Installation - Quick Reference Guide

SMA FLEXIBLE STORAGE SYSTEM with Battery Backup Function

Battery backup systems including increased self-consumption with SUNNY ISLAND 3.0M / 4.4M / 6.0H / 8.0H and SUNNY HOME MANAGER
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# 1 Information on this Document

## 1.1 Validity
This document is valid for the SMA Flexible Storage System with battery backup function with the following SMA products:

- HM-BT-10.GR2 (Sunny Home Manager) from firmware version 1.04
- SI3.0M-11 (Sunny Island 3.0M) from firmware version 3.2
- SI4.4M-11 (Sunny Island 4.4M) from firmware version 3.2
- SI6.0H-11 (Sunny Island 6.0H) from firmware version 3.1
- SI8.0H-11 (Sunny Island 8.0H) from firmware version 3.1

## 1.2 Content and Structure of This Document
This document summarizes the specific information for the SMA Flexible Storage System with battery backup function (battery backup system). Circuitry overviews provide you with a basis for setting up a battery backup system. The structure of the document specifies the chronological sequence for configuration and commissioning. This document does not replace the documentation of the individual products. You will find details and help in the event of difficulties in the documentation of the respective product.

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

- Training in how to deal with the dangers and risks associated with installing and using electrical devices and batteries
- Training in the installation and commissioning of electrical devices
- Knowledge of and adherence to the local standards and directives
- Knowledge of and compliance with this document and all safety precautions

## 1.4 Additional Information
Links to additional information can be found at www.SMA-Solar.com:

<table>
<thead>
<tr>
<th>Document title</th>
<th>Document type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMA Flexible Storage System with Battery Backup Function</td>
<td>Planning guidelines</td>
</tr>
</tbody>
</table>

## 1.5 Symbols for Information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>💥 DANGER💥</td>
<td>Indicates a hazardous situation which, if not avoided, will result in death or serious injury</td>
</tr>
<tr>
<td>🚨 WARNING🚨</td>
<td>Indicates a hazardous situation which, if not avoided, can result in death or serious injury</td>
</tr>
<tr>
<td>🔄 CAUTION распространенность</td>
<td>Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury</td>
</tr>
<tr>
<td>⚠️ NOTICE⚠️</td>
<td>Indicates a situation which, if not avoided, can result in property damage</td>
</tr>
<tr>
<td></td>
<td>Information that is important for a specific topic or goal, but is not safety-relevant</td>
</tr>
<tr>
<td>☐</td>
<td>Indicates a requirement for meeting a specific goal</td>
</tr>
<tr>
<td>☑️</td>
<td>Desired result</td>
</tr>
<tr>
<td>✗</td>
<td>A problem that might occur</td>
</tr>
</tbody>
</table>
1.6 Typographies

<table>
<thead>
<tr>
<th>Typography</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bold</strong></td>
<td>• Display messages</td>
<td>• Connect the grounding conductor to AC 2Gen/Grid.</td>
</tr>
<tr>
<td></td>
<td>• Parameters</td>
<td>• Select the parameter 235.01 GnAutoEna and set to Off.</td>
</tr>
<tr>
<td></td>
<td>• Connections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Slots</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Elements to be selected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Elements to be entered</td>
<td></td>
</tr>
</tbody>
</table>

| >          | • Several elements that are to be selected| • Select 600# Direct Access > Select Number.                           |

| [Button/Key] | • Button/key on the inverter to be selected or pressed | • Press [ENTER].                                                      |

1.7 Nomenclature

<table>
<thead>
<tr>
<th>Complete designation</th>
<th>Designation in this document</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMA Flexible Storage System with battery backup function</td>
<td>Battery backup system</td>
</tr>
<tr>
<td>Sunny Boy, Sunny Mini Central, Sunny Tripower</td>
<td>PV inverter</td>
</tr>
<tr>
<td>Grid failure or deviation from the country-specific limiting values for voltage and frequency</td>
<td>Grid failure</td>
</tr>
</tbody>
</table>

The term parameter includes parameters with configurable values as well as parameters for displaying values.
2 Safety

2.1 Intended Use

In the event of grid failure, a battery backup system with Sunny Island supplies loads with energy and a grid-tie PV system with voltage. In the event of grid failure, an automatic transfer switch disconnects the battery backup grid from the utility grid. After disconnection, the loads and the PV system have no supply for approximately five seconds, until the battery backup system can provide active and reactive power once more. The battery backup system supplies the loads and the PV system can synchronize with the battery backup grid and feed in.

The battery backup system should only be used in countries for which it is licensed or for which it is released by SMA Solar Technology AG and the grid operator. To fulfill the technical connection requirements of the grid operator and the local standards and directives, you must select one of the following basic structures:

- Battery backup system with all-pole disconnection
  In the event of grid failure, a tie switch disconnects all line conductors and the neutral conductor from the utility grid. The tie switch is designed with built-in redundancy. If the technical connection requirements of the grid operator or the local standards and directives call for or allow all-pole disconnection, you must install this basic structure. You must install all-pole disconnection in the following countries:
  - Belgium
  - Denmark
  - Germany
  - France
  - Austria
  - Switzerland

- Battery backup system without all-pole disconnection
  In the event of grid failure, a tie switch disconnects all line conductors from the utility grid. The neutral conductor of the battery backup grid remains permanently connected to the utility grid. If the technical connection requirements of the grid operator or the local standards and directives prohibit disconnection of the neutral conductor, you must install this basic structure. In Australia, you must install a battery backup system without all-pole disconnection.

Each basic structure can be designed either as a three-phase battery backup grid or as a single-phase battery backup grid. Single-phase battery backup grids can be connected to three-phase utility grids.

