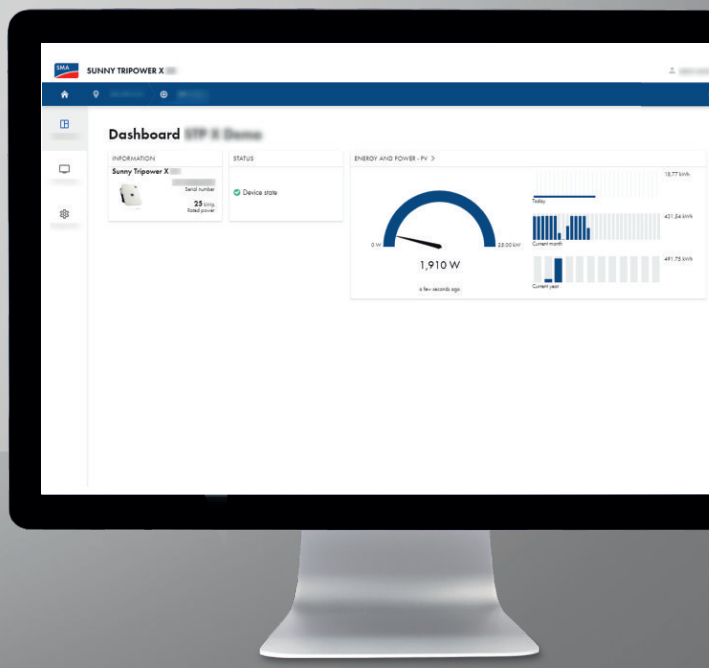
User Manual

ennexOS



Operation of the User Interface of Products powered by ennexOS

ENGLISH

ennexOS-BA-en-12 | Version 1.2

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Passwords managed by this SMA product are always stored encrypted.

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1 Information on this Document

1.1 Validity

This document is valid for the following SMA products with an user interface powered by ennexOS:

Product	Type	From firmware version
Sunny Boy Smart Energy 3.6 / 4.0 / 5.0 / 6.0 / 8.0 / 9.9	SBSE3.6-50 / SBSE4.0-50 / SBSE5.0-50 / SBSE6.0-50 / SBSE8.0-50 / SBSE9.9-50	3.17.x.R
Sunny Boy Smart Energy 3.8-US / 4.8-US / 5.8-US / 7.7-US / 9.6-US / 11.5-US	SBSE3.8-US / SBSE4.8-US / SBSE5.8-US / SBSE7.7-US / SBSE9.6-US / SBSE11.5-US	
Sunny Tripower Hybrid X 5 / 6 / 8 / 10 / 12 / 15 / 20 / 25 / 30	STPH5-60 / STPH6-60 / STPH8-60 / STPH10-60 / STPH12-60 / STPH15-60 / STPH20-70 / STPH25-70 / STPH30-70	
Sunny Tripower X 12 / 15 / 20 / 25	STP 12-50 / STP 15-50 / STP 20-50 / STP 25-50	
Sunny Tripower X 13-US (208V) / 20-US / 25-US / 30-US	STP 13-US-50 / STP 20-US-50 / STP 25-US-50 / STP 30-US-50	
Sunny Tripower X 50 / 60	STP 50-80 / STP 60-80	
Sunny Tripower X 27-US / 50-US / 62-US / 70-US	STP 31-US-80 / STP 50-US-80 / STP 62-US-80 / STP 70-US-80	
Sunny Tripower Storage X	STPS30-20 / STPS 50-20	
Sunny Island X	SI30-20 / SI50-20	
Sunny Island X-US	SI27-US (208V) / SI60-US	
Sunny Highpower Storage	SHPS 100-30 / SHPS 150-30 / SHPS 172-30 / SHPS 180-30	
Sunny Highpower Storage-US	SHPS 125-US-30 / SHPS 150-US-30 / SHPS 172-US-30 / SHPS 180-US-30 /	
SMA Data Manager M	EDMM-20	2.07.x.R
SMA eCharger	EVC22-3AC-20	

1.2 Target Group

This document is intended for qualified persons and end users. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by end users. Qualified persons must have the following skills:

- Training to deal with risks associated with installing, repairing, and using electrical devices, inverters, and batteries
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, regulations, standards, and directives
- Knowledge of and compliance with this document and all safety information
- Knowledge of and compliance with all documentation related to the products including all safety information

1.3 Content and Structure of this Document

This document describes the configuration and operation of products with a user interface powered by ennexOS.

The latest version of this document and the comprehensive manual for installation, commissioning, configuration and decommissioning of each SMA product can be found in PDF format or as eManual at www.SMA-Solar.com

This document supplements the documents that are enclosed with each product and does not replace any locally applicable codes or standards. Read and observe all documents supplied with the product.

Illustrations in this document are reduced to the essential information and may deviate from the real product.

1.4 Symbols in the Document

Symbol	Explanation
ℹ	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Required result
	Example

1.5 Typographies in the document

Typography	Use	Example
bold	• Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered	• Connect the insulated conductors to the terminals **-X703:1** to **-X703:6**. • Enter **10** in the field **Minutes**.
>	• Connects several elements to be selected	• Go to Settings > Date.
[**Button**] [**Key**]	• Button or key to be selected or pressed	• Select [**Enter**].
#	• Placeholder for variable components (e.g., parameter names)	• Parameter **WCtlHz.Hz#**

1.6 Designations in the Document

Complete designation	Designation in this document
User interface powered by ennexOS	User interface
Sunny Boy Smart Energy	Inverter, hybrid inverter, product
Sunny Tripower Hybrid X	Inverter, hybrid inverter, product
Sunny Tripower X 25 Sunny Tripower X 30-US	Inverter, PV inverter, product

Complete designation	Designation in this document
Sunny Tripower X 60 Sunny Tripower X 70-US	Inverter, PV inverter, product
Sunny Tripower Storage X	Inverter, battery inverter, product
Sunny Island X	Inverter, battery inverter, product
SMA Data Manager M	Communication product, product
SMA eCharger	Charging station, product

1.7 Additional Information

The following table provides some important additional information. Additional documents and language versions are available in the Downloads section on the product pages of the (e.g. Sunny Boy Smart Energy product page) at **www.SMA-Solar.com**.

Title and information content	Link to information
"SUNNY BOY SMART ENERGY 3.6 / 4.0 / 5.0 / 6.0 / 8.0 / 9.9"	Operating manual product page
"SUNNY BOY SMART ENERGY 3.8-US / 4.8-US / 5.8-US / 7.7-US / 9.6-US / 11.5-US"	Operating manual product page
"SUNNY TRIPOWER HYBRID X 5 / 6 / 8 /10 / 12 / 15"	Operating manual product page
"SUNNY TRIPOWER HYBRID X 20 / 25 / 30"	Operating manual product page
"SUNNY TRIPOWER X 25"	Operating manual product page
"SUNNY TRIPOWER X 30-US"	Operating manual
"SUNNY TRIPOWER X 60"	Operating manual product page
"SUNNY TRIPOWER X70-US"	Operating manual
"SUNNY TRIPOWER STORAGE X"	System Manual product page
"SUNNY ISLAND X"	Operating manual product page
"SUNNY ISLAND X-US"	Operating manual product page
"SMA Data Manager M"	Operating manual product page

Title and information content	Link to information
"SMA eCharger"	Operating manual product page
"Sunny Portal powered by ennexOS"	User manual product page
"SMA energy management powered by ennexOS"	Technical information

2 Safety

2.1 Intended Use

The user interface powered by ennexOS is the central software solution for configuring and monitoring the SMA products specified in the scope of application. The basic operation is the same across all products. The range of functions and available settings vary depending on the specific device type.

The documentation must be strictly followed. Deviations from the described actions and the use of materials, tools, and aids other than those specified by SMA Solar Technology AG are expressly forbidden.

Use SMA products only in accordance with the information provided in the enclosed documentation and with the locally applicable laws, regulations, standards and directives. Any other application may cause personal injury or property damage.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The documentation supplied is an integral part of SMA products. Keep the documentation in a convenient, dry place for future reference and observe all instructions contained therein.

This document does not replace any regional, state, provincial, federal or national laws, regulations or standards that apply to the installation, electrical safety and use of the product. SMA Solar Technology AG assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

2.2 IMPORTANT SAFETY INFORMATION

NOTICE

Manipulation of system data in networks

You can connect the supported SMA products to the Internet. When connected to the Internet, there is a risk that unauthorized users can access and manipulate the data of your system.

- Set up a firewall.
- Close unnecessary network ports.
- If absolutely necessary, only enable remote access via a virtual private network (VPN).
- Remote access must only be permitted via a secure connection.
- Do not use the port forwarding feature. This also applies to the used Modbus ports.

NOTICE

Damage of SMA products due to cyclical changing of parameters

The parameters of SMA products that can be changed with writable Modbus registers (RW) are intended for long-term storage of device settings. Cyclical changing of these parameters leads to destruction of the flash memory of the SMA products.

Parameters for grid management services to control and limit the nominal PV system power are an exception. Such parameters (system control objects) may be changed cyclically.

- Do not change device parameters cyclically.
- Use the parameters for grid management services for the automated remote control of the PV system.

Communication disturbances in the local network

The IP address range 192.168.12.0 to 192.168.12.255 is reserved for the SMA-internal data exchange and cannot be used for system communication within the local network.

Communication problems might occur if this IP address range is used in the local network.

- Do not use the IP address range 192.168.12.0 to 192.168.12.255 in the local network.

Requirements in the documents enclosed with each product must be observed.

This document supplements the documents that are enclosed with each product and does not replace any locally applicable codes or standards.

- Read and observe the requirements in the documents enclosed with the products in addition to the requirements stated below.

3 Interfaces and Functions

3.1 SMA Premium

Availability of SMA products in your country

Not all SMA products are available in all countries. For information on whether an SMA product is available in your country, check the information on the product page at https://www.SMA-Solar.com.

SMA Premium is an expanded function package that enables the use of the Energy Maximizer and thus supports optimal operation of PV systems. SMA Premium gives users access to intelligent energy management functions that help to increase self-consumption, utilize dynamic electricity costs, automatically control loads (electricity storage system, SMA eCharger, SMA EV Charger Business), and improve the economic efficiency of the system.

Activation of SMA Premium is done using Sunny Portal powered by ennexOS or the SMA Energy App. After activation, the package can be managed with the SMA ID.

Also see:

- Energy Maximizer ⇒ page 12
- Energy Planner ⇒ page 12

3.2 Energy Maximizer

The Energy Maximizer is an automated energy management system that provides intelligent optimizations to control energy flows across the entire system. The system uses forecast data and internal analytical algorithms to dynamically coordinate loads and storage and use energy efficiently. Code functions include:

- Automatic optimization of energy flows based on PV generation forecasts and tariff forecasts
- Consumption patterns and system sensors
- Proactive load shifting to increase self-consumption and avoid peak loads to reduce curtailment losses. Priority should be given to the use of electric current that is not remunerated, and, in the event of a negative feed-in tariff, grid feed-in should be prevented.

The Energy Maximizer operates completely autonomously and does not require no manual intervention. It minimizes the configuration effort and improves the energy efficiency of the entire system at the same time.

The product can be activated via SMA Premium to expand the basic functions of products powered by ennexOS. The configuration can then be carried out via Sunny Portal powered by ennexOS.

