



System monitoring
POWER REDUCER BOX
Technical Description

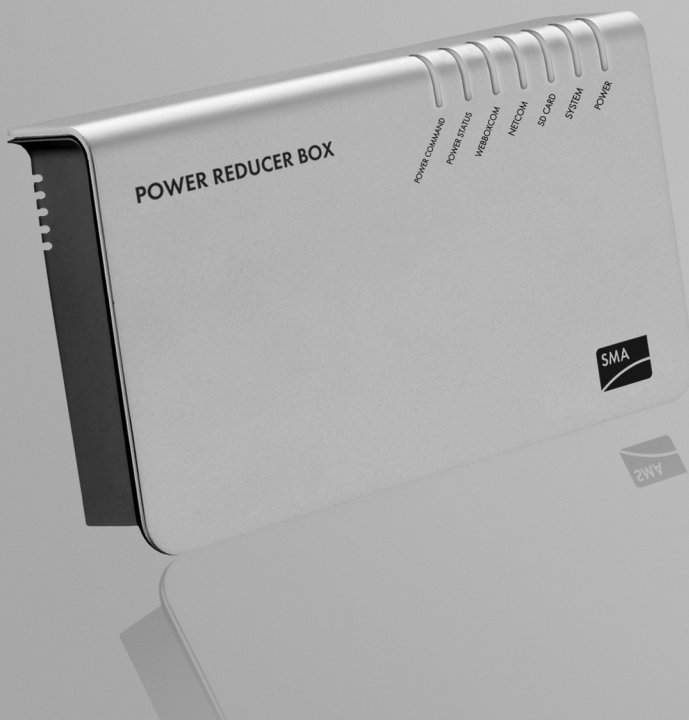


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1 Notes on this Manual

This manual describes how to install, mount and operate the Power Reducer Box. Store this manual where it can be accessed at all times.

1.1 Scope of Validity


This manual applies to firmware versions 1.5.2 and later.


1.2 Target Group


This manual is for qualified personnel and the user. Some tasks described in this manual may only be performed by qualified personnel. These tasks are identified with safety warnings.


1.3 Symbols Used


The following types of safety precautions and general information appear in this document as described below.

	DANGER!
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.	

	WARNING!
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.	

	CAUTION!
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.	

	NOTICE!
NOTICE indicates a situation that can result in property damage if not avoided.	

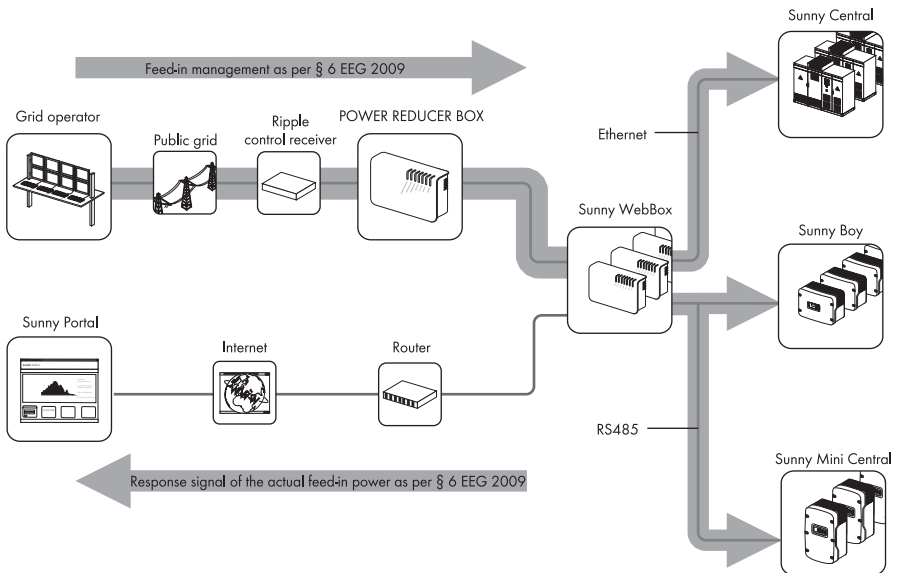
	Information
Information provides tips that are valuable for the optimal installation and operation of your product.	

2 Safety

2.1 Appropriate Usage

With the Power Reducer Box it is possible to implement active power limitation or reactive power setpoint in accordance with the requirements of the grid safety management (GSM) for a PV system. For this four digital states (e.g. of a radio ripple control receiver) are able to be imported with the Power Reducer Box and the inverters can be set according to the specifications of the utility operator. The four input ports are freely configurable via the integrated web interface. If a signal from the radio ripple control receiver is present, the Power Reducer Box analyzes the signal and relays an instruction via the Ethernet network to the registered Sunny WebBox devices. Activated Sunny WebBox devices transfer the instruction to the connected inverters.

Events are recorded onto the internal memory of the Power Reducer Box. Additionally it is possible to write events onto an SD card or download events via the web interface.



Function Overview of the Power Reducer Box

- Integrated web server (for configuration of the Power Reducer Box).
- Log book, in which every event is saved along with a time stamp.
- HTTP download of the events in csv format.
- Support of up to 50 Sunny WebBox devices.
- Saving of events onto SD card.

Supported Devices

- All WebBox devices with firmware version 1.45 and later.
 - The transmission protocol of your system must be set to SMA-NET.
 - The Sunny WebBox devices must not be operated in DHCP mode.

You can find a current list of all inverters supported by the Power Reducer Box on the Web interface of the Power Reducer Box ("Status configuration > Compatibility list") or in the download section of www.SMA.de/en.

If you have further questions regarding supported inverters, please contact the SMA Service Line.

Operating Modes

- **Active Power Limitation**
 - Implementation of the instruction for power limitation in less than one minute.
 - Configurable delay time for reconnection to the 20 kV grid.



Active Power Limitation to 0 %

At an active power limitation to 0 % the inverters cannot be completely dimmed to 0 watts. A low residual power will continue to be fed-in depending on the inverter type in use.

- **Setpoint for Reactive Power Output together with Active Power Output**
 - fixed power factor $\cos \Phi$ (static parameter).
 - fixed reactive power in % of the maximum possible reactive power (static parameter).

The Power Reducer Box is only suitable for use with original accessories from SMA Solar Technology or with accessories recommended by SMA Solar Technology.

Please also refer to the technical data of the Power Reducer Box.

2.2 Safety Instructions

Electrical Connection

**WARNING!**

Risk of lethal electric shock as a result of incorrect working on the Power Reducer Box.

- All work on the Power Reducer Box may only be carried out by qualified personnel.

**NOTICE!**

Electrostatic discharges can damage the Power Reducer Box.

- All installation work on the Power Reducer Box must be carried out by qualified personnel.
- Avoid coming into contact with components' connections and plug contacts.
- Ground yourself before working on the device.

**NOTICE!**

Safety-relevant parameters

You can change the safety-relevant inverter parameters of your PV system using the Power Reducer Box. Usually, these parameters may only be changed upon consultation with the energy supplier into whose grid you are feeding.

In case of doubt, please contact your energy supplier.

Operating Instructions



Inverters not supported in the PV system

Inverters not supported do not implement the parameters via the Power Reducer Box. The parameters of the utility operator can however be achieved. For this the status configuration of the Power Reducer Box must be adjusted so that the output of the supported inverters is more strongly controlled.

If the utility operator requires an active power limitation of 0 %, the unsupported inverters must be disconnected via a suitable switching unit.

In case of doubt, please contact your utility operator or the SMA Service Line before you commission the Power Reducer Box.



No automatic firmware update for registered Sunny WebBox devices

When using the Power Reducer Box for managing feed-in, the automatic firmware update must be deactivated in all Sunny WebBox devices that are to be registered. Please note that the specifications of the utility operator cannot be implemented during the Sunny WebBox update process.



