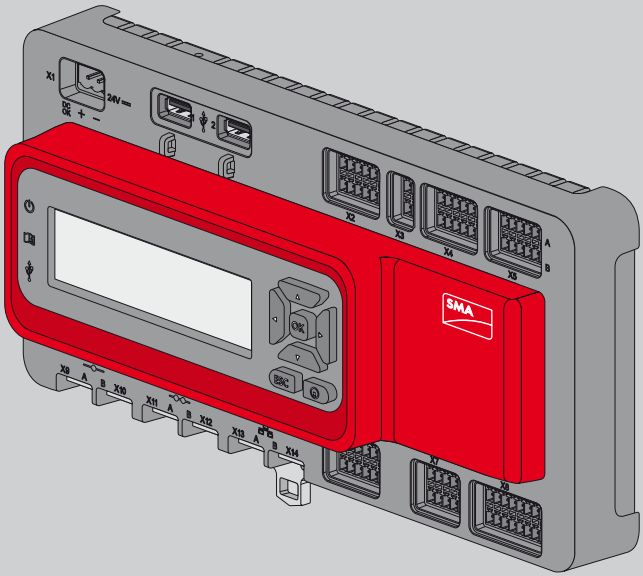
User Manual

SMA CLUSTER CONTROLLER



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1 Information on this Document

Validity

This document is applicable for the device type "CLCON-10.GR1" (SMA Cluster Controller) from hardware version A1 and from firmware version 1.0.

Target Group

This document is for skilled persons. Only persons with the appropriate skills are allowed to perform the tasks described in this manual (see Section 2.2 "Qualifications of Skilled Persons", page 12).

Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title	Document type
Adapting the Total Energy Yield for Inverter Replacement in Plants with Communication Products	Installation manual

Symbols

Symbol	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, could result in property damage
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates an essential requirement for achieving a specific goal
☑	Desired result
✖	A problem that might occur

Typography

Typography	Usage	Example
bold	• Display messages • Elements of a user interface • Terminals • Elements to be selected • Elements to be entered	• The value can be read from the **Energy** field. • Select **Settings**. • Enter the value **10** in the **Minutes** field.
>	• Connects several elements to be selected	• Select **Settings > Date**.
[**Button/Key**]	• Button or key to be selected or pressed	• Select [**Next**].

Nomenclature

Full designation	Designation in this cocument
Large-scale PV plant	Plant
PV inverters	Inverter
SMA Cluster Controller	Cluster Controller

Abbreviations

Abbreviation	Designation	Explanation
CO	Change Over	Relay change-over contact
CSV	Comma Separated Values	File format
DHCP	Dynamic Host Configuration Protocol	Protocol for the dynamic assignment of IP configurations
FTP	File Transfer Protocol	Network protocol for data transmission
IP	Internet Protocol	–
LED	Light-Emitting Diode	–
NC	Normally Closed	Rest contact of the relay
MSL	Mean Sea Level	–
NO	Normally Open	Operating contact of the relay
PUK	Personal Unlocking Key	Code number which enables access to SMA devices after loss of password
PV	Photovoltaics	–
TCP	Transmission Control Protocol	Transport protocol for packet-switching in connection-oriented networks
USB	Universal Serial Bus	Serial bus system
XML	Extensible Markup Language	–

2 Safety

2.1 Appropriate Usage

The Cluster Controller is a device for monitoring and controlling up to 75 SMA inverters with Speedwire/Webconnect interface in decentralised large-scale PV plants. For this purpose, the Cluster Controller performs the following essential tasks:

- Set-up of the Speedwire network
- Reading out, provision and administration of plant data
- Configuring device parameters
- Sending e-mail alerts in the event of critical plant statuses
- Implementation and feedback of network operator setpoints for active power limitation and reactive power under grid management
- Sending the plant data to an FTP server and/or the Sunny Portal Internet portal
- Performing updates for the Cluster Controller and the inverters

The Cluster Controller is an ITE Class A device according to EN 55022 and is designed for industrial use.

The Cluster Controller is suitable for indoor use only.

The Cluster Controller must only be used with supported devices.

For safety reasons, it is not permitted to modify the product or install components that are not explicitly recommended or distributed by SMA Solar Technology AG for this product.

Only use the Cluster Controller in accordance with the information provided in the enclosed documentation. Any other use may result in personal injury or property damage.

The enclosed documentation is an integral part of this product:

- Read and observe the documentation.
- Keep the documentation in a convenient place for future reference.

2.2 Qualifications of Skilled Persons

The work described in this document must be performed by skilled persons only. Skilled persons must have the following qualifications:

- Training in the installation and commissioning of electrical devices
- Training in how to deal with the dangers and risks involved in installing and operating electrical devices and plants
- Training in the installation and configuration of IT systems
- Knowledge of how an inverter works and is operated
- Knowledge of all applicable standards and directives
- Knowledge of and adherence to this document and all safety precautions

2.3 Safety Precautions

This section contains safety precautions that must be observed at all times when working on or with the product. To prevent personal injury or property damage and to ensure long-term operation of the product, read this section carefully and comply with the safety precautions at all times.

⚠ DANGER

Danger to life due to electric shock

If overvoltage occurs (e. g. through a flash of lightning) or if the enclosure of the Cluster Controller is not earthed, there is a danger of electric shock.

- Ensure that the Cluster Controller is integrated in the existing overvoltage protection.
- Earth the enclosure of the Cluster Controller (for information on connecting the protective conductor, see the Cluster Controller installation manual).

NOTICE

Damage to the devices and cables

The Cluster Controller is not splash water-protected (degree of protection: IP20). Consequently, it is possible that moisture may penetrate the device.

- Only use the Cluster Controller in a dry, indoor environment.

2.4 Operating Information

NOTICE

High costs possible through inappropriate Internet rates

According to use, the data volume of the Cluster Controller transferred via the Internet can be more than 1 GB per month. The data volume depends, among other things, on the number of inverters, the frequency of device updates, the frequency of data transfer to the Sunny Portal and the use of FTP push.

- SMA Solar Technology AG recommends using an Internet flat rate.

2.5 Supported Products

SMA Products

The Cluster Controller can establish a connection to and display data on the following SMA products that are equipped with Speedwire communication:

Inverters:

- All inverters with integrated or retrofitted Speedwire/Webconnect interface.

  Information on whether an inverter has an integrated Speedwire/Webconnect interface or can be retrofitted with a Speedwire/Webconnect interface can be found on the product page of the respective inverter at www.SMA-Solar.com.

Additional products:

- Sunny Portal
- SMA Grid Gate of device type "GRIDGATE-20" from firmware version 1.0*

Products from Other Manufacturers

Sensors:

- Irradiation sensors that can output a current signal in the range from 0 mA to 20 mA
- Temperature sensors with a PT100 measuring shunt or a PT1000 measuring shunt
- Additional sensors that can output a current signal in the range from 0 mA to 20 mA or a voltage signal in the range from − 10 V to +10 V

Digital and analogue signal sources:

- Signal sources with digital relay contacts
- Signal sources that provide digital output signals
- Signal sources that can output current signals in the range from 0 mA to 20 mA
- Signal sources that can process current signals in the range from 0 mA to 20 mA
- Signal sources that can output voltage signals in the range from − 10 V to 10 V

Routers and network switches:

- Router and switches for Fast Ethernet with a data transfer rate of at least 100 Mbit/s

Top-hat rail power supply units:

Along with the top-hat rail power supply units offered as an accessory (see Section 19), the Cluster Controller supports top-hat rail power supply units with the following properties:

- Maximum output current including short circuit: 8 A
- Maximum apparent output power: 100 VA
- DC output voltage: 24 V
- Nominal current: minimum 1.8 A

* Not available in all countries (for information on whether the product is available in your country, see the website of the SMA subsidiary in your country at www.SMA-Solar.com or contact your specialist dealer).

2.6 System Requirements

Supported Internet browsers:

- Microsoft Internet Explorer from version 8
- Mozilla Firefox from version 3.6

Recommended screen resolution:

- At least 1,024 pixels x 768 pixels

3 Product Description

3.1 Cluster Controller

The Cluster Controller is a device for monitoring and controlling up to 75 SMA inverters with Speedwire/Webconnect interface in decentralised large-scale PV plants. For this purpose, the Cluster Controller performs the following essential tasks:

- Set-up of the Speedwire network
- Reading out, provision and administration of plant data
- Configuring device parameters
- Implementation and feedback of network operator setpoints for active power limitation and reactive power operation under grid management
- Sending e-mail alerts in the event of critical plant statuses
- Sending the plant data to an FTP server and/or the Sunny Portal Internet portal
- Performing updates for the Cluster Controller and the inverters

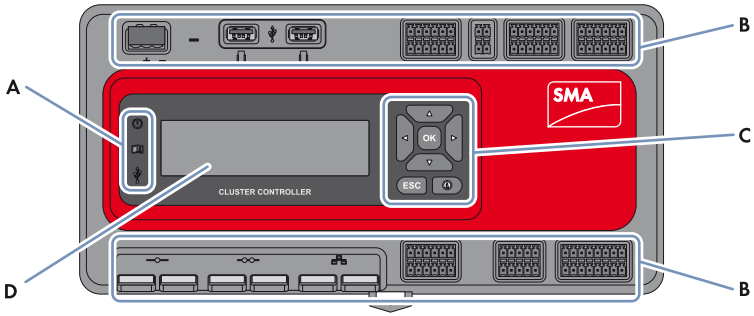


Figure 1: Design of the Cluster Controller

Position	Description
A	LEDs
B	Connection areas
C	Button field
D	Display

Reading out, Provision and Administration of Plant Data

The Cluster Controller is the central communication unit for the plant and continuously reads out the data of the devices in the plant (e.g. inverters, sensors). The Cluster Controller then makes this plant data available via the display, user interface and Modbus®* data interface. In addition, the plant data can be displayed, evaluated and managed using Sunny Portal (see Section 11 and the user manual of the Cluster Controller in Sunny Portal).

* Modbus® is a registered trademark of Schneider Electric and is licensed by the Modbus Organization, Inc.

Configuring Device Parameters

You can configure specific parameters of individual devices or entire device classes via the user interface of the Cluster Controller. For this purpose, you must be logged into the **Installer** user group on the Cluster Controller. The device parameters that can be configured, if any, depend on the device and the rights of the user group. You may only change grid-sensitive device parameters (SMA Grid Guard parameters) with the approval of the network operator and using your personal SMA Grid Guard code (see Section 15.5 "Setting SMA Grid Guard Mode", page 84).

Sending E-mail Alerts in the Event of Critical Plant Statuses

You have the option of being promptly informed of critical plant statuses via e-mail (see Section 9.2). For this purpose, the Cluster Controller automatically sends a notification if alert-related events occur in the plant.

Implementation and Feedback of Network Operator Setpoints for Active Power Limitation and Reactive Power Operation under Grid Management

With the Cluster Controller, you can implement different network operator setpoints for the active power limitation and the reactive power operation of your plant under grid management. For this purpose, your network operator transmits its setpoints directly to the Cluster Controller either in the form of digital or analogue signals (e.g. to a ripple control receiver that is connected to the Cluster Controller) or via the Modbus client. In agreement with your network operator, you can use the user interface of the Cluster Controller to configure which setpoints of the Cluster Controller are to be transmitted to the connected inverters depending on the respective signal. In addition, you have the option of using a digital response contact or an analogue current output signal to inform the network operator of the setpoints (if any) for the active power limitation and the reactive power operation that are currently being transmitted to the plant.

Sending the Plant Data to an FTP Server and/or the Sunny Portal Internet Portal

The Cluster Controller can automatically send the plant data that has been read out to an arbitrary FTP server and/or the Sunny Portal Internet portal via the Internet. The Cluster Controller establishes the connection to the FTP server and/or the Sunny Portal e.g. via a router.

Performing Updates for the Cluster Controller and the Inverters

You have the option of performing updates for the Cluster Controller and the inverters in the plant (see Section 14). You can perform the updates automatically or manually. The update source can be the SMA Update portal or a USB data carrier with update files downloaded from the Internet. Alternatively, you can also upload the update files directly from the computer via the user interface of the Cluster Controller.

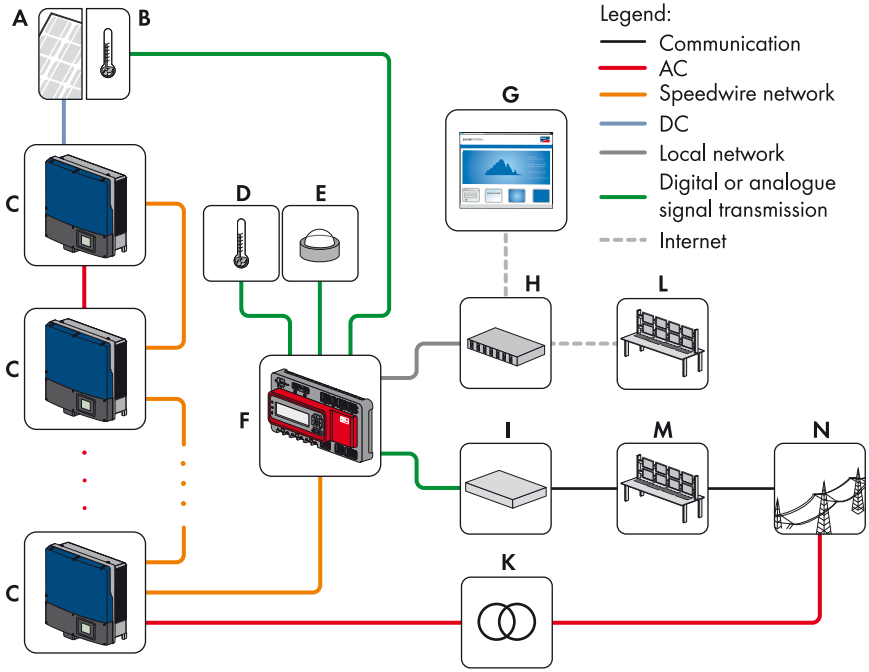


Figure 2: Decentralised large-scale PV plant with Cluster Controller (example)

Position	Description
A	PV modules
B	Module temperature sensor
C	Inverters
D	Outside temperature sensor
E	Irradiation sensor
F	Cluster Controller
G	Sunny Portal
H	Router
I	Ripple control receiver or remote terminal unit
K	Grid station
L	Control room
M	Grid control room
N	Electricity grid

3.2 Type Label

The type label clearly identifies the product. The type label can be found on the back of the enclosure. You will find the following information on the type label:

- Device type (Type)
- Serial number (Serial No.)
- Hardware version (Version)
- Device-specific characteristics

You will require the information on the type label to use the product safely and for customer support from the SMA Service Line. The type label must be permanently attached to the product.

Symbols on the Type Label

Icon	Description	Explanation
	C-Tick	The product complies with the requirements of the applicable Australian EMC standards.
CAN ICES-3 (A)/NMB-3(A)	IC labelling	The product complies with the requirements of the applicable Canadian EMC standards.
	Indoor	The product is only suitable for indoor installation.
	FCC marking	The product complies with the requirements of the applicable FCC standards.
	CE marking	The product complies with the requirements of the applicable EU directives.
	WEEE designation	Do not dispose of the product with household waste, but only in accordance with the locally applicable disposal regulations for electronic waste.
	Data matrix code	2D code for device-specific characteristics

3.3 LEDs

Operation LEDs

LED	Description	Explanation
	Power LED	Displays whether the Cluster Controller is starting or is in operation (for a description of the LED statuses, see Section 18.1.1)
	Status LED	Displays the status of the Cluster Controller and the connected devices as well as the communication status of the plant and the status of the grid management (for a description of the LED statuses, see Section 18.1.1)
	Data carrier status LED	Displays the status of the connected USB data carrier (for a description of the LED statuses, see Section 18.1.1)

LEDs of the Network Connections

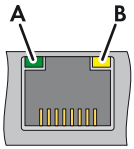


Figure 3: LEDs of the Network Connections

Position	Description	Colour	Explanation
A	Link/activity LED	Green	Displays the status and the activity of the network connection (for a description of the LED statuses, see Section 18.1.2)
B	Speed LED	Yellow	Displays the speed of the network connection (for a description of the LED statuses, see Section 18.1.2)

3.4 Display

The display shows information on the Cluster Controller and the connected devices as well as the plant status and the plant configuration. The display contrast can be configured (see Section 6.2). The display languages are German and English. The display language is changed via the user interface of the Cluster Controller (see Section 6.1).

