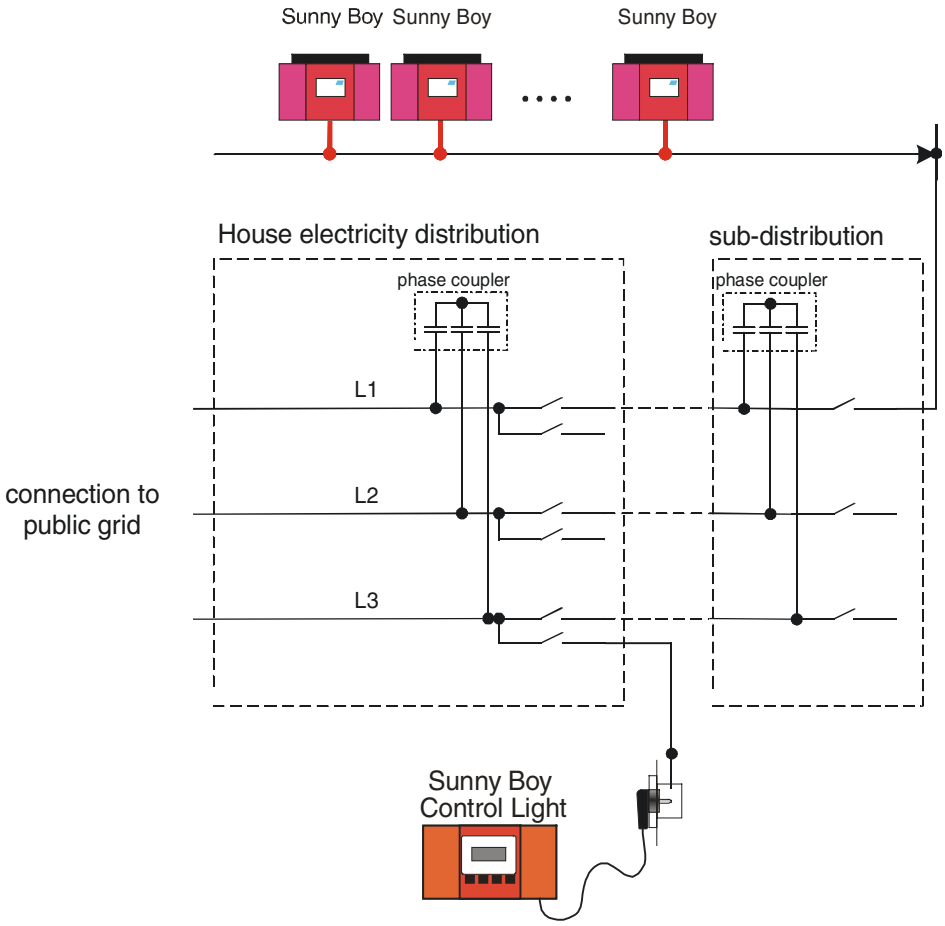


Fig. 7.8: Phase coupling for communication over different phases

Interfering Signals on the Grid

The data transmission is done with a frequency of 132.45 kHz. If other consumers also use this frequency, the transmission may be disturbed when a certain level is exceeded. Interfering signals can be developed by electric devices in the own household (insufficiently filtered switching power supply or similar), but also by devices in neighboring houses (e.g. electric devices with high power consumption in the neighborhood).

Acceptable transmission depends on the isolation or elimination of the interference source. Either the connection of the interfering device to another phase is sufficient or a carrier frequency suppression has to be installed. The suppression device has to separate the part of the mains, in which the data transmission should take place, from that part of the mains network in which the interfering consumers are installed. The efficiency of suppression unit can be boosted by the installation of a damping module active in the carrier frequency band of the interfering device on its side (in front of the suppression unit.)