Also see:

- SMA Premium ⇒ page 12

3.3 Energy Planner

The Energy Planner provides the basic functions that are always available for SMA energy management. The application allows you to configure the energy management manually and customize it to your needs.

The core functions include:

- Manual planning and control of energy flows within the system, with a focus on integrated batteries
- Configuration of peak load profiles and consumption profiles according to individual preferences or processes
- Fundamental visualization and analysis of the energy distribution in Sunny Portal powered by ennexOS
- Independent adjustment of operating parameters without automated intervention

The Energy Planner therefore serves as a flexible platform that enables basic energy management measures without relying on automated optimization mechanisms.

Also see:

- SMA Premium ⇒ page 12

4 Design of the User Interface

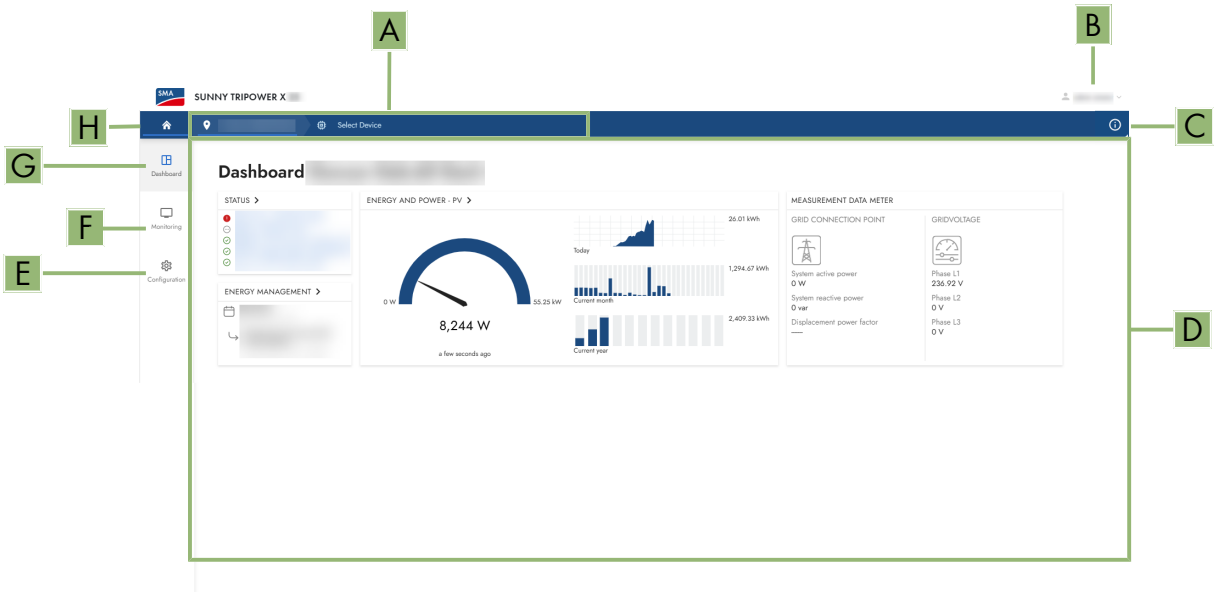

Figure 1: Design of the User Interface

Position	Designation	Description
A	Focus navigation	Enables the navigation between the following levels: • System • Device
B	User settings	Provides the following functions: • Configuring personal data • Logout • Activation PUK 2.0
C	System information	Displays the following information: • System • Device information • Licenses • eManual
D	Content Area	Displays the dashboard or content of the selected menu.
E	Configuration	Offers different views for configuration, depending on the selected level and user role.
F	Monitoring	Offers different views for monitoring, depending on the scope of the connected devices.
G	Dashboard	Displays information and instantaneous values of the device or system currently selected.
H	Home	Opens the user interface home page

5 Possible operating states

The **Status** in the dashboard provides an overview of possible operating states of the product. Depending on the color coding, additional information may be available, which can be called up via **Monitoring > Event monitor**.

Symbol	Color coding	Description
		Device OK.
		Attention needed.
		There is an error.
		Device has a communication error.

6 Establishing a connection to the user interface of inverters and charging stations

6.1 Information on establishing a connection

To establish a connection, SMA Solar Technology AG recommends only using Wi-Fi for commissioning. For a stable connection, especially in systems with e.g. system control or energy management, an Ethernet connection is advisable in order to prevent feed-in problems or yield losses.

For the operation of the Sunny Island X, the Sunny Tripower Storage X and the SMA Data Manager M, only the connection via Ethernet is to be used. Wi-Fi is only available for these devices for commissioning.

Additionally, the Wi-Fi direct connection with the SMA 360° app (see Section 6.3.3 "Establishing a direct Wi-Fi connection with the 360° app", page 17) is only available within the app for the following inverters:
Sunny Boy Smart Energy, Sunny Tripower X 25, Sunny Tripower X 60, Sunny Tripower Hybrid X and SMA eCharger.
When commissioning all other products powered by ennexOS with the SMA 360° app, you will be automatically sent to the user interface of the product.

6.2 Connection in the local network

6.2.1 Access addresses for the product in the local network

i DHCP Server is recommended

The DCHP server automatically assigns the appropriate network settings to your nodes in the local network. A manual network configuration is therefore not necessary. In a local network, the Internet router is usually the DHCP server. If the IP addresses in the local network are to be assigned dynamically, DHCP must be activated in the Internet router (see the Internet router manual). In order to receive the same IP address by the internet router after a restart, set the MAC address binding.

In networks where no DHCP server is active, proper IP addresses must be assigned from the free address pool of the network segment to all network participants to be integrated during commissioning.

i Observing network segregation

The Data Manager M features separate network areas for the internal system network and the external network. The internal DHCP server of the device is only available in the internal system network. In the external network, the product does not provide a DHCP.
An active DHCP server automatically assigns the appropriate network settings to your nodes in the respective network segment. A manual network configuration is therefore not necessary. In external networks, the Internet router can provide DHCP (see manual of the Internet router). In order to receive the same IP address by the internet router after a restart, MAC address binding can be set up.

In networks where no DHCP server is active, proper IP addresses must be assigned from the free address pool of the network segment to all network participants to be integrated during commissioning.

i Communication disturbances in the local network

The IP address range 192.168.12.0 to 192.168.12.255 is reserved for the SMA-internal data exchange and cannot be used for system communication within the local network.

Communication problems might occur if this IP address range is used in the local network.

- Do not use the IP address range 192.168.12.0 to 192.168.12.255 in the local network.

If the product is connected to a local network (e.g. via an Internet router or Wi-Fi), the product will receive a new IP address. Depending on the type of configuration, the new IP address will be assigned automatically by the DHCP server (Internet router) or manually by you.

Upon completion of the configuration, the product can only be reached via the listed access addresses in the local network:

- Generally applicable access address: IP address manually assigned or assigned by the DHCP server (Internet router) (identification via network scanner software or network configuration of the Internet router).
- Access address: **https://SMA[serial number]** (e.g. https://SMA0123456789)

6.2.2 Establishing a Connection via Ethernet in the local network

Does not apply to the SMA Data Manager M.

Requirements:

☐ The product must be connected to the local network via a network cable (e.g. via a router).

☐ The product must be integrated into the local network. Tip: You can change the network configuration on the welcome page of the product.

☐ A smart terminal device (e.g., laptop) must be available.

☐ The smart terminal device must be in the same local network as the product.

☐ The respective latest version of one of the following web browsers must be installed on the smart terminal device: Chrome, Edge, Firefox or Safari.

Procedure:

1. Open the web browser of your smart terminal device.
2. Enter the access address of the product in the address bar of the web browser.
3. **Web browser displays warning**

   After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.

   - Continue loading the user interface (scroll to bottom and click proceed/advance).

☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.

☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access addresses for the product in the local network ⇒ page 15

6.2.3 Establishing a Connection via WLAN in the Local Network

Does not apply to the SMA Data Manager M.

Stable Wi-Fi connection required

An unstable Internet connection can disrupt the product's communication. SMA recommends connecting the product to the local network via Ethernet.

Requirements:

☐ The product must be commissioned.

☐ The product must be integrated into the local network. Tip: You can change the network configuration on the welcome page of the product.

☐ A smart terminal device (e.g., laptop) must be available.

☐ The smart terminal device must be in the same local network as the product.

☐ The respective latest version of one of the following web browsers must be installed on the smart terminal device: Chrome, Edge, Firefox or Safari.

Procedure:

1. Open the web browser of your smart terminal device.
2. Enter the access address of the product in the address bar of the web browser.

3. **Web browser displays warning**
   After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.
   - Continue loading the user interface (scroll to bottom and click proceed/advance).

☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.

☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access addresses for the product in the local network ⇒ page 15

6.3 Direct connection via Wi-Fi

6.3.1 Connection options for Wi-Fi direct connection

You have several options to connect the product to a smart device. The procedure can be different depending on the devices. If the procedures described do not apply to your end device, establish the direct connection via Wi-Fi as described in the manual of your end device.

The following connection options ar available:

- Direct Wi-Fi connection with WPS (see Section 6.4.3 "Establishing a direct Wi-Fi connection with WPS", page 18)
- Direct Wi-Fi connection with Wi-Fi network search (see Section 6.3.4 "Establishing direct Wi-Fi connection with Wi-Fi network search", page 18)

6.3.2 Access information for direct Wi-Fi connection

Access information for the direct WiFi connection can be found below:

- SSID: **SMA[serial number]** (e.g., SMA0123456789)
- Device-specific Wi-Fi password: WPA2-PSK (see type label of the product)
- Default access address: **https://smalogin.net** or **https://192.168.12.3**

6.3.3 Establishing a direct Wi-Fi connection with the 360° app

Does not apply to the SMA Data Manager M.

Requirements:

☐ A smart end device with camera must be available.

☐ The SMA 360° App must be installed on the smart device.

☐ An SMA ID must be available.

Procedure:

1. Open the SMA 360° App and login with the Sunny Portal account details.
2. Go to **Operation** > **User interface** to connect to the inverter's Wi-Fi.
3. Scan the QR Code on you product via the SMA 360° App.
   ☑ The smart device automatically connects to the product. The login page of the user interface is displayed in the 360° App.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 17

6.3.4 Establishing direct Wi-Fi connection with Wi-Fi network search

Does not apply to the SMA Data Manager M.

1. Search for Wi-Fi networks with your smart device.
2. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
3. Enter the device-specific Wi-Fi password (see WPA2-PSK on the type label).
4. Open the web browser of your smart end device and enter **https://smalogin.net** in the address bar.
   - ☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.
   - ☑ The login page of the user interface opens if the product has already been configured.
5. If the login page of the user interface does not open, enter the IP address **https://192.168.12.3** or, if your smart terminal supports mDNS services, **SMA[serial number].local** or **https://SMA[serial number]** in the address bar of the web browser.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 17

6.4 WPS function

6.4.1 Connection options with WPS

You have several options to use the WPS function. Depending on the possible application of the WPS function, the procedure for activation will vary.

The following options are available:

- WPS for automatic connection to a network (e.g. via a router)
- WPS for direct connection between the product and a smart device

6.4.2 Activating WPS for automatic connection

Does not apply to the SMA Data Manager M.

Requirements:

- ☐ WLAN must be activated in the product.
- ☐ WPS must be activated on the router.
- ☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu **Configuration**.
2. Select **Network configuration** menu item.
3. Click on the button **Use WPS** in the **Wi-Fi** section.
4. Click on [**Save**].