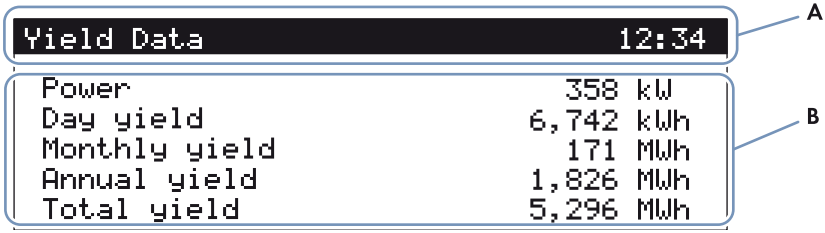


Figure 4: Display of the Cluster Controller (example)

Position	Description	Explanation
A	Title line	Displays the title of the display view The plant time is always displayed.
B	Data lines	Displays text and numeric values The numeric values for measurement or yield data are displayed with units.

Overview of the Display Views

Display view	Explanation
Start view	Displayed when the Cluster Controller starts up and includes the current firmware version of the Cluster Controller
Plant overview	Displays the plant status, the current daily yield, the plant power and the current setpoints for active power and reactive power If no button on the button field is pressed within five minutes, the Cluster Controller switches to the **Plant overview** display view.
Yield Data	Displays the yield data of the plant
Plant status	Displays the current plant status The number of inverters detected by the Cluster Controller and the status of the inverters is displayed here.
Cluster Controller	Displays the status and device information of the Cluster Controller When a USB data carrier is inserted, information on the current storage space of the USB data carrier will be displayed.

Display view	Explanation
Sunny Portal settings	Displays the configured upload frequency and the date of the last successful data upload to Sunny Portal
Analogue inputs	Displays the analogue inputs with the current level value and unit
Digital inputs	Displays the digital inputs in binary form The digital inputs are summarised in two groups here.
Meteorology	Displays the measured values of the connected irradiation sensor and the connected temperature sensors
Effective power control	Displays the current setpoint for active power limitation with the data of the last change to the configuration
Reactive power setpoint	Displays the current reactive power setpoint and date of the last change to the configuration
Grid management	Displays a summary of the settings made via the user interface of the Cluster Controller and the setpoint values for grid management.
External communication	Displays the settings for the local area network (LAN)
Speedwire	Displays the settings in the Speedwire network
Modbus settings	Displays the Modbus settings with the activated network protocols and the corresponding network ports
Settings	Enables the display contrast to be changed (see Section 6.2) and the Cluster Controller to be partially or fully reset (see Section 18.4)

3.5 Button Field

Description	Explanation
Any button	Activates the display illumination
Arrow buttons (◄ , ► , ▲ , ▼)	Changes the display views and selects specific display lines
[**OK**]	Confirms the selected action
[**ESC**]	Cancels the selected action
ⓘ	Opens the **Plant status** display view

3.6 Sunny Portal

Sunny Portal (www.SunnyPortal.com) is an Internet portal for the monitoring of plants as well as the visualisation and presentation of plant data. In order to use Sunny Portal, you need an SMA product that can record your plant data and send it to Sunny Portal, e.g. the Cluster Controller. Depending on which SMA product sends the data to Sunny Portal, various functions are available in Sunny Portal.

In order to use Sunny Portal, the Cluster Controller must be registered in Sunny Portal. You can access the Cluster Controller via the Internet using the Sunny Portal (see Section 16). In addition, Sunny Portal can monitor the operation of the Cluster Controller. For this communication monitoring, the Cluster Controller sends a signal to the Sunny Portal at a time interval specified by the user. If the signal fails to appear, Sunny Portal alerts the user via e-mail depending on the strictness of the communication monitoring configured in Sunny Portal (see user manual of the Cluster Controller in Sunny Portal).

4 User Interface of the Cluster Controller

4.1 User Groups and User Rights

The Cluster Controller distinguishes between the **User** and **Installer** user groups. To prevent two users from making changes at the same time via the user interface, only one user can be logged into the Cluster Controller at a time.

The user groups have the following rights:

Right	User group	
	User	Installer
Making system settings in the Cluster Controller (see Section 6)	✓	✓
Configuring the Cluster Controller for the local area network (see Section 17.1)	✓	✓
Changing the network ports (see Section 17.4 and Section 17.5)	✓	✓
Reading out the inverter power and the inverter parameter settings via the device menu (see Section 4.5)	✓	✓
Setting the inverter parameters (see Section 7)	–	✓
Changing the SMA Grid Guard parameters of devices (see Section 15.5)	–	Only with SMA Grid Guard code: ✓
Adding devices to the plant or replacing devices in the plant (see Section 10.1, Section 10.2 or Section 10.3)	–	✓
Changing the plant password for the **User** user group (see Section 15.3)	✓	✓
Changing the plant password for the **Installer** user group (see Section 15.3)	–	✓
Restart the Cluster Controller via the user interface (see Section 18.3)	–	✓

4.2 Overview of the User Interface

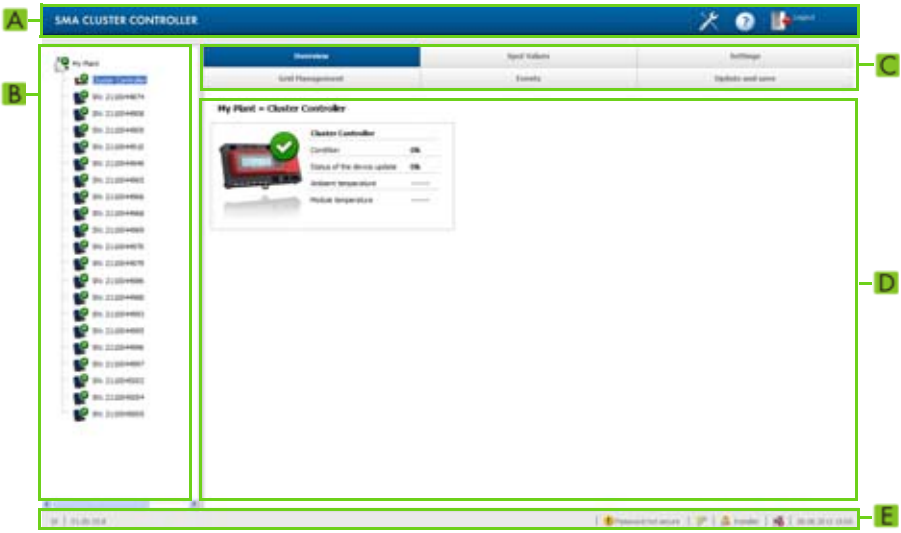


Figure 5: User interface of the Cluster Controller (example)

Position	Description	Explanation
A	Icon bar	Provides access to the main functions of the Cluster Controller
B	Plant tree	Presents all devices of the plant in a tree structure
C	Device Menu	Provides various device information and configuration options for the selected devices in the plant tree (B) via individual menus
D	Content area	Displays the content of the selected menu

Position	Description	Explanation
E	Status bar	Displays the following information: • Serial number of the Cluster Controller • Firmware version of the Cluster Controller* • Plant password security** • Information on update** • For the **Installer** user group with SMA Grid Guard code: SMA Grid Guard symbol** • User group** • Status of connection to plant** • Date and time**

* If the automatic update of the Cluster Controller is activated (see Section 14.1.1) and a new firmware version is available, the new firmware version is displayed in brackets after the current firmware version.

** Only displayed after login to the user interface

4.3 Icon bar

Icon	Description	Explanation
	Settings	Opens the **Settings** menu for the Cluster Controller
	Help	Opens a dialogue window with information on the Cluster Controller product documentation (user manual and installation manual)
	Logout	Logs the user out of the user interface

4.4 Plant Tree

In the plant tree, all devices in the plant are depicted in a tree structure. The plant tree is divided into the hierarchy levels "Plant view" and "Device overview".

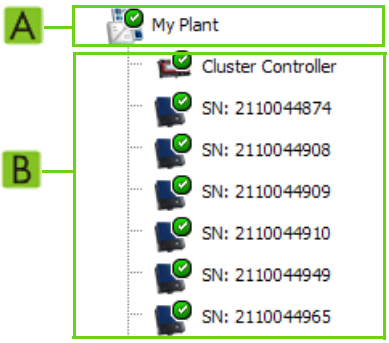


Figure 6: Layout of the plant tree (example)

Position	Description	Explanation
A	Plant view	Depicts the first hierarchy level of the plant tree and summarises all devices in the plant The plant name is displayed on this hierarchy level.
B	Device view	Depicts the hierarchy levels subordinate to the plant view The communication product is displayed first, followed by the inverters in the plant. The serial number of the device is displayed as the default device name. You can change the device name (see Section 10.4).

Status Symbols in Plant Tree

Icon	Description	Explanation
–	Neutral	The plant status or the device status is unknown and is currently being updated.
	OK	The device is working properly.
	Warning	At least one device in the plant has the **Warning** status. The affected device is currently not operating properly. It may be possible to remedy this status automatically.
	Error	At least one device in the plant has the **Fault** status. There is a problem with the device. This fault cannot be remedied automatically.

Icon	Description	Explanation
	Communication error	The device is currently not able to communicate. This may occur at night, for example, when the inverter is not feeding in. This symbol will also be displayed if you have decommissioned the device e.g. to perform a replacement. To remove the device from the plant tree, select the button [**Remove**] (for information on device replacement, see Section 10.3).

4.5 Device Menu

4.5.1 Overview Menu

Depending on whether you have selected the plant view or the device view in the plant tree, the **Overview** menu displays the most important information on the overall plant or on the selected device.

When a device is selected in the plant tree, the yield and output values of that device are also displayed in 4 diagrams on the overview page.

Selecting Power Values for Specific Points in Time or Periods of Time

Action, button or symbol	Explanation
Use the mouse to point at or click on a part of the diagram sequence.	Display the exact power value of the selected part, the corresponding time and the date
	Browse to the previous time period for power values
	Browse to the next time period for power values
	Directly select the time period for the power values

4.5.2 Instantaneous Values Menu

Instantaneous values are measured values or calculated values for the device, such as temperature and power. Different information is displayed depending on whether the plant view or the device view is selected in the plant tree. The values that are displayed depend on the user group and the selected device. All values are summarised in expandable parameter groups (see Section 4.6).

Selected view in the plant tree	Explanation
Plant view	Displays values for complete device classes. These values are sometimes compiled from the individual values of the respective devices. These values are indicated using the arrow symbol ▶ and can be expanded in order to display additional information on the value. When you click on the parameter group, the device classes are displayed separately (e.g. **Plant Communication (Communication products)**).
Device view	Displays values for the individual device

4.5.3 Settings Menu

Depending on whether the plant view or the device view is selected in the plant tree, the **Settings** menu displays all configurable parameters of the selected plant or the device selected in the plant tree. The parameters that are displayed depend on the user group and the selected device. All parameters are summarised in expandable parameter groups (see Section 4.6). For numerical values, the permissible parameter limits are displayed in brackets after the value.

Selected view in the plant tree	Displayed information
Plant view	List of all parameters of a device class When you click on a parameter group, the device classes are displayed separately (e.g. **Solar Inverters** and **Communication products**).
Device view	List of all parameters of the selected device

4.5.4 Updates Menu

The **Updates** menu is only displayed if the plant view is selected in the plant tree. In the **Updates** menu, you can display the current firmware version of the devices in your plant and make the settings for the device updates. The list of all available devices in the plant is grouped by device type. You can also view available device updates, download them and transmit them to the devices.

Update Status of the Devices

Update status	Explanation
Ok	No update files are available, or the update function is not activated.
Update available	The update file is ready for sending to the devices in the plant.
Update in process	The update process is underway.
Update failed	The update process was unsuccessful. The update file was not sent to all devices in the plant.

Status of the Update File

Status	Explanation
Download available	The update file is available for downloading.
Ready	The update file was downloaded and can be sent to the devices in the plant.
Sending	The update file is being sent to the devices in the plant.
Waiting	The update file is in the queue and will be sent to the devices in the plant as soon as possible.

4.5.5 Grid Management Menu

In the **Grid Management** menu, you can make settings for grid management (e.g. setpoints for the active power limitation or the reactive power setpoint). The **Grid Management** menu is only displayed if the Cluster Controller is selected in the plant tree.

Configurable Parameters for Digital and Analogue Inputs

Parameter	Explanation
Time interval for the control value	States the time interval at which the control command with the current control value is to be sent to the inverters if the target value sent by the signal generator has not changed

Configurable Parameters for Digital Inputs

Parameter	Explanation
Error tolerance time	Indicates the time as of which an invalid access status is recorded as a fault.

Configurable Parameters for Analogue Inputs

Parameter	Explanation
Error tolerance time	Indicates the time as of which an invalid input status is recorded as a fault.
Initial value input signal	Initial value for the input signal
Final value input signal	Final value for the input signal
Start target value active power limitation	Lower limit for the target value for the active power limitation related to the inverter parameter **Set active power limit** or **Pmax**
End target value active power limitation	Upper limit for the target value for the active power limitation related to the inverter parameter **Set active power limit** or **Pmax**
For reactive power in % predefined quantity: Start target value reactive power	Lower limit for the target value for the reactive power setpoint related to the inverter parameter **Set active power limit** or **Pmax**
For reactive power in % predefined quantity: End target value reactive power	Upper limit for the target value for the reactive power setpoint related to the inverter parameter **Set active power limit** or **Pmax**
For cos phi predefined quantity: Cos Phi start target value	Lower limit for the target value of the displacement power factor cos φ
For cos phi predefined quantity: Cos Phi end target value	Upper limit for the target value of the displacement power factor cos φ
For cos phi predefined quantity: Excitation type	Direction of phase displacement

Example of the importance of lower and upper limits for target values

4 mA is set as the initial value for the active power limitation target value and 16 mA is set as the end value for the active power limitation target value. If the network operator sends a signal of 3.5 mA to the Cluster Controller, the Cluster Controller then classifies this signal as 4 mA, as the value of 4 mA is set as the lower limit for the active power limitation target value. If the network operator sends a signal of 17 mA to the Cluster Controller, the Cluster Controller then classifies this signal as 16 mA, as the value of 16 mA is set as the upper limit for the active power limitation target value.

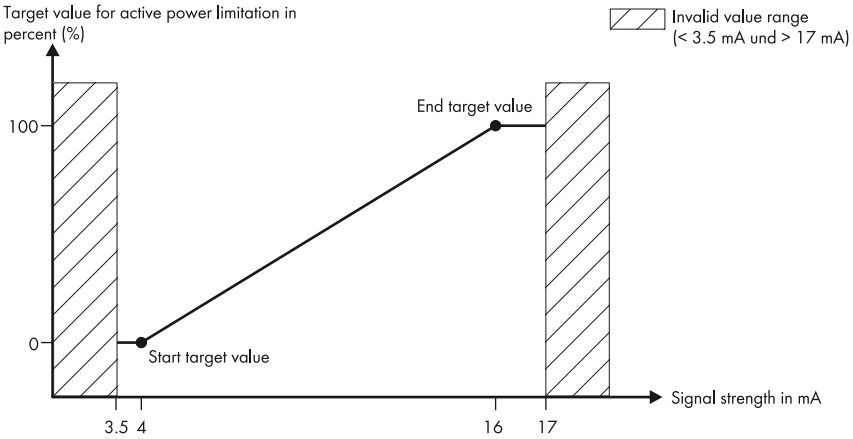


Figure 7: Example of the importance of the lower and upper limits for target values related to the inverter parameter **Set active power limit** or **Pmax**

Configurable Parameters for Active Power Control

Parameter	Explanation
Time interval in the event of a changed target value	States the time interval at which the control command with the new control value is to be sent to the inverters once the target value sent by the signal generator changes The first control value is sent to the inverter immediately after the target value is changed. If additional control values are required in order to reach the target value, these will be sent at the stated time interval. This may cause an incremental increase in the active power, for example.
Max. change in case of power increase	Indicates the maximum change in percentage points per time interval that occurs once an active power limitation setpoint has been cancelled
Max. change in case of power reduction	Indicates the maximum change in percentage points per time interval that occurs once an active power limitation setpoint has been input

Status Configuration

Icon	Explanation
	Corresponds to the value "Logical 1" (= 24 V)
	Corresponds to the value "Logical 0" (= 0 V)

4.5.6 Events Menu

In the **Events** menu, Cluster Controller events or inverter events are displayed in the form of an event log. The Cluster Controller requests the events list from the inverters directly. The respective events that will be displayed depend on the inverter selected in the plant tree, the user group and the filter settings for the event types (**Information**, **Warning**, **Fault**).