No DHCP mode in the registered Sunny WebBox devices

In the case of changing IP addresses in the WebBox devices (e.g. in DHCP networks) the Power Reducer Box does not function correctly. Convert all Sunny WebBox devices to be registered by the Power Reducer Box to static IP addresses.



Data traffic via the RPC interface

Limitation instructions from the Power Reducer Box are sent via the Sunny WebBox RPC interface. Avoid additional data traffic via the Sunny WebBox RPC interface, so as not to compromise the speed of the limitation instructions.



JavaScript

JavaScript must be activated in your browser!



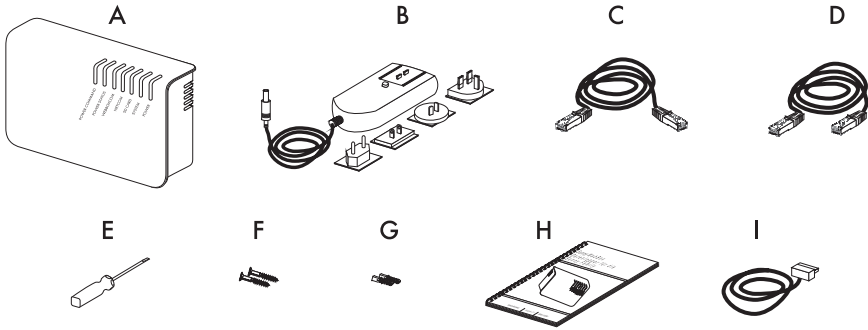
Data security

You can connect the Power Reducer Box to the internet. This, however, carries a security risk. SMA recommends changing the login password after the initial installation in order to protect it from unauthorized access by third parties. Select a number-letter combination with at least 8 characters for your password (see section 8.1 "Setting the Password." (page 38)).

3 Unpacking

3.1 Scope of Delivery

Check the delivery for completeness and any visible external damage. Please contact your dealer if the delivery is not complete or you find any damage.



Position	Quantity	Designation
A	1	Power Reducer Box
B	1	Plug-in power supply with four adaptors
C	1	Red Ethernet cable (patch cable)
D	1	Blue Ethernet cable (crossover cable)
E	1	Screwdriver
F	2	Screws
G	2	Wall anchor
H	1	Technical description with drilling template and compatibility list
I	1	Pre-assembled cable (length 2.5 m) with 7 pole socket (for the connection of the radio ripple control receiver)

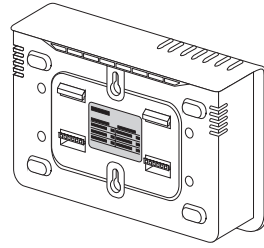
3.2 Identifying the Power Reducer Box

Type Plate

You can identify the Power Reducer Box using the type plate. The type plate can be found on the underside of the enclosure. It contains information regarding the specific characteristics of the device, serial number, version and MAC address.

Firmware Version

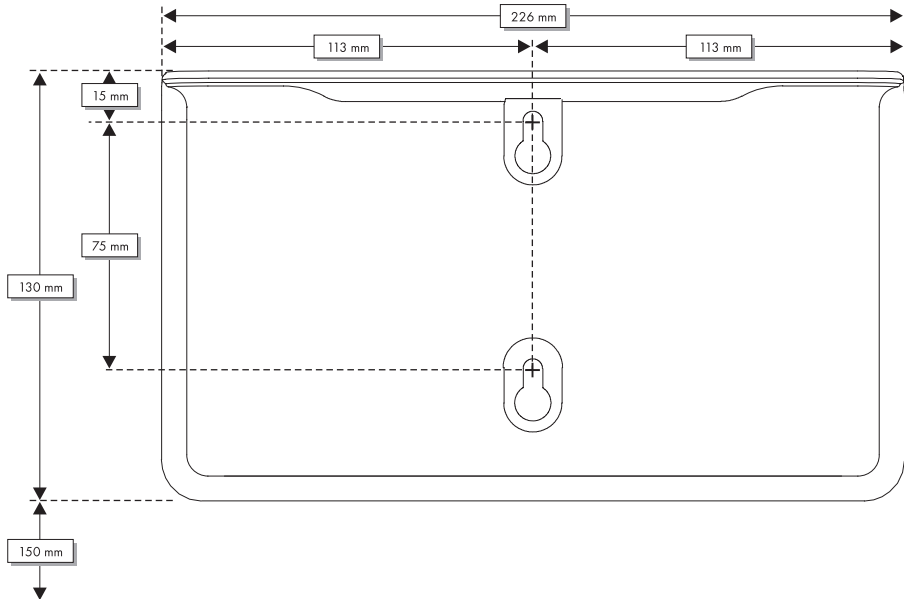
The firmware version can be found on the Power Reducer Box web interface in the lower left corner.



4 Mounting the Device

The Power Reducer Box can be mounted on a wall. If you choose to mount the device on a wall, you can either mount it directly to the wall or on top hat rails.

4.1 Dimensions



4.2 Mounting Location

Observe the following ambient conditions for the Power Reducer Box:

- The Power Reducer Box is only suitable for mounting in enclosed spaces.
- The ambient temperature must be between $-20\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$ during operation.
- The Power Reducer Box should be protected from dust, wet conditions, corrosive substances and vapors.
- The cable length of the digital connection between the Power Reducer Box and the radio ripple control receiver may be a maximum of 3 m.
- The device should be located near to a 230 V socket.
- The cable feeds require approx. 15 cm of space below the enclosure.
- Lay the cables so that they do not disconnect due to their own weight.
- Do not cover the Power Reducer Box. This can lead to heat accumulation in the device.
- You can mount the Power Reducer Box together with the necessary network technology (e.g. network switch, router, power supply) in one enclosure.

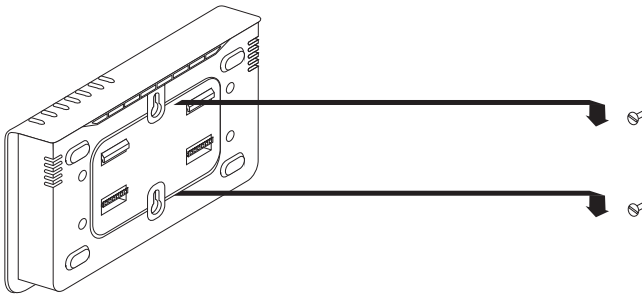
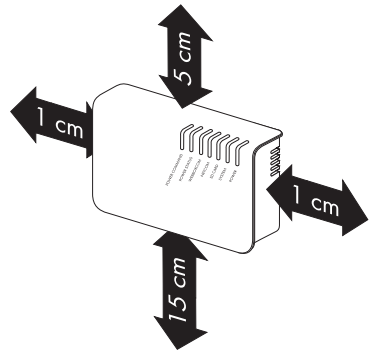
4.3 Mounting the Power Reducer Box on the Wall.

Mounting Accessories Provided



Position	Quantity	Designation
A	2	Screws
B	2	Wall anchor

1. Determine the installation site taking into consideration the installation location and space required.
2. Determine the position of the Power Reducer Box on the wall and mark the drill holes with a pen (see section 4.1).
3. Drill the holes (diameter 6 mm) at the marked positions and insert wall anchors.
4. Screw in the screws and leave about a 6 mm clearance between the screw head and the wall.
5. Hang the Power Reducer Box on the screws.