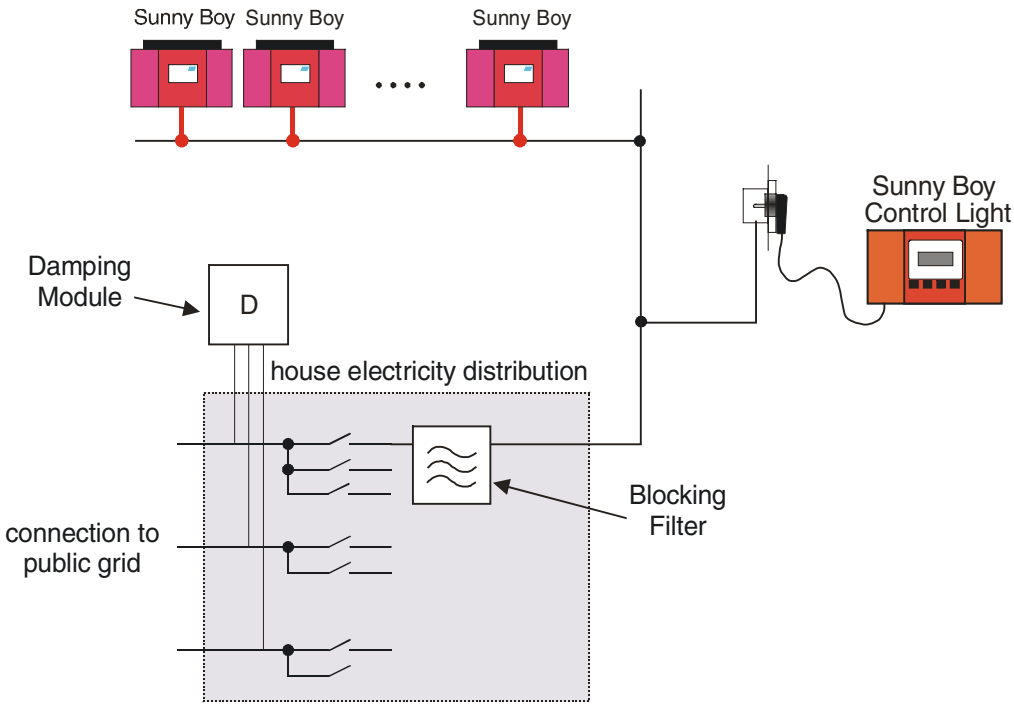


Fig. 7.9: Powerline with strong external interference

Parallel-Working Mains Communication

The data transmission of the ***Sunny Boy Control Light*** uses a carrier frequency of 132 kHz. If other communication systems also use this frequency on the mains, the transmission may be disturbed when exceeding a certain level. This can be affected by the carrier frequency of an interphone, a babyphone or similar. In such a case the communication systems will disturb each other.

Similar to devices generating interferences, the best solution is to separate the transmission paths. But contrary to the case in the previous chapter, the suppression of interference is not the problem in this case, because both communication systems have to work simultaneously. That is why at least one of the systems should be restricted to one phase resp. one wiring. This part of the electric installation may then be supplied via a stop filter, which ensures that neither high frequency signals are put in nor that the own carrier signal leaves this part of the electric installation. In case of a strong coupling such a limitation of the transmission path and the use of a stop filter might be necessary for both installed communication systems. By damping modules, a further improvement can be reached, which completes the effect of the stop filter, because these filters especially damp high frequency signals. Such a suppression module should only be installed in parts of electric installations where no transmission signals are desired at all.