In a three-phase battery backup system, in the event of grid failure, three Sunny Island inverters supply all line conductors with the corresponding line conductor. The three Sunny Island inverters are connected in parallel on the DC side and form one cluster. Only Sunny Island inverters of the same device type may be installed in a cluster. In a three-phase battery backup system, both single-phase and three-phase PV inverters can be connected. Multiple clusters must not be connected together.

In a single-phase battery backup system, in the event of grid failure, one Sunny Island supplies the battery backup grid. A grid failure is only recognized at the line conductor which is connected to the Sunny Island. In the event of grid failure, only single-phase PV inverters can feed in to a single-phase battery backup grid. A phase coupling, in the event of grid failure, enables combination of the line conductors to a single-phase distribution grid. With phase coupling, all the loads in the battery backup grid must be single-phase. No more than one Sunny Island may be connected in a single-phase battery backup system.

A PV system can be connected in the battery backup grid. The PV system must be suitable for use in battery backup systems (see the Planning Guidelines "SMA Flexible Storage System with Battery Backup Function" at www.SMA-Solar.com). The power of the PV system must be appropriate for the system (see Section 3.2 "System Information", page 12).

The automatic transfer switch is not a distribution board for the loads or the PV system. The loads and the PV system must be secured with protective devices in accordance with the local standards and directives. Grid-forming voltage sources (e.g., generators) must not be connected.
The utility grid connected to the automatic transfer switch must be a TN or TT system. The battery backup system is not suitable for supplying life-sustaining medical devices.

In battery backup systems, the Sunny Island uses lead-acid batteries or lithium-ion batteries for energy storage. Ensure that the battery room is sufficiently ventilated when using lead-acid batteries (see battery manufacturer's documentation). If lithium-ion batteries are connected, the battery management of the lithium-ion battery must be compatible with the Sunny Island (see the Planning Guidelines “SMA Flexible Storage System with Battery Backup Function” at www.SMA-Solar.com). The lithium-ion battery must be able to supply enough current at maximum output power of the Sunny Island inverter (for technical data, see the Sunny Island inverter installation manual).

In single-phase battery backup systems, the multifunction relays of the Sunny Island inverter cannot be configured. In three-phase battery backup systems, the slaves can control devices in the system (e.g., load-shedding contactors), each via two multifunction relays. The multifunction relays of the master cannot be configured.

The automatic transfer switch must be wired and connected in accordance with this documentation. The equipment or devices of the automatic transfer switch must satisfy protection class II and be operable without prior knowledge of electrical technology.

In battery backup systems, the following products must not be connected:

- Sunny Island Charger or other DC charge controllers
- DC loads

The battery backup system records the grid feed-in and purchased electricity with an SMA Energy Meter only. An SMA Energy Meter does not replace the energy meter of the electric utility company. The grid feed-in and the purchased electricity are transmitted to one Sunny Island via Speedwire. Therefore, the Sunny Island must be fitted with the Speedwire data module Sunny Island.

The Sunny Home Manager must not be installed in PV systems in which a Sunny WebBox is installed.

The individual products in the battery backup system must be used for their intended purpose (see documentation of each product). Any use of the system other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of the products. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.
2.2 Safety Precautions

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

**WARNING**

**Danger to life from electric shock due to circuit breakers that cannot be tripped**

In the battery backup grid, only the circuit breakers that can be tripped by the Sunny Island can be tripped in the event of a grid failure. Circuit breakers with a higher operating current cannot be tripped. Under fault conditions, there may be a voltage that poses a danger to life present on accessible parts for several seconds. This can result in fatal or serious injury.

- Check whether a circuit breaker has a higher trip characteristic than the following circuit breakers which can be tripped:
  - SI3.0M-11 and SI4.4M-11: circuit breaker with trip characteristic B6 (B6A)
  - SI6.0H-11 and SI8.0H-11: circuit breaker with trip characteristic B16 (B16A) or circuit breaker with trip characteristic C6 (C6A)

If a circuit breaker has a higher trip characteristic than the specified circuit breaker which can be tripped, you should also install a residual-current device of type A.

**Danger to life from electric shock due to live voltage**

High voltages are present in the battery backup system. When covers are removed (e.g., an enclosure lid), live components can be touched. Touching can result in death or serious injury due to electric shock.

- When carrying out any work on the electrical installation, wear suitable personal protective equipment.
- Turn off or disconnect the following devices from voltage sources in the given order:
  - Sunny Island
  - At the grid-connection point, the circuit breaker of the battery backup system
  - In the automatic transfer switch, all circuit breakers
  - Load-break switch of the battery

- Ensure that the battery backup system cannot be reconnected.
- Open the enclosure lid on the Sunny Island inverter and ensure that no voltage is present.
- Ground and short-circuit the AC conductors outside the automatic transfer switch.
- Cover or isolate any adjacent live components.

**Danger to life from electric shock due to damaged devices**

Operating a damaged device can lead to hazardous situations that can result in death or serious injuries due to electric shock.

- Only use the battery backup system when it is technically faultless and in an operationally safe state.
- Ensure that all safety equipment is freely accessible at all times.
- Make sure that all safety equipment is in good working order.
**WARNING**

**Danger to life due to incompatible lithium-ion battery**
An incompatible lithium-ion battery can lead to a fire or an explosion. With incompatible lithium-ion batteries, it is not ensured that the battery management is intrinsically safe and will protect the battery.

- Ensure that the battery complies with the locally applicable standards and directives and is intrinsically safe.
- Ensure that the lithium-ion batteries are approved for use with the Sunny Island.
  