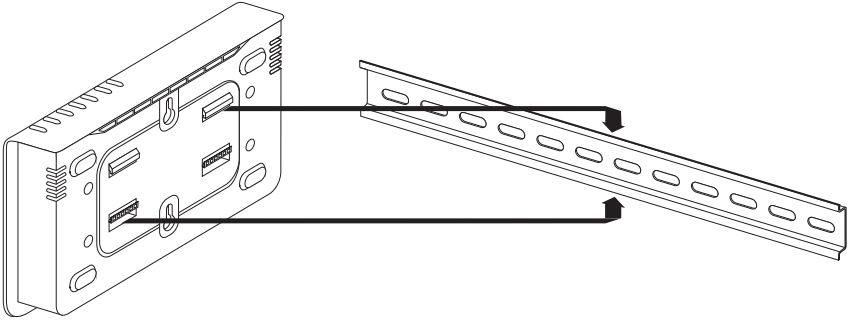


The Power Reducer Box is mounted.

4.4 Mounting the Power Reducer Box on a Top Hat Rail.

No additional mounting equipment is necessary in order to mount the Power Reducer Box onto a top hat rail.

1. Hook the Power Reducer Box with both lower brackets under the lower edge of the top hat rail.
2. Press the Power Reducer Box upwards and snap the top hat rail into the upper brackets.



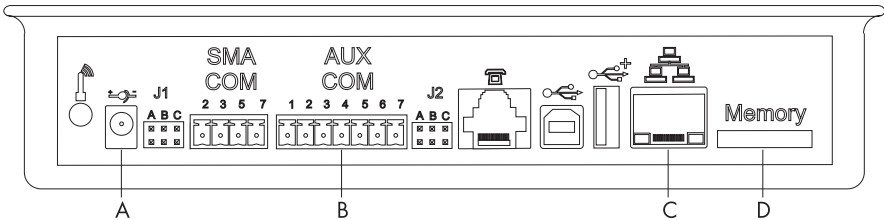
- The Power Reducer Box is mounted.

5 Electrical Connection

WARNING!
 Risk of lethal electric shock as a result of incorrect working on the Power Reducer Box.

- All work on the Power Reducer Box may only be carried out by qualified personnel.

5.1 Overview of the Connection Area



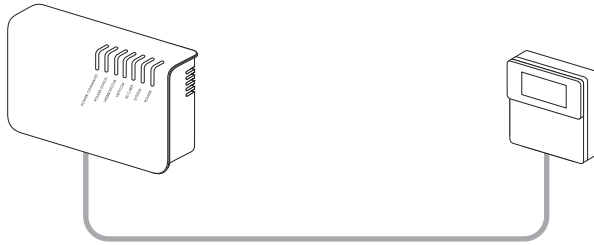
Position	Designation
A	Connection for the plug-in power supply
B	AUXCOM for connection to the radio ripple control receiver
C	Ethernet connection
D	SD card slot

All other connections on the Power Reducer Box have no function.

5.2 Connecting the Power Reducer Box to the Radio Ripple Control Receiver

NOTICE!
 Damage to the Power Reducer Box or the radio ripple control receiver due to incorrect connections.

- The connection of the Power Reducer Box to a radio ripple control receiver may only be carried out by qualified personnel.



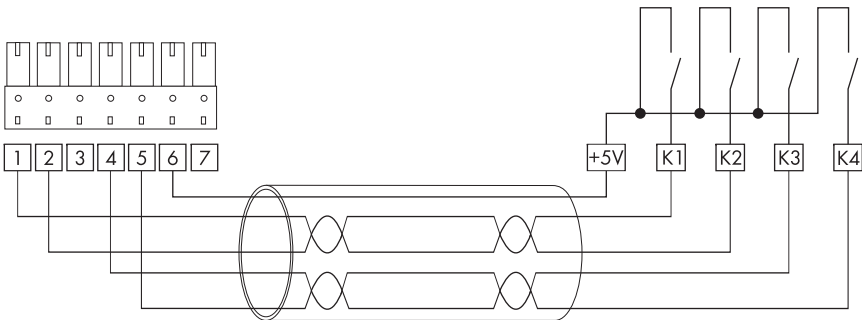
This section describes the connection of the Power Reducer Box to a radio ripple control receiver. The configuration of the radio ripple control receiver depends on the device and manufacturer.

Digital Output Port of the Radio Ripple Control Receiver

NOTICE!
Damage to the Power Reducer Box due to too high input voltages.

- Use the +5 V wire from PIN 6 of the AUXCOM terminal for the control of the inputs via the relay contacts.
- Do not use external power supplies.

1. Connect the pre-assembled cable to the radio ripple control receiver. You will find the wiring layout in the following diagram.



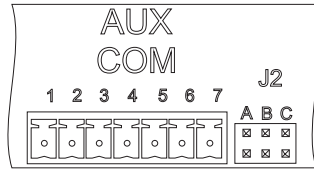
Insulated conductor color (DIN 47100 without color repetition)	Signal	AUXCOM configuration	Description
gray	+5 V	6	Power supply (+5 V)
white	K1	1	Relay contact 1
brown	K2	2	Relay contact 2
green	K3	4	Relay contact 3
yellow	K4	5	Relay contact 4



Standard configuration:

Active power limitation for K1 = 0 %, K2 = 30 %, K3 = 60 % and K4 = 100 %.

2. Plug the 7 pole plug into the AUXCOM terminal of the Power Reducer Box.
- The Power Reducer Box is connected to the radio ripple control receiver.



5.3 Connecting the Power Reducer Box to the Ethernet Network

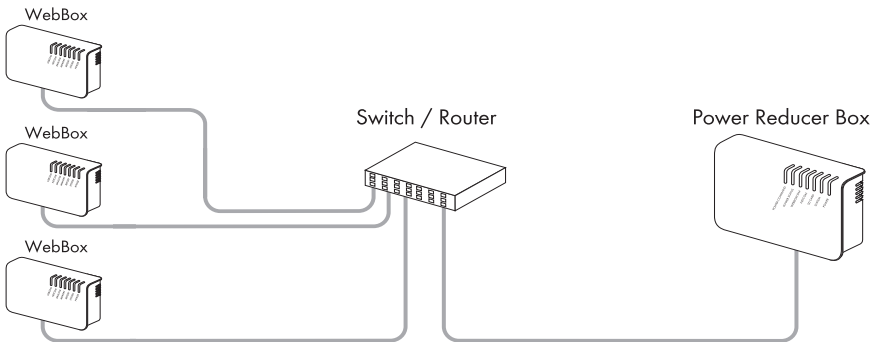
The Power Reducer Box is equipped with an integrated network connection, which enables it to be connected to any Ethernet network. The terminal supports both Ethernet and Fast Ethernet networks (10 / 100 Mbit/s). The speed is switched automatically depending on the connected switch, router or PC.

5.3.1 Connection within a Local Network

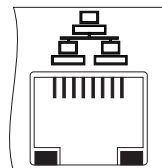


Initial start-up

Please note that before integration of the Power Reducer Box into a local network, you must configure the Power Reducer Box for your network (see section 6 "Getting started" (page 20)).



1. Connect the Power Reducer Box to the network with the **red** Ethernet cable via the Ethernet terminal of the enclosure. The receiver (switch, router) normally has the same designation. If you have questions then please read the receiver manual.





Ethernet cabling recommendations

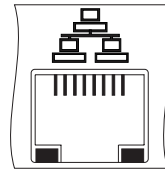
If the delivered Ethernet cable is too short, please note the following when purchasing a longer cable:

- You require a patch cable.
- Unnecessarily long cables have an adverse effect on the signal quality. The maximum permitted cable length for Ethernet cable is 100 m per segment.
- Use high quality cable, at least category 5 (SFTP Cat 5) or higher shielded twisted pair.

5.3.2 Connecting the Power Reducer Box Directly to a PC



1. Connect the Power Reducer Box directly to the PC via the Ethernet terminal of the enclosure. For this, use the **blue** Ethernet cable. The PC should normally have the same designation. If necessary, refer to the PC manual.



Ethernet cabling recommendations

If the delivered Ethernet cable is too short, please note the following when purchasing a longer cable:

- You require a crossover cable.
- Unnecessarily long cables have an adverse effect on the signal quality. The maximum permitted cable length for Ethernet cable is 100 m per segment.
- Use high quality cable, at least category 5 (SFTP Cat 5) or higher shielded twisted pair.