Event Types

Icon	Description	Explanation
	Errors	The **Fault** event has existed for some time and could not yet be automatically remedied.
	Incoming fault	The **Fault** event has occurred.
	Outgoing fault	The **Fault** event no longer exists.
	Warning	The **Warning** event has existed for some time and could not yet be automatically remedied.
	Incoming warning	The **Warning** event has occurred.
	Outgoing warning	The **Warning** event no longer exists.
	Information	The **Information** event has existed for some time.
	Incoming information	The **Information** event has occurred.
	Outgoing information	The **Information** event no longer exists.

Severity of the Event

Icon	Explanation
	This event can only be rectified by a user with **Installer** rights (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).
	This event can only be rectified by SMA Service (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

4.5.7 Update and Save Menu

In the **Update and save** menu, you have the following options:

- Perform an update for the Cluster Controller via the user interface (see Section 14.1 "Update for Cluster Controller", page 73).
- Save or restore the device configuration of the Cluster Controller (see Section 7.5).
- Update or save the Modbus profiles or plant configurations (see Section 12.2).

4.6 Parameter Groups of the Menus

Depending on whether you have selected the plant view or the device view in the plant tree, either the parameters of entire device classes or the parameters of the selected devices will be displayed in the parameter groups. The parameter groups that are displayed in the menu and the information contained in the parameter groups depend on the devices available in the plant or the device selected in the plant tree.

Icon	Description	Explanation
	Status	General information on device status
	Type label	All values that identify the device/plant
	Settings	Update settings
	Device	Values that directly affect the device and that cannot be assigned to any of the other parameter groups (e.g. **DC Side** etc.)
	User rights	All values that affect access to the device or the plant
	DC side	Values that affect the DC side of the inverter or the plant
	AC side	Values that affect the AC side of the inverter or the plant
	Grid monitoring	Information that affects the electricity grid and is partially protected by the personal SMA Grid Guard code
	Equipment & device control system	Includes parameters for inverters that must fulfil special requirements for feed-in at the medium voltage level. The parameters are protected by the personal SMA Grid Guard code.
	Plant communication	Values that define the communication between the communication devices and the plant, as well as information on the update status of the device

Icon	Description	Explanation
	External communication	All values that define the communication between the plant, the local network and the Internet
	Data recording	All values that affect data recording for the device (e.g. the storage format)
	Sunny Portal	All values for Sunny Portal communication
	Further applications	Values that cannot be assigned to any of the other groups (e.g. alerts)
	Meteorology	All measured values from the connected sensors (e.g. irradiation values)
	Device components	All parameters and measured values that affect the components of a device (e.g. the version numbers of the components)
	General settings	Contains parameters for plant control within the scope of grid management
	Active power	All values that affect the active power limitation setpoints
	Reactive power	All values that affect the reactive power setpoints

4.7 Icons

On the user interface of the Cluster Controller, a distinction is made between the following symbol types:

- Icons for access rights
- Device icons
- Other icons

Icons for Access Rights

Icon	Description	Explanation
	Padlock symbol	Not possible to access the device. The device password does not match the plant password.
	SMA Grid Guard symbol	Indicates that the logged in user has the right to change grid-sensitive device parameters (SMA Grid Guard parameters)

Device Icons

Icon	Explanation
	Complete plant
	Cluster Controller
	Inverter (example)
	Unknown inverter
	Unknown device

Other Icons

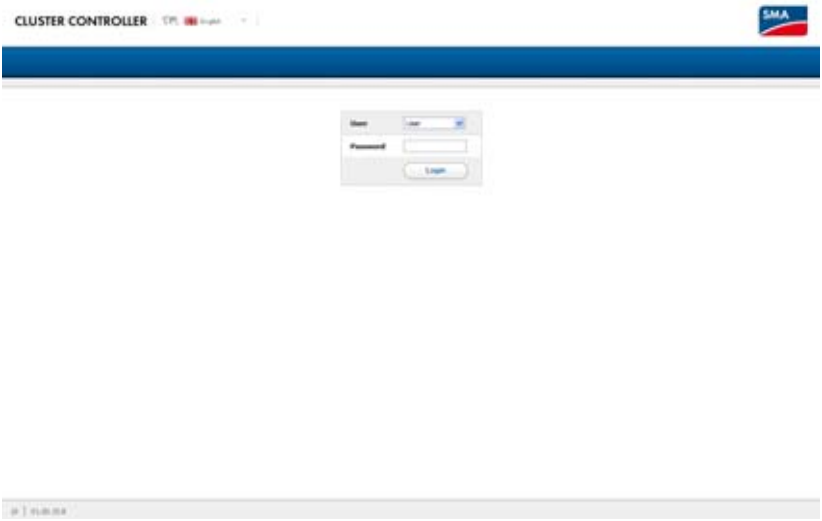
Icon	Description	Explanation
	Hourglass	Indicates that values are currently being saved in the device
	Average	Displays the average value
	Sum	Displays added values
	Maximum	Displays the maximum value
	Minimum	Displays the minimum value
	Update	Indicates that an action is currently being performed or that device values are currently being read out
	Stopwatch	Indicates that a value is from more than 10 minutes ago
	Calendar function	Opens a calendar for selecting a date, a start date or an end date

5 Logging Into or Out of the Cluster Controller

Logging into the Cluster Controller

1. If the IP address of the Cluster Controller is unknown, read out the IP address of the Cluster Controller from the display and write it down. For this purpose, select the **External communication** display view and read out and write down the IP address.
2. Call up the IP address of the Cluster Controller via the Internet browser.

   ☑ The login page opens:



   ✖ Does the login page fail to open?

   Possible fault cause: you have not written down the IP address correctly or you have not entered it correctly.

   - Enter the correct IP address and confirm the entry with the enter key.
   - If the problem persists, rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).
3. If required, select the desired language in the upper area of the login page.

4. Log in either as **User** or as **Installer** with the respective plant password of the user group.
   - When logging in for the first time, log in as **User** or **Installer** with the respective default plant password of the user group:

User group	Default plant password
User	0000
Installer	1111

> **Changing default plant passwords**
>
> Promptly change the default plant passwords of all user groups to prevent unauthorised access to the user interface of the Cluster Controller and the inverters in your plant (see Section 15.3).

   - If you have already changed the default plant password of your user group, log in with the changed plant password.

☑ The user interface opens.

✖ The user interface does not open?

Fault cause: you have not correctly entered the plant password of the selected user group.

- On the login page, enter the correct plant password for the selected user group and confirm the entry with the enter key.

Logging out of the Cluster Controller

You protect your plant against unauthorised access by directly logging out of the Cluster Controller user interface. If you only close your Internet browser, you are only logged out of the Cluster Controller after 10 minutes.

Procedure:

- Select [**Logout**] in the icon bar.

6 System Settings

6.1 Setting the Display Language

Available display languages

The display languages of the Cluster Controller are German and English.
The default language is English.

Procedure:

1. Call up the login page of the Cluster Controller.
2. Select the desired language in the upper area of the login page.
3. Log in either as **User** or as **Installer** with the respective plant password of the user group.
   This implements the language change on the user interface and on the display of the Cluster Controller.
   ☑ The display language and the user interface language of the Cluster Controller are changed. If you have selected a language other than **German** via the user interface, the display language is English.

6.2 Adjusting the Display Contrast

1. Call up the **Settings** display view. For this purpose, simultaneously press and hold the [**OK**] and [**ESC**] buttons on the button field for two seconds.
   ☑ The **Settings** display view opens.
2. Select the **Display Contrast** line and use the arrow buttons to set the desired display contrast:

Arrow button	Explanation
►	Increases the display contrast
◄	Reduces the display contrast

3. To exit the **Settings** display view, press [**ESC**].

6.3 Setting the Date Format

No effect on data exports

The changes to the format only affect the display on the user interface and the Cluster Controller display. The format change has no effect on data exports.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Device > Country settings**.
3. Select [**Edit**].

4. In the **Date format** drop-down list, select the desired date format.

Abbreviation	Explanation
DD	Day
MM	Month
YYYY	Year

5. Select [**Save**].

6.4 Setting the User Interface Language

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Device > Country settings**.
3. Select [**Edit**].
4. In the **Language** drop-down list, select the desired language. This changes the display language to English if you choose a user interface language other than **German**.
5. Select [**Save**].

6.5 Setting the Number Format

No effect on data exports

The changes to the format only affect the display on the user interface and the Cluster Controller display. The format change has no effect on data exports.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Device > Country settings**.
3. Select [**Edit**].
4. In the **Number format** drop-down list, select the desired number format.
5. Select [**Save**].

6.6 Setting the Time Format

No effect on data exports

The changes to the format only affect the display on the user interface and the Cluster Controller display. The format change has no effect on data exports.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Device > Country settings**.
3. Select [**Edit**].
4. In the **Time format** drop-down list, select the desired time format.

Abbreviation	Explanation
HH	24-hour format
hh	12-hour format
mm	Minutes
ss	Seconds

5. Select [**Save**].

6.7 Setting the Unit of Temperature

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Device > Country settings**.
3. Select [**Edit**].
4. In the **Unit of temperature** drop-down list, select the desired unit of temperature.
5. Select [**Save**].

6.8 Settings for Plant Time

6.8.1 Information on Plant Time

The system time is given as the date and time of a system. The plant time is set via the Cluster Controller and transmitted to all inverters in the plant.

If additional communication products are added to the plant, the new communication products automatically adopt the existing plant time.

If you change the plant time, the inverters will adopt the new plant time immediately. Additional communication products in the plant do not adopt the plant time for some time, but a maximum of seven hours later.

You can either set the plant time manually on the Cluster Controller or have it synchronised via the Internet using a time server.

NOTICE

Potential loss of plant data due to changing the plant time

Changing the plant time can influence previously recorded plant data. If you put back the time or the date, for example, the Cluster Controller may potentially overwrite previously recorded plant data.

- Only change the plant time when it is necessary.

6.8.2 Synchronising Plant Time via the Internet

You can synchronise the plant time automatically or manually via the Internet. For this purpose, either Sunny Portal or an NTP server acts as the source. You do not need to register in Sunny Portal to do this.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > Time settings** parameter group.
3. Select [**Edit**].
4. In the **Standard/Daylight Saving Time** conversion on drop-down list, select the desired entry:

Entry	Explanation
yes	Activates the automatic adjustment between summer and winter time
no	Deactivates the automatic adjustment between summer and winter time

5. Select the desired entry in the **Automatic time synchronisation** drop-down list:

Entry	Explanation
yes	Activates the automatic time synchronisation
no	Deactivates the automatic time synchronisation

6. In the **Time synchronisation source** drop-down list, select the desired time synchronisation source.
7. If an NTP server is to be used as a time synchronisation source, enter the name or the IP address of the desired NTP server in the **NTP server** field.
8. In the **Time zone** drop-down list, select the desired time zone.
9. Select [**Save**].
   ☑ For automatic time synchronisation, the Cluster Controller synchronises the date and the time with Sunny Portal or the NTP server once a day at around 9 p.m.
10. To trigger the time synchronisation manually, select [**Execute**] in the **Trigger time synchronisation** field.
    ☑ For manual time synchronisation, the Cluster Controller synchronises the date and the time with the time synchronisation source. The time synchronisation was successful if the time is displayed in the **Set plant time** field.
    ☑ The result of the manual time synchronisation attempt is logged in the event log (see Section 9.1 "Displaying Events", page 56).

6.8.3 Manually Setting the Plant Time

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > Time settings** parameter group.
3. Select [**Edit**].
4. In the **Standard/Daylight Saving Time** conversion on drop-down list, select the desired entry:

Entry	Explanation
yes	Activates the automatic adjustment between Summer and Winter Time
no	Deactivates the automatic adjustment between Summer and Winter Time

5. In the **Set plant time** field, set the current date and time of the plant.
6. In the **Time zone** drop-down list, select the time zone in which the plant is located.
7. Select [**Save**].

7 Device Configuration

7.1 Setting the Characteristic Curve of the Irradiation Sensor

If you have connected an irradiation sensor to the Cluster Controller, you must also set the characteristic curve of the irradiation sensor via the user interface of the Cluster Controller. As a result, the current signals in mA provided by the irradiation sensor are converted by the Cluster Controller into the proportional irradiation values in W/m^2 and displayed.

Requirements:

☐ An irradiation sensor must be connected to the Cluster Controller (see the Cluster Controller installation manual).

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group **Meteorology > Environment > Insolation sensor > Characteristic curve**.
3. Select [**Edit**].
4. Set the characteristic curve depending on the connected irradiation sensor (see manufacturer manual):
   - In the **Maximum insulation** field, enter the desired value.
   - In the **Minimum insolation** field, enter the desired value.
   - In the **Maximum measurement** field, enter the desired value.
   - In the **Minimum measurement** field, enter the desired value.
5. Select [**Save**].

7.2 Setting Parameters for a Device Class

A device class refers to all devices of the same type. You can configure all the devices in a device class simultaneously. However, it is not possible to configure different device classes at the same time. Therefore, save the changes made to one device class before processing another device class.

The parameters that you are able to set for a device class depend on the rights of your user group (see Section 4.1).

Procedure:

1. Select the plant in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group that contains the parameter which is to be configured.
   ☑ The device classes are displayed in brackets after the name of the parameter group, e.g. **Device (Communication products)**. It may take a moment for all data to be read from the devices.
3. Select [**Edit**] in the parameter group of the desired device class.
4. Set the desired parameters.
5. Select [**Save**].
   ☑ The settings are saved in the Cluster Controller and are then transmitted to all devices of the affected device class. The save process is displayed on the user interface of the Cluster Controller via an hourglass symbol and may take many hours if the DC input voltage in the inverter is too low (e.g. at night).

7.3 Setting the Parameters of an Individual Device

The parameters that you are able to set for a device depend on the rights of your user group (see Section 4.1).

Procedure:

1. Select the desired device in the plant tree and select the **Settings** menu in the device menu.
2. Select the parameter group that contains the parameter which is to be configured. For this purpose, note that it may take a moment to read the values because the values are requested directly from the device.
3. Select [**Edit**].
4. Set the desired parameter.
5. Select [**Save**].
   ☑ The settings are saved in the Cluster Controller and are then transmitted to the affected device. The save process is displayed on the user interface of the Cluster Controller via an hourglass symbol and may take many hours if the DC input voltage in the inverter is too low (e.g. at night).

7.4 Deactivating the Webconnect Function of the Inverters

If the Webconnect function is activated for the inverters in the plant, you should deactivate the Webconnect function to avoid unnecessary attempts by the inverters to connect with the Sunny Portal. The Webconnect function is enabled by default.

You have the following options:

- Disabling the Webconnect function for multiple inverters simultaneously
- Disabling the Webconnect function for an individual inverter

Disabling the Webconnect Function for Multiple Inverters Simultaneously

1. Select the plant in the plant tree and select the **Settings** menu in the device menu.
   ☑ The device classes are displayed in brackets after the name of the parameter group, e.g. **Device (Communication products)**. It may take a moment for all data to be read from the devices.
2. Select the parameter group **External Communication > Webconnect**.
3. Select [**Edit**].
4. In the **Activated** drop-down list, select the entry **No**.
5. Select [**Save**].
   ☑ The settings are saved in the Cluster Controller and are then transmitted to all devices of the affected device class. The save process is displayed on the user interface of the Cluster Controller via an hourglass symbol and may take many hours if the DC input voltage in the inverter is too low (e.g. at night).

Disabling the Webconnect Function for an Individual Inverter

1. In the plant tree, select the desired inverter and select the **Settings** menu in the device menu.
2. Select the parameter group **External Communication > Webconnect**.
3. Select [**Edit**].
4. In the **Activated** drop-down list, select the entry **No**.
5. Select [**Save**].

7.5 Saving and Restoring the Device Configuration of the Cluster Controller

Saving the device configuration

1. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
2. Select the **Device configuration** parameter group and select [**Save device configuration**].
3. If required, change the save location and the file name for the save file and select [**Save**].
   ☑ The device configuration is downloaded and saved.

Restoring the Device Configuration

Note the firmware version of the configuration file

Only configuration files with a firmware version that is the same as or older than that of the Cluster Controller can be used to restore the device configuration.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
3. Select the **Device configuration** parameter group and select **Restore device configuration (*.bak)** [**Browse...**].
   ☑ The file selection window opens.
4. Select the desired configuration file and select [**Open**].
   ☑ The file name of the selected configuration file is displayed in the **Restore device configuration (*.bak)**.
5. Select [**Execute**].
   ☑ The configuration file is uploaded and the device configuration is restored. The Cluster Controller restarts.