  The list of lithium-ion batteries approved for the Sunny Island is updated constantly (see Technical Information "List of Approved Lithium-Ion Batteries" at www.SMA-Solar.com).
- If no lithium-ion batteries approved for Sunny Island inverters can be used, you should use lead-acid batteries.

**Danger to life due to explosive gases**
Explosive gases may escape from the battery and cause an explosion. This can result in fatal or serious injury.

- Protect the battery environment from open flames, embers, or sparks.
- Install, operate, and maintain the battery in accordance with the manufacturer's specifications.
- Do not heat the battery above the temperature permitted or burn the battery.
- Ensure that the battery room is sufficiently ventilated.

**Chemical burns and poisoning due to battery electrolyte**
If handled inappropriately, battery electrolyte can cause irritation to the eyes, respiratory system, and skin, and it can be toxic. This may result in blindness and serious chemical burns.

- Protect the battery enclosure against destruction.
- Do not open or deform the battery.
- Whenever working on the battery, wear suitable personal protective equipment such as rubber gloves, apron, rubber boots, and goggles.
- Rinse acid splashes thoroughly with clear water and consult a doctor.
- Install, operate, maintain, and dispose of the battery according to the manufacturer's specifications.

**Risk of injury due to short-circuit currents**
Short-circuit currents in the battery can cause heat build-up and electric arcs. Burns or eye injuries due to flashes may result.

- Remove watches, rings, and other metal objects.
- Use insulated tools.
- Do not place tools or metal parts on the battery.

**CAUTION**

**Risk of burns due to short-circuit currents on the disconnected Sunny Island**
The capacitors at the DC connection input area store energy. After the battery is isolated from the Sunny Island, battery voltage is still temporarily present at the DC connection. A short circuit at the DC connection can lead to burns and may damage the Sunny Island inverter.

- Wait 15 minutes before performing any work at the DC connection or on the DC cables. This allows the capacitors to discharge.
**NOTICE**

**Damage to three-phase loads during phase coupling**

If three-phase loads are connected to a single-phase utility grid during phase coupling, SMA Solar Technology AG cannot rule out damage to the three-phase loads.

- Ensure that, during phase coupling, only single-phase loads are connected to the battery backup grid.

**Damage to the tie switch due to incorrect design**

If the ampacity of the tie switch is not sufficient, the tie switch becomes overloaded and is damaged.

- Adjust the ampacity of the tie switch in accordance with the requirements on site. The tie switch must be designed for at least the operating range of the upstream fuse or the maximum short-circuit current of the PV system.

**Damage to the battery due to incorrect settings**

Incorrect settings can lead to premature aging of the battery. Settings of the parameters in the menu *220# Battery* influence the charging behavior of the Sunny Island inverter.

- Ensure that the values recommended by the battery manufacturer are set for the battery (for the battery technical data, see the documentation of the battery manufacturer).

**Destruction of devices due to electrostatic discharge (ESD)**

If enclosure parts are removed, the devices (e.g., Sunny Island or PV inverter) can be damaged or destroyed if electronic components or connections are touched.

- Do not touch any electronic components in open devices.
- Ground yourself before touching any connections.
3 Information and System Description

3.1 Requirements of the "VDE Forum Network Technology / Network Operations (FNN)"

The information only applies for systems for which the following characteristics are all applicable:

- The system stores energy for increased self-consumption.
- Only one Sunny Island is connected in the system.
- The grid operator requires compliance with the Technical Information "Connection and Operation of Storage Units" of the FNN. Currently, only the grid operators in Germany require compliance with the above-mentioned Technical Information (status: June 2014).

In these systems, the Sunny Island must be connected to a line conductor supplied by a single-phase PV inverter. If there are only three-phase PV inverters connected in the system, the Sunny Island can be connected to any line conductor.

The requirements of the Technical Information "Connection and Operation of Storage Units in Low-Voltage Networks" published by the FNN influence the discharge behavior of the Sunny Island inverter. In systems with one Sunny Island and single-phase PV inverters, the SMA Flexible Storage System reduces the maximum discharge power of the Sunny Island inverter if necessary (for examples of correct connection of the PV inverters, see quick reference guide "SMA Flexible Storage System").

3.2 System Information

Battery backup systems without increased self-consumption

If you are not increasing the self-consumption of PV energy, the following devices are not required:

- SMA Energy Meter
- Sunny Home Manager
- Speedwire data module Sunny Island

Information on batteries

Lithium-ion batteries in battery backup systems

In order to meet the requirements of battery backup systems in the event of grid failure, the Sunny Island has a high overload capacity. The prerequisite for this overload capacity is that the battery is able to supply sufficient current. With lithium-ion batteries, this ampacity cannot be taken for granted.

- Clarify with the battery manufacturer whether the battery is suitable for battery backup systems with Sunny Island. Note especially the ampacity if, in the event of grid failure, the battery backup grid is supplied by the Sunny Island.

Recommendations for battery capacity

SMA Solar Technology AG recommends the following minimum battery capacities. The battery capacities apply for a ten-hour electric discharge (C10).

- Single-phase battery backup system with SI3.0M-11: 100 Ah
- Single-phase battery backup system with SI4.4M-11: 100 Ah
- Single-phase battery backup system with SI6.0H-11: 120 Ah
- Single-phase battery backup system with SI8.0H-11: 160 Ah
- Three-phase battery backup system with three SI3.0M-11: 300 Ah
- Three-phase battery backup system with three SI4.4M-11: 300 Ah
- Three-phase battery backup system with three SI6.0H-11: 360 Ah
- Three-phase battery backup system with three SI8.0H-11: 480 Ah

The minimum battery capacity must be observed to ensure stable operation of the system.
Information on the automatic transfer switch

Wiring and connection of automatic transfer switches

- Do not bridge the neutral conductors of connections X1 to X5. If the neutral conductor connections are bridged, residual-current devices could trip.
- Label the equipment and devices of the automatic transfer switch in accordance with the schematic diagrams. This makes installation and commissioning easier and simplifies the support process in the event of service.
- Only install an SMA Energy Meter if the systems have increased self-consumption.

