Service Manual for Installers

Troubleshooting for SMA Home Storage

HS-BM-3.28-10

1 Information on this Document

1.1 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Knowledge of how batteries work and are operated
- 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 all documentation related to the products including all safety information

1.2 Content and Structure of this Document

This document is intended to assist in troubleshooting common service and failure cases in connection with SMA Home Storage (HS-BM-3.28-10) regarding the following topics: undervoltage, deep discharging, inconsistent firmware, recharging, updates.

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.

1.3 Levels of Warning Messages

The following levels of warning messages may occur when handling the product.

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

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

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

NOTICE
Indicates a situation which, if not avoided, can result in property damage.

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

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 Additional Information

Additional information is available at www.SMA-Solar.com.

Title and information content	Type of information
"SMA HOME STORAGE - Safety Information"	Technical Information
SUNNY BOY SMART ENERGY 3.6 / 4.0 / 5.0 / 6.0 Mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning	Operating manual
SUNNY BOY SMART ENERGY "Approved Batteries and Information on Battery Communication Connection"	Technical Information
SUNNY TRIPOWER 5.0 / 6.0 / 8.0 / 10.0 SMART ENERGY Mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning	Operating manual

Title and information content	Type of information
SUNNY TRIPOWER SMART ENERGY "Approved Batteries and Information on Battery Communication Connection"	Technical Information
"SMA Smart Home"	Planning guidelines

2 Troubleshooting in case of undervoltage of a battery module

2.1 At least one battery module reports event 5156 / 9C / 9312

One or several battery modules report the event 5156 / 9C / 9312 **Undervoltage battery module** via the user interface of the inverter. You can find more information on this and other events in the manual of the inverter and battery.

Cause	Remedy
The voltage of at least one module is below 90 V.	• Measure the voltage on each battery module (see Section 2.2, page 5).
The firmware of the Sunny Tripower Smart Energy is ≤ 3.04.16.R and/or the firmware version of the battery is ≤ 1.1.20.R.	• Check the firmware version and perform an update (see Section 2.3.1, page 6).
The firmware of the Sunny Boy Smart Energy is ≤ 03.08.12.R and/or the firmware version of the battery is ≤ 1.1.20.R.	• Check the firmware version and perform an update (see Section 2.4.1, page 7).

2.2 Measuring the voltage on the battery module

⚠ DANGER

Danger to life due to electric shock when live components or DC cables are touched

The DC cables connected to a battery may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the product and inverter from voltage sources and make sure they cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.

⚠ WARNING

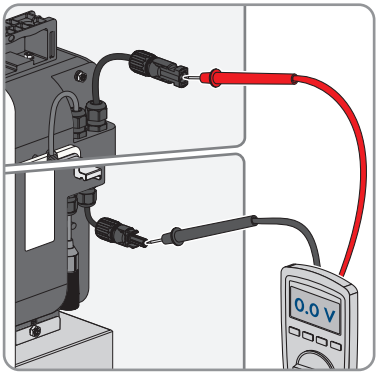
Danger to life due to electric shock from destruction of the measuring device due to overvoltage

Overvoltage can damage a measuring device and result in voltage being present in the enclosure of the measuring device. Touching the live enclosure of the measuring device results in death or lethal injuries due to electric shock.

- Only use measuring devices with a DC input voltage range of 1000 V or higher.

Procedure:

1. Disconnect the battery modules from voltage sources and from the inverter (see battery manual).
2. Switch on the modules disconnected from the inverter using the DC switches on the modules (see battery manual).
3. Wait 45 seconds.
4. Measure the voltage on the DC connectors.



5. If the voltage of a battery module is below 90 V, check and update the firmware version of the Sunny Boy Smart Energy (see Section 2.4.1, page 7) or of the Sunny Tripower Smart Energy (see Section 2.3.1, page 6).