☑ The WPS function is activated and the automatic connection to the network can be established.

6.4.3 Establishing a direct Wi-Fi connection with WPS

Does not apply to the SMA Data Manager M.

Requirements:

- ☐ A smart device (e.g., laptop) with WPS function must be available.

Procedure:

1. Enable the WPS function on the inverter. To do this, tap on the enclosure lid of the inverter twice.
   ☑ The blue LED flashes slowly for approx. 2 minutes. The WPS function is active during this time.
2. Ensure that the WPS function is enabled on your smart device.
   ☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.
   ☑ The login page of the user interface opens if the product has already been configured.
3. If the login page of the user interface does not open, enter the IP address **https://192.168.12.3** or, if your smart terminal supports mDNS services, **SMA[serial number].local** or **https://SMA[serial number]** in the address bar of the web browser.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 17

7 Establishing a Connection to the User Interface of Communication Products

7.1 Connection in the local network

7.1.1 Access addresses for the product in the local network

DHCP Server is recommended

The DCHP server automatically assigns the appropriate network settings to your nodes in the local network. A manual network configuration is therefore not necessary. In a local network, the Internet router is usually the DHCP server. If the IP addresses in the local network are to be assigned dynamically, DHCP must be activated in the Internet router (see the Internet router manual). In order to receive the same IP address by the internet router after a restart, set the MAC address binding.

In networks where no DHCP server is active, proper IP addresses must be assigned from the free address pool of the network segment to all network participants to be integrated during commissioning.

Observing network segregation

The Data Manager M features separate network areas for the internal system network and the external network. The internal DHCP server of the device is only available in the internal system network. In the external network, the product does not provide a DHCP.
An active DHCP server automatically assigns the appropriate network settings to your nodes in the respective network segment. A manual network configuration is therefore not necessary. In external networks, the Internet router can provide DHCP (see manual of the Internet router). In order to receive the same IP address by the internet router after a restart, MAC address binding can be set up.

In networks where no DHCP server is active, proper IP addresses must be assigned from the free address pool of the network segment to all network participants to be integrated during commissioning.

Communication disturbances in the local network

The IP address range 192.168.12.0 to 192.168.12.255 is reserved for the SMA-internal data exchange and cannot be used for system communication within the local network.

Communication problems might occur if this IP address range is used in the local network.

- Do not use the IP address range 192.168.12.0 to 192.168.12.255 in the local network.

If the product is connected to a local network (e.g. via an Internet router or Wi-Fi), the product will receive a new IP address. Depending on the type of configuration, the new IP address will be assigned automatically by the DHCP server (Internet router) or manually by you.

Upon completion of the configuration, the product can only be reached via the listed access addresses in the local network:

- Generally applicable access address: IP address manually assigned or assigned by the DHCP server (Internet router) (identification via network scanner software or network configuration of the Internet router).
- Access address: **https://SMA[serial number]** (e.g. https://SMA0123456789)

7.2 Direct connection via Wi-Fi

7.2.1 Connection options for Wi-Fi direct connection

You have several options to connect the product to a smart terminal (e.g. laptop). The procedure can be different depending on the end devices. If the procedures described do not apply to your end device, establish the direct connection via Wi-Fi as described in the manual of your end device.

The following connection options ar available:

- Establishing a direct Wi-Fi connection by entering the Wi-Fi data from the type label

- Establishing a direct Wi-Fi connection by scanning the QR code from the device label

7.2.2 Access information for direct Wi-Fi connection

Communication disturbances in the local network

The IP address range 192.168.12.0 to 192.168.12.255 is reserved for the SMA-internal data exchange and cannot be used for system communication within the local network.

Communication problems might occur if this IP address range is used in the local network.

- Do not use the IP address range 192.168.12.0 to 192.168.12.255 in the local network.

Access information for the direct WiFi connection can be found below:

- SSID: **SMA[serial number]** (e.g., SMA0123456789)
- Device-specific Wi-Fi password: WPA2-PSK (see type label of the product)
- Default access address: **https://192.168.12.3**

7.2.3 Establishing a direct Wi-Fi connection by entering the Wi-Fi data

Only applies to communication products.

Requirements:

☐ A smart terminal (e.g. laptop) must be available.

Procedure:

1. Activate the Wi-Fi access point on the product. Tap on the enclosure lid of the product twice.
   ☑ The COM LED is intermittently flashing orange and green for approx. 5 seconds. The Wi-Fi access point is then activated for approx. 30 minutes. Once this period has expired, the Wi-Fi access point is deactivated automatically. During commissioning, the COM LED is flashing until an administrator account has been set up.
2. Search for Wi-Fi networks with your smart device.
3. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
4. Enter the device-specific Wi-Fi password (see WPA2-PSK on the type label).
5. Open the web browser of your smart terminal and enter the IP address **https://192.168.12.3** into the address bar or, if your smart terminal supports MSDNs services, **SMA[serialnumber].local** or **https://SMA[serialnumber]**.
   ☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.
   ☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 17

7.2.4 Establishing a direct Wi-Fi connection by scanning the QR code

Only applies to communication products.

Requirements:

☐ A smart terminal (e.g. laptop) must be available.

Procedure:

1. Activate the Wi-Fi access point on the product. Tap on the enclosure lid of the product twice.
   ☑ The COM LED is intermittently flashing orange and green for approx. 5 seconds. The Wi-Fi access point is then activated for approx. 30 minutes. Once this period has expired, the Wi-Fi access point is deactivated automatically. During commissioning, the COM LED is flashing until an administrator account has been set up.
2. Scan the QR code on the device label using your terminal.
3. Confirm the connection to the Wi-Fi access point of the product on your terminal. It may be necessary to deactivate the mobile data connection on your smart terminal.
4. Open the web browser of your smart terminal and enter the IP address **https://192.168.12.3** into the address bar or, if your smart terminal supports MSDNs services, **SMA[serialnumber].local** or **https://SMA[serialnumber]**. Or, to open the user interface directly, scan the right QR code on the label included in the delivery using your smart terminal.
   ☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.
   ☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 17

8 Configuring Service Access

The PUK 2.0 function allows you to grant an SMA-authorized service user access to the product's user interface in the event of a product malfunction or when performing warranty services. With PUK 2.0, you can configure yourself whether and for how long service access to your system is possible. If no service access is configured, your system cannot be accessed.

In order for the service user to access your system, a VPN connection may also need to be set up.

Requirements:

☐ The product's user interface must be open and you must be logged in.

Procedure:

1. In the user settings, select **PUK 2.0 configuration**.
2. Select [**Configure**].
3. Select the desired duration for service access.
4. Click on [**Save**].

9 Bookmarking Instantaneous Values

If you frequently check certain instantaneous values, you can bookmark them. This makes it easier to quickly locate them in the product's user interface.

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Choose the product or system in the focus navigation.
2. Select the **Monitoring** menu.
3. Select the menu item **Realtime values**.
4. Call up the instantaneous value via the search function or navigate to the instantaneous value.
5. Click the star icon in the instantaneous value row, on the right under **Favorites**.
6. Select **Favorites** in the top-right corner of the table header to activate sorting.
   ☑ Favorites now appear at the top of the instantaneous values list.

10 User Management

10.1 Access rights to the user interface

During registration, one user with administrator rights is created. With administrator rights, you can add further system users who can configure user rights or delete users.

This gives users access to the system and to the devices recorded in the system.

You can assign the following roles for users:

- User
- Installer

In addition, administrator rights can be assigned for each role.

10.2 Delete user accounts

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If the password is lost, all user accounts can be reset and recreated. All system data will be retained.

Individual user accounts can be deleted via [**Configuration**] > **User management** if a user with administrator rights is still able to log in.

Requirements:

☐ The Device Key on the password sheet enclosed in the documentation package must be included in the scope of delivery. The Device Key is provided on the product for the SMA Data Manager M.

☐ The login page of the user interface must be open.

Procedure:

1. Click [**Delete user accounts?**] button.
2. Enter Device Key.
3. Select [**Delete**].

☑ The product is performing a restart. After the restart, you can create a new user account.

11 Modbus

11.1 SMA Modbus Client Profile

Connected Modbus devices can be used, for example, as energy meters for generation and consumption data at the point of interconnection or for energy monitoring. For this, predefined Modbus profiles, user-created Modbus profiles or the SunSpec Modbus profile must be used. The Modbus profiles will then be assigned to the Modbus devices.

11.2 SunSpec Modbus client profile

The product supports the standardized SunSpec Modbus profile via the interface of the Modbus client (Modbus TCP/RTU). The connected Modbus devices must conform with the SunSpec specification (see manufacturer manual).

The SunSpec Modbus-client profiles listed here are models that can be captured by System Managers.

The mandatory data of the following SunSpec models are supported:

Common model:

- 1, 11, 12

PV inverter:

- 101, 123, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 714

Battery inverter:

- 1, 123, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 101, 120, 121, 122

Hybrid inverter:

- 1, 123, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 101, 120, 121, 122, 160

Energy meters:

- 201, 202, 203, 204, 211, 212, 213, 214

11.3 Integrating an energy meter into systems with System Manager via Modbus

To record consumption or generation values, additional energy meters can be integrated into a system with System Manager directly via Modbus. The recorded measured values are then available for visualization and evaluation in Sunny Portal powered by ennexOS.

Integration is carried out via the Modbus interface of the respective meter. After successful configuration and assignment of the relevant registers, the measured data are read out cyclically and processed in the system. This allows both consumption and generation amounts to be displayed and used for other energy management functions.

11.4 Creating a New Modbus Client Profile

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **Device administration** in the **Configuration** menu.
3. Select the ⊕ button.
4. Select **Modbus devices** and confirm with [**Next**].
5. Select **Manage Modbus profiles**.
6. Select **Create a new Modbus profile**.

7. Fill out the entry fields and select [**Save**]. The device type and the mapping template, for example, specify the required Modbus registers.
8. If needed, Modbus-client profiles can be exported as JSON files and imported to other System Managers. To do this, open the profile in the list **Manage Modbus profiles** and export accordingly via [**Export**]. Import takes place at the same location when a new Modbus profile is created.

11.5 Registering a New Modbus Device and Assigning a Modbus Profile

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

☐ The connected Modbus devices must be configured to update their setpoints in cyclic intervals (maximum cycle time: 1 minute; recommended cycle time: 1 second).

☐ The Modbus devices must be in operation and connected to the product.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **Device administration** in the **Configuration** menu.
3. Select the ⊕ button.
4. Select **Modbus devices** and confirm with [**Next**].
5. Fill out the input fields and confirm with [**Next**].
   ☑ Available Modbus devices in the system are searched for and displayed.
6. Select the Modbus devices to be added to the system and select [**Save**].

☑ The connected Modbus device can be used as an energy meter for generation and consumption data at the point of interconnection or for energy monitoring or as sensor for wind speed, solar irradiation, and temperature.

12 Device Administration

12.1 Register Devices

You can register new devices and add them to the system on system level. This is required, for example, if your system has been expanded.

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Device management** menu item.
4. Select the ⊕ button.
5. Follow the steps of the device registration wizard.

12.2 Delete devices

You can delete registered devices on system level.

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Device management** menu item.
4. In the row of the device to be deleted, click the ••• button.
5. Select **Delete device**.
6. Select [**Delete**] in the displayed message.