6 Getting started

Before you use the Power Reducer Box for the first time, you must integrate it into your Ethernet network. For this you must connect the Power Reducer Box directly to the PC (see section 5.3.2 "Connecting the Power Reducer Box Directly to a PC" (page 19)).

6.1 Connecting the Power Supply

Only connect the plug-in power supply after all necessary electrical connections to the Power Reducer Box have been made (Ethernet connection, radio ripple control receiver). Upon connection to the plug-in power supply the Power Reducer Box starts and is operationally ready after approx. 60 - 90 seconds.

Connecting the Plug-in Power Supply



1. Check the connections.
 2. Connect the DC plug connector of the power supply unit to the DC connection of the Power Reducer Box.
 3. Insert the plug-in power supply into the power outlet.
- The Power Reducer Box starts.

6.2 Network Settings



Changing network settings

Do not change any network settings either on your PC or the Power Reducer Box if you are not certain about the consequences of the changes. Changing certain values via the PC can corrupt your existing network partially or completely. In severe cases, the Power Reducer Box can no longer be accessed from the PC. You will need the corresponding user authorizations on the PC in order to be able to change network settings. If in doubt, contact the network administrator.



Operating system

The following descriptions apply to Windows XP with Internet Explorer 6. The descriptions are similar and should be recognizable when using Windows 2000 / Vista or Internet Explorer 5/7/8..

The following steps are necessary for integrating the Power Reducer Box into a local network:

- Set the PC to the standard network settings of the Power Reducer Box, see section 6.2.1 "Setting the PC to the Standard Network Settings of the Power Reducer Box." (page 21).
- Set the Power Reducer Box to the local network settings (see section 6.2.2 "Setting the Power Reducer Box to the Local Network Settings" (page 23)).
- Connect the Power Reducer Box to the local network (see section 6.2.3 "Connecting the Power Reducer Box to the Local Network" (page 24)).

6.2.1 Setting the PC to the Standard Network Settings of the Power Reducer Box.

In order to set the PC to the standard network settings of the Power Reducer Box, the following steps are required:

- Setting up an IP address on the PC.
 - Setting up the proxy server advanced rules of the browser (e.g. Internet Explorer).
1. Connection of the Power Reducer Box directly to the PC (see section 5.3.2 "Connecting the Power Reducer Box Directly to a PC" (page 19)).
 2. Connecting the Power Reducer Box to the power supply (see section 6.1 "Connecting the Power Supply" (page 20)).

Setting up an IP Address on the PC

3. In Windows, select "Start > Settings > Network connections > LAN connection".
 - The "LAN connection status" window opens.
4. In the "General" register, select the [Properties] button.
 - The window "LAN connection properties" opens.
5. In the "General" register, select the "Internet protocol (TCP/IP)" and then select [Properties].



Noting settings in the window "Internet protocol properties (TCP/IP)".

Note the current settings in the window "Internet protocol properties (TCP/IP)" before changing it to the settings of the Power Reducer Box. Upon configuration of the Power Reducer Box re-enter the noted settings if necessary in order to recreate the original network configuration.

6. Select "Use following IP address".
7. The following specifications are necessary:

IP address: 10.100.2.70
Subnet mask: 255.0.0.0

8. Delete any entries in the "Standard gateway", "Preferred DNS server", and "Alternative DNS server" boxes.
9. Select [OK].
 - The window "Internet protocol properties (TCP/IP)" closes.
10. In the window "LAN connection properties", select [Close].
11. In the window "LAN connection status", select [Close].

Proxy Server Exceptions in Internet Explorer

12. Start Internet Explorer.
13. In Internet Explorer, select "Tools > Internet Options".
 - The "Internet Options" window opens.
14. Select the "Connections" tab, then click [Settings].
15. If there is no checkmark in the box before "Use a proxy server for your LAN", go to step 16, otherwise click [Advanced] and carry out the following instructions:
 - Enter "10.100.*" at the end of the entry in the "Do not use proxy server for addresses beginning with" field; use the semicolon as separator if required.
 - Confirm your settings in each of the three windows by clicking [OK].
16. If there is no checkmark in the box before "Use a proxy server for your LAN", click [Cancel] twice.
17. Call up the Power Reducer Box start page by entering <http://10.100.2.1> in the address bar of your browser.
 - The Power Reducer Box start page appears.



No connection to the Power Reducer Box

If no connection to the Power Reducer Box is established, check the electrical connection (see section 5.3.2 "Connecting the Power Reducer Box Directly to a PC" (page 19)).

- The PC is set to the standard network settings of the Power Reducer Box.

Now set the Power Reducer Box to the local network settings (see section 6.2.2 "Setting the Power Reducer Box to the Local Network Settings" (page 23)).

6.2.2 Setting the Power Reducer Box to the Local Network Settings

For delivery, the static network settings of the Power Reducer Box are set to the following values:

IP address:	10.100.2.1
Subnet mask:	255.0.0.0
Port:	80



Network administrator

If your local Ethernet is managed by a network administrator, contact him/her before integrating the Power Reducer Box into your network.

The Power Reducer Box should preferably have a static IP address in your network.

Static Network Settings

1. Log in as "installer" on the start page of the Power Reducer Box (see section 7.1 "Log in to the Power Reducer Box" (page 25)).
 - The "Plant overview" page opens.
2. Select "Network and system settings" in the main menu.
3. Enter the following settings in "Network settings":
 - In the "Acquire IP address" field select the value "static".



Assigning IP addresses

Only one instance of each IP address is permissible in the Ethernet network. The last part of the IP address must never be 0 or 255.

4. Enter the IP address into the "IP address" field, at which the Power Reducer Box shall be accessed.
5. In the "Subnet mask" field, enter the subnet mask of your network. This mask limits the Ethernet network to certain IP addresses and separates network areas from each other.
6. In the "Gateway address" field, enter the gateway address of your network. The gateway address is the IP address of the device that establishes the connection with the Internet. Usually, the address of the router is entered here.
7. In the "DNS server address" field, enter the address of the DNS server. The DNS (Domain Name System) server translates Internet addresses (e.g. www.SunnyPortal.com) into the respective IP addresses. Internet addresses are easier to remember than IP addresses. Type in the DNS server address your Internet service provider has provided you with or, alternatively, enter the IP address of your router.
8. Select [Save].
 - The Ethernet interface of the Power Reducer Box is configured.
9. Select [Logout]
 - The Power Reducer Box is set to the local network settings.

You may now connect the Power Reducer Box to your local network (see section 6.2.3 "Connecting the Power Reducer Box to the Local Network" (page 24)).

Dynamic Network Settings

You can also integrate the Power Reducer Box into your Ethernet network via DHCP. For this an active DHCP server must be available in your local network.

1. Log in as "installer" on the start page of the Power Reducer Box (see section 7.1 "Log in to the Power Reducer Box" (page 25)).
 - The "Plant overview" page opens.
2. Select "Network and system settings" in the main menu.
3. In the "Acquire IP address" field select the value "dynamic".
4. Select [Save].
 - The Power Reducer Box acquires its IP address from the local network DHCP server.



Retrieving the IP address dynamically (DHCP)

If the Power Reducer Box has been integrated into your network via DHCP, you must determine the IP address via the router. We recommend extending the lease of the assigned IP address. If necessary, please contact your network administrator. Generally a static network setting should be preferred.


6.2.3 Connecting the Power Reducer Box to the Local Network


1. Stop the Power Reducer Box (see section 9.2 "Stopping the Power Reducer Box" (page 41)).
2. Remove the crossover cable.
3. Connect the Power Reducer Box to the local network (see section 5.3.1 "Connection within a Local Network" (page 18)).
4. Connect the power supply (see section 6.1 "Connecting the Power Supply" (page 20)).
5. If necessary, reset the PC to the local network settings.
 - The Power Reducer Box is connected to the local network.