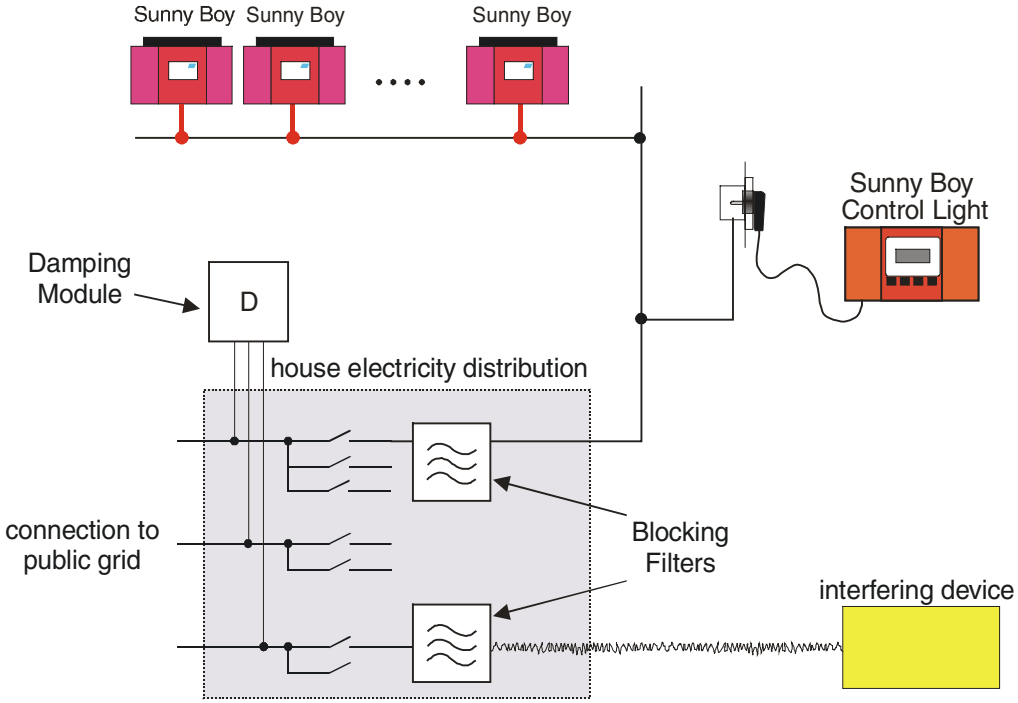


Fig.7.10: Interference suppression from several communication systems

7.2.2 Interference Suppression

If the data transmission via Powerline is interrupted from time to time, or cannot be established at all, the transmission line has to be cleared. For this purpose please take the following steps:

Identification of Interference Sources

- Starting point of the examination should be a functioning data transmission, if possible. Please disconnect all electric devices from the mains (it is sometimes not sufficient merely to switch them off! Please think also about three-phase current consumers!) which are connected to the same line as the devices and the ***Sunny Boy Control Light***. Switch off all remaining fuses in the household distribution. Now connect the ***Sunny Boy Control Light*** with an extension cable to the socket with the shortest wiring length to the inverter. Start the function "Diagnosis - Communication" and select the device to be monitored. ***Sunny Boy Control Light*** now tries to communicate with the device

and informs you about the transmission results so that you can identify transmission defects immediately.

- Plug the extension cable into different sockets of the mains line you are analyzing while continuously increasing distance to the inverter, and check whether the communication still works. A communication breakdown from a certain line length to the inverter on (< 30 m) indicates a disturbance from external devices outside the household distribution (countermeasure: suppression filter in the branch circuit).

- Now reconnect the mains circuits one after the other and check if any errors occur in the communication of ***Sunny Boy Control Light***.

- In case of communication disturbances disconnect every electric consumer on the last connected circuit one after the other in order to identify the disturbing device.

- Leave disturbing devices disconnected from the mains and continue connecting circuits and devices until all electric consumers are reconnected to the mains except the disturbing ones.

Optimizing the Installation

- Check whether the influence of disturbing devices can be reduced sufficiently by just connecting them to another circuit resp. phase.

- A junction line from the device to the ***Sunny Boy Control Light*** can help reduce the filter expenditure in heavily disturbed installations.

Filtering Interference

- Supply the section of the electric installation for Powerline communication with a suppression unit.

- Please connect continuously disturbing devices to a suitable filter (see chapter 7.3, Technical Data).

Reduce external interference by the installation with a damping module in that part of the electric installation where no communication with Powerline is planned.