12.3 Speedwire encryption

12.3.1 Speedwire Encryption of the System Communication

Speedwire encryption is used to encrypt system communication between all compatible Speedwire devices. In order to be able to use the Speedwire encryption in the system, all connected Speedwire devices, apart from the SMA Energy Meter, must support the SMA Speedwire Encrypted Communication function.

Speedwire encryption for systems with 1 System Manager

In systems with more than 1 System Manager, there can be overlaps in the system encryption.

- Only enable the Speedwire encryption in systems with 1 System Manager.

12.3.2 Enabling Speedwire Encryption

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Requirements:

☐ All devices in the local network must be in operation and connected to the product via an Internet router.

☐ All devices must support the Speedwire encryption.

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Device management** menu item.
4. Select the ⊕ button.
5. Select **SMA Speedwire devices** and confirm with [**Next**].
   ☑ All SMA Speedwire devices in the systems are searched for and displayed.
6. Enable SMA Speedwire encryption and select [**Continue**].
7. Assign a new system password and select [**Save**].
8. Repeat these steps for all Speedwire-capable devices in the system.

13 Parameter

13.1 Information on Parameter Settings with System Managers

When a System Manager is configured in a system, certain parameters are available not only at device level, but also at system level. In this case, it may be sufficient not to select a single product in the focus navigation to make settings that affect all subordinate devices. These settings are directly made at system level.

13.2 Changing parameters

The parameters of the product are set to certain values by default. You can change the parameters to optimize the performance of the product.

This section describes the basic procedure for changing parameters. Always change parameters as described in this section.

Requirements:

- ☐ The product's user interface must be open and you must be logged in.
- ☐ Changes to grid-relevant parameters must be approved by the responsible grid operator, and can only be made as an **installer**.

Procedure:

1. Choose the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Parameters**.
4. Call up the parameter via the search function or navigate to the parameter.
5. Change the parameter value.
6. Click on [**Save**].

13.3 Firmware Update

13.3.1 Automatically Updating the Firmware

By activating the automatic firmware update, the product searches and installs new firmware versions automatically provided an Internet connection exists. In the process, an available firmware update may take up to 48 hours.

Functional limitations during the update

While an update is being performed, the functions of the product may be limited. The product is performing a restart and may be without function at times. This process takes several minutes and cannot be canceled.

The automatic firmware update can be activated via the user interface during commissioning.

Requirements:

- The user interface must be open and you must be logged in as **User**.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Parameters**.
4. Select the value **Yes** for the parameter **Automatic updates enabled** or **Parameter.Upd.AutoUpdIsOn**.

5. Select the value **Yes** for the parameter **Device updates activated** or **Parameter.DevUpd.IsOn**.
6. Click on [**Save**].
   ☑ The firmware update can be manually triggered via the parameter **Check for update and install it** or **Parameter.Upd.AvalChkIstl**.

Also see:

- Update and backup ⇒ page 57

13.3.2 Automatically updating the firmware of connected devices

By activating the automatic firmware update, the product searches and installs new firmware versions of connected SMA products automatically provided an Internet connection exists. In the process, an available firmware update may take up to 48 hours.

The automatic firmware update can be activated via the user interface during commissioning.

i Firmware updates despite disabled automatic firmware update

The automatic firmware update is installed on connected SMA products even if the automatic firmware update function is disabled in the parameters of the connected SMA products.

- Only perform the automatic firmware update for connected SMA products if firmware updates are to be installed.

i Functional limitations during the update

While an update is being performed, the functions of the product may be limited. The product is performing a restart and may be without function at times. This process takes several minutes and cannot be canceled.

Requirements:

- The user interface must be open and you must be logged in as **User**.
- The connected SMA products must support automatic firmware updates via the product.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Parameters**.
4. Select the value **Yes** for the parameter **Automatic updates enabled** or **Parameter.Upd.AutoUpdIsOn**. This disables the automatic firmware update function in the parameters of the connected SMA products.
5. Click on [**Save**].
   ☑ The firmware update can be manually triggered via the parameter **Check for update and install it** or **Parameter.Upd.AvalChkIstl**.

Also see:

- Update and backup ⇒ page 57

13.4 Open-Loop and Closed-Loop Control via Digital Inputs

13.4.1 Open-loop control

The SMA products are equipped with digital inputs to which a ripple control receiver can be connected, for example. When the inverters receive setpoints in the form of digital signals via the ripple control receiver, open-loop control is used. The product reacts to the setpoints and implements them.

During open-loop control operations, the product does however not check whether the specified setpoint also matches the actual value, in other words the current value at the point of interconnection. There is therefore no actual value feedback to be processed further. It is not necessary to measure the feed-in power at the point of interconnection, and therefore systems with open-loop control do not require an energy meter.

Advantages:

- If the grid operator specifies setpoints and directly transmits these to the inverter as digital signals via a ripple control receiver, the inverter implements these specifications. If the product is used as system manager, it can run subordinate inverters using open-loop control and can transmit the specifications to the subordinate inverters.
- The "Control" function can be used in each SMA product without the need to install an additional energy meter.

Disadvantages:

- Open-loop control does not consider the possible self-consumption. Increased self-consumption is only possible with closed-loop control.

13.4.2 Closed-loop control

In closed-loop control operations, a setpoint is sent to the product as a digital signal, for example via a ripple control receiver. Here the product reacts to the setpoints and implements them. Subsequently, the product checks whether the specified setpoints matches the actual value, in other words the current value at the point of interconnection. There is a feedback loop with the actual value for further processing. For closed-loop control, it is necessary to measure the feed-in power at the point of interconnection. To this end, an energy meter has to be used, for example the SMA Energy Meter.

Advantages:

- If the grid operator specifies setpoints and directly transmits these to the inverter as digital signals via a ripple control receiver, the product implements these specifications. If the product is used as System Manager, it can run subordinate inverters using open-loop control and can transmit the specifications to the subordinate inverters.
- By integrating an energy meter, such as the SMA Energy Meter, the self-consumption can be increased. The energy meter regularly provides feedback to the product regarding the amount of feed-in power at the point of interconnection.
- When electrical loads have been integrated into the system, self-consumption can be increased if the product does not continuously limit its feed-in power, but instead dynamically adapts it at the point of interconnection, depending on the load power consumption. You can thus maximize your PV energy yield. In this case, limited specifications by the grid operator do not cause the product to be restricted to 70%, but instead the 30% excess energy is used by the loads.

13.4.3 Control and Regulation of Grid Management Services via Digital Inputs

During the configuration of grid management services, the operating modes **Open loop control** and **Closed loop control** can be selected via digital inputs.

- **Open loop control**: The System Manager limits the output power to the default value, ignoring any potential self-consumption.
- **Closed loop control**: This operating mode can only be selected when using the inverter in combination with an energy meter. The System Manager utilizes the measurement data from the energy meter at the point of interconnection to regulate the system's specified power output. As a result, self-consumption within the system is considered.

Also see:

- Separated reference values for the active power limitation ⇒ page 38

13.5 Control of external devices via Modbus

To control external devices, such as a battery, via Modbus using an additional system controller, activate the following parameter on the device level of the System Manager. The parameter is deactivated by default. If you activate the parameter, it is possible that SMA Energy Management will no longer function as expected because the settings via Modbus overwrite the settings from the SMA system.

Further information on control via Modbus can be found in the technical information "SMA GRID GUARD 10.0 - Grid Management Services via Inverter and System Controller" at www.SMA-Solar.com.

Channel	Name	Settings
Mb.ScdInEna	**Modbus P-settings at input 2**	**On** **Off**
Mb.TcpSrv.IsOn	**Modbus TCP server on**	**Yes** **No**
Mb.UdpSrv.IsOn	**Modbus UDP server on**	**Yes** **No**

13.6 Parameters for country data set

The product is not set to any country data set at the factory. While commissioning the product using the commissioning wizard or the SMA 360° app, a country data set appropriate for the installation site and intended purpose must be selected for the product to start operating.

If no country data set is configured during commissioning, the country data set **SMA 50 Hz-Stopp** is configured. In this case, the system cannot feed into the utility grid and the system is in the operating mode **Stop**.

If the setting is made via the System Manager, the country data set no longer needs to be manually updated in all other downstream devices within the system.

You can change the country standard via the user interface. First select the country data set and then the grid type suitable for your application.

Channel	Name	Settings
CntrySet	**Set country standard**	Selection of different country data sets
Inverter.GriTyp	**Grid type**	Selection of different grid types
Cntry	**Country standard**	Display of the currently set country data set
CntryBas	**Underlying country standard**	Display of the country data set on which the current settings are based
GridMs.GriTyp	**Grid type**	Display of the currently set grid type

13.7 Parameters for arc-fault circuit interrupter (AFCI)

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You can set the arc-fault circuit interrupter using the following parameters.

Channel	Name	Settings
AfciIsOn	**AFCI switched on**	**Yes** **No**

You can use the following parameters to set the manual restart after an arc fault detection.

Channel	Name	Settings
Operation.ManRstr.IsOn	**Manual restart activated**	**Yes** **No**
Operation.ManRstr.ManRstrAFCI	**Manual restart after arc detection**	**On** **Off** **Yes, after 5 electric arc detections within 24 hrs**

Also see:

- Changing parameters ⇒ page 30
- Manual restart after electric arc ⇒ page 63

13.8 Parameters for grid and PV system protection

If a relay for a grid and PV system protection is connected to the digital input, you must activate the grid and PV system protection.

The grid and PV system protection can be configured via the following parameters:

Channel	Name	Settings
PwrCtlMdul.GriSysPro	**Grid and system protection**	**On** **Off**

13.9 Parameters for backup operation

You can use the following parameters on the user interface of the System Manager, provided the System Manager supports backup operation, or via Sunny Portal powered by ennexOS, to set the operating mode of the secure power supply function and battery-backup function.

Channel	Name	Settings
Operation.BckTyp	**Configuration of the backup type**	**Off** **Secure power supply** **Automatic backup operation**

13.10 Setting of SMA ShadeFix

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You can set the time interval in which the inverter has to determine the optimum operating point and to optimize the MPP of the PV system. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.

Channel	Name	Settings
DcCfg.MPP-Shdw.CycTms	**Cycle time of SMA ShadeFix**	Time interval in seconds (180 s to 3600 s)

13.11 Check fan function

You can check the function of the fans by setting a parameter.

Requirements:

☐ You are logged in as **Installer** on the user interface of the inverter.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Parameters**.
4. Search for the parameter **Parameter.Coolsys.FanTst**.
5. Depending on the test requirements, set the parameter to [**Fan interior**] or [**Fan heat sink**] via the button [**Value**].
6. Confirm with [**Save**].
   ☑ The parameters are set and the fan test is being carried out. The result can be checked under the menu item **Monitoring > Event monitor**.
7. Check whether die fans on the device are audibly switched on.

13.12 Q on Demand 24/7

With the "Q on Demand 24/7" function, the inverter remains connected to the utility grid overnight and is supplied with power via the utility grid in order that it can provide reactive power. When connected overnight, the inverter only draws an insignificant amount of active power from the utility grid to supply its internal assemblies. Depending on grid conditions and PV module characteristics, the inverter can provide up to 100% of its rated power as reactive power. The provision of reactive power during feed-in operation leads to a reduction of the feed-in power. This means that at 100% reactive power, the feed-in power is 0%. If the inverter is disconnected from the utility grid outside of feed-in operation, the "Q on Demand 24/7" function is not active. The "Q on Demand 24/7" function can only be restarted once there is sufficient PV power at the DC inputs of the inverter, meaning that the inverter can briefly switch back to feed-in operation at least once.