2.3 System with Sunny Tripower Smart Energy

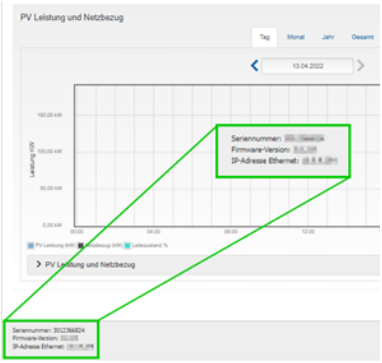
2.3.1 Checking and updating the firmware version

Requirements:

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

Procedure:

1. On the home page of the user interface, in the bottom left corner, identify the firmware version.



2. If the firmware version is ≤ 3.04.16.R, update the firmware to version ≥ 3.05.26.R (see inverter manual). In the firmware 3.05.26.R for the inverter, the firmware version 1.1.20.R for the battery is also included. This is required for faultless operation.
   ☑ After the successful inverter update, the event message **Update completed** appears.
3. Wait ten minutes so that the battery update is also carried out.
   ☑ The event message **Update battery management syst.** appears.
   ☑ After the successful battery update, the event message **Update completed** appears again.
4. If the firmware version of the inverter is already ≤ 3.05.26.R, check the firmware version of the battery (see Section 3.2, page 11).
5. If the firmware version of the battery has not been updated to version 1.1.20.R yet, restart battery and inverter (see manuals for the inverter and battery).
   ☑ Restarting updates the battery firmware.
6. As soon as both the firmware of the inverter and of the battery are up to date, set the parameter for the emergency charging (see Section 2.3.2, page 7).

2.3.2 Setting parameters for emergency charging

It is possible to set what proportion of the battery charge is to be retained for deep discharge protection via parameter **Minimum width of deep discharge protection area**. The following settings will then allow the battery to be emergency-charged from the utility grid.

Requirements:

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

Procedure:

1. On the inverter user interface select **Device parameters** > **Battery** > **Areas of application**.
2. Set the parameter **Minimum width of deep discharge protection area** to 50%.
   ☑ Emergency charging of the battery begins.
3. Call up the home page of the user interface to monitor the current state of charge (SOC) of the battery.
4. As soon as the state of charge (SOC) has reached 5%, reset the parameter **Minimum width of deep discharge protection area** to the previously set value. The default is 5%.
   ☑ The system is functioning correctly again and, if present, is controlled by the values of the Sunny Home Manager 2.0 or SMA Energy Meter.
5. If the emergency charging of the battery does not start or at least one battery module is displaying an error indicated by the red LED, perform the emergency charging procedure (see Section 2.5, page 9).

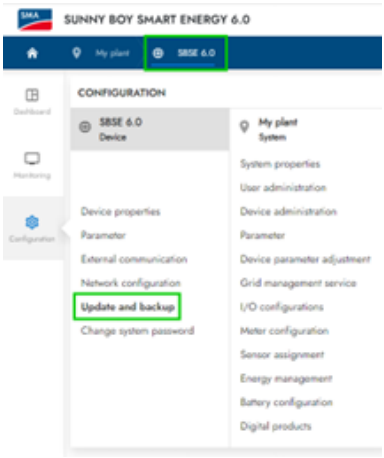
2.4 System with Sunny Boy Smart Energy

2.4.1 Checking and updating the firmware version

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

Procedure:

1. Check the firmware version of the connected battery module (see Section 3.3, page 12).
2. If the firmware version is < 1.1.20.R, update the firmware to the current version ≥ 1.1.20.R. To do this, download the current firmware version at https://www.sma.de/en/service/ downloads in the **Home Storage System** category.
3. On the inverter user interface select **Configuration > Update and backup**.



4. 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.
5. Select [**Start update**].
6. Follow the instructions in the dialog.
   ☑ The inverter is performing a restart after the firmware update.
7. After the successful firmware update, set the parameter for the emergency charging (see Section 2.4.2, page 8).

2.4.2 Setting parameters for emergency charging

The following settings will allow the battery to be emergency-charged from the utility grid.

Requirements:

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

Procedure:

1. On the inverter user interface select **Configuration** > **Parameters**.
2. Set the parameter **External active power setting, fallback behavior** to **Apply fallback values** (default: **Values maintained**).
3. Set the parameter **Fallback of the limitation of the battery discharge.** to -1000 W (default: 0 W).
4. Set the parameter **Fallback of the limitation of the battery charge.** to -1000 W (default: 0 W).

5. Set the parameter **External active power setpoint, timeout** to 6 s (default: 600 s).
6. Click on [**Save**].
   ☑ Emergency charging of the battery begins.
7. Call up the home page of the user interface to monitor the current state of charge (SOC) of the battery.
8. As soon as the state of charge (SOC) has reached 5%, reset the parameters **Fallback of the limitation of the battery discharge.**, **Fallback of the limitation of the battery charge.** and **External active power setpoint, timeout** to the previously set values or to the defaults.
9. Click on [**Save**].
10. Set the parameter **External active power setting, fallback behavior** to **Values maintained**.
11. Click on [**Save**].
    ☑ The system is functioning correctly again and, if present, is controlled by the values of the Sunny Home Manager 2.0 or SMA Energy Meter.
12. If the emergency charging of the battery does not start or at least one battery module is displaying an error indicated by the red LED, perform the emergency charging procedure (see Section 2.5, page 9).