This proposed procedure gives you a systematic overview of the number and influence of interference sources on the transmission line.

All additional components (suppression unit, phase coupler, filter, damping module) are commercial products that are available at standard electrician suppliers or from ***SMA***. The installation is done in the household distribution and must be done by a qualified electricians.

7.2.3 Communication

Testing the Communication

The reliability of a communication link can be tested with:

- 2 ***Sunny Boy Control Light***
- 1 ***Sunny Boy Control Light*** and a PC with a ***Sunny Boy Control Light***, Sunny Boy Control or a SWRCOM.

It is recommendable to test the communication link before installing the system.

Test with two *Sunny Boy Control Light*

- connect both ***Sunny Boy Control Light*** to the same wall socket, where you want to connect a part of the participants for your communication.
- Switch the data acquisition of ***Sunny Boy Control Light*** A off**:** "Setup - System - Service Funct.: reset system". Confirm twice, the ***Sunny Boy Control Light*** A will start the Plug & Play sequence the next time it is activated.
- start the device detection on for the ***Sunny Boy Control Light*** B. ("Setup - PV-Plant - Detection"). This lets the ***Sunny Boy Control Light*** B detect the ***Sunny Boy Control Light*** A.
- connect Sunny Boy Control A to the furthest away socket you want to connect participants to. Define the ***Sunny Boy Control Light*** A to be communication test participant in the "Setup - Diagnosis - Communication" menu.

Acceptable data transmission quality is given with 75 % and more.

Test with one *Sunny Boy Control Light* and one PC with a SWRCOM

- Sunny Data must be installed on the PC
- connect the PC and the ***Sunny Boy Control Light*** to the same socket.

- switch the data acquisition of Sunny Boy Control off: "Setup - System - Service Funct.: reset system". Confirm twice, the Sunny Boy Control A will start the Plug & Play sequence the next time it is activated.
- start "Device Detection" on the PC with Sunny Data and detect the Sunny Boy Control.
- connect Sunny Boy Control A to the furthest away socket you want to connect participants to. Define the Sunny Boy Control A to be communication test participant in the "Setup - Diagnosis - Communication" menu.
- Sunny Data version 1.30 and higher supports "'Dev Com Statistics'"

Acceptable data transmission quality is given with 75 % and more.

Testing the Communication to the Sunny Boys

"Setup - Diagnosis - Communication" helps you detect transmission failures to single devices. Select the device that you want to test:

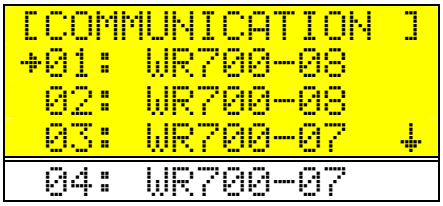


Fig. 7.11: Selecting a Device

The ***Sunny Boy Control Light*** then sends data inquiries to the selected device and evaluates the transmission quality.

Fig. 7.12: Communication test

The ***Sunny Boy Control Light*** constantly displays the percentage of correctly transmitted packages. Only the last 20 packages are evaluated.

7.3 Technical Data

Supply voltage:	90 ... 260 V, 50 ... 60 Hz
Power consumption:	4-6 W in operation (depends on the amount of Sunny Boys to be managed) 3 W in standby mode
Carrier frequency for Powerline communication:	132.45 kHz
Transmission protocol:	compliant with DIN EN 50065 part 1 (VDE 0808 part 1)
Ambient temperature:	0 to 40 °C
Size:	229 x 126 x 46 mm
Display:	4 x 16 characters
Weight:	approx. 1250 g
Protection type:	IP 40
Protection:	overload protection, 365 V / 90 mA

Connections:

• Mains connection:	2 m 3-wire power cable, with protective earth
• PC (COM 2):	for connection to a PC or for connection to an External Display

Accessories (optional):

	SMA No.	Description
•	35-5010 interface adapter	D-SUB plug adapter for PC-connection (9 pin to 25 pin)
•	36-5001 PC data cable	PC-connection for COM2 (RS232) to PC, (D-SUB 9-pin)

Storage Capacity

The Sunny Boy Control can monitor 20 Sunny Boy Inverters. 4 different Sunny Boy inverter types are allowed.