If the “Q on Demand 24/7” function is activated for longer than 24 hours, a self-test is performed. The inverter is disconnected from the utility grid for a few minutes. The self-test should be carried out at a time when the sun is shining. As soon as enough DC power is available, the PV inverter starts operating again. The time for the self-test is set via the parameter **Time of cyclic insulation measurement**.

The general setting of the grid management services (e.g. cos phi setpoint or Q(V) characteristic curve) can not be fully set independently of the "Q on Demand 24/7" function via the relevant parameters - "Q on Demand 24/7" only permits Q specifications. It is to be noted here that certain settings can have an influence on other grid-support settings and functions.

This means that if the "Q on Demand 24/7" function" is active, no other grid-supporting functions (e.g., cos phi) are possible between day and night operation of the inverter. Should an independent reactive power provision be desired between day- and night operation, the reactive power provision must be communicated to the inverter via a superordinate control unit.

The function "Q on Demand 24/7" is not compatible with the reactive power modes **cos φ(P) charac. curve** or **cos φ(V) charac. curve**.

The provision of reactive power can only be read off in the instantaneous values (**GridMs.TotVAr**, **Reactive power**) or requested via Modbus.

You can set the reactive power mode using the following parameters.

Channel	Name	Settings
Inverter.VArModCfg.QoDEna	**Q on Demand**	**On** **Off**
Inverter.VArModCfg.VArCnstCfgDmd.VArNom	**Manual reactive power setpoint for zero power output**	0% to 100%
Inverter.VArModCfg.VArModZerW	**Reactive power for zero active power**	Selection of various reactive power modes
Inverter.VArModCfg.VArModZerWFlb	**Reactive power fallback process in case of zero active power**	Selection of various reactive power modes
Operation.LeakRisMsTm	**Time of cyclic insulation measurement**	Time in minutes starting from 0:00 a.m. (e.g., 600 minutes for 10:00 a.m.)

13.13 Parameters for Rapid Shutdown Function (US)

You can use the following parameters to set up the operating mode of the rapid shutdown function. These settings are only available for US products.

Channel	Name	Settings
Operation.RSSOpMode	**Rapid Shutdown Mode**	**On** **Off** **SunSpec shutdown**

You can use the following parameters to set which switch will act as the rapid shutdown initiator. When **Digital input** selected, a rapid shutdown initiator must be connected to the digital input **GSI**.

Channel	Name	Settings
Operation.RSSInitiator	**Rapid Shutdown Initiator**	**AC disconnect PV system** **Digital input**

Also see:

- Changing parameters ⇒ page 30

13.14 Restarting the product via the user interface

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Choose the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Parameters**.
4. Call up the parameter **Initiate device restart** (**Sys.DevRstr**) via the search function or navigate to the parameter.
5. Change the parameter value to **Execute**.
6. Click on [**Save**].
   ☑ The product is performing a restart.

14 Grid management service

14.1 Active Power Limitation

You can implement grid operator specifications for the limitation of the active power feed-in from 0% to 100% in your system. The setpoint for limitation of active power feed-in is specified in percent. The total power of the system serves as the reference value. If your grid operator requires the system not to feed in any active power, you must limit the active power feed-in to a fixed value of 0% and additionally adjust the preset value for the active power gradient. Thus, it is possible to limit the active power feed-in to 0% within a few seconds. To compensate for load step changes and to establish a safety distance to the active power limitation, a negative value can be set. This achieves a timely limitation of the active power feed-in. The value for the limitation of the active power feed-in should be adjusted to the load step changes accordingly. No further inverter settings are necessary.

14.2 Separated reference values for the active power limitation

The total AC power that the grid management service settings refer to is the sum of the outputs of PV, hybrid and battery inverters. Without any further configuration, external setpoints for active power limitation of direct sellers or grid providers are given as a percentage of the total AC power. If the active power limitation is to refer to other reference values, configurations must be made in the parameters at the system level.

While the parameters can be used independently, they are recommended for direct sellers and grid providers due to differing setpoint priorities: the grid operator's setpoints take precedence over those of the direct seller.

Channel	Name	Settings
Inverter.WModCfg.WCtlCom-Cfg.WRefMod	**External active power setpoint, selection of reference value**	**Maximum active power VMax**: Default setting **Reference value Active power**: This setting enables modification of the reference value used for direct sellers
Inverter.WModCfg.WCtlCom-Cfg2.WRefMod	**External active power setpoint2, selection of reference value**	**Maximum active power VMax**: Default setting **Reference value Active power**: This setting enables modification of the reference value used for grid providers
Inverter.WModCfg.WCtlCom-Cfg.WSptRef	**External active power specification, reference value**	Individual reference value in W for direct sellers
Inverter.WModCfg.WCtlCom-Cfg2.WSptRef	**External active power specification 2, reference value**	Individual reference value in W for grid providers

14.3 Configuring active and reactive power setpoints

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Supported inverters for the limitation of the active power feed-in to 0%

The limitation of the active power feed-in to 0% are only supported by inverters that support the fallback function. In the event of a communication failure between the product and the inverter, the inverter is reduced to an output power of 0% during fallback). For more information see the inverter manual at www.SMA-Solar.com.

Requirements:

☐ The configuration for the active power limitation must be agreed upon with the responsible grid operator.

☐ There must be an appropriate energy meter installed at the grid-connection point within the system.

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **Grid management service** in the menu **Configuration**.
3. Select the button **Configuration & activation** in the **Active and reactive power** row.
   ☑ The installation assistant will open.
4. Make the settings for **Grid settings**, **Active power** and **Reactive power** according to the specifications required by the grid operator and laid down in the standards and confirm each with [**Next**].
5. Click on [**Save**].

14.4 Configure additional specifications from the grid operator for the country data set.

⚠ QUALIFIED PERSON

During device registration, the required country data sets are selected for the detected devices. To achieve the correct control speed for the country data set, you need to make additional settings.

These settings refer to the PT1 element and the gradient to compensate for jumps in the incoming active power setpoints. These settings are configured separately for grid operators and direct sellers. By default, the value 3 s is set for the PT1 element and 0.5 %/s is set for the gradient. These values need to be adjusted according to the requirements of the grid operator.

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **Grid management service** in the menu **Configuration**.
3. Select the button **Configuration & activation** in the **Active and reactive power** row.
4. Open the configuration wizard for **Grid operator specifications** under **Active power**.
5. In case of a manual setpoint, activate **Manual setpoint for active power limitation** and enter the active power limitation specified by the grid operator.
6. In case of an external setpoint, activate **Source for external setpoint** and select the applicable options.
7. Activate **Behavior in case of setpoint change**.
8. Select **Implementation with PT1 element** and enter the values provided by the grid operator in the field **Setting time**. To achieve the fastest control speed, deactivate this option.
9. Select **Gradient** and enter the values provided by the grid operator for **Max. increase of the default value** and **Max. decrease of the default value**. To achieve the fastest control speed, deactivate this option.
10. Click on [**Next**].
11. Click on [**Save**].
12. Select the device in the focus navigation and make the same settings as at system level.

Also see:

- Register Devices ⇒ page 28

14.5 Configure additional direct seller's specifications for the country data set.

⚠ QUALIFIED PERSON

During device registration, the required country data sets are selected for the detected devices. To achieve the correct control speed for the country data set, you need to make additional settings.

These settings refer to the PT1 element and the gradient to compensate for jumps in the incoming active power setpoints. These settings are configured separately for grid operators and direct sellers. By default, the value 3 s is set for the PT1 element and 0.5 %/s is set for the gradient. These values need to be adjusted according to the requirements of the grid operator.

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **Grid management service** in the menu **Configuration**.
3. Select the button **Configuration & activation** in the **Active and reactive power** row.
4. Open the configuration wizard for **Direct seller settings** under **Active power**.
5. Under the **Direct seller settings**, activate the **Source for external setpoint** and select one of the available options.
6. Activate **Behavior in case of setpoint change**.
7. Select **Implementation with PT1 element** and enter the values provided by the grid operator in the field **Setting time**. To achieve the fastest control speed, deactivate this option.
8. Select **Gradient** and enter the values provided by the grid operator for **Max. increase of the default value** and **Max. decrease of the default value**. To achieve the fastest control speed, deactivate this option.
9. Click on [**Next**].
10. Click on [**Save**].
11. Select the device in the focus navigation and make the same settings as at system level.

Also see:

- Register Devices ⇒ page 28

14.6 Setting Zero Export

⚠ QUALIFIED PERSON

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

☐ **Optimized closed-loop/open-loop control** must be activated under **Operating mode for active power** (see Section 14.3 "Configuring active and reactive power setpoints", page 38).

Procedure:

1. Select the system in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Grid management services**.
4. Select **Configuration & activation** under **Active and reactive power**.
5. Open the sub-item **Grid operator specifications** in the **Active power** area.

6. Activate **Manual setpoint for active power limitation**.
7. Adjust the value to **0%**.
8. Click on [**Save**].

14.7 Setting phase-exact zero feed-in

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To set the phase-exact zero feed-in, the corresponding parameters must be set in the subordinate inverters and the system.

With phase-exact zero export, the grid feed-in is individually monitored on all three grid conductors. As soon as grid feed-in still occurs on a line conductor, the total feed-in power is reduced. This procedure is mandatory in some countries and may lead to increased grid-supplied power.

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

☐ **Optimized closed-loop/open-loop control** must be activated under **Operating mode for active power** (see Section 14.3 "Configuring active and reactive power setpoints", page 38).

Procedure:

1. Select the system in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Grid management services**.
4. Select **Configuration & activation** under **Active and reactive power**.
5. Open the sub-item **Grid operator specifications** in the **Active power** area.
6. Activate **Manual setpoint for active power limitation**.
7. Activate the button **Phase-exact zero active power feed-in**.
8. Click on [**Save**].

15 I/O configuration

15.1 Digital output

15.1.1 Use of one or multiple digital outputs (MFR)

The digital output (MFR) can be switched depending on measured values or states.

You have several options to use the digital output.

Possible use	Category	Explanation
Notification in the event of an error	System state	System is in warning or error state.
Alarm in case of warning or error	System state	System is in error state.
Direct selling enabled	System state	The active power limitation of the direct seller is currently used for the point of interconnection.
Battery state of charge[1)]	Monitoring	Balanced state of charge of all batteries in the system
System active power[1)]	Monitoring	Sum of the active power of all PV inverters in the system.
System reactive power[1)]	Monitoring	Balance of the reactive power of all selected PV inverters in the system.
Reactive power setpoint[1)]	Setpoints	Reactive power value to be set.
Setpoint of active power limitation[1)]	Setpoints	The active power value currently to be set.
Standardized measured voltage value for Q(V)[1)]	Point of interconnection	Standardized measured voltage value from the point of interconnection. For this, you require a valid Q(V) configuration in the grid management services.
System active power (grid-supplied power)[1)]	Point of interconnection	Currently drawn active power.
System active power (grid feed-in)[1)]	Point of interconnection	Currently fed-in active power.
System reactive power at the grid connection point[1)]	Point of interconnection	Current reactive power.