8 Exporting Plant Data

8.1 Export Options

The instantaneous values and the parameters of the devices in the plant can be saved, displayed and prepared for further processing by the Cluster Controller. The plant data can be saved to the internal memory of the Cluster Controller and to external memory. The storage capacity of the internal memory is limited. If the free storage capacity of the internal memory is 10% or below, the older plant data will be deleted until a free storage capacity of 20% is reached. Therefore, save the plant data to an external memory at regular intervals. You have the following options for exporting the plant data:

Option	Explanation
Export to USB data carrier	The plant data is exported to a USB data carrier that is connected to the Cluster Controller (see Section 8.4).
Export to integrated FTP server	The plant data is exported to the FTP server integrated in the Cluster Controller (see Section 8.5). You can access the exported plant data directly via the integrated FTP server. The integrated FTP server is protected via the plant password of the respective user group.
Export to external FTP server	The plant data is exported to an external FTP server via an FTP push function (see Section 8.6).
Export to Sunny Portal	The plant data is sent to the Sunny Portal Internet portal at a configurable time interval (see Section 11.2).

8.2 Export Formats

8.2.1 CSV Format

When the CSV format is selected, the Cluster Controller creates a CSV file for each day and saves the collected plant data to this file every five minutes. Individual data is always separated by a semicolon in the CSV file. The decimal separator and the time format within the CSV file depend on the country settings of the Cluster Controller (see Section 6.3).

Directory Path and Structure of the File Name

Directory path: .../CSV/[YYYY]/[MM]/

File name structure: [YYYYMMDD].csv

Example: daily report file from 2012-10-15

.../CSV/2012/10/20121015.csv

File Structure (Example)

Line	Explanation	
1	CSV file metadata	
2	Empty line	
3		Name of device (serial number or changed device name)
4		Device type
5		Serial number of the device
6		Name of the values
7		Type of the values
8	Date and time format	Unit of the values
9	Time (= date and time) when the device generated the value	Value
10	...	...

8.2.2 XML Format

When selecting the XML format, the Cluster Controller creates a directory for each day and saves the collected plant data to this directory every five minutes as XML files. Every 15 minutes, the XML files are packaged to a ZIP file containing three XML files.

Directory Path and Structure of the File Name

Directory path: .../XML/[YYYY]/[MM]/[YYYYMMDD]/

Structure of the file name for an individual XML file: [HHMMSS].xml

Structure of the file name for a ZIP file: [HHMMSS].zip

Example: daily report file from 2012-10-15, 09:48:02

.../XML/2012/10/20121015/094802.xml

File Structure (Example)

```
<?xml version="1.0" encoding="utf-8"?>
<ClusterController>
  <Info>
    <Created>2012-02-10T01:37:04</Created>
    <Culture>de</Culture>
    <UtcOffset>60</UtcOffset>
  </Info>
   <MeanPublic>
    <Key>Cluster Controller 1:155000234:Metering.TotWhOut</Key>
    <Mean>761.858</Mean>
    <Base>1</Base>
    <Period>300</Period>
    <Timestamp>2012-02-09T10:55:52</Timestamp>
   </MeanPublic>
   <MeanPublic>
   (...)
   </MeanPublic>
<ClusterController>
```

Description	Explanation
Info	Information
Create	Date of generation
Culture	Language

Description	Explanation
UtcOffset	Offset in minutes to UTC
MeanPublic	Data of the mean values
CurrentPublic	Data of the instantaneous values
Key	Name of the element made up of device name, serial number of the device and the parameter name. Individual values are separated by a colon. *Example: D <Key>SENS0700:5141:TmpMdul C</Key>*
Min	Smallest value in measurement interval/merging
Max	Largest value in measurement interval/merging
Mean	Average value in measurement interval/merging
Base	Number of measured values in the interval/number of merged values
Period	Length of the measurement interval in seconds
TimeStamp	Time stamp at which the average was calculated

8.3 Setting the Measurement Name to the Local Language

You can set the name of the measured values as follows:

- Technical name of the measured value. Example: **Metering.TotWhOut**
- Name of the measured value as a term. Example: **Total yield**

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Data Recording > Export** parameter group.
3. Select [**Edit**].
4. In the **Measurement name in local language field**, select **Yes** in order to the display the name as a term.

   or

   In the **Measurement name in local language field**, select **No** in order to the display the technical name.
5. Select [**Save].**

8.4 Exporting Plant Data to a USB Data Carrier

Requirements:

☐ Maximum memory capacity: 2 TB

☐ The USB data carrier must be formatted in the file system FAT16 or FAT32.

Period of Archiving

Depending on the available storage capacity of the USB data carrier and your plant's configuration, the following approximate periods of archiving for the plant data are possible:

Number of connected inverters	Approximate period of archiving	
	4 GB memory capacity	8 GB memory capacity
5	10 years	20 years
10	5 years	10 years
25	2 years	4 years
50	1 years	2 years
75	9 months	18 months

Procedure:

- Connect the USB data carrier to the Cluster Controller at USB terminal **1**.
  ☑ Depending on the available storage capacity of the USB data carrier, the Cluster Controller exports the plant data to the USB data carrier in the selected file format (see Section 8.2).

8.5 Exporting Plant Data to the Integrated FTP Server

8.5.1 Setting the Export Format for Plant Data

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Data Recording > Export** parameter group.
3. Select [**Edit**].
4. Select the export format for the plant data:
   - To export the plant data in CSV format, select the entry **Yes** in the **Data export in CSV format** drop-down list (default setting).
   - To export the plant data in XML format, select the entry **Yes** in the **Data export in XML format** drop-down list.
5. Select [**Save**].

8.5.2 Activating or Deactivating the Integrated FTP Server

Activating the Integrated FTP Server

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > FTP server** parameter group.
3. Select [**Edit**].
4. In the **Activated** drop-down list, select the entry **Yes**.
5. Select [**Save**].

Deactivating the Integrated FTP Server

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > FTP server** parameter group.
3. Select [**Edit**].
4. In the **Activated** drop-down list, select the entry **No** (default setting).
5. Select [**Save**].

8.5.3 Calling up the Integrated FTP Server via the Internet Browser

Requirements:

☐ The integrated FTP server must be activated (see Section 8.5.2).

Procedure:

1. The IP address of the Cluster Controller, the user identifier and the plant password are to be entered in the address bar of the Internet browser as follows:

   ftp://[User identifier]:[Password]@[IP address]

   For this purpose, use the following user identifier:

User identifier	Explanation
Installer	User identifier for the **Installer** user group
User	User identifier for the **User** user group

Example: entering the IP address, user identifier and plant password

If you wish to use the password "1111" to log in to the Cluster Controller as an installer with the IP address 192.169.4.2, enter the following:

ftp://installer:1111@192.169.4.2

2. Press the enter key.

   ☑ The Internet browser displays the directory structure of the integrated FTP server. You can now display the saved data or download the desired data.

3. Delete the Internet browser cache. This removes your login data from the cache and prevents unauthorised access to the integrated FTP server.

8.6 Additionally Exporting Plant Data to an External FTP Server (FTP Push)

8.6.1 Enabling the FTP Push Function

Via the FTP push function, the Cluster Controller can upload the collected plant data to an arbitrary external FTP server. Port 21 is the default for the FTP push. The collected plant data is uploaded to the directory given and in the selected data format every 15 minutes.

Requirements:

☐ Port 21 must be approved in the router firewall settings.

☐ In the FTP server, the Append function must be activated. This way, new data is appended to a file already on the FTP server and the data volume to be transferred is reduced.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Further Applications > FTP Push** parameter group.
3. Select [**Edit**].
4. Select the export format for the plant data:
   - To export the data in CSV format, select **Yes** in the **Data export in CSV format** field.
   - To export the data in XML format, select **Yes** in the **Data export in XML format** field.
5. In the **Login** field, enter the login name of the external FTP server.
6. In the **Port** field, enter the network port of the external FTP server.
7. In the **Password** field, enter the password of the external FTP server.
8. In the **Server path** field, enter the subdirectory to which the Cluster Controller should save the data on the external FTP server.
9. In the **Server** field, enter the name or the IP address of the external FTP server.
10. Select [**Save**].
11. Perform a connection test. In addition, select [**Execute**] in the **Connection test** field.

    ☑ The Cluster Controller performs the connection test. **OK** is displayed in the field **Result of the last connection test**.

    ✖ Was the connection test unsuccessful?

    - Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

8.6.2 Disabling the FTP Push Function

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Further Applications > FTP Push** parameter group.
3. Select [**Edit**].
4. Disable the export of plant data:
   - In the **Data export in CSV format** field, select the entry **No**.
   - In the **Data export in XML format** field, select the entry **No**.
5. Select [**Save**].

8.6.3 Testing the FTP Push Function

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Further Applications > FTP Push** parameter group.
3. In the **Connection test** field, select [**Execute**].

   ☑ The Cluster Controller performs the connection test. **OK** is displayed in the field **Result of the last connection test**.

   ✖ Was the connection test unsuccessful?

   Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

9 Plant Monitoring

9.1 Displaying Events

You can have an event log displayed for each device in the plant. All events for the device are logged in the event log (for information on the event type in the **Events** menu, see Section 4.5).
Up to 500 events are displayed.

Procedure:

1. To display events for a device, select the desired device in the plant tree and select the **Events** menu in the device menu.
2. For events with the spanner symbol ( ), contact the user with **Installer** rights and inform them of the serial number of the device and the event number.
3. For events with the telephone receiver symbol ( ), contact the user with **Installer** rights and inform them of the serial number of the device and the event number. The user with **Installer** rights contacts the SMA Service Line.

9.2 Setting Alerts

You can use the alert function to be informed of alert-related events in the plant via e-mail. For this purpose, the Cluster Controller takes into account the events of the last 24 hours. Alert-related events include e.g. **Fault** type events that can lead to yield losses.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Make the settings for the SMTP server:
   - Select the **External Communication > SMTP** parameter group.
   - Select [**Edit**].
   - In the **Encryption** drop-down list, select the desired password encryption type.
   - In the **Login** field, enter the name for the SMTP server.
   - If required, enter an alternative e-mail address in the **Alternative e-mail sender address (optional)** field that is to be displayed in the e-mail as the sender. If you do not enter an alternative e-mail address, the e-mail address in the **Login** field is displayed as the e-mail address.
   - In the **Port** field, enter the network port at which the SMTP server is available. Tip: the normal ports for SMTP servers are ports 25, 465 and 587. When using port 465, an encrypted connection is always established regardless of the selected encryption type.
   - In the **Password** field, enter the password for the SMTP server.
   - In the **Server** field, enter the name or the IP address of the SMTP server.
   - Select [**Save**].

4. Make the settings for e-mail alerts:
   - Select the **Further Applications > Alert > Email** parameter group.
   - Select [**Edit**].
   - In the **Activated** field, select the entry **Yes**.
   - If the e-mail is to be displayed in a language other than the currently configured language, select the desired e-mail language in the **Language** drop-down list.
   - In the **Email address(es)** field, enter the recipient's e-mail address. If more than one e-mail address is to be entered, each of the e-mail addresses is to be separated by a comma or a semicolon.
5. If required, set a filter for the alert:
   - Select the **Filter settings** group.
   - If there is to be no alert for reactive power setpoint events, select the entry **No** in the **Alert at reactive power specification** drop-down list.
   - If there is to be no alert for active power limitation events, select the entry **No** in the **Alert at active power limitation** drop-down list.
6. Select [**Save**].
7. Test the alert via e-mail:
   - Select the **Email** group.
   - Select [**Execute**] in the **Send test e-mail** field.

   ☑ The Cluster Controller sends a test e-mail to the given e-mail address. **OK** is displayed in the field **Result of the last e-mail dispatch**.

   ✖ Could the test e-mail not be sent correctly?

   Possible fault cause: you have incorrectly entered the e-mail address, there is no Internet connection or the Cluster Controller network settings are faulty.
   - Correct the e-mail address entered.
   - Establish an Internet connection.
   - Ensure that the SMTP settings of the Cluster Controller are correct.
   - If there is a proxy server in your local area network (LAN), ensure that the proxy settings of the Cluster Controller are correct.

   ✖ Have you not received the test e-mail?
   - Check the spam folder of your e-mail inbox.
   - Check the local network settings and adjust if required.

10 Plant Management

10.1 Replacing the Cluster Controller

1. Save the device configuration of the Cluster Controller (see Section 7.5).
2. Decommission the plant.
3. Decommission the Cluster Controller that is to be replaced (see the Cluster Controller installation manual).
4. Commission the new Cluster Controller (see the Cluster Controller installation manual).
5. Restore the device configuration of the Cluster Controller (see Section 7.5).
6. Recommission the plant.

10.2 Adding an Inverter

1. Connect the new inverter to the Cluster Controller (see the Cluster Controller installation manual).
2. Log in to the Cluster Controller as **Installer**.
   ☑ The new inverter is displayed with a padlock symbol in the plant tree.
3. Select the inverter marked with the padlock symbol in the plant tree and adjust the device password to the plant password (see Section 15.2).
4. If you use Sunny Portal, activate the inverter in Sunny Portal (see the user manual of the Cluster Controller in Sunny Portal).

10.3 Replacing an Inverter

- Replace the inverter (for information on the procedure for replacing an inverter in plants with communication products, see the installation manual "Adapting the Total Energy Yield for Inverter Replacement in Plants with Communication Products" at www.SMA-Solar.com).

10.4 Changing Plant Names or Device Names

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Type Label > Type Label** parameter group.
3. Select [**Edit**].
4. To change the plant name, enter the desired plant name in the **Plant name** field.
5. To change the device name, select the desired device name in the **Device name** field.
6. Select [**Save**].

10.5 Reading Out the Type, Serial Number and Firmware Version of the Devices

1. Select the device in the plant tree and select the **Settings** menu in the device menu. Tip: the serial number and the firmware version of the Cluster Controller are also displayed at the bottom left in the status bar.
2. Select the **Type Label > Type Label** parameter group.
   ☑ The device type, the serial number and the firmware version are displayed in the **Type Label** group. Here, the firmware version is displayed in the **Software package** field.

10.6 Reading Out the IP Addresses of the Devices

Reading out the IP Address of the Cluster Controller

You have two options for reading out the IP address of the Cluster Controller:

- Reading out the IP address from the display
- Reading out the IP address from the user interface

Reading out the IP address from the display

- On the Cluster Controller, select the **External communication** display view and read out the IP address.

Reading out the IP address from the user interface

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **External Communication** parameter group and read out the IP address:
   - If the Cluster Controller automatically receives its IP address via DHCP, read out the IP address in the **DHCP** group.
   - If the Cluster Controller has received a static IP address, read out the IP address in the **Ethernet** group.

Reading out the IP Address of the Inverter

You have two options for reading out the IP address of the inverter:

- Reading out the IP address from the inverter display
- Reading out the IP address from the user interface of the Cluster Controller

Reading out the IP Address from the Inverter Display

- Tap twice on the enclosure lid.
  ☑ The display alternates automatically between the firmware version, the serial number of the inverter, the NetID, IP address, subnet mask, the configured country data set and display language.

Reading out the IP Address from the User Interface of the Cluster Controller

1. In the plant tree, select the desired inverter and select the **Spot Values** menu in the device menu.
2. Select the parameter group **Plant Communication > Speedwire** and read out the IP address.

11 Sunny Portal

11.1 Registering the Cluster Controller in Sunny Portal

No combination of Cluster Controller and Sunny WebBox in one Sunny Portal plant

In a Sunny Portal plant, the Cluster Controller may not be used in combination with the Sunny WebBox.

- "If there is already a Sunny WebBox in the Sunny Portal plant where you want to integrate the Cluster Controller, delete the Sunny WebBox from the Sunny Portal plant before registering the Cluster Controller (see user manual of the Cluster Controller in Sunny Portal).

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. If there is a proxy network in your local network, make the proxy settings on the user interface of the Cluster Controller (see Section 17.2). This ensures that the Cluster Controller can establish a connection to Sunny Portal via the proxy server.
3. Select the **Sunny Portal > Basic Settings** parameter group.
4. Select [**Edit**].
5. Activate data transmission to Sunny Portal. For this purpose, select the entry **Yes** in the **Use Sunny Portal** drop-down list.
6. Make the user settings in the **User settings** group:
   - In the **Email** field, enter the e-mail address to which Sunny Portal should transmit the access data.