The storage capacity is large enough to store the energy data of 200 days. Back up the data to a PC regularly in order to maintain a continuous data about the performance of your plant.

7.4 Default Parameters

The default settings of the Sunny Boy Control are as follows:

Menu "Setup...System":

Parameter	Setting
Stand-By Mode	Activated
Gatewaymode	automatic

Fig. 7.13: Default settings in menu ‘System’

Menu "Setup...System...Language":

Parameter	Setting
language	German

Fig. 7.14: Default language

Menu "Setup...System...Online-Info...Chan.Selection...SC...":

SC (Sunny Boy Control)
Pac
E-total
E-today
Status

Fig. 7.15: Default channel for displaying in 'Online-Info'

Menu "Setup...Interface...Communication...":

Category	Parameter	Settings
Com1: Sunny Boy	Medium	Powerline
	Baud	1200 Baud
	Protocol	Sunny-Net
Com2: PC	Medium	RS232
	Baud	19200 Baud
	Protocol	Sunny-Net

Fig. 7.16: Default parameter 'Communication'

The installed interface types (RS232, Powerline) are automatically detected by ***Sunny Boy Control Light*** during its self test. Transmission is defined with 8 data bits, no parity and 1 stop bit in any case. Only the Baud rate of the PC interface can be modified.

Menu "Setup...Interfaces...Modem"

Interface	Deactivated
Type	Hayes
Init string	AT&FE0V1X1Q0L2M1 ATS0=1 AT&H0&D0&W
Dial out code	---
Dial mode	Tone

Fig. 7.17: Default values of the Modem Connection

Menu "Setup...Interfaces...Ext.Display"

Interface	Deactivated
Type	Hayes
Configuration	Display 01:SC:Pac 4.0 Display 02:SC:E-total 4.0 Display 03:SC:E-today 4.0 Display 04:SC:Pac 6.2 Display 05:SC:E-total 6.2 Display 06:SC:E-today 6.2

Fig. 7.18: Default values Ext. Display

Menu "Setup...Control...Tolerances"

Parameter	Default
Warnings	15.00min
Offline	30.00min
Energy	50.00%
Communication	50.00%

Fig. 7.19: Default settings for 'Tolerances'

Menu "Setup...Control...Fax-Info"

Category	Parameter	Setting
	FAX-Info	disabled
Events	Signaling via	Daily Report
	Warnings	Daily Report
	Failure	Hourly Report
	Daily Report at	23:45 PM
Recipient	Company/Name	FIRMA XYZ-SOLAR HERRN MUSTERMANN
	Area Code	-
	Phone Number	-
Sender	Plant name	MEINE ANLAGE
	Plant Phone Number	+49 123 123456789

Fig. 7.20: Default Parameter FAX-Info

Reset System

A system reset deletes all data and sets all parameters to factory default. The system reset is only possible after entering the installer password.

Do the following to reset the system

- Enter the installer password
- Select "Setup - System - Service Funct."
- Select "Reset system" and confirm by pressing the enter key twice.

7.5 AT-Commands

The commands described in the following table are used for initializing the modem. The init-strings can be modified according to your specific modem type.