15.1.2 Configure the digital output (MFR)

⚠ QUALIFIED PERSON

Requirements:

- ☐ A signal source must be connected to the digital output (**MFR**).
- ☐ The product to which the signal receiver is connected must be configured as System Manager.
- ☐ The user interface must be open and you must be logged in as **Installer**.

[1)] Conditions for activating the outlet signal must be specified

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **I/O configurations**.
4. Select **+ New I/O configuration** to add a new configuration.
5. Select the type of the I/O channel **Digital output**.
6. Select the use for the digital output.
7. If necessary, activate inversion of the signal. Observe the pin assignment of the terminal block.
8. Click on [**Save**].

15.1.3 Operators for limit-based switching

The digital outputs of connected or integrated I/O systems can be switched depending on measured values or states. In this way, heat pumps or relays, for example, can be controlled by specifying a defined output. A specifically adjustable tolerance (hysteresis) prevents the digital outputs from switching even with minor fluctuations of the yields. In addition, the choice of operator can be used to specify whether the tolerance applies to falling below and/or exceeding the defined value.

Operator	Tolerance (hysteresis), example	Explanation
Greater than or equal to (>=)	5 %	No switching occurs within the range of 100% to 105% of the defined value.
Less than or equal to (<=)	5 %	No switching occurs within the range of 95% to 100% of the defined value.
Equal to	5 %	No switching occurs within the range of 97.5% to 102.5% of the defined value.

15.1.4 Parameter for limit-based switching

The following limits and parameters are available for limit-based switching:

- Direct selling enabled
- Notification in the event of an error
- Alarm in case of warning or error
- System active power (grid-supplied power)
- System active power (grid feed-in)
- System reactive power at the point of interconnection
- Standardized measured voltage value for Q(V)
- Reactive power setpoint
- Setpoint of active power limitation
- Battery state of charge
- System active power
- System reactive power

15.1.5 Reference values for threshold-based switching

When configuring threshold-based switching, ensure that the reference and threshold values are set optimally for your system. Depending on the situation, different reference values may be appropriate.

- **System active power**: The system's active power, calculated as the sum of the current inverter outputs, can serve as a meaningful reference value if there are no other loads in the system or if the switching behavior of the heat pump is intended to be independent of other loads in the system. The reference value can only be selected if **Monitoring** is chosen as the function for the digital or analog output in the I/O configuration.
- **System active power (grid feed-in)**: The active power feed-in measured at the point of interconnection is a meaningful reference value if there are additional loads in the system and the system generates more energy than is consumed, allowing regular feed-in to the utility grid. The reference variable can only be selected if **Point of interconnection** is chosen as the function of the digital or analog output in the I/O configuration.
- **System active power (grid-supplied power)**: Using the grid-supplied active power measured at the point of interconnection as a threshold is advisable when there is a defined upper limit for grid-supplied power that may be exceeded. The reference variable can only be selected if **Point of interconnection** is chosen as the function of the digital or analog output in the I/O configuration.

15.1.6 Switch digital outputs based on thresholds

Requirements:

☐ The user interface must be open and you must be logged in as **Installer**.

☐ A Data Manager M must be configured as System Manager in the system.

Procedure:

1. Select the system in the focus navigation.
2. Select the menu item **I/O configurations** in the **Configuration** menu.
3. In the **Manage I/O configurations** menu select the button **New I/O configuration**.
4. To configure the digital outputs of a connected device, select the option button **Digital output**.
5. Fill out the entry fields and select [**Save**].

15.2 Digital input

15.2.1 Instantaneous Values for Verifying Active Power Limitation

Instantaneous values listed below can be used to verify the correct operation of active power limitation through digital inputs.

Instantaneous values can be accessed on the inverter's user interface at the inverter level via **Monitoring** > **Realtime values**.

Channel	Name
GridMs.TotW.Pv	**PV power**
Operation.DrtStt	**Reason for derating**
Inverter.WModCfg.WCtlComCfg.WNom	**Normalized active power limitation by PV system control**
GridMs.TotWIn.Bat	**Power consumption battery**
GridMs.TotWOut.Bat	**Power grid feed-in battery**

Also see:

- Bookmarking Instantaneous Values ⇒ page 24

15.2.2 Configuring the digital input for the external setpoint

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If the grid operator specifications were not configured via the commissioning wizard, you can carry out the configuration as described below. For information on which digital input is intended for the external setpoint, refer to the operating manual of the product.

Requirements:

- ☐ Four freely configurable digital inputs must be available in the product.
- ☐ A ripple control receiver or remote terminal unit for active power setpoints must be connected to the digital input.
- ☐ The product that is connected to the ripple control receiver or the remote terminal unit must be configured as System Manager.
- ☐ The user interface must be open and you must be logged in as **Installer** or **Administrator**.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Grid management service**.
4. For the active and reactive power select **Configuration & activation**.
5. Open the configuration wizard for **Grid operator specifications** under **Active power**.
6. Activate **Source for external setpoint**.
7. Select **Digital inputs**.
8. Select **+ New I/O configuration**.
9. Select the System Manager as the source for the digital signal.
10. Select the digital inputs.
11. Configure the grid operator specifications. You can add a new line for each default value and specify the combination of signals (bits).
12. Click on **[Accept]**.
13. Configure the fallback behavior for missing setpoints.
14. If necessary, configure the behavior in case of setpoint change.

15.2.3 Configure digital inputs

⚠ QUALIFIED PERSON

Requirements:

- ☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **I/O configurations**.
4. Select **+ New I/O configuration** to add a new configuration.
5. Select the type of the I/O channel **Digital input**.
6. Select the use for the digital input.
7. Adjust further required settings (if applicable).

8. Assign a name to the I/O channel.
9. Click on [**Save**].

15.2.4 Configuring the fast stop function

⚠ QUALIFIED PERSON

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **I/O configurations**.
4. Select the type of the I/O channel **Digital input**.
5. Select the use for the digital input **Signal fast stop**.
6. Select source of the **digital value**.
7. Select the digital input that is to be used as the fast stop.
8. If necessary, activate inversion of the signal.
9. Assign a name to the I/O channel.
10. Click on [**Save**].

15.2.5 Use of an inverter's digital inputs together with a Sunny Home Manager

When an inverter is used in a system together with a Sunny Home Manager, the inverter must be set up as a subordinate device. However, any inverter with a ripple control receiver or remote terminal unit connected via the digital inputs must be configured as a System Manager.

In this configuration, an external active power setpoint can still be implemented by using an I/O module (e.g., MOXA ioLogik E 1214). In this case, the ripple control receiver is connected to the I/O module. The I/O module transmits the setpoints to the Sunny Home Manager via Modbus.

16 Energy management

16.1 Information on the use of the energy management

The energy management controls the energy flow in the system and optimizes the self-consumption. With the Energy Planner, you configure the time-dependent system behavior, for example for battery charge, grid feed-in or peak load shaving.

The Energy Planner can be configured via the user interface of the System Manager. This interface allows you to create and manage schedules for the operating modes each configured in the energy management.

As soon as the system is created in Sunny Portal powered by ennexOS, the schedules already configured on the user interface of the System Manager will be stored automatically in Sunny Portal. Then, the schedules can be updated or newly configured via the user interface of the System Manager or remotely via Sunny Portal. There is a continuous data exchange between the System Manager and Sunny Portal.

Sunny Portal additionally provides the option to configure schedules remotely and regardless of location. The user interface of the System Manager, however, is available only locally. The advantage of this is that settings can be made on the system even if the System Manager temporarily has no Internet connection, for example.

For the configuration of schedules it is required to activate the energy management and configure at least one operating mode. Only then are the corresponding schedule functions available.

The SMA Premium functions, in particular the Energy Maximizer, are only activated and configured in Sunny Portal ("User manual Sunny Portal powered by ennexOS"). These functions cannot be adjusted via the user interface of the System Manager.

Also see:

- SMA Premium ⇒ page 12
- Energy Maximizer ⇒ page 12
- Energy Planner ⇒ page 12

16.2 Activating the energy management

⚠ QUALIFIED PERSON

Requirements:

- ☐ A suitable energy meter is installed and configured at the point of interconnection within the system.
- ☐ A battery is available in the system and has been put into operation.
- ☐ The user interface is open and you are logged in.
- ☐ The operating mode for active power must be set to **Closed-loop control**.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. Select **Advanced settings**.
3. Select **Control by SMA energy management**.
4. Finish by clicking [**Save**].

Also see:

- Available operating modes ⇒ page 50

16.3 Deactivating the energy management

⚠ QUALIFIED PERSON

A single energy management profile cannot be deactivated, only changed. To deactivate the entire energy management, proceed as described in this section.

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. Select **Advanced settings**.
3. Select **No control by SMA energy management**.
4. Finish by clicking [**Save**].

☑ Energy management is deactivated. If there is a battery in the system, the respective battery or hybrid inverter must take over control itself. Otherwise, the battery will behave according to its fallback behavior (see Section 16.12 "Set battery fallback behavior when energy management is disabled", page 55).

Also see:

- Available operating modes ⇒ page 50

16.4 Predefined operating modes

The page shows predefined operating modes that are stored in the product. These profiles form the basis for configuring the energy management using individual operating modes. If an operating mode is not selected, Maximum increased self-consumption is activated automatically.