Installation and commissioning easier and simplifies the support process in the event of service.

Connection of automatic transfer switches for single-phase battery backup systems

- With single-phase battery backup systems, connect circuit breaker F1 and the Sunny Island to the same line conductor. Ensure that only this line conductor of the Sunny Island inverter is monitored for grid failure.
- Connect the PV inverter and the Sunny Island to the same line conductor if possible. This way, in the event of grid failure, the PV inverters are supplied with voltage directly and then can feed in even if phase coupling is deactivated.

Information on the Sunny Island

Connection of the neutral conductor

At connection AC2, there are two terminals N and NTT for the connection of the neutral conductor.

- In battery backup systems, at connection AC2, always connect the neutral conductor to terminal NTT.

This ensures that the Sunny Island disconnects at all poles.

Device types within a cluster

All Sunny Island inverters must be of the same device type.

Information on the communication devices

Requirements for the router and network switches for Speedwire devices

An SMA Flexible Storage System has the following requirements for the communication devices:

- All Speedwire devices must be connected to the same router or network switch.
- The router and optionally one or more network switches must fully support Multicast.
- The router must support "Internet Enabled Devices" with the interfaces SIP and STUN.

The most common routers and network switches support Multicast and "Internet Enabled Devices".

Electricity supply of communication devices

During a grid failure, only the devices in the battery backup grid are supplied with current.

- Connect the electricity supply of the Sunny Home Manager, router, and the optional network switches to the battery backup grid.

The Sunny Home Manager does not support wind power inverters or CHP plants

The Sunny Home Manager only supports PV inverters. If your system combines various AC power sources (e.g., PV system and small wind turbine system), the Sunny Home Manager can only detect the PV inverters and limit their power. In the Sunny Home Manager system, no wind power inverters or CHP plants are displayed in Sunny Portal. Since the data from wind power inverters or CHP plants is not taken into account by the Sunny Home Manager, the data calculated in Sunny Portal and the displayed diagrams may be inaccurate. However, you have the option of displaying the wind power inverters via the Sunny Explorer software and configuring them if necessary (see Sunny Explorer documentation).
### Information on the PV system

**Maximum PV system power**

In battery backup systems, the maximum power of the PV system depends on the total power of the Sunny Island.

- Maximum output power of the PV system per SI3.0M-11: 4,600 W
- Maximum output power of the PV system per SI4.4M-11: 4,600 W
- Maximum output power of the PV system per SI6.0H-11: 9,200 W
- Maximum output power of the PV system per SI8.0H-11: 12,000 W

Observance of the maximum output power of the PV system is a requirement for stable operation of the battery backup system during a grid failure.

#### Frequency-dependent control of active power feed-in

In battery backup systems, the active power of the PV inverters must be controllable depending on the frequency.

- With existing systems, ensure that the PV inverters are controllable depending on the frequency (see Planning Guidelines "SMA Flexible Storage System with Battery Backup Function").

### 3.3 Design and Functions of the Battery Backup System

![Block circuit diagram of a single-phase battery backup system](image-url)

In the event of grid failure, a battery backup system with Sunny Island supplies loads with energy and a grid-tie PV system with voltage. In the event of grid failure, an automatic transfer switch disconnects the battery backup grid from the utility grid. After disconnection, the loads and the PV system have no supply for approximately five seconds, until the battery backup system can provide active and reactive power once more. The battery backup system supplies the loads and the PV system can synchronize with the battery backup grid and feed in.
When the utility grid is available again, the battery backup system synchronizes the battery backup grid with the utility grid. Following successful synchronization, the automatic transfer switch connects the battery backup grid to the utility grid. If the automatic transfer switch is connected to the utility grid, the battery backup system uses the battery for increased self-consumption.

You can set up and wire the automatic transfer switch yourself or acquire it pre-wired from another provider (see Planning Guidelines “SMA Flexible Storage System with Battery Backup Function” at www.SMA-Solar.com).

**Connection of loads and the PV system**

The automatic transfer switch is not a distribution board for the loads or the PV system. You must also install the necessary protective devices for the loads and the PV system.
3.4 Design and Functions of the Automatic Transfer Switch

3.4.1 Devices of the Automatic Transfer Switch

Figure 2: Schematic diagram of a single-phase automatic transfer switch with all-pole disconnection and SMA Energy Meter for increased self-consumption (example)
An automatic transfer switch provides the following functions:

- Grid disconnection isolates the battery backup grid from the utility grid.
- The grounding device grounds the battery backup grid after it has been disconnected from the utility grid. The grounding device is only required in systems with all-pole disconnection.
- The phase coupling connects the line conductors of the battery backup system to a single-phase distribution grid. The phase coupling is a function for single-phase battery backup systems if the installation of the battery backup grid is three-phase.
- The SMA Energy Meter measures the grid feed-in and the purchased electricity. The SMA Energy Meter is only required in systems for increased self-consumption.