2.5 Carrying out the emergency charging procedure

⚠ DANGER

Danger to life due to electric shock when live components or DC cables are touched

The DC cables connected to a battery may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the product and inverter from voltage sources and make sure they cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.

⚠ WARNING

Danger to life due to electric shock from destruction of the measuring device due to overvoltage

Overvoltage can damage a measuring device and result in voltage being present in the enclosure of the measuring device. Touching the live enclosure of the measuring device results in death or lethal injuries due to electric shock.

- Only use measuring devices with a DC input voltage range of 1000 V or higher.

Requirements:

☐ The battery is connected correctly to the inverter.

Procedure:

1. Switch off all battery modules via the DC switch. The following steps can be carried out on all battery modules simultaneously or individually on each battery module.

2. Switch on the DC switches on all battery modules and switch them off again after approx. 6-9 seconds. Perform this process a total of three times on each battery module.
3. Switch the battery modules back on.
   ☑ The blue LEDs on the battery modules are flashing continuously.
4. Wait 45 seconds.
5. Measure the voltage on the DC connectors of the battery modules. A voltage between 90 V and 75 V should be measurable.
   ☑ On the inverter user interface, the battery status displays a yellow exclamation mark and the message **Emergency charge**.
6. For Sunny Tripower Smart Energy: reset the parameter so that the emergency charging of the battery can be started (see Section 2.3.2, page 7).
7. For Sunny Boy Smart Energy: reset the parameter so that the emergency charging of the battery can be started (see Section 2.4.2, page 8).
8. If emergency charging still is not working, contact Service.

3 Troubleshooting in case of problems with system integration

3.1 Battery module cannot be integrated into the system

Following a firmware update, the replacement of a battery module or retrofitting (e.g. expanding the battery capacity), at least one battery module can no longer be integrated into the overall system or the expected battery capacity is incorrectly shown on the user interface.

Cause	Remedy
Firmware of the battery is outdated.	• Restart the battery and the inverter (see product manuals). The restart might result in a firmware update of the battery modules.
The firmware of the inverter is outdated.	• For Sunny Tripower Smart Energy systems: check the firmware version and perform an update (see Section 2.3.1, page 6). • For systems with Sunny Boy Smart Energy: check the firmware version and perform an update (see Section 2.4.1, page 7).
The serial number of the battery module is not correctly recorded.	• For Sunny Tripower Smart Energy systems: check the serial number of the battery module (see Section 3.2, page 11). • For systems with Sunny Boy Smart Energy: check the serial number of the battery module (see Section 3.3, page 12).

3.2 System with Sunny Tripower Smart Energy: check the firmware version and the serial number of a battery module

Requirements:

☐ The battery module to be checked is connected to the inverter separately.

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

Procedure:

1. On the inverter user interface select **Device parameters** > **Device components** > **Battery management system**.
2. Read the firmware version of the battery module at **Software-Version**. If the firmware version ≥ 3.04.21.R is installed on the inverter, the connected battery module contains at least firmware version 1.1.20.R. An individual battery module is automatically updated as soon as it is connected.
3. If the battery module is not updated automatically, restart battery and inverter (see manuals for the inverter and battery).

4. Read the serial number of the battery module at **Serial number** and compare it with the information on the type label of the battery module. If the serial numbers do not match, contact Service.
5. Repeat the process with another battery module if necessary.

Also see:

- Checking and updating the firmware version ⇒ page 6

3.3 System with Sunny Boy Smart Energy: check the firmware version and the serial number of a battery module

Requirements:

☐ The battery module to be checked is connected to the inverter separately.

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

Procedure:

1. On the inverter user interface select **Configuration** > **Parameters**.
2. Identify the firmware version of the battery via the value of parameter **BMS firmware version**.
3. If the firmware version is < 1.1.20.R, update the firmware to the current version ≥ 1.1.20.R (see Section 2.4.1, page 7).
4. Read the serial number of the battery module at **BMS serial number** and compare it with the information on the type label of the battery module. If the serial numbers do not match, contact Service.
5. Repeat the process with another battery module if necessary.

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