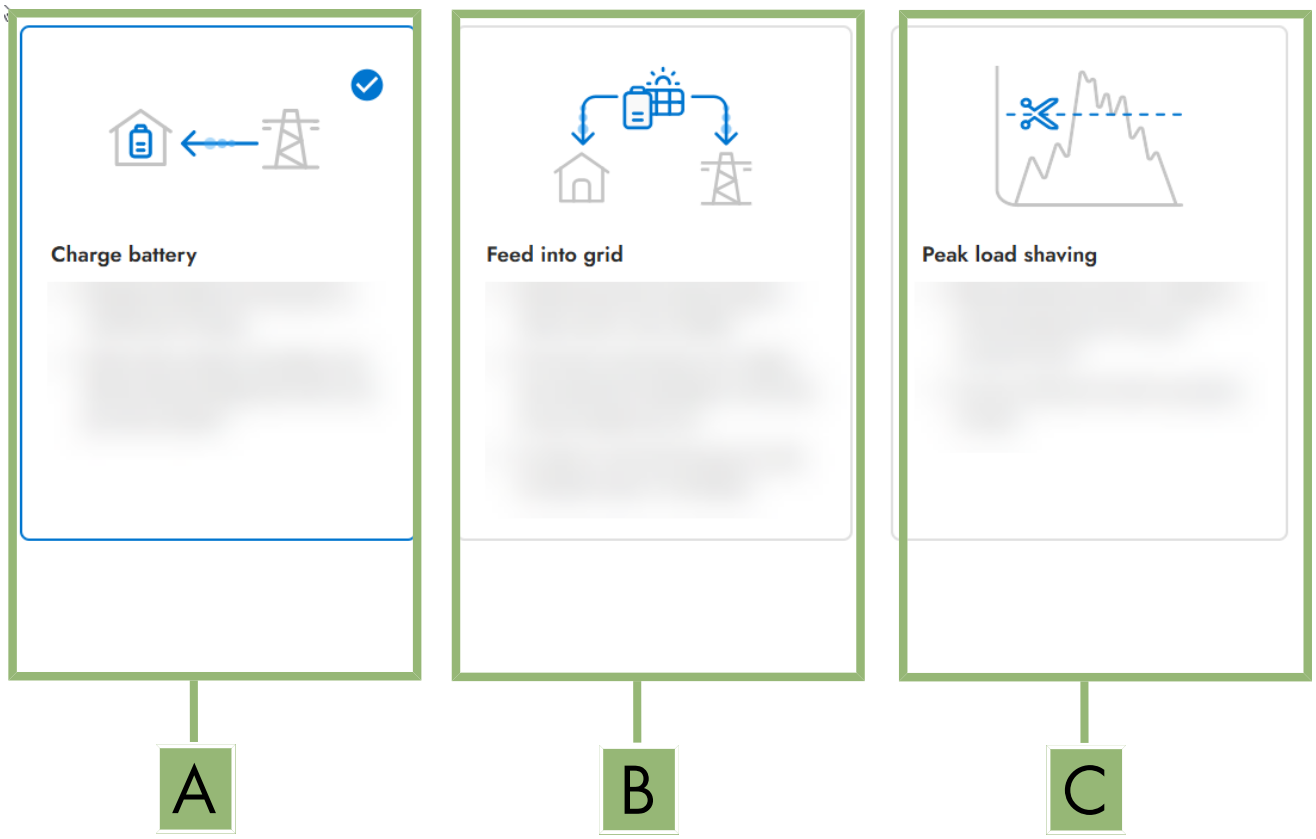

Figure 2: Overview of predefined energy management profiles

Position	Energy management profile	Explanation
A	Battery charging	The battery is charged with excess energy from the PV system. If there is no excess energy available, the battery is charged from the utility grid.
B	Injection to the network	The available energy from the PV system is fed into the utility grid.
C	Peak load shaving	During peak loads, energy from the PV system or battery is used to reduce the amount of energy drawn from the utility grid. A combination of increased self-consumption and peak load shaving can be set (multiuse).
-	Maximum Increased Self-Consumption	This operating mode is always active if no other mode has been selected. Self-consumption is maximized through intelligent charging and discharging of the battery, and feed-in to the utility grid is minimized. The operating mode cannot be used as a basis for configuring individual operating modes.

Also see:

- Add new operating mode ⇒ page 53

16.5 Available operating modes

In the **Configuration** > **Energy management** menu, under **Operating modes**, you will find an overview of all available operating modes.

When energy management is started for the first time after commissioning, only the predefined profile **Maximum increased self-consumption** is displayed.

Also see:

- Predefined operating modes ⇒ page 49
- Add new operating mode ⇒ page 53
- Activating the energy management ⇒ page 47
- Deactivating the energy management ⇒ page 48

16.6 Setting options for peak load shaving

Setting option	Explanation
Threshold for peak load shaving	Limiting value for the grid supply from which the battery is to be used to reduce peak loads. Only whole numbers are accepted as an entry.
Battery charge for peak load shaving	The parameter **Battery charge** controls the charging behavior of the inverter during peak load shaving: If the state of charge of the battery should always be as high as possible, for example, activate or leave the option **Recharge start voltage corresponds to threshold for peak load shaving** activated for the parameter **Battery state of charge**. If recharging of the battery from the utility grid is to be avoided, for example, deactivate the option **Recharge start voltage corresponds to threshold for peak load shaving** and set the **Recharge start voltage** to 0 kW for the parameter **Battery state of charge**.
Include increased self-consumption (multiuse)	Enables automatic switching between increased self-consumption and peak load shaving by means of a battery limit. Additionally, you can set the SOC threshold for mode switching as well as a hysteresis.
Averaging interval in the tariff	Interval for billing the performance prices: If the tariff of your electric utility company does not specify an interval for billing the performance prices or if the interval for billing the performance prices is not known, select the **Unknown** option.

Setting option	Explanation
Adjustment	If no value is specified for the **Billing interval in the tariff**, the option **Immediate adjustment** is always active. In this case, peak load shaving is controlled according to the instantaneous value of the grid supply at the point of interconnection. If a value for the **Averaging interval in the tariff** is specified, the option **Billing interval** can be selected. In this case, peak load shaving is controlled according to the averaging value of the grid supply at the point of interconnection. If a peak load that is too high cannot be curtailed, the resulting overload can be compensated for at another time in the averaging interval. It can happen that the inverter curtails the grid-supplied power even further than specified by the threshold for peak load shaving.
Automatic threshold adjustment	Only if a value for the **Averaging interval in the tariff** is specified, can the function **Automatic threshold adjustment** be used. If the option **Adaptively increase threshold** is activated and the threshold for peak load shaving could not be observed despite adjustment via the averaging interval, the threshold is automatically increased. Exceeding the original threshold specifies the measure for the adaptive increase. Optionally, the threshold for peak load shaving can be reset to the originally entered value at the end of the billing period.

Also see:

- Add new operating mode ⇒ page 53

16.7 Setting options for the multiuse function

Setting option	Explanation
Threshold value for peak load shaving	Limiting value for the grid supply from which the battery is to be used to reduce peak loads. The battery is only discharged if this threshold at the point of interconnection is exceeded. Only whole numbers are accepted as an entry.
Limit for switching operating modes (multiuse): battery state of charge (SoC)	Between the maximum state of charge of the battery and the **Limit for switching operating modes**, the battery is used solely for increased self-consumption. Between the **Limit for switching operating modes** and the minimum battery state of charge, the battery is only used for peak load shaving
Battery charging limit	The **Battery charge** controls the charging behavior of the inverter depending on the **Limit for switching operating modes**. If the **Battery charge** and the **Limit for switching operating modes** are set to the same value, the battery will be recharged with energy from both the PV system and the utility grid. For example, if the **Battery charge** is set to 50% and the **Limit for switching operating modes** is set to 59%, and when the state of charge is between 50% and 59%, the battery will be recharged only with energy from the PV system. If the battery state of charge is below 50%, the utility grid is also used to recharge the battery.

Setting option	Explanation
Billing interval in the tariff	Interval for billing the performance prices: If the tariff of your electric utility company does not specify an interval for billing the performance prices or if the interval for billing the performance prices is not known, select the **Unknown** option.
Adjustment	If no value is specified for the **Billing interval in the tariff**, the option **Immediate adjustment** is always active. In this case, peak load shaving is controlled according to the instantaneous value of the grid supply at the point of interconnection. If a value for the **Averaging interval in the tariff** is specified, the option **Averaging interval** can be selected. In this case, peak load shaving is controlled according to the averaging value of the grid supply at the point of interconnection. If a peak load that is too high cannot be curtailed, the resulting overload can be compensated for at another time in the averaging interval. It can happen that the inverter curtails the grid-supplied power even further than specified by the threshold for peak load shaving.
Automatic threshold adjustment	Only if a value for the **Averaging interval in the tariff** is specified, can the function **Autom. threshold adjustment** be used. If the option **Adaptively increase threshold** is activated and the threshold for peak load shaving could not be observed despite adjustment via the averaging interval, the threshold is automatically increased. Exceeding the original threshold specifies the measure for the adaptive increase. Optionally, the threshold for peak load shaving can be reset to the originally entered value at the end of the billing period.
Battery charge	The parameter **Battery charge** is the recharging threshold that controls the charging behavior of the inverter during peak load shaving. If the **Battery charge** and the **Limit for switching operating modes** are set to the same value, the battery will be recharged with energy from both the PV system and the utility grid. If different values are set, the recharging of the battery is subject to an algorithm: When the battery is discharged (starting from a higher state of charge) or charged (starting from a lower state of charge), this algorithm determines whether the battery is charged from the PV system only, or it is charged from the PV system and the utility grid: • For example, if the **Battery charge** is set to 59% and the **Limit for switching operating modes** is set to 50%, and the battery was discharged from a higher state of charge, only energy from the PV system will be used to recharge the battery. • If, e.g., the **Battery charge** is set to 59% and the **Limit for switching operating modes** is set to 50%, and the battery was charged from a lower state of charge, the battery will be charged from both the PV system and the utility grid.

Also see:

- Add new operating mode ⇒ page 53
- Setting options for peak load shaving ⇒ page 50

16.8 Add new operating mode

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Requirement:

☐ Energy management is activated (see Section 16.2 "Activating the energy management", page 47).

☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. In the **Operating modes** section, select the **New operating mode** button.
   ☑ The overview of the predefined operating modes opens.
3. Select the preferred operating mode to serve as the basis for configuration.
4. Configure individual settings.

Also see:

- Setting options for the multiuse function ⇒ page 51
- Predefined operating modes ⇒ page 49
- Available operating modes ⇒ page 50
- Setting options for peak load shaving ⇒ page 50

16.9 Backup Configuration

The **Energy management** allows for detailed backup settings, including operating mode and battery reserve. Alternatively, these settings can be configured using the SMA 360° commissioning wizard.

Procedure:

1. Select **Configuration** > **Energy management**.
2. Select **Configure** in the **Backup** area.
3. Under **Default settings** in the area **Backup**, open the setup screen via [**Configure**].
4. Make the desired settings.

16.10 Battery Management

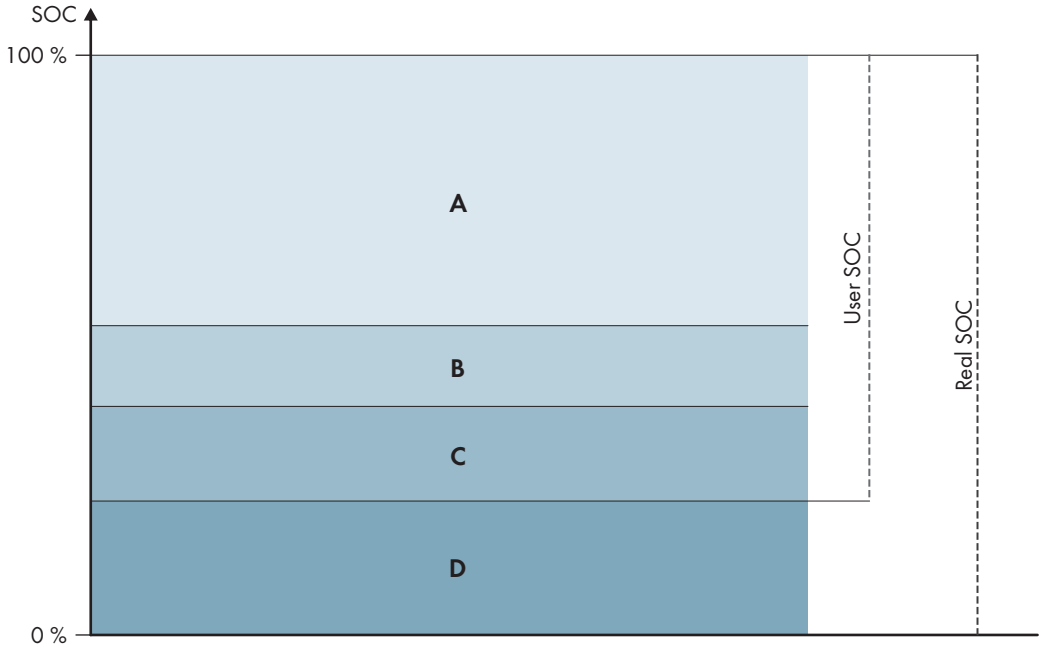

Figure 3: State of charge ranges of the battery

Range	Inverter behavior
A	The inverter uses the battery within this range for increased self-consumption. When more energy is needed than can be supplied by the PV modules, the battery is discharged.
B	The value indicates the percentage of battery charge to be retained for secure power supply operation and battery-backup operation. This battery charge cannot be used in parallel grid operation, even if the secure power supply operation and battery-backup operation are deactivated.
C	In this range, the battery is no longer discharged, even in secure power supply operation or battery-backup operation.
D	The value specifies which percentage of the Real SOC is to be reserved as deep discharge protection. This value corresponds to a User SOC of 0%. When the state of charge is displayed as 0% (User SOC), the battery is actually (Real SOC) still charged to as much percentage as this value indicates.