7 Operation

7.1 Log in to the Power Reducer Box

Login Page

POWER REDUCER BOX 



Device status:	<input checked="" type="checkbox"/> OK
Operating mode:	Effective power control A
Setpoint (set)	-
Setpoint (current)	L1-L3: 100%
Language:	English B
User group:	User C
Password	<input type="password"/>

D 153020468 | 1.5.2
E Last update: 02/16/2010 14:25:56

Position	Designation
A	Device status
B	Language selection
C	Login area
D	Serial number and software version
E	Last actualization of page contents

To change the Power Reducer Box settings, you must first log in.

The Power Reducer Box differentiates between three user groups:

- User
- Installer
- Service



Service user group

The Service user group is exclusively restricted to SMA Service employees.

In order to prevent two users effecting contradictory settings at the same time, only one user can ever be logged on to the Power Reducer Box at one time.

The "Installer" user group has the following rights in addition to the rights of the "User" user group.

- Changing the status configuration.
- Registration and administration of Sunny WebBox devices in the Power Reducer Box.
- Resetting the "User" user group password.

Log in to the Power Reducer Box

Factory settings:		
User group:	User	Installer
Password	0000	1111

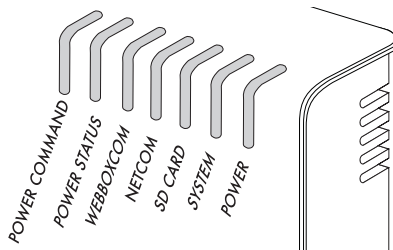
1. In the browser, enter the IP address of your Power Reducer Box.
 - The Power Reducer Box login page appears. If the login page does not open, check the electrical connection (page 16) and the network configuration (page 18).
2. Select the desired language in the "Language" field.
3. Select the user group in the "User group" field.
4. Enter the password in the "Password" field.
5. Select [Login].
 - The Power Reducer Box start page appears.



Safety

Once you have logged on for the first time, change your password in order to protect from unauthorized access (see section 8.1).

7.2 LED Overview

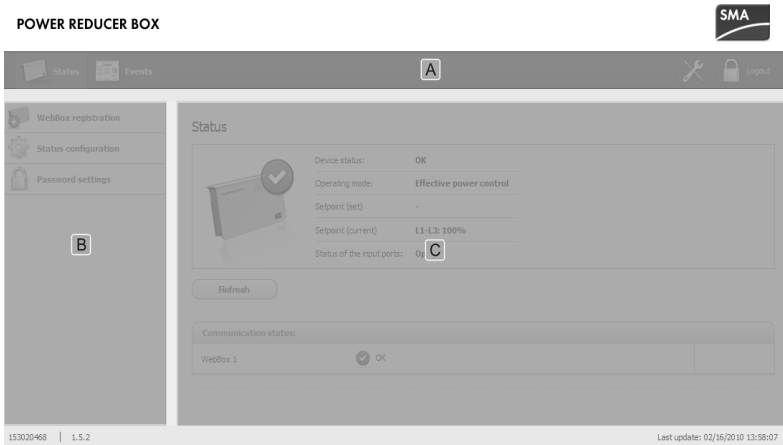


Legend	Meaning
POWER COMMAND	Validation of the parameter
POWER STATUS	Status of the power limitation
WEBBOXCOM	Communication with Sunny WebBox
NETCOM	Activity in the Ethernet network
SD CARD	Status of the SD card
SYSTEM	Readiness for operation
POWER	Power supply

7.3 Overview of the Program Interface


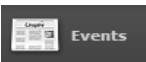


The Power Reducer Box is operated via the integrated web interface. The following figure displays the segmentation of the web interface.

Start Page of the Web Interface



Position	Designation
A	Main Menu
B	Context Menu
C	Contents section

7.4 Main Menu

Button	Designation	Function
	Status	This button opens the "Status" page (see section 7.6 "Device Status" (page 28)).
	Events	This button opens the "Events" page (see section 7.7 "Events" (page 29)).
	Network and system settings	This button opens the "Network and system settings" page of the Power Reducer Box.
	Logout	You can log out using this button.

7.5 Context Menu

Button	Function
WebBox registration	This menu item opens the "WebBox registration" page (see section 7.8 "WebBox Registration" (page 31)).
Status configuration	This menu item opens the "Status configuration" page (see section 7.9 "Configuring the System States" (page 33)).
Password settings	This menu item opens the "Password settings" page.

7.6 Device Status

On the "Status" page an overview of the current status of the PV system is given in the upper area. The following information is shown:

Device status	The device status displays which overall status the Power Reducer Box is in.
Operating mode	The operating mode displays which parameter the Power Reducer Box is currently implementing.
Setpoint (set)	The Setpoint (set) displays which values have been configured in the Power Reducer Box for the parameter.
Setpoint (current)	The Setpoint (current) displays which values are currently being implemented.
Status of the input ports	The status shows the current incoming signal of the radio ripple control receiver. K1 to K4 relate to the respective connected relays. If no signal is incoming, the value "Open" is displayed.



Display of the current status of the Power Reducer Box

The device status is also displayed on the login page of the Power Reducer Box.

In the lower area, all of the Sunny WebBox devices registered to the Power Reducer Box are listed with their current communication status. A Sunny WebBox can have the following statuses:

Symbol	Status	Description
	Ok	Communication between Power Reducer Box and Sunny WebBox is functioning correctly.
	Unknown	The communication status of the Sunny WebBox is currently unknown.
	Failure	There is a communication failure between the Power Reducer Box and the Sunny WebBox.

7.6.1 Updating the Device Status



Automatic updating of the page contents

The page contents are updated automatically every 30 seconds.

You can update the device status manually:

1. Select "Status" in the main menu.
 2. Select [Update].
- The device status will be updated.

7.7 Events

All events of the Power Reducer Box, such as change to status or fault in communication, are logged and displayed on the "Events" page. All events are recorded in the internal memory. Once the internal memory has reached its capacity, the oldest events will be written over. In addition you have the possibility to save the events onto an SD card.

7.7.1 Filtering and Displaying Events

1. Select "Events" in the main menu.

The events of the current day are displayed.
 2. If necessary, filter the events. For this, a checkmark must be placed in the relevant field. Multiple selection is possible. The following filter settings are possible:
 - Status change
 - Info
 - Warning
 - Disturbance
 - Error
 3. Select time period.
 4. Select [Update].
- The events in the desired time period are displayed.

In addition events can be downloaded directly (see section 7.7.2) or saved additionally onto an SD card (see section 7.7.3).

7.7.2 Downloading Events

You can download events as text files in csv format via the web interface. However, only events are downloaded that have currently been displayed or filtered. The csv file uses UTF-8 character encoding.

1. Select "Events" in the main menu.
 2. Select [Download].
 3. Select save location and confirm.
- The events are downloaded.

7.7.3 Saving Events to an SD Card

Events can additionally be saved to an SD card. Recording of the events begins with the insertion of the SD card into the Power Reducer Box. If the SD card has reached its capacity, recording is stopped. Old data files are not overwritten on the SD card. The red blinking SD card LED displays if the SD card is full or write-protected.



SD card compatibility

To ensure that the SD card is functioning properly, use SD cards available from SMA. Compatibility with all SD cards available on the market cannot be guaranteed. SD cards with a capacity of above 2 GB and SDHC cards are not supported.

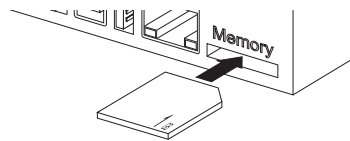


Formatting the SD card

Only use SD cards which have been formatted with the FAT32 file system.