   ☑ The plant identifier is automatically entered in the **Plant ID** field. Together with the e-mail address and the plant name, the plant identifier is a unique identifier of the plant in Sunny Portal.

   - In the **Plant name** field, enter the name under which the plant is to be displayed in Sunny Portal.
7. Select [**Save**].
8. Perform the registration in Sunny Portal. For this purpose, select [**Execute**] in the **Register** field in the **Status and Actions** group.

   ☑ The Cluster Controller synchronises the plant time with the Sunny Portal and carries out the registration. **OK** is displayed in the **Result of the last registration** field and Sunny Portal sends the access data to the specified e-mail address.

   ☑ The registration of the other devices in the plant is performed automatically.

   ☑ The result of the registration attempt is logged in the event log (see Section 9.1 "Displaying Events", page 56).

   ✖ Has the registration failed?
   - Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

11.2 Setting Data Transmission to Sunny Portal

Requirements:

☐ You must be registered in Sunny Portal (see Section 11.1).

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Sunny Portal > Basic Settings** parameter group.
3. Select [**Edit**].
4. Select the desired entry in the **Use Sunny Portal** drop-down list:

Entry	Explanation
yes	Activates the data transmission to Sunny Portal
no	Deactivates the data transmission to Sunny Portal

5. Select [**Save**].

11.3 Setting Communication Monitoring

For the communication monitoring, the Cluster Controller sends a signal to the Sunny Portal at a configurable time interval. If the signal fails to appear, Sunny Portal alerts you via e-mail depending on the strictness of the communication monitoring configured in Sunny Portal (see user manual of the Cluster Controller in Sunny Portal).

Example: setting communication monitoring

The time interval **every eight hours** is selected in the Cluster Controller for sending the communication monitoring signal and the communication monitoring setting **Sharp** is selected in Sunny Portal. If the Sunny Portal has not received a signal from the Cluster Controller after eight hours and 15 minutes, the Sunny Portal sends an e-mail alert. After the alert e-mail, the Sunny Portal sends a reminder e-mail up to three days later stating that the communication error is still present.

Failed send attempts are logged in the event log

If the send attempt fails (e.g. if Sunny Portal is not available or in the event of network problems), the Cluster Controller logs this in the event log (see Section 9.1 "Displaying Events", page 56).

Requirements:

☐ You must be registered in Sunny Portal (see Section 11.1).

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Sunny Portal > Basic Settings** parameter group.
3. Select [**Edit**].
4. In the **Communication monitoring signal** drop-down list, select the desired time interval (default setting: **every 8 hours**).
5. Select [**Save**].
6. Adjust the strictness of the communication monitoring in Sunny Portal if required (see the user manual of the Cluster Controller in Sunny Portal).

11.4 Setting the Upload Frequency

Requirements:

☐ You must be registered in Sunny Portal (see Section 11.1).

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Sunny Portal > Basic Settings** parameter group.
3. Select [**Edit**].
4. In the **Upload frequency** drop-down list, select the desired time interval.

Time interval	Explanation
Every 15 minutes	The data upload takes place every 15 minutes.
Hourly	The data upload takes place every 60 minutes.
Daily	The data upload takes place daily at around 01:30.

Delay in data upload possible

To prevent excessive data volume for Sunny Portal at specific times, the Cluster Controller delays the start of the data upload by up to 10 minutes if required.

If a data upload is still in progress and the Cluster Controller is meant to start a new data upload (e.g. at a configured time interval of 15 minutes), then the Cluster Controller does not perform the new data upload and only transmits the data at the next time interval.

5. Select [**Save**].

11.5 Testing the Connection to Sunny Portal

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Sunny Portal > Status and Actions** parameter group.
3. In the **Portal connection test** field, select [**Execute**].
   ☑ The Cluster Controller performs the connection test. **OK** is displayed in the field **Result of the last connection test**.
   ✖ Was the connection test unsuccessful?
   - Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

11.6 Adjusting the Plant Identifier for Sunny Portal

In the following cases, you must adjust the plant identifier for Sunny Portal in the Cluster Controller:

- Another communication device (e.g Sunny WebBox) has already sent plant data of the affected PV plant to Sunny Portal.
- You have reset the Cluster Controller to default settings.
- You have replaced the Cluster Controller with another Cluster Controller.

Procedure:

1. Log in to Sunny Portal using the available access data (see the user manual of the Cluster Controller in Sunny Portal).
2. If there is already a Sunny WebBox in the Sunny Portal plant where you want to integrate the Cluster Controller, delete the Sunny WebBox from the Sunny Portal plant (see user manual of the Cluster Controller in Sunny Portal).
3. In Sunny Portal, copy the plant identifier:
   - Select **Configuration > Plant Properties**.
   - Select the **Plant Data** tab.
   - Select [**Edit**].
   - Copy the plant identifier to the clipboard.
4. Log in to the Cluster Controller.
5. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
6. Select the **Sunny Portal > User settings** parameter group.
7. Select [**Edit**].
8. In the **Plant ID** field, delete the current content and paste in the content of the clipboard.
9. Select [**Save**].

12 Modbus Configuration

12.1 Activating the Modbus Server

To use a Modbus client, you must activate the required Modbus server via the user interface of the Cluster Controller.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Select the **External Communication > Modbus** parameter group.
4. Select [**Edit**].
5. To use the TCP server, make the following settings in the **TCP server** group:
   - In the **Activated** drop-down list, select the entry **Yes**.
   - If required, change the port in the **Port** field (default setting: 502).
6. To use the UDP server, make the following settings in the **UDP server** group:
   - In the **Activated** drop-down list, select the entry **Yes**.
   - If required, change the port in the **Port** field (default setting: 502).
7. Select [**Save**].
8. If required, make additional Modbus settings (see technical description "SMA CLUSTER CONTROLLER Modbus® Interface")

12.2 Saving or Updating the Modbus Profile and Plant Configuration

Saving the Modbus Profile

1. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
2. Select the **Modbus** parameter group.
3. Select [**Save user-defined Modbus profile (usrprofile.xml)**] and save the file to the desired storage location with the desired file name.

Updating the Modbus Profile

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
3. Select the **Modbus** parameter group.

4. To update the SMA Modbus profile, perform the following steps:
   - In the **Update SMA Modbus profile (*.xml)** field, select [**Browse...**].
   ☑ The file selection window opens.
   - Select the desired SMA Modbus profile and select [**Open**].
   ☑ The file name of the SMA Modbus profile is displayed in the **Update SMA Modbus profile (*.xml)** field.
   - Select [**Refresh**].
5. To update the user-defined Modbus profile, perform the following steps:
   - In the **Update user-defined Modbus profile (*.xml)** field, select [**Browse...**].
   ☑ The file selection window opens.
   - Select the desired Modbus profile and select [**Open**].
   ☑ The file name of the user-defined Modbus profile is displayed in the **Update user-defined Modbus profile (*.xml)** field.
   - Select [**Refresh**].

Saving the Plant Configuration

1. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
2. Select the **Modbus** parameter group.
3. To save the automatically created plant configuration file, select [**Save automatically generated plant configuration (sysplant.xml)**].
4. To save the user-defined plant configuration file, select [Save user-defined plant configuration **(usrplant.xml)**].

Updating the Plant Configuration

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
3. Select the **Modbus** parameter group.
4. In the **Update user-defined plant configuration (*.xml)** field, select [**Browse...**].
   ☑ The file selection window opens.
5. Select the desired plant configuration file and select [**Open**].
   ☑ The file name of the plant configuration file is displayed in the **Update user-defined plant configuration (*.xml)** field.
6. Select [**Refresh**].

13 Grid Management

13.1 Options for Implementing the Network Operator Setpoints

The Cluster Controller can receive the network operator setpoints for grid management via three different types of signal source. For this purpose, the different types of signal source can be combined, meaning for example that setpoints for the active power limitation can be received as digital signals and the setpoints for the reactive power setpoint can be received as analogue signals:

Type of signal	Explanation
Digital signals	The network operator setpoints are sent to the Cluster Controller as digital signals in the form of binary values. For this purpose, up to four relay contacts can be used for the active power limitation and the reactive power setpoint.
Analogue signals	The network operator setpoints are sent to the Cluster Controller as analogue current signals. For this purpose, current signals from 0 mA to 20 mA can be sent for the active power limitation and the reactive power setpoint respectively.
Signal setpoint via Modbus client	The network operator setpoints are sent via the Modbus client to network terminal **X13** or **X14** of the Cluster Controller (for information on Modbus configuration, see Section 12).

To implement the network operator setpoints, you must make the corresponding settings for both the **Active power** and **Reactive power** parameter groups via the user interface of the Cluster Controller (see Section 13.2 and Section 13.3).

If the Cluster Controller classifies a network operator setpoint as invalid or if it does not receive a network operator setpoint within a configurable time, and you have made the "Fallback" settings for this case, the Cluster Controller correspondingly implements these "Fallback" settings (see Section 13.4).

13.2 Making Settings for Active Power Limitation

Requirements:

- ☐ The configuration for the active power limitation must be agreed with the responsible network operator.
- ☐ The necessary parameters for the active power limitation must be set in the inverter (see the inverter manual).
- ☐ If a network operator setpoint is currently being implemented for the active power limitation, the active power limitation may not be configured.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. In the plant tree, select the Cluster Controller and select the **Grid Management** menu in the device menu.
3. When using the digital or the analogue inputs, make the settings for the plant control:
   - Select the **General Settings > Plant Control** parameter group.
   - Select [**Edit**].
   - In the **Time interval for the Control value** field, enter the desired time interval.
4. Select the **Active power** parameter group and select [**Edit**].
5. In the **Basic Settings** group, select the desired signal source in the **signal source** drop-down list. For this purpose, note that the desired Modbus server must be activated in the Cluster Controller when using the Modbus (see Section 12.1).
6. When using the digital inputs, make the settings for the digital inputs:
   - Select the **Settings of digital inputs** group.
   - In the **Error tolerance time** field, enter a value above 1 second if possible. This prevents e.g. a brief, simultaneous pull on two relays of a ripple control receiver during a Cluster Controller status change being classified as an invalid status.
7. When using the analogue inputs, make the settings for the analogue inputs:
   - Select the **Settings of analog inputs** group.
   - In the **Error tolerance time** field, enter the desired time interval.
   - In the **Initial value input signal** field, enter the desired value.
   - In the **Final value input signal** field, enter the desired value.
   - In the **Start target value active power limitation** field, enter the desired value.
   - In the **End target value active power limitation** field, enter the desired value.

   Input signals potentially up to 21 mA

   For an analogue signal source, the Cluster Controller classifies input signals as valid up to a maximum of 21 mA. It is possible that this can cause a certain overload in order to be sure of reaching the maximum target value.
8. Make the settings for the active power control:
   - Select the **Settings for active power control** group.
   - In the **Time interval in the event of a changed target value** field, enter the desired time interval.

Example: Time interval in the event of a changed target value is 60 seconds

Immediately after the target value sent by the signal generator is changed, the Cluster Controller sends a control command with a corresponding control value to the inverters. If additional control values are required in order to reach the target value, and you have entered a value of 60 seconds for the parameter **Time interval in case of a changed target value**, the Cluster Controller sends each of these additional control values at intervals of 60 seconds. Once the modified target value has been reached, the Cluster Controller once again sends the current control value at the time interval you entered for the parameter **Time interval for control the value** in the **General Settings** parameter group.

- In the **Max. change in case of power increase** field, enter the desired value.
- In the **Max. change in case of power reduction** field, enter the desired value.

9. When using the digital inputs, set the status configuration:
   - Select the **Status configuration** group.
   - Depending on the number of digital inputs used in the **Active** column, activate the selection field of the respective status to be configured.
   - In the **Active power** column, enter the desired value for the respective status to be configured.
10. Make the settings for the "Fallback" (see Section 13.4).

13.3 Making Settings for Reactive Power Setpoint

13.3.1 Adjusting the Reactive Power with Reactive Power in % Predefined Quantity

If you select a predefined quantity for reactive power in percent as a setpoint value for the reactive power, the reactive power in relation to the maximum possible active power is used as the predefined quantity.

Requirements:

☐ The configuration for the reactive power setpoint must be agreed with the responsible network operator.

☐ The necessary parameters for the reactive power setpoint must be set in the inverter (see the inverter manual).

☐ If a network operator setpoint is currently being implemented for the reactive power, the reactive power setpoint may not be configured.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. In the plant tree, select the Cluster Controller and select the **Grid Management** menu in the device menu.

3. When using the digital or the analogue inputs, make the settings for the plant control:
   - Select the **General Settings > Plant Control** parameter group.
   - Select [**Edit**].
   - In the **Time interval for the Control value** field, enter the desired time interval.
4. Select the **Reactive power** parameter group and select [**Edit**].
5. Make the basic settings in the **Basic Settings** group:
   - In the **signal source** drop-down list, select the desired signal source. For this purpose, note that the desired Modbus server must be activated in the Cluster Controller when using the Modbus (see Section 12.1).
   - In the **Predefined Quantity** drop-down list, select the **reactive power in %** predefined quantity.
6. When using the digital inputs, make the settings for the digital inputs:
   - Select the **Settings of digital inputs** group.
   - In the **Error tolerance time** field, enter a value above 1 second if possible. This prevents e.g. a brief, simultaneous pull on two relays of a ripple control receiver during a Cluster Controller status change being classified as an invalid status.
7. When using the analogue inputs, make the settings for the analogue inputs:
   - Select the **Settings of analog inputs** group.
   - In the **Error tolerance time** field, enter the desired time interval.
   - In the **Initial value input signal** field, enter the desired value.
   - In the **Final value input signal** field, enter the desired value.

   Input signals potentially up to 21 mA

   For an analogue signal source, the Cluster Controller classifies input signals as valid up to a maximum of 21 mA. It is possible that this can cause a certain overload in order to be sure of reaching the maximum target value.
   - Enter the desired value in the field **Start target value reactive power**.
   - Enter the desired value in the field **End target value reactive power**.
8. When using the digital inputs, set the status configuration:
   - Select the **Status configuration** group.
   - Depending on the number of digital inputs used in the **Active** column, activate the selection field of the respective status to be configured.
   - In the **Reactive power** column, enter the desired value for the respective status to be configured.
9. Make the settings for the "Fallback" (see Section 13.4).

13.3.2 Adjusting the Reactive Power with Cos Phi Predefined Quantity

If you select the displacement power factor cos φ as a predefined quantity for the reactive power setpoint, the cosine function of the phase shift angle between the current and the voltage is used as the predefined quantity.

Requirements:

- ☐ The configuration for the reactive power setpoint must be agreed with the responsible network operator.
- ☐ The necessary parameters for the reactive power setpoint must be set in the inverter (see the inverter manual).
- ☐ If a network operator setpoint is currently being implemented for the reactive power, the reactive power setpoint may not be configured.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. In the plant tree, select the Cluster Controller and select the **Grid Management** menu in the device menu.
3. When using the digital or the analogue inputs, make the settings for the plant control:
   - Select the **General Settings > Plant Control** parameter group.
   - Select [**Edit**].
   - In the **Time interval for the Control value** field, enter the desired time interval.
4. Select the **Reactive power** parameter group and select [**Edit**].
5. Make the basic settings in the **Basic Settings** group:
   - In the **signal source** drop-down list, select the desired signal source. For this purpose, note that the desired Modbus server must be activated in the Cluster Controller when using the Modbus (see Section 12.1).
   - In the **Predefined Quantity** drop-down list, select the **cos Phi** predefined quantity.
6. When using the digital inputs, make the settings for the digital inputs:
   - Select the **Settings of digital inputs** group.
   - In the **Error tolerance time** field, enter a value above 1 if possible. This prevents e.g. a brief, simultaneous pull on two relays of a ripple control receiver during a Cluster Controller status change being classified as an invalid status.
7. When using the analogue inputs, make the settings for the analogue inputs:
   - Select the **Settings of analog inputs** group.
   - In the **Error tolerance time** field, enter the desired time interval.
   - In the **Initial value input signal** field, enter the desired value.
   - In the **Final value input signal** field, enter the desired value.

Input signals potentially up to 21 mA

For an analogue signal source, the Cluster Controller classifies input signals as valid up to a maximum of 21 mA. It is possible that this can cause a certain overload in order to be sure of reaching the maximum target value.

- Enter the desired value in the field **Cos Phi start target value**.
- In the **Excitation type** drop-down list, select the desired excitation type.
- Enter the desired value in the field **Cos Phi end target value**.
- In the **Excitation type** drop-down list, select the desired excitation type.