### 3.4.2 Grid Disconnection

Within the automatic transfer switch, a tie switch disconnects the battery backup grid from the utility grid. The conditions at the tie switch differ depending on the installation site. SMA Solar Technology AG offers two basic structures for grid disconnection and these differ as far as the tie switch is concerned:

- **Grid disconnection with all-pole disconnection of the battery backup grid from the utility grid**
  
  In the event of grid failure, a tie switch disconnects all line conductors and the neutral conductor from the utility grid. If the technical connection requirements of the grid operator or the local standards and directives call for or allow all-pole disconnection, you must install this basic structure. You must install all-pole disconnection in the following countries:
  - Belgium
  - Denmark
  - Germany
  - France
  - Austria
  - Switzerland

- **Grid disconnection without all-pole disconnection of the battery backup grid from the utility grid**
  
  In the event of grid failure, a tie switch disconnects all line conductors from the utility grid. The neutral conductor of the battery backup grid remains permanently connected to the utility grid. If the technical connection requirements of the grid operator or the local standards and directives prohibit disconnection of the neutral conductor, you must install this basic structure. In Australia, you must install a battery backup system without all-pole disconnection.

Independent of the basic structure, you must adjust the ampacity of the tie switch in accordance with the requirements on site. The tie switch must be designed for at least the operating range of the upstream fuse or the maximum short-circuit current of the PV system.

The circuitry of the automatic transfer switch is designed in such a way that the tie switch disconnects only in the event of a grid failure. If you stop or switch off the Sunny Island, the battery backup grid remains connected to the utility grid. This means that you can carry out maintenance work on the battery without the supply to the loads being interrupted.
Circuit description of the tie switch with all-pole disconnection*

The tie switch with all-pole disconnection consists of contactors Q1 and Q2. The tie switch disconnects the battery backup grid from the utility grid in the event of a grid failure or if the utility grid is outside the limiting values for voltage and frequency.

The control voltage of contactors Q1, Q2, and Q3 is equal to the voltage of a line conductor of the utility grid. This means that the tie switch can only be activated when grid voltage is present. An auxiliary contact of contactor Q3 locks contactor Q1. Contactors Q3 and Q2 are controlled by the multifunction relay Relay1 of the Sunny Island inverter. If the multifunction relay Relay1 is in non-operative mode, contactors Q2 and Q3 activate. If contactor Q3 is in non-operative mode, contactor Q1 will also go into non-operative mode and be locked.

In the event of a total grid failure, contactors Q1, Q2, and Q3 go into non-operative mode due to lack of control voltage and they disconnect the battery backup grid with all poles from the utility grid. The Sunny Island also measures the voltage of the utility grid. For this, the Sunny Island is connected with the same line conductor as the control voltage of contactors Q1, Q2, and Q3. If there is a deviation from country-specific limiting values for voltage and frequency of the utility grid, the multifunction relay Relay1 is activated. The contactors Q1, Q2, and Q3 remain in non-operative mode or go into non-operative mode.

When the utility grid is available again, the Sunny Island detects this. The Sunny Island synchronizes the battery backup grid with the utility grid. Following successful synchronization, the multifunction relay Relay1 goes into non-operative mode and contactors Q2 and Q3 are activated. Contactor Q3 unlocks contactor Q1 and Q1 is activated. The battery backup grid is again connected to the utility grid.

Circuit description of the tie switch without all-pole disconnection**

The tie switch without all-pole disconnection consists of contactor Q2 (see Section 5.1.1 "Schematic Diagram of the Automatic Transfer Switch", page 30). The tie switch disconnects the battery backup grid from the utility grid in the event of a grid failure or if the utility grid is outside the limiting values for voltage and frequency.

The control voltage of contactor Q2 is equal to the voltage at the line conductor L1 of the utility grid. This means that the tie switch can only be activated when grid voltage is present. Contactor Q2 is controlled by the multifunction relay Relay1 of the Sunny Island inverter. If the multifunction relay Relay1 is in non-operative mode, contactor Q2 activates.

In the event of a total grid failure, contactor Q2 goes into non-operative mode due to lack of control voltage and disconnects the battery backup grid from the line conductors of the utility grid. The Sunny Island also measures the voltage of the utility grid. For this, the Sunny Island is connected to the same line conductor as the control voltage of contactor Q2. If there is a deviation from country-specific limiting values for voltage and frequency of the utility grid, the multifunction relay Relay1 is activated. Contactor Q2 remains in non-operative mode or goes into non-operative mode.

When the utility grid is available again, the Sunny Island detects this. The Sunny Island synchronizes the battery backup grid with the utility grid. Following successful synchronization, the multifunction relay Relay1 goes into non-operative mode and contactor Q2 activates. The battery backup grid is again connected to the utility grid.

3.4.3 Grounding Device for the Battery Backup Grid

With TN and TT systems, the neutral conductor must be grounded for protection in the case of indirect contact with live components. Grounding in the utility grid is usually achieved at the local grid transformer.

In automatic transfer switches with all-pole disconnection, all poles of the battery backup grid are disconnected from the utility grid in the event of grid failure. As a result of the disconnection, the neutral conductor in the battery backup grid is not grounded. Therefore, in automatic transfer switches with all-pole disconnection, a grounding device must ground the neutral conductor in the event of grid failure. The grounding device enables the required protection in the event of indirect contact with live components. The grounding device is set up for fail-safe operation.

If the neutral conductor of the battery backup grid is connected to the utility grid, there must be no further grounding in the battery backup grid. The grounding device therefore disconnects the connection between the neutral conductor and ground if the automatic transfer switch connects the battery backup grid to the utility grid.