All events are saved onto the SD card daily under the directory /Year/Month/Prefix_Year_Month_Day.csv. Example of a daily report for July 1, 2009 and the default prefix: /2009/07/PRB_09_07_01.csv. UTF-8 character encoding is used for all .csv files.

1. Insert the SD card in the Power Reducer Box.
- The events are saved additionally onto the SD card.



Loss of data upon removal of SD card

Do not remove the SD card while the SD CARD LED is blinking green or orange. This can damage the file system of the SD card and lead to data loss.

Depending on the data quantity, the writing process can take some time (e.g. upon inserting an empty SD card).

You can carry out further settings on the protocol file in the system settings of the Power Reducer Box (see section 8.3.3).

7.8 WebBox Registration



The following settings may only be carried out by qualified personnel.



No removal or editing of Sunny WebBox devices during active implementation of the Power Reducer Box.

Do not remove any Sunny WebBox devices and do not change any Sunny WebBox IP addresses in the Sunny WebBox registration, while an active power limitation (< 100 %) or reactive power setpoint is active.

7.8.1 Registering Sunny WebBox

All Sunny WebBox devices which are to be controlled by the Power Reducer Box must be registered via the web interface. The Sunny WebBox devices must not be operated in DHCP mode.

1. Select "WebBox registration" in the context menu.
 2. Enter the settings for each Sunny WebBox to be registered in the upper area:
 - In the "Name" field enter the name of the WebBox. The name can be freely assigned and serves the display on the "Status" page (maximum 20 characters). If no name is assigned, the IP address of the Sunny WebBox is registered as standard.
 - In the "IP Address" field enter the IP address of the Sunny WebBox, under which it is to be reached. The Sunny WebBox must have a fixed IP address and must not be in DHCP mode.
 - In the "Port" field enter the Web server port of the Sunny WebBox, under which it can be reached. Port 80 is set by default here.
 3. Select [Add].
- The newly registered Sunny WebBox appears in a list in the lower area.



Valid Sunny WebBox



It is not checked whether the Sunny WebBox address is valid. Check the status display on the "Status" page (see section 7.6) to see whether the Sunny WebBox has been correctly registered.

You can enter further Sunny WebBox devices in the same way. Please note the maximum number of supported Sunny WebBox devices.

Available Sunny WebBox devices can be deleted or edited (see section 7.8.2 "Deleting / Editing Sunny WebBox" (page 32)).

7.8.2 Deleting / Editing Sunny WebBox

You can edit or delete registered Sunny WebBox devices in the Power Reducer Box.

Button	Designation	Function
	Edit	Enables editing of the Sunny WebBox registration.
	Delete	Deletes a registered Sunny WebBox from the Power Reducer Box.

Editing Sunny WebBox

1. Select "WebBox registration" in the context menu.
2. In the list of Sunny WebBox devices, click on "Edit" behind the desired Sunny WebBox.
 - The Sunny WebBox to be edited is displayed in the upper area.
3. Adjust the Sunny WebBox settings.
4. Select [Save].
 - The Sunny WebBox is displayed with changed values in the list of WebBox devices.

Deleting Sunny WebBox

1. Select "WebBox registration" in the context menu.
2. In the list of Sunny WebBox devices, click on "Delete" behind the desired Sunny WebBox.
 - The Sunny WebBox is deleted from the list.

7.9 Configuring the System States



The following settings may only be carried out by qualified personnel.

The assignment of the digital input ports to the system states takes place via the web interface. A maximum of 16 states can be configured. Of these, at least 2 states must be configured. If there is a state present which is not configured in the Power Reducer Box, it is rated as an error and logged.

POWER REDUCER BOX

Status
 Logout

WebBox registration

Status configuration

Password settings

Status configuration

Status of the digital input ports

K4	K3	K2	K1	active	Operating mode	Active power in %			Reactive power in %			Cos phi			Excitation
						L1	L2	L3	L1	L2	L3	L1	L2	L3	
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input checked="" type="checkbox"/>	Effective power control	0	0	0							overexcited
●	●	●	●	<input checked="" type="checkbox"/>	Effective power control	30	30	30							overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input checked="" type="checkbox"/>	Effective power control	60	60	60							overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input checked="" type="checkbox"/>	Effective power control	100	100	100							overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited
●	●	●	●	<input type="checkbox"/>	Effective power control										overexcited

Settings

Failure tolerance time: s

Debounce time: ms

Time interval in case of changed setting: s

Time interval in case of constant setting: x time interval in case of changed setting

Maximum change in case of power increase: %

Maximum change in case of power decrease: %

Reference parameter: Compatibility list

153020#68 | 1.5.2
Last update: 02/16/2010 14:05:26



Standard configuration:
 Active power limitation for K1 = 0 %, K2 = 30 %, K3 = 60 % and K4 = 100 %

The following parameters can be configured:

- Active Power Limitation
- Reactive Power Setpoint
- cos Phi setpoint

Additionally, the following combined parameters can be configured:

- Active power limitation and reactive power setpoint
- Active power limitation and cos Phi setpoint
- Reactive power setpoint and cos Phi setpoint



Configuring combined parameters

Please note that in the case of combined parameters (e.g. active power limitation and reactive power setpoint) the respective settings of the individual parameters must be made. In case of doubt, please contact SMA Solar Technology.

7.9.1 Setting Active Power Limitation



Active power limitation to 0 %

At an active power limitation to 0 % the inverters cannot be completely dimmed to 0 watts. The inverter continues to feed in a low residual power.

In order to configure the active power limitation for a state of a relay, proceed as follows:

1. Log in as "Installer".
2. Select "Status configuration" in the context menu.
3. Search for the entry of the state to be configured in the "Digital input port state" column.
4. In the "Active" column place a checkmark alongside the state to be configured.
 - The state is active. Upon saving it will be analyzed by the Power Reducer Box.
5. Select the value "Active power limitation" of the state to be configured in the "Operating mode" column.
6. In the "Active power in %" column, enter the active power for the state to be considered for the phases L1, L2 and L3 in percent.

Different phases are only interpreted by inverters with multiple phases. Enter the same value for all phases in the case of single phase inverters.
7. Configure further states in the same way.
8. Take on general settings of the system states (see section 7.9.5 "Setting General System States" (page 36)).
9. Select [Save].
 - The active power limitation is set.

7.9.2 Setting the Reactive Power Setpoint

In order to configure the reactive power setpoint for a state of a relay, proceed as follows:

1. Log in as "Installer".
2. Select "Status configuration" in the context menu.
3. Search for the entry of the state to be configured in the "Digital input port state" column.
4. In the "Active" column place a checkmark alongside the state to be configured.
 - The state is active and will be analyzed by the Power Reducer Box upon saving.
5. Select the value "Reactive power setpoint" of the state to be configured in the "Operating mode" column.
6. In the "Reactive power in %" column, enter the reactive power setpoint for the state to be considered in percent for the phases L1, L2 and L3.

Different phases are only interpreted by inverters with multiple phases. Enter the same value for all phases in the case of single phase inverters.
7. Configure further states in the same way.
8. Take on general settings of the system states (see section 7.9.5 "Setting General System States" (page 36)).
9. Select [Save].
 - The reactive power setpoint is set.

7.9.3 Setting the cos Phi Setpoint

In order to configure the cos Phi setpoint for a state of a relay, proceed as follows:

1. Log in as "Installer".
2. Select "System states" in the context menu.
3. Search for the entry of the state to be configured in the "Digital input port state" column.
4. In the "Active" column place a checkmark alongside the state to be configured.
 - The state is active and will be analyzed by the Power Reducer Box upon saving.
5. In the "Parameters" column, select the "cos Phi setpoint" next to the state to be configured.
6. Enter the cos Phi value for the phases L1, L2 and L3 in the "cos Phi" column for the state to be configured.