8. When using the digital inputs, set the status configuration:
   - Select the **Status configuration** group.

   ☑ The **cos phi** and **Excitation type** columns are also displayed.
   - Depending on the number of digital inputs used in the **Active** column, activate the selection field of the respective status to be configured.
   - In the **cos phi** column, enter the desired value.
   - In the **Excitation type** drop-down list, select the desired excitation type.
9. Make the settings for the "Fallback" (see Section 13.4).

13.4 Making Settings for the Fallback

The "Fallback" is an operating mode, the setpoints of which are implemented by the Cluster Controller if it classifies a network operator setpoint as invalid or if it does not receive a network operator setpoint within a configurable time. The Cluster Controller classifies a network operator setpoint as invalid if there is no configuration for the network operator setpoint in the Cluster Controller or if the network operator setpoint is outside of the value range configured in the Cluster Controller. The "Fallback" prevents the Cluster Controller from transmitting setpoints to the inverter for an extended period of time where, in the event of an invalid or missing network operator setpoint, these setpoints may no longer be up to date. This prevents potential yield losses. The "Fallback" must be activated and configured via the user interface of the Cluster Controller. In the event of an invalid or missing network operator setpoint and configurable "Fallback", the Cluster Controller only keeps the last valid network operator setpoint for a limited, configurable time. Once this "Fallback" time has elapsed, the Cluster Controller implements the setpoints that were assigned to the "Fallback". When a valid network operator setpoint is available, the "Fallback" is reset and the Cluster Controller implements the current network operator setpoint.

Requirements:

☐ The activation and the configuration of the "Fallback" must be agreed with the network operator.

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. In the plant tree, select the Cluster Controller and select the **Grid Management** menu in the device menu.
3. Select the parameter group for which the "Fallback" settings are to be made:
   - To configure the "Fallback" for the active power limitation, select the **Active power > Fallback settings** parameter group.
   - To configure the "Fallback" for the reactive power setpoint, select the **Reactive power > Fallback settings** parameter group.
4. Select [**Edit**].
5. Make the desired settings for the "Fallback":
   - In the **Fallback activated** drop-down list, select the entry **Yes**.
   - In the **Fallback activates after** field, enter the desired time after which the "Fallback" is to be activated.
   - Depending on the parameter group and the desired predefined quantity, enter the desired value in the **Active power** or **Reactive power** or **cos phi** field.
   - If **cos phi** is selected as the predefined quantity, select the desired excitation type in the **Excitation type** drop-down list.
6. Select [**Save**].

14 Update

14.1 Update for Cluster Controller

14.1.1 Configuring an Automatic Update (Recommended)

In the automatic update of the Cluster Controller, only update files for the Cluster Controller itself are taken into account. The update files are downloaded via the Internet from the SMA Update portal. The Cluster Controller checks once a day whether a new update is available. If a new update is available, the Cluster Controller downloads the update. The update procedure starts automatically the following night at 11 p.m. Settings already present for the Cluster Controller and the plant data are kept following the update process. If an automatic update process for the Cluster Controller is interrupted, e.g. by a power outage, the Cluster Controller restarts the update process again at the next possible time.

Requirements:

☐ The Cluster Controller must be connected to the Internet.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > Update** parameter group.
3. Select [**Edit**].
4. Select the desired entry in the **Automatic update** drop-down list:

Entry	Explanation
yes	Activates the automatic update
no	Deactivates the automatic update

5. Select [**Save**].

14.1.2 Performing a Manual Update

You can always perform the manual update, even if the automatic update is enabled for the Cluster Controller. Settings already present for the Cluster Controller and the plant data are kept following the update process.

You have the following options for performing the manual update:

- Performing a manual update via the Internet
- Performing a manual update via the user interface
- Performing a manual update via the USB data carrier

Performing a manual update via the Internet

Requirements:

☐ The Cluster Controller must be connected to the Internet.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **Device > Update** parameter group.
3. In the **Check for update and install it** field, select [**Execute**].
   ☑ The Cluster Controller checks whether a new update is available. If a new update is available, the Cluster Controller downloads the update from the SMA Update portal and starts the update process.

Performing a manual update via the user interface

1. Select the desired update file and download onto the computer (update files are available at www.SMA-Solar.com).
2. Log in to the Cluster Controller as **Installer**.
3. Select the Cluster Controller in the plant tree and select the **Update and save** menu in the device menu.
4. Select the **Update** parameter group.
5. In the **Upload update file (*.up2)** field, select [**Browse...**].
   ☑ The file selection window opens.
6. Select the desired update file and select [**Open**].
   ☑ The name of the update file is displayed in the **Upload update file (*.up2)** field.
7. Select [**Execute**].
   ☑ The update file is uploaded and executed.

Performing a manual update via the USB data carrier

1. Prepare the USB data carrier:
   - Select the desired update file and download onto the computer (update files are available at www.SMA-Solar.com).
   - Connect the USB data carrier to the computer.

   USB data carrier with more than one partition

   If there is more than one partition on the USB data carrier, the Cluster Controller only searches the first partition for update files.
     - In the first partition of the USB data carrier, create a file folder in the root directory with the title **UPDATE**.
   - Copy the downloaded update file (*.up2) to the **UPDATE** folder.
2. Connect the USB data carrier to USB terminal **2** of the Cluster Controller.

   ☑ The update file is uploaded and executed.

14.2 Update for Connected SMA Devices

14.2.1 Configuring an Automatic Update (Recommended)

No update is performed for inverters with communication errors ( )

No update is performed for inverters that are not connected to the Cluster Controller as a result of a communication fault.

- Determine the cause for the communication fault via the inverter event log and rectify the communication fault so that the inverter is no longer displayed with the symbol in the plant tree.

Sufficient DC input voltage is required for update

For some inverters, updates are only possible above a specific DC input voltage. Depending on the time of day, the weather, or the condition of the PV modules (e.g. pollution or covered with snow), the DC input voltage may be too low for the update. These inverters do not feed in during the update. This can result in temporary yield losses.

Do not change the update source during the automatic update process

If the update source is changed during the automatic update process, the update process does not continue. Update files that have already been sent to the inverters cannot be withdrawn.

- Do not change the update source during the automatic update process.

As update sources for the automatic update of SMA devices, you can select the SMA Update portal or a USB data carrier connected to the Cluster Controller. When updating via the SMA Update portal, the Cluster Controller checks once a day whether a new update is available. If a new update is available, the Cluster Controller downloads the update. When updating via the USB data carrier, available update files are copied directly to the Cluster Controller. For both update sources, the sending of the update files starts automatically the following night at 4 a.m. If an automatic update process for the inverters in the plant is interrupted by a power outage, for example, the Cluster Controller restarts the update process the following day.

Procedure:

1. In the plant tree, select the plant and select the **Updates** menu in the device menu.
2. Select the **Settings** parameter group.
3. Select [**Edit**].
4. To disable the automatic update, select the entry **No** in the **Activated** drop-down list.

5. To enable the automatic update, make the following settings:
   - In the **Activated** drop-down list, select the entry **Yes** (default setting).
   - In the **Operating mode** drop-down list, select the entry **Automatic update**.
   - In the **Update source** drop-down list, select the desired update source:

Update source	Explanation
Update portal	The update files are downloaded from the SMA Update portal on the Internet.
USB connection 2	The update files are downloaded from the USB data carrier that is connected to USB terminal **2**.

6. Select [**Save**].
7. If a USB data carrier is to be used as an update source, prepare the USB data carrier:
   - Select the desired update file and download onto the computer (update files are available at www.SMA-Solar.com).
   - Connect the USB data carrier to the computer.

   USB data carrier with more than one partition

   If there is more than one partition on the USB data carrier, the Cluster Controller only searches the first partition for update files.
     - In the first partition of the USB data carrier, create a file folder in the root directory with the title **UPDATE**.
   - Copy the downloaded update file (*.up2) to the **UPDATE** folder.
   - Connect the USB data carrier to USB terminal **2** of the Cluster Controller.

   ☑ The Cluster Controller copies the update file from the USB data carrier and displays the update file status as **Ready** in the Available updates area.

14.2.2 Performing a Manual Update

Sufficient DC input voltage is required for update

For some inverters, updates are only possible above a specific DC input voltage. Depending on the time of day, the weather, or the condition of the PV modules (e.g. pollution or covered with snow), the DC input voltage may be too low for the update. These inverters do not feed in during the update. This can result in temporary yield losses.

You have the following options for performing the manual update for the connected inverters:

- Performing a manual update via the Internet
- Performing a manual update via the USB data carrier

Settings already present for the Cluster Controller and the plant data are kept following the update process.

Performing a manual update via the Internet

Do not change the update source during the update process

The manual update via the Internet can take some time. If the update source is changed before the update process has ended, the update status may possibly not be displayed correctly.

- Do not change the update source during the update process.

Requirements:

☐ The Cluster Controller must be connected to the Internet.

Procedure:

1. Enable the manual update:
   - In the plant tree, select the plant and select the **Updates** menu in the device menu.
   - Select the **Settings** parameter group and select [**Edit**].
   - In the **Activated** drop-down list, select the entry **Yes**.
   - In the **Operating mode** drop-down list, select the entry **Manual update**.
   - In the **Update source** drop-down list, select the entry **Update portal**.
   - Select [**Save**].
2. Select the desired device type, e.g. SB 5000TL-21.
3. In the **Available updates** area, highlight the desired update file and select [**Download**].
   ☑ The Cluster Controller downloads the update file from the Internet and, following successful download, displays the update file with status **ready** in the **Available updates** area.
   ✖ Has the update file not been downloaded?

   Possible fault cause: the Internet connection has been interrupted.
   - Restore the Internet connection.

4. Select [**Send**].
   ☑ The Cluster Controller checks the saved files.
   ☑ The Cluster Controller sends the update file once daily on up to five sequential days to the devices in the plant. The update process was successful if the version number of the sent update file is displayed for all affected devices.
   ✖ Did no device, or not all affected devices, report back with the version number of the sent update file?
   - Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

Performing a manual update via the USB data carrier

1. Prepare the USB data carrier:
   - Select the desired update file and download onto the computer (update files are available at www.SMA-Solar.com).
   - Connect the USB data carrier to the computer.

   USB data carrier with more than one partition
   If there is more than one partition on the USB data carrier, the Cluster Controller only searches the first partition for update files.
   - In the first partition of the USB data carrier, create a file folder in the root directory with the title **UPDATE**.
   - Copy the downloaded update file (*.up2) to the **UPDATE** folder, then remove the USB data carrier from the computer.
2. Connect the USB data carrier to USB terminal **2** of the Cluster Controller.
3. Start the update process:
   - In the plant tree, select the plant and select the **Updates** menu in the device menu.
   - Select the desired device type, e.g. SB 5000TL-21.
   - In the **Available updates** area, highlight the desired update file and select [**Download**].
   ☑ The Cluster Controller copies the update file from the USB data carrier and displays the update file status as **Ready** in the **Available updates** area.
4. Remove the USB data carrier from the Cluster Controller.
5. Select [**Send**].
   ☑ The Cluster Controller checks the saved files.
   ☑ The Cluster Controller sends the update file once daily on up to five sequential days to the devices in the plant. The update process was successful if the version number of the sent update file is displayed for all affected devices.
   ✖ Did no device, or not all affected devices, report back with the version number of the sent update file?
   - Rectify the fault (see Section 18.2 "Faults in the Cluster Controller or the Connected Devices", page 99).

15 Passwords and SMA Grid Guard

15.1 Selecting a Secure Plant Password

From the perspective of plant communication, all devices form a plant with the same password. For this reason, a password used for all devices in a plant is called a "plant password". You can only access all devices of your plant with the Cluster Controller if all devices have the same plant password.

The plant password that you enter for your respective user group when logging in to the Cluster Controller user interface for the first time is a default plant password. For security reasons, you should change the default plant password as soon as possible following commissioning (see Section 15.3).

You can increase the security of your plant password with the following measures:

- Select plant passwords of at least eight characters.
- Use combinations of upper and lowercase letters, special characters and numbers.
- Do not use names or common words (e.g. "dog", "cat", "house").
- For the plant password, avoid using words that have any personal relevance to you such as the names of persons or pets, personnel numbers, identification numbers or car licence plates.
- Do not repeat names or words (e.g. "househouse" or "catcat").
- Do not combine numbers or letters in the same order as they appear on your keyboard (e.g. "12345", "qwert").

15.2 Adapting the Device Password to the Plant Password

If the password of a device is different from the plant password, the device will be displayed with a padlock symbol in the plant tree. This is the case when adding new inverters to an existing plant, for example.

Procedure:

To adapt the device password to the plant password, perform the following actions in the specified order. The exact procedure is described in the subsequent sections.

- Adapt the plant password to the device password
- Reset the plant password

Adapting the plant password to the device password

In order to access the device marked with the padlock symbol, you must first adapt the plant password to the device password. For new devices, the device password corresponds to the default plant password. The default plant password of the **User** user group is "0000"; the default plant password of the **Installer** user group is "1111".

Procedure:

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Adapt the plant password to the device password:
   - Select the **User Rights > Access Control** parameter group.
   - Select [**Edit**].
   - In the **Set installer password** field, enter the default plant password **1111**.
   - Confirm the default plant password in the **Confirm the password** field.
   - In the **Set user password** field, enter the default plant password **0000**.
   - Confirm the default plant password in the **Confirm the password** field.
   - Select [**Save**].

   ☑ The Cluster Controller changes the device password for all approved devices in the plant.
4. Restart the Cluster Controller via the user interface (see Section 18.3)

Resetting the plant password

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Adapt the plant password to the previous plant password again:
   - Select the **User Rights > Access Control** parameter group.
   - Select [**Edit**].
   - In the **Set installer password** field, enter the previous plant password for the **Installer** user group.
   - Confirm the plant password in the **Confirm the password** field.
   - In the **Set user password** field, enter the previous plant password of the **User** user group.
   - Confirm the plant password in the **Confirm the password** field.
   - Select [**Save**].

   ☑ The Cluster Controller changes the plant passwords for all approved devices in the plant. All devices now have the previous plant passwords again.
4. Select [**Save**].
5. Restart the Cluster Controller via the user interface (see Section 18.3)

   ☑ After a maximum of two minutes, the new device is displayed without a padlock symbol in the plant tree.

15.3 Changing the Plant Password

Requirements:

☐ If you wish to change the plant password for the **Installer** user group, you must be an **Installer** yourself (see Section 4.1 "User Groups and User Rights", page 24).

Plant password requirement:

☐ The plant password can be a maximum of 12 characters.

Permissible special characters: ? _ ! -

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **User Rights > Access Control** parameter group.
3. Select [**Edit**].
4. Enter the new plant password:
   - Depending on the rights of the user group, enter a new plant password in the **Set installer password** or **Set user password** field.
   - In the **Confirm the password** field, enter the new plant password again.
5. Select [**Save**].
   ☑ The Cluster Controller changes the plant password for all devices in the plant.

15.4 Loss of Plant Passwords

If you have forgotten the plant passwords for both user groups, then you can disconnect the inverters using a PUK (Personal Unlocking Key). For every inverter, there is one PUK for each user group (**User** and **Installer**).

Procedure:

To reset the plant passwords, perform the following actions in the specified order. The exact procedure is described in the subsequent sections.

- Requesting the PUK
- Unlocking inverters with PUKs

Requesting the PUK

1. Download the application form for the PUKs (application form available at www.SMA-Solar.com).
2. Complete the application form and sign it.
3. Send the application form to the SMA Service Line by e-mail, fax or post (see Section 20 "Contact", page 113).

Unlocking inverters with PUKs

Unlocking several inverters using the PUK

Each PUK can only be used for one inverter and one user group.

- If you requested PUKs for several inverters, you must unlock each inverter individually using the corresponding PUK.

Connection required between the Cluster Controller and the inverter during the unlocking process

In order for the changed password settings to become effective, there must be a connection between the Cluster Controller and the respective inverter during the unlocking process.

- Only unlock the inverter with the PUK if there is a connection to the inverter.