* The explanation is based on a single-phase battery backup system with one Sunny Island. Three-phase battery backup systems behave in the same way.
** The explanation is based on a single-phase battery backup system with one Sunny Island. Three-phase battery backup systems behave in the same way.
Circuit Description of the Grounding Device

Contactors Q3 and Q4 form the grounding device (see Section 4.1 "Single-Phase Battery Backup System", page 20). Contactors Q3 and Q4 are controlled by the two multifunction relays of the Sunny Island inverter. Contactor Q3 is activated in parallel to contactor Q2 of the tie switch. If contactor Q2 deactivates and the tie switch opens, contactor Q3 connects the neutral conductor in the battery backup grid to the grounding conductor. In addition, the Sunny Island uses the multifunction relay Relay2 to control contactor Q4. If the multifunction relay Relay2 activates, contactor Q4 activates and also connects the neutral conductor to the grounding conductor. This arrangement ensures that the neutral conductor of the battery backup grid is always connected to ground.

3.4.4 Phase Coupling for Single-Phase Battery Backup Systems

In single-phase battery backup systems, in the event of grid failure, the battery backup grid is single-phase. If the installation of the battery backup grid is three-phase, only one part of the loads can continue to be supplied.

Phase coupling enables combination of the line conductors in the battery backup grid. As a result, the other two line conductors are also supplied with voltage. This means that, in the event of grid failure, a three-phase battery backup grid becomes a single-phase distribution grid.

Phase coupling can be switched on independently for the other line conductors. Phase coupling is only suitable for battery backup grids with single-phase PV inverters and single-phase loads.

Circuit description of the phase coupling

Contactor Q6 is the phase coupler. If the multifunction relay Relay2 activates on the Sunny Island, contactor Q6 activates and connects the unsupplied line conductors via circuit breakers F3 and F4 with the supplied line conductor.

In the event of grid failure, the line conductor that is connected with the Sunny Island is supplied with voltage first. Then the phase coupling combines the two other line conductors. When the utility grid is available again, the phase coupling disconnects the combined line conductors. Only the line conductor which is connected to the Sunny Island is not interrupted on connection to the utility grid.
4 Battery Backup Systems With All-Pole Disconnection

4.1 Single-Phase Battery Backup System

4.1.1 Schematic Diagram of the Automatic Transfer Switch

Figure 3: Schematic diagram of the single-phase automatic transfer switch with all-pole disconnection and optional SMA Energy Meter
4.1.2 Circuitry Overview

Figure 4: Connection of the automatic transfer switch with all-pole disconnection (e.g., for Germany)
### 4.1.3 Connecting the Sunny Island Inverter

![Diagram of Sunny Island Inverter](image)

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cable for the control voltage</td>
<td>Sunny Island: connection <strong>AC1 Loads/SunnyBoys</strong> terminals L and N&lt;br&gt;Automatic transfer switch: connection <strong>X5</strong> terminals L and N&lt;br&gt;Conductor cross-section: 2.5 mm² to 16 mm²</td>
</tr>
<tr>
<td>B</td>
<td>AC power cable</td>
<td>Sunny Island: connection <strong>AC2 Gen/Grid</strong> terminals L, N, TT, and PE&lt;br&gt;Automatic transfer switch: connection <strong>X3</strong> terminals L1, N, and PE&lt;br&gt;Conductor cross-section: 10 mm² to 16 mm²</td>
</tr>
<tr>
<td>C</td>
<td>Measuring cable for voltage measurement</td>
<td>Sunny Island: connection <strong>ExtVtg</strong> terminals L and N&lt;br&gt;Automatic transfer switch: connection <strong>X4</strong> terminals L1 and N&lt;br&gt;Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>D</td>
<td>DC+ cable</td>
<td>Battery connection</td>
</tr>
<tr>
<td>E</td>
<td>DC – cable</td>
<td>Conductor cross-section: 50 mm² to 95 mm²&lt;br&gt;Cable diameter: 14 mm to 25 mm</td>
</tr>
<tr>
<td>Position</td>
<td>Designation</td>
<td>Description/information</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>-------------------------</td>
</tr>
</tbody>
</table>
| F        | Measuring cable of the battery temperature sensor | Sunny Island: **BatTmp** connection  
You only have to connect a battery temperature sensor if lead-acid batteries are used.  
Mount the battery temperature sensor in the middle of the battery connection, in the upper third of the battery cell. |
| G        | Control cable of the tie switch | Sunny Island: connection **Relay1** terminals C and NC  
Automatic transfer switch: connection **X4** terminals 1 and 2  
If the multifunction relay activates, the contactors of the tie switch deactivate.  
Conductor cross-section: 1.5 mm² to 2.5 mm² |
| H        | Control cable of contactors Q4 and Q6 | Sunny Island: connection **Relay2** terminals C and NO  
Automatic transfer switch: connection **X5** terminals 1 and 2  
If the multifunction relay activates, the contactors activate.  
Conductor cross-section: 1.5 mm² to 2.5 mm² |
| I        | Measuring cable for monitoring the tie switch | Sunny Island: connections **DigIn+** and **BatVtgOut+**  
Automatic transfer switch: connection **X5** terminals 3 and 4  
Inside the Sunny Island inverter, connect connections **DigIn −** and **BatVtgOut −**.  
Conductor cross-section: 0.2 mm² to 2.5 mm² |
| K        | Data cable to Sunny Remote Control | Sunny Island: **Display** connection |
| L        | Speedwire network cable | Sunny Island: **ComETH** connection  
In order to connect the router/network switch, the Speedwire data module  
Sunny Island must be mounted in the Sunny Island (see Sunny Island Speedwire data module installation manual). The **ComETH** connection is on the data module. |
| M        | Data cable for battery management | Sunny Island: **ComSync In** connection  
You only have to connect a data cable to the battery if lithium-ion batteries are used. The communication bus must be equipped with a terminator on both ends. |
4.2 Three-Phase Battery Backup System

4.2.1 Schematic Diagram of the Automatic Transfer Switch

Figure 6: Schematic diagram of the three-phase automatic transfer switch with all-pole disconnection and optional SMA Energy Meter

* The indicated values are not recommended by SMA Solar Technology AG. The electrical devices must be designed in accordance with the locally applicable standards and directives.