The cos Phi value can be between 0.10 and 1.00. Different phases are only interpreted by inverters with multiple phases (see inverter manual). Enter the same value for all phases in the case of single phase inverters.
7. Whether the cos Phi value is under-excited or over-excited is to be selected in the "Excitation" column.
8. Configure further states in the same way.

9. Take on general settings of the system states (see section 7.9.5 "Setting General System States" (page 36)).
 10. Select [Save].
- The cos Phi setpoint is now set.

7.9.4 Setting Combined Parameters



Configuring combined parameters

Please note that in the case of combined parameters (e.g. active power limitation and reactive power setpoint) the respective settings of the individual parameters must be made. In case of doubt, please contact SMA Solar Technology.

In order to set combined parameters, the individual parameters must be configured respectively for one state of the relay.

- Active power limitation and reactive power setpoint
- Active power limitation and cos Phi setpoint
- Reactive power setpoint and cos Phi setpoint

7.9.5 Setting General System States

1. Log in as "Installer".
2. Select "Status configuration" in the context menu.
3. In the "Error tolerance time" field, enter the desired error tolerance time, from when an invalid input signal is recognized as an error. In practice it can be that during state change an undefined input signal appears for a short time, if, for example, two relays activate for 1 s simultaneously. The error tolerance time should be set to long enough so that no error message is generated during this transition of states.
4. In the field "Debouncing time" enter the desired debouncing time in milliseconds. The value states how long a signal must be present at a minimum of one input port, in order that it is recognized as such and then can be processed by the system. This setting prevents short impulses, caused by mechanical contact bounces, being falsely recognized as a signal during the state transition.
5. In the field "Time interval for changed parameter", enter the time interval in seconds in which the control command should be sent to the registered Sunny WebBox devices after the parameter of the radio ripple control receiver has changed. After the parameter has been reached, the Power Reducer Box will jump to the "Time interval for constant parameter". Example: When entering 60 seconds, the Power Reducer Box would transmit a control command with the changed parameter value to the registered Sunny WebBox devices every 60 seconds after a parameter has changed.

6. Select the factor in the "Time interval for constant parameter" with which the value of the "Time interval for changed parameter" should be multiplied. The field "Time interval for constant parameter" defines at which interval the control command should be transmitted to the Sunny WebBox devices once the parameter of the radio ripple control receiver has been met.
7. In the field "Max. change during power increase" enter the maximum, percental change per minute upon lifting of an active power limitation (requirement for the reconnection of systems to the 20 kV grid: max. 10 % of the connection active power per minute.)¹⁾.
8. In the field "Max. change by power decline" enter the maximum percental change per minute in accordance with a request for a active power limitation.
9. Enter the reference parameter for the inverters in the "Reference parameter" field. The reference parameter defines to which value the active power limitation will refer. Make sure that your connected inverters support the set reference parameter (see "Compatibility list").
10. Select [Save].
 - The configurations are saved.

¹⁾Technical guideline "Generation systems on the medium voltage grid" BDEW (German Federal Association for Energy and Water), June 2008

8 Settings

8.1 Setting the Password.



Password security

In order to increase the security, please note the following points when selecting a password:

- Minimum 8 characters
 - Mix upper and lower-case letters
 - Use numbers and special characters
1. Select "Password settings" in the context menu.
 2. In the "Change password" area, enter the respective settings:
 - Enter the old password in the "Old password" field.
 - Enter the new password in the "New password" field.
 - Re-enter the new password in the "Repeat password" field.
 3. Select [Save].
- The settings are active from the next login.

8.2 Resetting Password

1. Select "Password settings" in the context menu.
 2. In the "Reset password" area, select the user group that should be reset.
 3. Select [Reset]
- The password is reset to the factory installed password and is active from the next login.



Resetting passwords of other user groups

Additionally, the "User" user group password can be reset in the "Installer" user group.

8.3 Setting Network

1. Select "Network and system settings" in the web interface.
2. Make a selection in the "Retrieve IP address" field.

The following selection is possible:

Static	Network settings have to be made manually.
Dynamic	Network settings are automatically acquired from the network (DHCP).

3. If "static" has been selected, continue with section 8.3.1 "Static Network Settings" (page 39)
4. If "dynamic" has been selected, then select [Save].
 - The network of the Power Reducer Box is set.



DHCP usage

The Power Reducer Box can only be accessed via its IP address. Before setting the Power Reducer Box to dynamic IP address assignment, check your DHCP server. The DHCP server must extend the lease of the assigned IP address. If the DHCP server assigns a new IP address after the lease has expired, we do not recommend using the DHCP server. DHCP servers can normally list all devices to which you have assigned an IP address. The Power Reducer Box can then be identified via its MAC address. You will find the MAC address of your Power Reducer Box on the type plate.

8.3.1 Static Network Settings

1. Select "Network and system settings" in the main menu.
2. The "Retrieve IP address" field should be set to "static".
3. Enter the IP address at which the Power Reducer Box can be accessed into the "IP address" field.



Assigning IP addresses

Only one instance of each IP address is permissible in the Ethernet network. The last part of the IP address must never be 0 or 255.

4. In the "Subnet mask" field, enter the subnet mask of your network. This mask limits the Ethernet network to certain IP addresses and separates network areas from each other.
5. In the "Gateway address" field, enter the gateway address of your network. The gateway address is the IP address of the device that establishes the connection with the Internet. Usually, the address of the router is entered here.
6. In the "DNS server address" field, enter the address of the DNS server. The DNS (Domain Name System) server translates Internet addresses (e.g. www.SunnyPortal.com) into the respective IP addresses. Internet addresses are easier to remember than IP addresses. Type in the DNS server address your Internet service provider has provided you with or, alternatively, enter the IP address of your router.
7. Select [Save].
 - The static network settings have been set.

8.3.2 Setting Date and Time



Automatic time synchronization

When an automatic time synchronization should take place with Sunny Portal (logging in to Sunny Portal is not necessary for this), place a checkmark next to "Time synchronization". Manually entering the date and time is then not necessary. Note that the Power Reducer Box must have an internet connection.

1. Select "Network and system settings" in the main menu.
 2. Select the current date in Day-Month-Year format in the "New date: Day, Month, Year" field.
 3. Enter the current time in the format hours:minutes in the "New time (hh:mm) 24 hour format" field.
 4. Select the time zone in which the system is located in the "Time zone" field.
 5. Select [Save].
- The date and time are set.

8.3.3 Setting the Log File

1. Select "Network and system settings" in the main menu.
 2. Select the prefix, with which the file name of the log file should begin in the "Prefix for log files" field.
 3. Select the language in which the events should be written to the SD card in the "Language of the log files" field.
 4. Select [Save].
- Events are written to the SD card in the selected language.

9 Service Functions

9.1 Firmware Update via SD Card

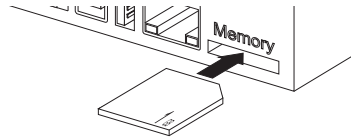
You can perform a firmware update of the Power Reducer Box via an SD card. For this, download the relevant update file from www.SMA.de/en.



Formatting the SD card

Only use SD cards which have been formatted with the FAT32 file system.

1. Save the update file on the SD card.
2. Insert the SD card in the Power Reducer Box.
 - The update is automatically carried out. The update process takes approx. 15 minutes. A red running light of the LEDs signalizes the running update process. After successful completion of the update process, the LEDs "POWER", "SYSTEM" and "SD CARD" light up green.
3. Remove the SD card after successful update.



During the update, a restart of the Power Reducer Box is carried out, which leads to impairments to the function of the Power Reducer Box during the update process. The settings made remain the same. Upon successful update the Power Reducer Box is again available via the web interface.

9.2 Stopping the Power Reducer Box



Loss of data when disconnecting the Power Reducer Box from the power supply.