Description	**Microlink 33.6TQV**	**Microlink 56k**	**Zyxel / Hayes Standard**
Load factory settings	&F	&F	&F
Disable character echo in command state	E0	E0	E0
Display result code in verbose form	V1	V1	V1
Ignore dial tone / busy tone	X1	X1	X1
Return result code	Q0	Q0	Q0
Speaker on level 2	L2	L2	L2
Speaker always on	M1	M1	M1
Automatic answer after 1 ring	S0=1	S0=1	S0=1
Flow control disabled	\Q0	+IFC=0,0	&H0
	S28=198	S28=128	
Ring indication and answer possible with DTR=OFF	√	√	
Automatic re-synchronization on	√	-	
V.100 speed adaptation on,	√	-	
Word length in async. direct mode 10 bit/char	√	-	
Ignore DTR, assume DTR always on	&D0	&D0	&D0
Automatic re-synchronization on	-	%E1	
Save current settings as user profile 0	&W	&W	&W

Fig. 7.21: AT commands

Description	Class 2	Class 2.0
Local FAX station ID string (e.g.: +49 561 9522100)	+FLID="ID-String"	+FLI="ID-String"
Current session negotiating session (196 dpi)	+FDIS=1	+FIS=1,5,0,0,0,0
Phase C data bit order	+FBOR=1	+FEA
Service class identification and control	+FCLASS=2	+FCLASS=2.0
Set 'Dial Tone'	ATT	ATT
Set 'Dial Pulse'	ATP	ATP
Dial	ATD	ATD
Begin phase C data reception	+FDT	+FDT
End page or document	+FET=2	+FKS
Quit Connection	H0	H0

Fig. 7.22: Fax commands (these strings cannot be changed)

7.6 Guarantee Regulations and Liability

You have purchased a product, which was thoroughly checked before delivery. If your device nevertheless is defective or shows malfunction during the guarantee period, please contact your distributor or company that installed the device.

Guarantee

The guarantee period is 24 months from the date of purchasing the device by the end user. It ends at the latest 30 months after the shipping date from SMA, and includes all defects caused by material or manufacturing faults.

The guarantee period for guarantee repairs or compensation deliveries ends 6 months after delivery, but runs at least until the expiration of the original guarantee period for the purchased device.

SMA will only guarantee services, if the rejected device is sent back to SMA together with a copy of the invoice the distributor has issued to the customer. The type identification sign on the device must be completely legible. In any other case SMA reserves its right to refuse guarantee services.

Conditions

The device will be repaired in its fabrication site without invoice for material and labor, or a replacement device will supplied.

The objected device is to be sent back to SMA without charges in the original packing or in a transport packing of equal quality.

The customer has to grant SMA the necessary time and opportunity to repair the defects.

Exclusion of Liability

Excluded are any guarantee claims and liabilities for direct or consequential damages due to

- transportation damages,
- improper installation or operation,
- alterations, modifications or unauthorized repairing attempts,
- inappropriate use or operation,
- insufficient air circulation for the device,
- violation of according safety regulations (VDE etc.),
- or force majeure (lightning, overvoltage, storm, fire).

We cannot guarantee the proper function of the data transmission via mains (Powerline modem) in case it is carried out in electric grids with high harmonic distortion resp. high-frequency line distortions like e.g. industrial power supply grids, or the neighborhood of irregular consumers (unshielded motors, switching power supplies, converters, etc.). Since the simultaneous operation of babyphones may lead to short-time data

transmission failures via mains.

We reserve the right to leave our products subject of modifications due to improvements.

Sequential Damages

SMA in no case will cover any liability for damages resulting from the use of a ***Sunny Boy Control Light*** (including and without restriction for direct and indirect damages of used hardware, personal damages, profits lost, operating troubles, loss of data, or any financial losses).

Further or other claims for direct and indirect damages, especially including claims for damages from positive contract violation, are excluded insofar as not otherwise compelling stated by law.

Trademarks

Microsoft, MS-Excel, MS-Word and MS-DOS are registered trademarks and Windows is a trademark of the Microsoft Corporation.

IBM is a registered trademark of the International Business Machines Corporation. CorelDRAW® is a registered trademark of the Corel Corporation. Sunny Boy® and SMA® are registered trademarks of the SMA Regelsysteme GmbH.

We accept all trademarks mentioned in this manual.