Procedure:

1. Reset the password settings of the Cluster Controller via the display:
   - Call up the **Settings** display view. For this purpose, simultaneously press and hold the [**OK**] and [**ESC**] buttons on the button field for two seconds.
   ☑ The **Settings** display view opens.
   - Select the **Reset password** line and press [**OK**].
   ☑ The **Confirm the Resetting** display view opens.
   - Select **OK** and confirm with [**OK**].
   ☑ The user password and the installer password are reset.
2. Log in to the Cluster Controller as **Installer** with the default plant password **1111**.
   ☑ The inverters are each displayed with a padlock symbol in the plant tree.
3. Adapt the installer password of the Cluster Controller to the PUK of the desired inverter. As a result, the inverter can be accessed again:
   - Select the Cluster Controller in the plant tree and select the **Settings > User Rights > Access Control** menu in the device menu.
   - Select [**Edit**].
   - In the **Set installer password** field, enter the PUK of the desired inverter as the new plant password.
   - In the **Confirm the password** field, enter the new plant password again.
   - Select [**Save**].
   ☑ The Cluster Controller changes the plant password for the **Installer** user group and the inverter is no longer displayed with a padlock symbol in the plant tree.
4. To unlock additional inverters, repeat step 3 for the relevant inverters.

5. Adapt the installer password and the user password of the Cluster Controller to the desired plant passwords:
   - Select the Cluster Controller in the plant tree and select the **Settings > User Rights > Access Control** menu in the device menu.
   - Select [**Edit**].
   - In the **Set installer password field**, enter the desired plant password for the **Installer** user group as a new plant password.
   - In the **Confirm the password** field, enter the new plant password again.
   - In the **Set user password** field, enter the desired plant password for the **User** user group.
   - In the **Confirm the password** field, enter the new plant password again.
   - Select [**Save**].

   ☑ The Cluster Controller changes the plant passwords of both user groups and transmits the changed plant passwords to the inverters.

15.5 Setting SMA Grid Guard Mode

When the inverters are delivered, the SMA Grid Guard parameters are set depending on the country. Changes to the SMA Grid Guard parameters must always be agreed with the network operator and are recorded in the event logs of the inverters.

To change SMA Grid Guard parameters, the SMA Grid Guard mode must be enabled on the Cluster Controller user interface. For this purpose, you require a personal SMA Grid Guard code. You can request your personal SMA Grid Guard code from SMA Solar Technology AG (application for the SMA Grid Guard code available at www.SMA-Solar.com).

Requirements:

☐ The responsible network operator must approve changes of grid-relevant parameters.

☐ The SMA Grid Guard code for changing the grid-relevant parameters must be available (application for the SMA Grid Guard code available at www.SMA-Solar.com).

Activating the SMA Grid Guard mode

1. Log in to the Cluster Controller as **Installer**.
2. Select the SMA Grid Guard symbol in the status bar.

   ☑ The SMA Grid Guard dialogue window opens.
3. In the **Individual access code** field, enter the personal SMA Grid Guard code.
4. Select [**OK**].

   ☑ The SMA Grid Guard mode is activated. In the plant tree, updating the symbols for access rights (SMA Grid Guard symbol and padlock symbol) can take up to two minutes.

Deactivating the SMA Grid Guard mode

1. Log in to the Cluster Controller as **Installer**.
2. Select the SMA Grid Guard symbol in the status bar.
   ☑ The SMA Grid Guard dialogue window opens.
3. In the **Individual access code** field, enter the blocking code **54321**.
4. Select [**OK**].
   ☑ SMA Grid Guard mode is deactivated. In the plant tree, updating the symbols for access rights (SMA Grid Guard symbol and padlock symbol) can take up to two minutes.

16 Setting Up Access via the Internet

If the Cluster Controller is integrated in a local area network with a router, you can also access the Internet via the user interface of the Cluster Controller. You have the following options:

- Access via Sunny Portal
- Access via WAN IP address
- Access via DynDNS

Ensuring data security in Ethernet networks

When accessing via the Internet, there is the risk that unauthorised users may access and manipulate the data or devices in your plant.

- Take suitable protective measures (e.g. set up a firewall, close network ports that are not required, only enable remote access via the VPN tunnel).

Access via Sunny Portal

Requirements:

☐ The Cluster Controller must be registered in Sunny Portal (see Section 11.1).

☐ Corresponding port forwarding must be set up in the router (see router manual). The Cluster Controller is set to HTTP port 80 and NAT port 80 by default.

Procedure:

- In the Sunny Portal on the **Configuration > Device overview** page, select the Cluster Controller.

  ☑ The Cluster Controller login page opens.

Access via WAN IP address

Requirements:

☐ Corresponding port forwarding must be set up in the router (see router manual). The Cluster Controller is set to HTTP port 80 and NAT port 80 by default.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **External Communication > Nat** parameter group.
3. In the **WAN IP** field, read out the IP address of the WAN.
4. In order to call up the Cluster Controller user interface later on via the Internet, enter the previously noted WAN IP address in the address bar of the Internet browser. If you have changed the port, you must also state the port.

Example: entering the WAN IP address and the port

The WAN IP address is "83.246.95.22" and the port is "81".

- Enter **http://83.246.95.22:81** in the address bar of the Internet browser.

Access via DynDNS

1. Set up the desired Internet address with a DynDNS service, e.g. at dyndns.com.
2. Set up the router for DynDNS (see router manual).
3. Set up corresponding port forwarding in the router (see router manual). The Cluster Controller is set to HTTP port 80 and NAT port 80 by default.

17 Network Configuration

17.1 Configuration for Static Local Area Network (LAN)

17.1.1 Configuring the Cluster Controller

Different IP address ranges required for Speedwire network and local network (LAN)

In order for a clear assignment of the IP addresses in the Speedwire network and in the local network (LAN) from the perspective of the Cluster Controller to be possible, the IP address ranges of both networks must be different. At the factory, the Cluster Controller uses address range 172/16 for the Speedwire network.

- Ensure that different IP address ranges are used for the Speedwire network and the local network (LAN).

Observe the configuration of the router and the switch

For the Speedwire connection, the Cluster Controller uses IP addresses from the Unicast area and also IP addresses from the Multicast area 239/8 (239.0.0.0 to 239.255.255.255).

- When using a router or switch, ensure that the router and switch forward the Multicast telegrams required for the Speedwire connection to all nodes of the Speedwire network (for information on configuration of the router or switch, see the manufacturer manual).

Requirements:

☐ In the router and in the switch, network port 9522 must be approved.

Procedure:

1. Write down the previous IP address, subnet mask and gateway address of the computer.
2. Connect the computer to terminal **X13** or **X14** of the Cluster Controller.
3. Read out and write down the IP address of the Cluster Controller:
   - Select the **External communication** display view.
   - Read out the IP address from the **IP Address** line and write it down.
4. Adapt the network settings of the computer:
   - Adapt the IP address.

Example: adapting the IP address of the computer to the address range of the Cluster Controller

The IP address of the Cluster Controller is "169.254.0.3" and the IP address of the computer is "10.4.33.105".

- Change the IP address of the computer to **169.254.0.4**.

   - Change the subnet mask to **255.255.0.0**.
   - Ensure that no gateway address is entered.

5. Call up the Cluster Controller via the IP address read out from the display and log in.
6. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
7. Disable DHCP if it has not yet been disabled.
   - Select the **External Communication > Ethernet > DHCP** parameter group.
   - Select [**Edit**].
   - In the **Activated** drop-down list, select the entry **No**.
8. In the **Ethernet** group, make the desired settings for the static local area network (LAN) and select [**Save**].
   ☑ The Cluster Controller saves the network settings and can no longer be accessed via the old IP address.
9. Adapt the network settings of the computer back to the previous network settings that were written down.
10. Check whether the Cluster Controller can be accessed via the new IP address.

    If the Cluster Controller cannot be accessed via the new IP address, it is likely that the Cluster Controller network settings are incorrect.
    - Check the network settings and adjust if required.
11. Connect the Cluster Controller and the computer to the desired node in the static local area network (LAN).

17.1.2 Configuring the Inverters

You have the option of assigning static IP addresses to the inverters in the plant. The inverters are configured for automatic address allocation via DHCP by default.

Procedure:

1. Log in to the Cluster Controller.
2. Select the desired inverter in the system tree.
3. Select the **Settings > Plant Communication** menu in the device menu.
4. Select [**Edit**].
5. In the **Automatic configuration switched on** drop-down list, select the entry **No**. This disables the automatic assignment of the IP address for the inverter.
6. In the **IP Address** field, enter the desired static IP address.
7. Select [**Save**].

17.2 Making the Proxy Configuration

When using a proxy server, you must make a corresponding proxy configuration in order to be able to access the Cluster Controller user interface within the local area network (LAN) or to enable the Cluster Controller to access the Internet, e.g. for connecting to Sunny Portal.

Enabling access to the user interface of the Cluster Controller

- In the Internet browser, include the IP address of the Cluster Controller in the list of proxy exceptions.

Enabling access to the Cluster Controller on the Internet

1. Log in to the Cluster Controller.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Select the **External Communication > Proxy settings** parameter group and make the desired proxy configuration. Tip: the proxy settings for the Internet browser can usually be adopted for the Cluster Controller.
4. Select [**Save**].

17.3 Making the DHCP Configuration

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **External Communication > Ethernet > DHCP** parameter group.
3. Select [**Edit**].
4. Make the desired DHCP settings:
   - To activate DHCP, select the entry **Yes** in the **Activated** drop-down list.
   - To deactivate DHCP, select the entry **No** in the **Activated** drop-down list.
5. Select [**Save**].

17.4 Changing the HTTP Port

When calling up the Cluster Controller, state the IP address and the changed HTTP port

If you have the default HTTP port configured in the Cluster Controller, you must state this changed HTTP port together with the IP address of the Cluster Controller when calling up the user interface.

Example: calling up the user interface of the Cluster Controller after changing the HTTP port

The IP address of the Cluster Controller is 192.168.0.168 and you have changed the HTTP port to 8080.

- To call up the Cluster Controller user interface, enter **http://192.168.0.168:8080** in the address bar of the Internet browser.

Procedure:

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **External Communication > HTTP** parameter group.
3. Select [**Edit**].
4. In the **Port** field, enter the desired port (default setting: port 80).
5. Select [**Save**].

17.5 Changing the NAT Port

1. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
2. Select the **External Communication > Ethernet > Nat** parameter group.
3. Select [**Edit**].
4. In the **Port** field, enter the desired port (default setting: port 80).
5. Select [**Save**].

18 Troubleshooting

18.1 LED States

18.1.1 Operation LEDs

Configuration of the Status LED (🕮)

The status LED can display the following statuses:

- Status of the Cluster Controller
- Status of the connected inverters
- Status of the plant communication
- Status of the grid management

Procedure:

- If the status LED is not illuminated green after commissioning, additionally observe the event log of the Cluster Controller to precisely determine the fault cause (see Section 9.1 "Displaying Events", page 56).

LED	Status	Cause and Corrective Measures
All	Off	The Cluster Controller is not connected to the voltage supply. **Corrective Measures:** • Connect the Cluster Controller to the voltage supply (see the Cluster Controller installation manual).
		The voltage supply is reverse-connected or the top-hat rail power supply unit is defective. **Corrective Measures:** • Ensure that the voltage supply is correctly connected (see the Cluster Controller installation manual). • If the voltage supply is correctly connected, replace the top-hat rail power supply unit.

LED	Status	Cause and Corrective Measures
Power (⏻) and status (🕮)	Power glowing red, status glowing yellow or red	The voltage supply is too low. **Corrective Measures:** • Ensure that the connected voltage supply is sufficient (see the Cluster Controller installation manual). • If the problem persists, contact the SMA Service Line (see Section 20).
Power (⏻)	Glowing green	The start procedure is complete. The Cluster Controller is ready for operation.
Status (🕮)	Glowing green	Normal operation
	Glowing yellow	At least one device has the status **Warning**. **Corrective Measures:** • Observe the event log of the Cluster Controller (see Section 9.1). • Observe the device documentation.
		The communication with at least one device is interrupted. There may be a disturbance in the device. **Corrective Measures:** • Observe the event log of the Cluster Controller (see Section 9.1). • Observe the device documentation.

LED	Status	Cause and Corrective Measures
Status (🕮)	Glowing yellow	The communication with at least one device is interrupted. The Cluster Controller may not be connected to the device. **Corrective Measures:** • Ensure that the patch cables are correctly connected (see the Cluster Controller installation manual). • Check whether the network components, patch cables or plug connectors are defective or damaged. Replace defective or damaged network components, patch cables or plug connectors. • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • If the problem persists, contact the network administrator.
	Flashing yellow	An update of the Cluster Controller or the connected devices is currently taking place.
		The active power limitation is active and the setpoint value is above 0% and below 100%.
		The reactive power setpoint is active. The setpoint value is not 0% or the displacement power factor cos φ is below 1.
	Glowing red	The active power limitation is active and the setpoint value is 0%.
		At least one device has the status **Fault**. **Corrective Measures:** • Observe the event log of the Cluster Controller (see Section 9.1). • Observe the device documentation.

LED	Status	Cause and Corrective Measures
Status (🕮)	Glowing red	The communication with all devices is interrupted. There is a problem in the local area network (LAN). **Corrective Measures:** • Ensure that the patch cables are correctly connected (see the Cluster Controller installation manual). • Check whether the network components, patch cables or plug connectors are defective or damaged. Replace defective or damaged network components, patch cables or plug connectors. • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Restart the Cluster Controller if required. For this purpose, disconnect the Cluster Controller from the voltage supply and reconnect to the voltage supply. • If required, assigned a fixed IP address for the Cluster Controller (see Section 17.1). • If the problem persists, contact the network administrator
		The SD card in the Cluster Controller may be defective. **Corrective Measures:** • Check the event report of the Cluster Controller (see Section 9.1). • If the SD card is defective, contact the SMA Service Line (see Section 20).
	Flashing red	The Cluster Controller could not start correctly. A system fault has occurred. **Corrective Measures:** • Contact the SMA Service Line (see Section 20).

LED	Status	Cause and Corrective Measures
Data carrier status ( )	Off	The Cluster Controller is starting and no information is yet available for data export or for USB data carriers. **Corrective Measures:** • Wait until the Cluster Controller has completed the start process and is ready for operation. Once the start process is complete, the power LED ( ) glows green.
		No USB data carrier was detected. It is possible that no USB data carrier is connected or the USB data carrier is not compatible. **Corrective Measures:** • Ensure that a compatible USB data carrier is connected (see Section 19 "Accessories", page 112).
	Glowing green	The USB data carrier is compatible. The free memory capacity is above 10%.
	Glowing yellow	The USB data carrier at the USB terminal **1** is compatible but the free memory capacity is 10% at maximum. **Corrective Measures:** • Files that are no longer required are to be deleted from the USB data carrier. **or** Replace the USB data carrier with a USB data carrier that has sufficient free memory capacity.

LED	Status	Cause and Corrective Measures
Data carrier status ( )	Glowing red	The USB data carrier at USB terminal **1** is full or write-protected. **Corrective Measures:** • If the USB data carrier is full, replace the USB data carrier. • If the USB data carrier is write-protected, remove the write protection or use a USB data carrier without write protection.
	Flashing green or yellow or red	Write or read accesses are currently being performed on the USB data carrier. • Only remove the USB data carrier once the data carrier status LED is no longer flashing.

18.1.2 LEDs of the Network Connections

LED	Status	Cause and Corrective Measures
Link/activity (green)	Off	No network connection has been established. The Cluster Controller is not connected to the voltage supply. **Corrective Measures:** • Connect the Cluster Controller to the voltage supply (see the Cluster Controller installation manual).
		No network connection has been established. The patch cable at the Cluster Controller, at the router or at the network switch is not correctly connected. **Corrective Measures:** • Ensure that the patch cables are correctly connected (see the Cluster Controller installation manual).
		No network connection has been established. One or more network components, patch cables or plug connectors are defective or damaged. **Corrective Measures:** • Replace the defective or damaged network components, patch cables or plug connectors.
	Flashing	Network connection established. Data is being transmitted or received.
Speed (yellow)	Off	Network connection established. The data transfer rate is up to 10 Mbit/s.
	On	Network connection established. The data transfer rate is up to 100 Mbit/s.

18.2 Faults in the Cluster Controller or the Connected Devices

Problem	Cause and Corrective Measures
The Cluster Controller does not start. The LEDs and the display are off.	The Cluster Controller is not connected to the voltage supply. **Corrective Measures:** • Ensure that the three-pole plug for the voltage supply is connected to terminal **X1** of the Cluster Controller.
	The voltage supply is reverse-connected or the top-hat rail power supply unit is defective. **Corrective Measures:** • Ensure that the voltage supply is correctly connected (see the Cluster Controller installation manual). • If the voltage supply is correctly connected, replace the top-hat rail power supply unit.
The login page does not open and the status LED ( ) flashes red.	The Cluster Controller could not start correctly. A system fault has occurred. **Corrective Measures:** • Disconnect the Cluster Controller from the voltage supply and reconnect to the voltage supply. Note that this can lead to loss of plant data. • If the problem persists, contact the SMA Service Line (see Section 20).
The login page does not open.	The Cluster Controller is not connected to the voltage supply. **Corrective Measures:** • Ensure that the three-pole plug for the voltage supply is connected to terminal **X1** of the Cluster Controller.