Do not disconnect the Power Reducer Box from the power supply while the SD CARD LED is blinking green or orange.

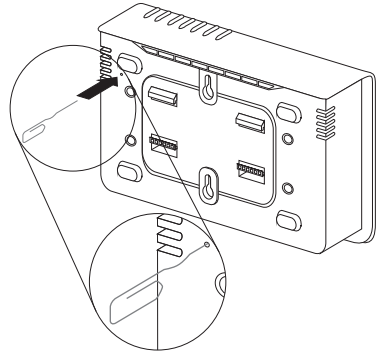
1. Pull the plug-in power supply out of the plug socket.
 - The Power Reducer Box is stopped.

9.3 Resetting the Power Reducer Box

The Power Reducer Box can be reset using a reset button. The hole for the reset button is found on the rear panel of the Power Reducer Box under the upper left foot.

The Power Reducer Box must be on when activating the reset button.

1. Use a pointed object (such as a paper clip) to activate the reset button through the hole. Depending on the duration, the actions listed in the table below will be performed.



Time	Action
< 1 second	Resetting of the network settings
1 - 5 seconds	Resetting of the network settings and passwords
5 - 15 seconds	Resetting of all settings of the Power Reducer Box to the factory settings (=delivery state)

- The Power Reducer Box is reset.

By interrupting the power supply, you can restart the device without resetting the passwords or the settings. See section 9.2 "Stopping the Power Reducer Box" (page 41).

10 Maintenance and Care

10.1 Maintenance

Conduct regular visual inspections of the Sunny WebBox to check for external damage or dirt.

10.2 Care

**NOTICE!****Damage to the device due to ingress of liquids.**

The Power Reducer Box is not waterproof. Protect the Power Reducer Box from wet conditions.

- To clean the device, use only a lightly dampened cloth so as to prevent the ingress of liquids. If there is a considerable amount of dirt, you can also use a mild, non-abrasive, non-corrosive cleaning agent.

11 Decommissioning

11.1 Dismounting the Power Reducer Box

1. Pull the plug-in power supply out of the plug socket.
2. Unplug the DC plug of the power supply from the Power Reducer Box.
3. Remove the SD card from the SD card slot of the Power Reducer Box after a short push.
4. Remove cabling to the radio ripple control receiver.
5. Remove the Ethernet cable from the Power Reducer Box.
6. Remove the enclosure.

Top hat rail mounting

Remove the enclosure of the Power Reducer Box from the top hat rail. To do so, lightly press the Power Reducer Box upwards, tilting the top edge forwards.

Wall mounting

Remove the enclosure of the Power Reducer Box from the wall. To do so, press the Power Reducer Box upwards, and pull it forwards.

- The Power Reducer Box is dismounted.

11.2 Packing the Power Reducer Box

When returning the device to us, please be sure to use packaging which adequately protects the device from damage during transport (if possible, the original packing).

11.3 Disposal of the Power Reducer Box

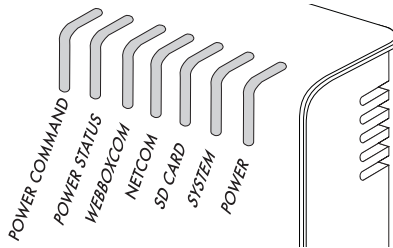
Dispose of the Power Reducer Box at the end of its service life in accordance with the disposal regulations for electronic scrap which apply at the installation site at that time, or send it back to SMA Solar Technology with shipping paid by sender, and labeled "ZUR ENTSORGUNG ("for disposal)".

12 Troubleshooting



Some measures for troubleshooting may only be carried out by qualified personnel. These measures are indicated accordingly.

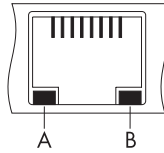
12.1 Meaning of the LEDs



LED	Status	Meaning	Action
POWER COMMAND	glows green	Parameters are valid.	none
	glows red	Parameters are invalid.	Only for installers: <ul style="list-style-type: none"> • Check connection to radio ripple control receiver. • Check radio ripple control receiver. • Check state configuration for completeness and validity (see section 7.9).
POWER STATUS	glows green	Setpoint = 100 %	none
	glows red	Output limitation active (< 100 %)	none
WEBBOXCOM	glows green	All registered Sunny WebBox devices are available.	none
	flashes orange	Not all Sunny WebBox devices are available.	Only for installers: Determine faulty Sunny WebBox via the status display. Check Sunny WebBox and where necessary its cabling.
	flashes red	No Sunny WebBox is available.	Only for installers: Check cabling and Ethernet devices (e.g. router).

LED	Status	Meaning	Action
NETCOM	flashes green	Network activity	none
SD CARD	glows green	SD card is inserted and can be written to, > 10 % free	none
	flashes green	Recording active, >10 % free	none
	glows orange	SD card is inserted and can be written to, ≤ 10 % free	Replace SD card in the near future.
	flashes orange	Recording active, ≤ 10 % free	Replace SD card in the near future.
	flashes red	The SD card is full or write-protected.	Replace SD card or remove the write protection.
	off	No SD card is inserted.	none
SYSTEM	glows green	The Power Reducer Box is ready for operation.	none
	glows orange	The Power Reducer Box is booting.	none
	flashes red	System fault	Stop the Power Reducer Box and restart (see section 9.2 and section 6.1) Only for installers: Carry out a reset of the Power Reducer Box (see section 9.3)
POWER	glows green	The Power Reducer Box is supplied with power.	none
	off	The Power Reducer Box is not supplied with power.	Check power supply.

12.2 Explanation of the LEDs at the Ethernet Connection



	LED	State	Function
A	Speed	off	10 Mbit/s connection speed
		on	100 Mbit/s connection speed
B	Link / Activity	off	No connection established
		on	Connection (link) established
		Flashing	Data is being transmitted or received (Activity)

13 Technical Data

General data	
Dimensions (W/H/D) in mm	255/130/57
Weight	750 g
Mounting location	indoors
Applicability	top hat rail mounting, wall mounting
Status display	LEDs
Software language	German, English
Features	integrated web server
Communication	
Communication with the Sunny WebBox	Ethernet
PC communication	Ethernet
Interfaces	
Radio ripple control receiver	4 digital input ports
Ethernet	10/100 Mbit/s, RJ45
AUXCOM for digital inputs	
Connection resistance	< 1 k Ω
Disconnection resistance	> 1 M Ω
Input current per channel	< 20 mA
Output voltage	nominal voltage: 5 V short circuit tolerance: permanent
Sunny WebBox	50
Max. communication range	
Ethernet	100 m
Power supply	
Power supply	plug-in power supply
Power consumption	< 4 W
Environmental conditions for operation	
Ambient temperature	-20 °C to +60 °C
Relative humidity	5 % to 95 %, non-condensing
Elevation	0 to 2000 m above sea level
Protection rating	IP20

Environmental conditions during storage / transport	
Ambient temperature	-40 °C to +70 °C
Relative humidity	5 % to 95 %, non-condensing
Elevation	0 to 3000 m above sea level
Memory	
Internal	16 MB ring buffer
External	SD card (max. 2 GB)

Plug-in power supply

General data	
Dimensions (W/H/D) in mm	107.77/57.6/33.5
Weight	300 g
Mounting location	indoors
Power supply	
Input voltage	100 V - 240 V AC, 50 / 60 Hz

14 Accessories

14.1 SD Cards



2 GB

SMA order number: SD card 2 GB

15 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We require the following information in order to provide you with the necessary assistance:

- Information on the Ethernet network used.
- Information on the PV system.
- Configuration file and log file from the SD card.
- Firmware version of the Power Reducer Box (see section 3.2 "Identifying the Power Reducer Box" (page 12)) as well as the connected WebBox devices.

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- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
- In case of unforeseen calamity or force majeure

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