7.7 Sources of supply

Sunny Boy Products, HvG External Display, Sensors:

Rosendahl Industrievertretungen, Adolf-Dembach-Straße 1, D-47829 Krefeld,
Tel. 02151 / 456789-0, eMail: ri@sma.de, www.rosendahl.net

External Display:

ist EnergieCom GmbH, Stadtjägerstraße 11, D-86152 Augsburg,
Tel. 0821 / 34666-0, eMail: info@ist-energiecom.de, www.ist-energiecom.de

Datalite Electronics Europe, Rozenbottelberg 4, NL-3755 BR Eemnes,
Tel. +31 / 35 / 5317547, eMail: datalite@datalite.nl, www.datalite.nl

Siebert Industrieelektronik GmbH, Siebertstraße, D-66571 Eppelborn,
Tel. 06806 980-0, eMail: info@siebert.de, www.siebert.de

RS232 / RS485 Converter

PHOENIX CONTACT GmbH & Co, Flachsmarktstraße 8, 32825 Blomberg,
Tel.: 05235 / 300, eMail info@phoenixcontact.com, www.phoenixcontact.de

Modem:

ELSA-AG, Sonnenweg 11, D-52070 Aachen,
Tel.: 0241 / 606-0, www.elsa.de

ZyXEL Deutschland,
Tel.: 0180 / 5213247, eMail: support@zyxel.de, www.zyxel.de

Siemens AG, Wittelsbacherplatz 2, 80312 München,
eMail: www@siemens.de, www.siemens.de

Accessories for household distribution

Busch-Jäger Elektro GmbH, Freisenbergstr.2, 58513 Lüdenscheid,
Tel.: 0180 / 56 69 900, eMail: info.bje@de.abb.com, www.busch-jaeger.de

7.8 Sunny Boy Control Light Service

SMA Regelsysteme GmbH

-Sunny Boy Control Service-

Hannoversche Straße 1 - 5

D - 34266 Niestetal

Tel.: 05 61 / 95 22 - 0

Fax: 05 61 / 95 22 - 100

http://www.sma.de

Sunnyboy@sma.de

S-Nr.: _____

Company :
Name :
Street :
Zip-code : City :
Tel. :
Fax :
email :

Information concerning the PV-plant

Number of inverters :
Inverter Types :

Inverter Serial No.:
***Sunny Boy Control Light* Serial No.:**

Failure Description

Describe your problem:

Did this problem occur from the beginning? ☐ yes ☐ no

Was the function Ok and then made trouble? ☐ yes ☐ no

Does this failure always occur? ☐ yes ☐ no

Can you reproduce the failure? ☐ yes ☐ no

How can you reproduce the failure?

Do you have data files that describe the failure ☐ yes ☐ no

if yes:

☐ sent to SMA on disk - via mail

☐ sent to SMA via email to _____

☐ please call me (best is between ___h to ___h)

☐ please send me a fax.

☐ I will call you.

7.9 Sunny Boy Info Service

If you are interested in getting information about Sunny Boy products (Software-Updates, news, etc.), please send an eMail with the following content to SMA.