Problem	Cause and Corrective Measures
The login page does not open.	The voltage supply is reverse-connected or the top-hat rail power supply unit is defective. **Corrective Measures:** • Ensure that the voltage supply is correctly connected (see the Cluster Controller installation manual). • If the voltage supply is correctly connected, replace the top-hat rail power supply unit.
	A firewall is blocking the connection. **Corrective Measures:** • Adjust the firewall settings in order to allow the required connection.
	If the Cluster Controller is connected to the local area network via DCHP and the voltage supply of the Cluster Controller was interrupted, it is possible that the DHCP server of the Cluster Controller has been assigned a new IP address. **Corrective Measures:** • Select the **External communication** display view and read out the current IP address of the Cluster Controller.

Problem	Cause and Corrective Measures
The login page does not open.	There is a problem in the local area network (LAN). **Corrective Measures:** • Ensure that the patch cables are correctly connected to the Cluster Controller (see the Cluster Controller installation manual). • Check whether the network components, patch cables or plug connectors are defective or damaged. Replace defective or damaged network components, patch cables or plug connectors. • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Restart the Cluster Controller. For this purpose, disconnect the Cluster Controller from the voltage supply and reconnect to the voltage supply. Note that this can lead to loss of plant data. • If the problem persists, contact the network administrator.
	If the Cluster Controller is accessed via the Internet, there may not currently be an Internet connection or the port forwarding to the Cluster Controller from the router may be missing or may have been set up incorrectly. **Corrective Measures:** • In the event of interrupted Internet connection, restore the Internet connection. • If port forwarding has not been set up, port forwarding to the Cluster Controller is to be set up on the router. • If port forwarding has already been set up on the router, ensure that the port forwarding is correct.
Login to the user interface has failed.	The plant password has been entered incorrectly four times. Access to the Cluster Controller is suspended for 15 minutes. **Corrective Measures:** • Wait for 15 minutes, then log in with the correct plant password.
The user interface is not displayed properly.	JavaScript is disabled in the Internet browser. **Corrective Measures:** • Enable JavaScript in the Internet browser.

Problem	Cause and Corrective Measures
At least one device has the status **Warning** or **Fault**.	There may be a disturbance in the device. **Corrective Measures:** • Observe the event log of the Cluster Controller (see Section 9.1). • Observe the device documentation.
The communication with at least one device is interrupted.	There may be a disturbance in the device. **Corrective Measures:** • Observe the event log of the Cluster Controller (see Section 9.1). • Observe the device documentation.
	The Cluster Controller may not be connected to the inverter. **Corrective Measures:** • Ensure that the patch cables are correctly connected (see the Cluster Controller installation manual). • Check whether the network components, patch cables or plug connectors are defective or damaged. Replace defective or damaged network components, patch cables or plug connectors. • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • If the problem persists, contact the network administrator.

Problem	Cause and Corrective Measures
The communication with all devices is interrupted.	There is a problem in the local area network (LAN). **Corrective Measures:** • Ensure that the patch cables are correctly connected (see the Cluster Controller installation manual). • Check whether the network components, patch cables or plug connectors are defective or damaged. Replace defective or damaged network components, patch cables or plug connectors. • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Restart the Cluster Controller. For this purpose, disconnect the Cluster Controller from the voltage supply and reconnect to the voltage supply. • If the problem persists, contact the network administrator.
In the event log, the spanner symbol () is displayed next to the event type.	This event can only be rectified by a user with **Installer** rights. **Corrective Measures:** • Contact the user with **Installer** rights and inform them of the serial number of the device and the event number.
In the event log, the telephone receiver symbol () is displayed next to the event type.	This event can only be rectified by SMA Service. **Corrective Measures:** • Contact the user with **Installer** rights and inform them of the serial number of the device and the event number. The user with **Installer** rights contacts the SMA Service Line (see Section 20).

Problem	Cause and Corrective Measures
The correct number of all connected inverters is not shown on the user interface or the display.	The communication with at least one inverter is interrupted. Either the Cluster Controller has not yet registered with one or more inverters or the connection to one or more inverters has been interrupted. **Corrective measures:** • Wait for six minutes and re-check whether the correct number of all connected inverters is displayed. If the correct number of all connected inverters is still not displayed, proceed as follows: • Ensure that the inverters are in operation (see the installation manual of the inverters). • Ensure that the network cables that connect the inverters to one another are correctly connected (depending on the inverter equipment; see the inverter installation manual or the Speedwire/ Webconnect interface installation manual). • Ensure that the inverter patch cable that is directly connected to the Cluster Controller is connected to network terminal **X9** or **X10** of the Cluster Controller. • Ensure that no network components, patch cables or plug connectors are defective.
The expected binary values for the digital signal source are not shown on the display.	The digital signal source is not correctly connected. **Corrective Measures:** • Ensure that the digital signal source is correctly connected (see the Cluster Controller installation manual).
No current signal for the analogue signal source or the sensor is shown on the display.	It is likely that the analogue signal source or the sensor is not correctly connected. **Corrective Measures:** • Ensure that the analogue signal source is correctly connected (see the Cluster Controller installation manual). • Ensure that the sensor is correctly connected (see the Cluster Controller installation manual).

Problem	Cause and Corrective Measures
No measured values for the connected temperature sensor are shown on the display.	The temperature sensor is not correctly connected. **Corrective Measures:** • Ensure that the temperature sensor is correctly connected (see the Cluster Controller installation manual).
No measured values for the connected irradiation sensor are shown on the display.	If no measured values are displayed for the connected irradiation sensor, either the characteristic curve of the irradiation sensor is not configured or the irradiation sensor is not correctly connected. **Corrective Measures:** • Ensure that the characteristic curve of the irradiation sensor is configured (see Section 7.1). • Ensure that the irradiation sensor is correctly connected (see the Cluster Controller installation manual).
Despite not being switched on, a measured value of up to 2.2 V for **Analogue voltage input 4 (AI4)** is still shown on the display and the user interface.	If no sensor is connected to the terminal block **Analogue voltage input 4 (AI4)**, a measured value of up to 2.2 V will nevertheless be shown in the display and on the user interface for this terminal block. **Corrective Measures:** • In order for a measured value of 0 V to be displayed for the terminal block **Analogue voltage input 4 (AI4)** when it is not connected, place a jumper wire at terminal **X8** between contact pin **B**5 and contact pin **B**7.
The parameters of a device class or an individual device cannot be edited.	You do not have the necessary rights to edit the parameters (see Section 4.1 "User Groups and User Rights", page 24). **Corrective Measures:** • Change the user group.
No inverters, or not all inverters, report back with the version number of the sent update file.	If you have configured the automatic update and Internet connection was interrupted or is interrupted, the update file may not have been correctly downloaded from the Internet. **Corrective Measures:** • Ensure that an Internet connection is established. The automatic update for the inverters starts again on the following day. • To start the update directly, perform a manual update (see Section 14.2.2).

Problem	Cause and Corrective Measures
	The USB data carrier was removed from the Cluster Controller during the update process. **Corrective Measures:** • Reconnect the USB data carrier to USB terminal **2** and perform a manual device update (see Section 14.2.2).
	Due to missing DC input voltage of the inverters, an update file has been sent and saved in the inverter but has not yet been run. The DC input voltage can vary depending on the time of day, the weather, or the condition of the PV modules (e.g. pollution or covered with snow). **Corrective Measures:** • To start the update directly, perform a manual update (see Section 14.2.2).
No inverters, or not all inverters, report back with the version number of the sent update file.	The update file was not sent to the inverters in the plant after five attempts. **Corrective Measures:** • Check the status of the Speedwire connection of the inverters via the menu **Spot Values > Plant Communication**. For this purpose, note that the Speedwire connection may also be interrupted due to missing DC input voltage to the inverters. The DC input voltage can vary depending on the time of day, the weather, or the condition of the PV modules (e.g. pollution or covered with snow). • To start the update directly, perform a manual update (see Section 14.2.2).
The update via the USB data carrier does not start.	There are no update files on the USB data carrier or the update files on the USB data carrier are not located in the **UPDATE** directory. **Corrective Measures:** • Save the desired update files onto the USB data carrier in the **UPDATE** directory (for information on updating via the USB data carrier, see Section 14.1.2 and Section 14.2) and connect the USB data carrier to USB terminal **2** of the Cluster Controller.

Problem	Cause and Corrective Measures
The Cluster Controller does not write any data to the USB data carrier.	The USB data carrier is connected to USB terminal **2**. The Cluster Controller only writes data to USB data carriers that are connected to USB terminal **1**. **Corrective Measures:** • Connect the USB data carrier to USB terminal **1**. For this purpose, note that the USB data carrier cannot be write-protected.
The Cluster Controller does not send any data to the Sunny Portal.	The data transmission is incorrectly configured. **Corrective Measures:** • If the Cluster Controller is not yet registered in Sunny Portal, register the Cluster Controller in Sunny Portal (see Section 11.1). • Test the connection to Sunny Portal (see Section 11.5). • Check the settings for Sunny Portal (see Section 11 "Sunny Portal", page 60).
	There is a fault in the local area network (LAN). **Corrective Measures:** • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Check whether the network components are defective or damaged. Replace defective or damaged network components.
The Cluster Controller does not send any data to the external FTP server.	The data transmission is incorrectly configured. **Corrective Measures:** • Test the FTP push function (see Section 8.6.3).
	There is a fault in the local area network (LAN). **Corrective Measures:** • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Check whether the network components are defective or damaged. Replace defective or damaged network components.

Problem	Cause and Corrective Measures
The Sunny Portal connection test was unsuccessful.	The data transmission is incorrectly configured. **Corrective Measures:** • If the Cluster Controller is not yet registered in Sunny Portal, register the Cluster Controller in Sunny Portal (see Section 8.6.3). • Test the connection to Sunny Portal (see Section 11.5). • Check the settings for Sunny Portal (see Section 11 "Sunny Portal", page 60).
	There is a fault in the local area network (LAN). **Corrective Measures:** • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Check whether the network components are defective or damaged. Replace defective or damaged network components.
The external FTP server connection test was unsuccessful.	The data transmission is incorrectly configured. **Corrective Measures:** • Ensure that you have write authorisation on the FTP server. • Test the FTP push function (see Section 8.6.3).
The external FTP server connection test was unsuccessful.	There is a fault in the local area network (LAN). **Corrective Measures:** • Check whether the network settings of the individual network components are correct. Adapt the network settings if required. • Check whether the network components are defective or damaged. Replace defective or damaged network components.
After an FTP download, Internet Explorer shows old plant data.	There is a problem with the cache properties of Internet Explorer. **Corrective Measures:** • Use a different Internet browser for the FTP download.

Problem	Cause and Corrective Measures
The registration of the Cluster Controller in the Sunny Portal was not successful.	The Sunny Portal cannot currently be accessed due to maintenance. **Corrective Measures:** • Call up **www.SunnyPortal.com** and check for any messages regarding maintenance.
	The Cluster Controller is already registered in another Sunny Portal plant, for example if you have replaced the Cluster Controller. **Corrective Measures:** • Adjust the plant identifier for Sunny Portal in the Cluster Controller (see Section 11.6).
The registration of another device in Sunny Portal was not successful.	There may be a firmware problem in the affected device. **Corrective Measures:** • Contact the SMA Service Line (see Section 20).
After the replacement of the Cluster Controller, two plants with the same plant name appear in Sunny Portal.	The plant was registered twice in Sunny Portal. The new Cluster Controller logs into Sunny Portal with a new plant identifier. The Sunny Portal creates a new plant for this plant identifier, even if you gave the plant the same plant name. **Corrective measures:** • Assign the plant identifier of the old system to the replacement device (see Section 11.6). • In the replacement device, enter the e-mail address of a user who has Sunny Portal administrator rights for the plant. • In Sunny Portal, delete the new plant the replacement device created.

Problem	Cause and Corrective Measures
The Cluster Controller cannot be accessed by the Modbus client.	The required Modbus server is not enabled. **Corrective Measures:** • Ensure that the required Modbus server is enabled (see Section 12.1).
	The correct IP address for the Cluster Controller is not set in the Modbus client. **Corrective Measures:** • Read out the IP address of the Cluster Controller (see Section 10.6). • Ensure that the correct IP address for the Cluster Controller is set in the Modbus client (see the manufacturer manual).
The Modbus profile contains measured values that are not available.	The Modbus configuration may be incorrect. **Corrective Measures:** • Check the Modbus configuration using the assignment tables and adjust if required (see technical description "SMA CLUSTER CONTROLLER Modbus® Interface").
The Cluster Controller does not send any reply within the reply time specified by the Modbus client.	The Modbus configuration may be incorrect. **Corrective Measures:** • Check the Modbus configuration using the assignment tables and adjust if required (see technical description "SMA CLUSTER CONTROLLER Modbus® Interface").
The Cluster Controller does not transmit a value specified in the Modbus profile to the devices in the plant.	The Modbus configuration may be incorrect. **Corrective Measures:** • Check the Modbus configuration using the assignment tables and adjust if required (see technical description "SMA CLUSTER CONTROLLER Modbus® Interface").

18.3 Restarting the Cluster Controller via the User Interface

1. Log in to the Cluster Controller as **Installer**.
2. Select the Cluster Controller in the plant tree and select the **Settings** menu in the device menu.
3. Select the parameter group **Device > System**.
4. In the **Initiate device restart** field, select [**Execute**].
   ☑ The Cluster Controller is restarted. The start-up procedure can take up to two minutes.

18.4 Resetting the Cluster Controller

You can reset the Cluster Controller via the button field.

Procedure:

1. Simultaneously press and hold [**OK**] and [**ESC**] for two seconds.
   ☑ The **Settings** display view opens.
2. Select the settings that are to be reset:

Settings to be reset	Explanation
Resetting your Password	The user password and the installer password are reset.
Reset network settings	The network settings of the Cluster Controller are reset.
Restoring Factory Settings	The Cluster Controller is reset to default settings. Stored plant data is deleted.

3. To exit the **Settings** display view again, press [**ESC**].
4. To confirm the settings that are to be reset, perform the following steps:
   - Press [**OK**].
   ☑ The **Confirm the Resetting** display view appears.
   - Select **OK** and confirm with [**OK**].
   ☑ The selected settings are reset.
   ☑ If the network settings were reset or the Cluster Controller was reset to default settings, the Cluster Controller restarts.
5. If Sunny Portal is used and the Cluster Controller was reset to default settings, adjust the plant detection for Sunny Portal in the Cluster Controller (see Section 11.6).

19 Accessories

You will find the corresponding accessories and spare parts for your product in the following overview. If required, you can order them from SMA Solar Technology AG or from your specialist dealer.

Description	Brief description	SMA order number
Top-hat rail power supply unit	Top-hat rail power supply for the SMA Cluster Controller	CLCON-PWRSUPPLY
USB stick 4 GB	USB memory stick with storage capacity of 4 GB	USB-FLASHDRV4GB
USB stick 8 GB	USB memory stick with storage capacity of 8 GB	USB-FLASHDRV8GB

20 Contact

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

- Cluster Controller:
  - Serial number
  - Firmware version
- Inverters:
  - Type
  - Serial number
  - Firmware version
- When using a retrofitted Speedwire/Webconnect interface:
  - Serial number and firmware version of the Speedwire/Webconnect interface

You can read out the necessary information via the user interface of the Cluster Controller (see Section 10.5). Alternatively, you can also read out the serial number and the device type on the type label of the respective product (see the respective product manual). You can read out the serial number and the firmware version of the Cluster Controller on the **Cluster Controller** display view

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: International:	1800 SMA AUS (1800 762 287) +61 2 9491 4200
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Brasil	Vide España (Espanha)		
Česko	SMA Central & Eastern Europe s.r.o. Praha	+420 235 010 417	
Chile	Ver España		
Danmark	Se Deutschland (Tyskland)		

Deutschland	SMA Solar Technology AG Niestetal	Medium Power Solutions	
		Wechselrichter: Kommunikation: SMS mit „Rückruf“:	+49 561 9522-1499 +49 561 9522-2499 +49 176 888 222 44
		Hybrid Energy Solutions	
		Sunny Island:	+49 561 9522-399
		Power Plant Solutions	
		Sunny Central:	+49 561 9522-299
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