16.11 Configuring the battery

⚠ QUALIFIED PERSON

You have the option to change the configuration of your battery or restart it at any time via the inverter user interface, e.g. when using a new battery.

Requirement:

☐ The user interface of the inverter is open and you are logged in.

Procedure:

1. Select the menu item **Battery configuration** in the menu **Configuration**.
2. Follow the steps of the commissioning wizard and configure your battery. For every setting made in a step, click on [**Next**].

☑ When all settings are made, the inverter starts the communication connection with the battery.

☑ The user interface shows an overview of the current battery configuration.

16.12 Set battery fallback behavior when energy management is disabled

If SMA energy management is not to be used, SMA recommends making the following settings. If energy management is deactivated and no further settings are made, the battery will behave according to its fallback behavior. The default setting is **Values maintained**, so that the battery continues to be charged or discharged depending on its last status.

Requirement:

☐ Energy management is activated (see Section 16.2 "Activating the energy management", page 47).

☐ The user interface is open and you are logged in.

Procedure:

1. In the focus navigation, select the inverter to which the battery is connected.
2. Select **Configuration** > **Parameters** in the menu.
3. Set parameter **External active power setting, fallback behavior** (**Inverter.CtlComCfg.WCtlCom.CtlComMssMod**) to **Apply fallback values**.
4. Set parameter **Fallback of the limitation of the battery discharge.** (**Inverter.CtlComCfg.WCtlCom.FlbBatWMax**) to 0 W.
5. Set parameter **Fallback of the limitation of the battery charge.** (**Inverter.CtlComCfg.WCtlCom.FlbBatWMin**) to 0 W.
6. Configure the energy management so that the battery should not charge or discharge.
7. Ensure that the battery is not charging or discharging.
8. Deactivate the energy management (see Section 16.3 "Deactivating the energy management", page 48).

16.13 Create a new schedule

Schedules control the use of operating modes. If no schedule is created, the operating mode **Maximum increased self-consumption** is always active.

Requirement:

☐ Energy management is activated (see Section 16.2 "Activating the energy management", page 47).

☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. In the **Schedules** section, select the **New schedule** button.
3. Set the name of the schedule, standard operating mode, and time period.
4. Click on [**Next**].
5. Use the [**New time window**] button to define which operating mode should be used in which time windows. If no time slots are defined, the default operating mode is active for the entire duration of the schedule.

16.14 Export schedules

To use a schedule in another facility, it can be exported.

Requirement:

- ☐ At least 1 schedule has been created.
- ☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. In the **Schedules** section, select ···.
3. Select **Download schedules**.
4. Select the button [**Download**].

☑ A .zip file containing all created schedules has been created. The file cannot be unzipped and is only intended for import into another system.

Also see:

- Import schedules ⇒ page 56

16.15 Import schedules

Schedules that have already been created can be imported into another system.

Requirement:

- ☐ A .zip file containing schedules for another system is available.
- ☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. In the **Schedules** section, select ···.
3. Select **Upload schedules**.
4. Add file and select [**Upload**].

☑ The schedules from the file and the corresponding operating modes are now available in the system. Existing schedules have been overwritten.

Also see:

- Export schedules ⇒ page 55

17 Update and backup

17.1 Performing a Manual Firmware Update via the User Interface

⚠ QUALIFIED PERSON

Functional limitations during the update

While an update is being performed, the functions of the product may be limited. The product is performing a restart and may be without function at times. This process takes several minutes and cannot be canceled.

Charging process is interrupted

If a manual firmware update is performed during an active charging process, the charging process will be interrupted. The charging process must then be restarted. SMA Solar Technology AG recommends performing a manual firmware update without a connected vehicle.

Checking the charging cable lock after firmware update

It may happen that the parameter **Lock the charging cable to the charging station** is deactivated after a firmware update.

- Check the status of the parameter after the update. Prior to the customer handover, perform a test charging process with a vehicle and make sure that the charging cable lock is functioning properly.

Requirements:

☐ An update file with the desired firmware of the product must be available. You can download the update file, for example, from the product page under www.SMA-Solar.com.

☐ The user interface must be open and you must be logged in as **Installer**.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Update and backup** menu item.
4. In the **Manual update** area, click [**Select file**] and select the update file for the product.
   ☑ The user interface confirms that the update file is compatible.
5. If the user interface does not confirm the compatibility of the update file, replace the update file.
6. Select [**Start update**].
7. Follow the instructions in the dialog.
   ☑ The product is performing a restart after the firmware update.
8. Select the **Monitoring** menu.
9. Select the menu item **Event monitor**.
10. Check in Events, Parameter Settings, or Device Properties whether the firmware update has been completed successfully.

17.2 Performing a Manual Firmware Update via the 360° App

Does not apply to the SMA Data Manager M.

Requirement:

☐ The SMA 360° app must be installed on the mobile terminal.

Procedure:

1. Open the SMA 360° app.

2. Navigate to [**Setup**] > [**Manual firmware update**].
3. Download the product software via ↗.
4. Follow the instructions in the app.

Also see:

- Information on establishing a connection ⇒ page 15

17.3 Performing a firmware update for SMA Home Storage or SMA Storage M

The SMA Home Storage can only be used by the inverter from a battery firmware ≥ 1.1.19.R.

Requirements:

☐ The current firmware file for the SMA battery must be stored on your terminal. The latest file can be found on the product page at https://www.SMA-Solar.com in the section "Downloads > "Software".

☐ The user interface of the inverter is open and you are logged in.

Procedure:

1. Select the inverter via the focus navigation.
2. Navigate to **[Configuration]** > **Update and backup**.
3. In the **Manual update** area, click [**Select the file**] and select the update file for the battery.
   ☑ The user interface confirms that the update file is compatible.
4. Select [**Start update**].
5. Follow the instructions in the dialog.
   ☑ The battery is performing a restart after the firmware update.

17.4 Function and content of the backup file

The backup file is used to transfer configuration information, e.g., when commissioning a replacement device or when restoring previously saved parameter settings.

The backup file includes the following system and device configuration data for your product:

- Grid Management Services
- Ethernet
- Energy meter
- Sunny Portal setting
- Self-defined Modbus profiles
- System password
- User interface login data
- List of connected devices

The following information is not included in the backup file:

- Notifications
- Wi-Fi data
- Historic energy and performance values
- Event messages

17.5 Creating a Backup File

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Update and backup** menu item.
4. Select the [**Create backup file**] button.
5. Enter a password to encrypt the backup file and confirm with [**Create and download backup file**]. Please note that the password will be needed later for importing the backup file.
   ☑ An Ibd file with all parameter settings will be downloaded.

Also see:

- Function and content of the backup file ⇒ page 58

17.6 Upload backup file

⚠ QUALIFIED PERSON

Requirement:

☐ The backup file and the corresponding password must be available.

☐ The product must be reset to the default settings or a replacement device must be available.

Procedure:

1. Open the user interface.
2. The commissioning wizard opens.
3. On the first page of the commissioning wizard in the row **Device function**, select the option [**Start restoration**].
4. Select the desired backup file and enter the backup file password.
5. Confirm with [**Upload backup file**].
   ☑ The Ibd file with all parameter settings will be uploaded to the product. The product restarts automatically. This process can take several minutes.

Also see:

- Resetting the product to default setting ⇒ page 61
- Function and content of the backup file ⇒ page 58

18 Generating the I-V Characteristic Curve

⚠ QUALIFIED PERSON

Requirements:

☐ The user interface of the product must be open and you must be logged in as **Installer**.

Procedure:

1. Select the product in the focus navigation.
2. Select the **Monitoring** menu.
3. Select the menu item **Diagnosis**.
4. Select **I-V curve**.
5. Select [**New measurement**].
6. Use the measurement results to check whether there are any deviations or changes.
7. If necessary, carry out measures to correct the problems on the PV modules.
8. Export the results if necessary.

19 Resetting the product to default setting

Loss of data due to replacement or due to resetting to default settings

If the product is reset to the default settings or replaced, all data saved in the product and the admin account will be deleted. Some of the data saved in Sunny Portal can be transmitted to the product after calling up the Sunny Portal system again.

Requirements:

☐ The user interface of the product must be open and you must be logged in as **Installer**.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Device properties**.
4. Select the button [**If you want to reset the device to the default settings, click here**].
5. Select [**Reset**].
6. Assign the System Manager to the system in Sunny Portal powered by ennexOS again provided the device is to be operated there again (see manual of Sunny Portal).

20 Troubleshooting

20.1 Parameter changes via the device settings or a parameter adjustment are not confirmed

Cause	Remedy
Connected devices do not send notifications about parameter changes that were made.	• Check after about 5 minutes whether the parameter change has been accepted. If necessary, repeat the parameter change.
Parameters are modified by 2 users simultaneously.	• Ensure that parameters cannot be modified at the same time on the user interface of the product and in Sunny Portal.

20.2 The product cannot be registered in Sunny Portal

Cause	CORRECTIVE MEASURES
The Internet connection via a proxy server is not possible.	• Contact your installer or network administrator.
The PIC or RID entry is incorrect.	• Verify your entry.
The system is offline.	• Check the network connection.

20.3 The firmware of a connected SMA product was not updated during a firmware update

Cause	CORRECTIVE MEASURES
The firmware version downloaded is not the latest or is not suitable for the SMA product.	• The firmware version must be later than the firmware version installed on the SMA product. Ensure that you have downloaded the correct firmware version for your SMA product and update the firmware again.
The DC input voltage is not sufficient for a firmware update.	• Depending on the time of day, the weather, and the condition of the PV modules (e.g. affected by pollution or covered with snow), the DC input voltage may be too low for a firmware update. Ensure that there is sufficient DC voltage present and update the firmware again.
The transmission quality in the local network is not sufficient.	• Errors can occur during data transmission if the transmission quality in the local network is too low. Check the network status of your local network and, if necessary, contact your network administrator.

20.4 No data are displayed on the user interface of the product

Cause	Remedy
The buffer capacitor of the product's real-time clock might have discharged due to being without voltage supply for a longer time period.	• Ensure that the product has access to a time server on the Internet or in the local network to obtain a current time.

20.5 Manual restart after electric arc

⚠ QUALIFIED PERSON

If manual restart is configured in inverters with suitable monitoring function, and an electric arc is detected, the feed-in operation will automatically stop. You can use the following parameter to resume feed-in operation after an electric arc has been detected.

Channel	Name	Settings
Operation.OpMod	**General operating mode**	**Start**

Also see:

- Parameters for arc-fault circuit interrupter (AFCI) ⇒ page 34

20.6 Create Diagnostics Data

Download the diagnostic data of the device in case of failure. Diagnostic data makes it easier for SMA Service to analyze errors.

Requirement:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. In the **Monitoring** menu, select **Diagnostics**.
3. Select **Diagnostic data**.
4. Select the required values and click [**Download**].
5. Provide diagnostic data to the SMA Service in encrypted form.

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