* Not required for systems without increased self-consumption.

* Requirements for thermal fuse used: nominal cold resistance of at least 0.2 Ω and melting integral max. 1A sec.
4.2.2 Circuitry Overview

Figure 7: Connection of the automatic transfer switch with all-pole disconnection (e.g., for Germany)

At connection AC2, always connect the neutral conductor to Nn.

- DC+ cable
- DC- cable
- Line conductor
- Neutral conductor
- Grounding conductor
- Data cable
- WAN
- Network cable
- Speedwire (LAN)
- Terminator
### 4.2.3 Connecting the Master

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/Information</th>
</tr>
</thead>
</table>
| A        | Cable for the control voltage | Sunny Island: connection **AC1 Loads/SunnyBoys** terminals L and N  
Automatic transfer switch: connection **X5** terminals L and N  
Conductor cross-section: 2.5 mm² to 16 mm² |
| B        | AC power cable | Sunny Island: connection **AC2 Gen/Grid** terminals L, N₄, and PE  
Automatic transfer switch: connection **X3** terminals L₁, N, and PE  
Conductor cross-section: 10 mm² to 16 mm² |
| C        | Measuring cable for voltage measurement | Sunny Island: connection **ExtVtg** terminals L and N  
Automatic transfer switch: connection **X4** terminals L₁ and N  
Conductor cross-section: 1.5 mm² to 2.5 mm² |
| D        | DC+ cable | Battery connection |
| E        | DC – cable | Conductor cross-section: 50 mm² to 95 mm²  
Cable diameter: 14 mm to 25 mm |
| F        | Measuring cable of the battery temperature sensor | Sunny Island: **BatTmp** connection  
You only have to connect a battery temperature sensor if lead-acid batteries are used.  
Mount the battery temperature sensor in the middle of the battery connection, in the upper third of the battery cell. |
<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Control cable of the tie switch</td>
<td>Sunny Island: connection Relay1 terminals C and NC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch: connection X4 terminals 1 and 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the multifunction relay activates, the contactors of the tie switch deactivate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>H</td>
<td>Control cable of contactor Q4</td>
<td>Sunny Island: connection Relay2 terminals C and NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch: connection X5 terminals 1 and 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the multifunction relay activates, contactor Q4 activates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>I</td>
<td>Measuring cable for monitoring the tie switch</td>
<td>Sunny Island: connections DigIn+ and BatVtgOut+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch: connection X5 terminals 3 and 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inside the Sunny Island inverter, connect connections DigIn − and BatVtgOut −.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 0.2 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>K</td>
<td>Data cable to Sunny Remote Control</td>
<td>Sunny Island: Display connection</td>
</tr>
<tr>
<td>L</td>
<td>Speedwire network cable</td>
<td>Sunny Island: ComETH connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In order to connect the router/network switch, the Speedwire data module Sunny Island</td>
</tr>
<tr>
<td></td>
<td></td>
<td>must be mounted in the Sunny Island (see Sunny Island Speedwire data module installation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>manual). The ComETH connection is on the data module.</td>
</tr>
<tr>
<td>M</td>
<td>Data cable for battery management</td>
<td>Sunny Island: ComSync In connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You only have to connect a data cable to the battery if lithium-ion batteries are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>used. The communication bus must be equipped with a terminator on both ends.</td>
</tr>
<tr>
<td>N</td>
<td>Data cable for the internal communication in the</td>
<td>Sunny Island: ComSync Out connection</td>
</tr>
<tr>
<td></td>
<td>cluster</td>
<td>Connection of internal communication bus of slave 1</td>
</tr>
</tbody>
</table>
## 4.2.4 Connecting the Slaves

![Diagram of connecting the slaves](image)

### Figure 9: Connecting the slaves

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AC power cable</td>
<td>Sunny Island: connection <strong>AC2 Gen/Grid</strong> terminals L, N&lt;sub&gt;IT&lt;/sub&gt;, and PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Connect slave 1 to <strong>X3</strong> terminals <strong>L&lt;sub&gt;2&lt;/sub&gt;, N&lt;sub&gt;2&lt;/sub&gt;, and PE</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Connect slave 2 to <strong>X3</strong> terminals <strong>L&lt;sub&gt;3&lt;/sub&gt;, N&lt;sub&gt;3&lt;/sub&gt;, and PE</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 10 mm&lt;sup&gt;2&lt;/sup&gt; to 16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>B</td>
<td>Measuring cable for voltage</td>
<td>Sunny Island: connection <strong>ExtVtg</strong> terminals L and N</td>
</tr>
<tr>
<td></td>
<td>measurement</td>
<td>Automatic transfer switch:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Connect slave 1 to <strong>X4</strong> terminals <strong>L&lt;sub&gt;2&lt;/sub&gt; and N</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Connect slave 2 to <strong>X4</strong> terminals <strong>L&lt;sub&gt;3&lt;/sub&gt; and N</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 1.5 mm&lt;sup&gt;2&lt;/sup&gt; to 2.5 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>C</td>
<td>DC+ cable</td>
<td>Battery connection</td>
</tr>
<tr>
<td>D</td>
<td>DC − cable</td>
<td>Conductor cross-section: 50 mm&lt;sup&gt;2&lt;/sup&gt; to 95 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable diameter: 14 mm to 25 mm</td>
</tr>
<tr>
<td>E</td>
<td>Data cable for the internal</td>
<td>Sunny Island: <strong>ComSync In</strong> connection</td>
</tr>
<tr>
<td></td>
<td>communication in the cluster</td>
<td>With slave 1: connection of internal communication bus of master</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With slave 2: connection of internal communication bus of slave 1</td>
</tr>
<tr>
<td>Position</td>
<td>Designation</td>
<td>Description/information</td>
</tr>
<tr>
<td>----------</td>
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<td>-------------------------</td>
</tr>
</tbody>
</table>
| F        | Data cable for the internal communication in the cluster | Sunny Island: **ComSync Out** connection  
With slave 1: connection of internal communication bus after slave 2  
With slave 2: leave terminator plugged in. Slave 2 is connected to slave 1 only. |
5 Battery Backup Systems Without All-Pole Disconnection