To: listserver @ sma.de

Subject: subscribe SunnyBoy

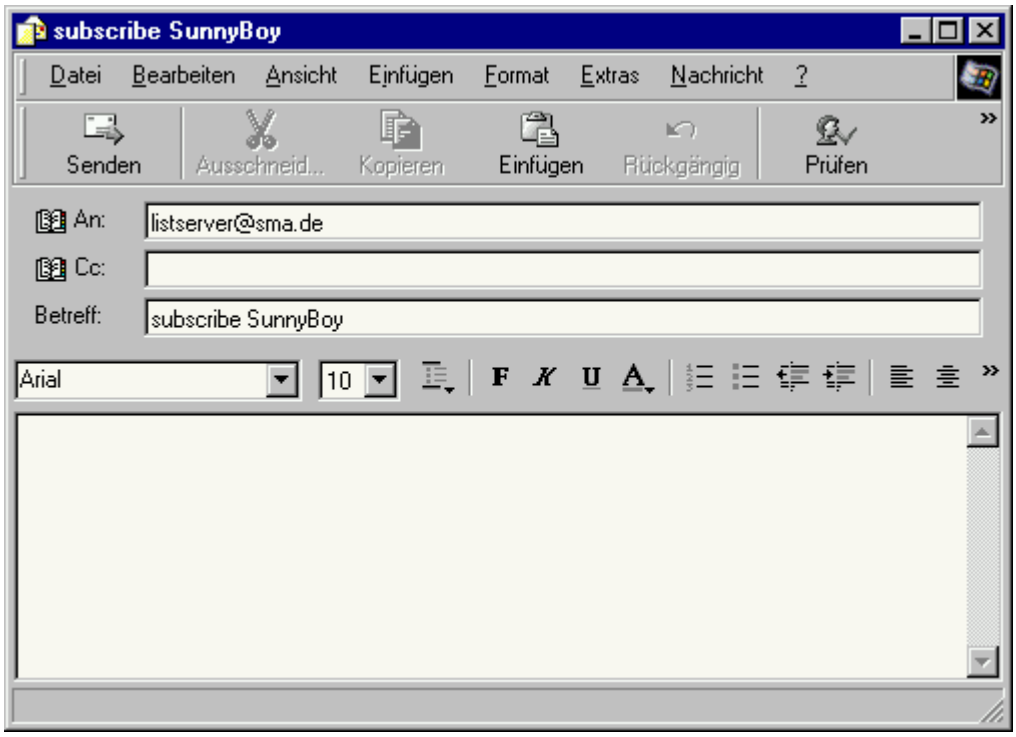
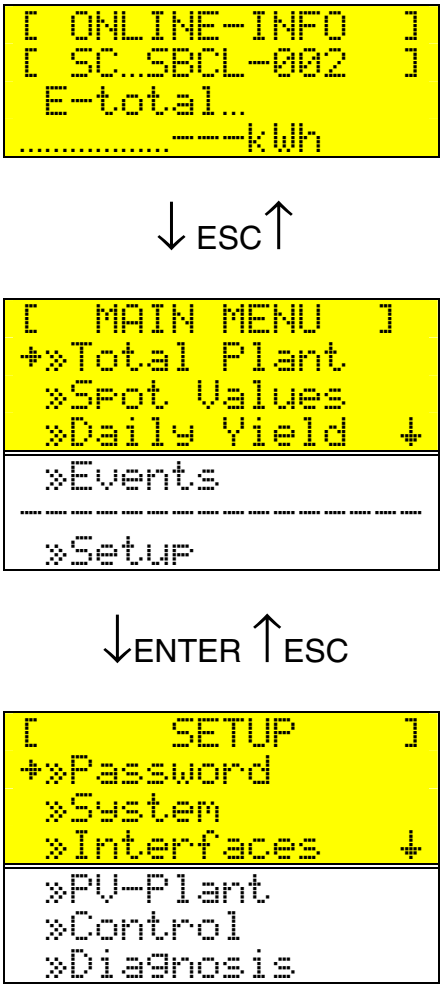


Fig. 7.23: Registration via eMail

7.10 Menu Overview



Cyclic display of information, faults and warnings concerning the plant		Chap. 4.2
← Sunny Boy Control Light main menu		Chap. 4.3
← total power, total energy yield etc.		Chap. 4.3.1
← spot values of selected device		Chap. 4.3.2
← measured daily data		Chap. 4.3.3
← Overview of failures and events		Chap. 4.3.4
← Setup menu (“see password”)		Chap. 5
(only with password)		Chap. 5.1
← lock/unlock menu with password		Chap. 5
← language, date and time, “Online-Info” configuration		Chap. 5.2
← interface configuration		Chap. 5.3
← device registration, detection, parameter, energy-offset		Chap. 5.4
← tolerances, FAX-Info		Chap. 5.5
← reports, communication test		Chap. 5.6

Fig. 7.24: Sunny Boy Control Light menu structure