5.1 Single-Phase Battery Backup System

5.1.1 Schematic Diagram of the Automatic Transfer Switch

Figure 10: Schematic diagram of the single-phase automatic transfer switch without all-pole disconnection and optional SMA Energy Meter
5.1.2 Circuitry Overview

Figure 11: Connection of the automatic transfer switch without all-pole disconnection (e.g., for Australia)

At connection AC2, always connect the neutral conductor to Nnr.

* In the event of grid failure, maximum trip-capable circuit breakers:
  - Trip characteristic B6 (S13.0M-11/S14.4M-11) or
  - B16/C6 (S16.0H-11/S18.0H-11).
### 5.1.3 Connecting the Sunny Island Inverter

![Connecting the Sunny Island inverter](image)

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cable for the control voltage</td>
<td>Sunny Island: connection AC1 Loads/SunnyBoys terminals L and N Automatic transfer switch: connection X5 terminals L and N This cable is only required for phase coupling. Conductor cross-section: 2.5 mm² to 16 mm²</td>
</tr>
<tr>
<td>B</td>
<td>AC power cable</td>
<td>Sunny Island: connection AC2 Gen/Grid terminals L, N, TT, and PE Automatic transfer switch: connection X3 terminals L1, N, and PE Conductor cross-section: 10 mm² to 16 mm²</td>
</tr>
<tr>
<td>C</td>
<td>Measuring cable for voltage measurement</td>
<td>Sunny Island: connection ExtVtg terminals L and N Automatic transfer switch: connection X4 terminals L1 and N Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>D</td>
<td>DC+ cable</td>
<td>Battery connection</td>
</tr>
<tr>
<td>E</td>
<td>DC − cable</td>
<td>Conductor cross-section: 50 mm² to 95 mm²</td>
</tr>
<tr>
<td>F</td>
<td>Measuring cable of the battery temperature sensor</td>
<td>Sunny Island: BatTmp connection You only have to connect a battery temperature sensor if lead-acid batteries are used. Mount the battery temperature sensor in the middle of the battery connection, in the upper third of the battery cell.</td>
</tr>
<tr>
<td>Position</td>
<td>Designation</td>
<td>Description/information</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>G</td>
<td>Control cable of the tie switch</td>
<td>Sunny Island: connection <strong>Relay1</strong> terminals C and NC&lt;br&gt;Automatic transfer switch: connection <strong>X4</strong> terminals 1 and 2&lt;br&gt;If the multifunction relay activates, the contactor of the tie switch deactivates. Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>H</td>
<td>Control cable of contactor Q6</td>
<td>Sunny Island: connection <strong>Relay2</strong> terminals C and NO&lt;br&gt;Automatic transfer switch: connection <strong>X4</strong> terminals 1 and 2&lt;br&gt;If the multifunction relay activates, the contactor activates. This cable is only required for phase coupling. Conductor cross-section: 1.5 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>I</td>
<td>Measuring cable for monitoring the tie switch</td>
<td>Sunny Island: connections <strong>DigIn+</strong> and <strong>BatVtgOut+</strong>&lt;br&gt;Automatic transfer switch: connection <strong>X5</strong> terminals 3 and 4&lt;br&gt;Inside the Sunny Island inverter, connect connections <strong>DigIn−</strong> and <strong>BatVtgOut−</strong>. Conductor cross-section: 0.2 mm² to 2.5 mm²</td>
</tr>
<tr>
<td>K</td>
<td>Data cable to Sunny Remote Control</td>
<td>Sunny Island: <strong>Display</strong> connection</td>
</tr>
<tr>
<td>L</td>
<td>Speedwire network cable</td>
<td>Sunny Island: <strong>ComETH</strong> connection&lt;br&gt;In order to connect the router/network switch, the Speedwire data module Sunny Island must be mounted in the Sunny Island (see Sunny Island Speedwire data module installation manual). The <strong>ComETH</strong> connection is on the data module.</td>
</tr>
<tr>
<td>M</td>
<td>Data cable for battery management</td>
<td>Sunny Island: <strong>ComSync In</strong> connection&lt;br&gt;You only have to connect a data cable to the battery if lithium-ion batteries are used. The communication bus must be equipped with a terminator on both ends.</td>
</tr>
</tbody>
</table>
5.2 Three-Phase Battery Backup System

5.2.1 Schematic Diagram of the Automatic Transfer Switch

Figure 13: Schematic diagram of the three-phase automatic transfer switch without all-pole disconnection and optional SMA Energy Meter
5.2.2 Circuitry Overview

**At connection AC2, always connect the neutral conductor to Nn.**

*In the event of grid failure, maximum trip-capable circuit breakers: Trip characteristic B6 (SI3.0M-11/SI4.4M-11) or B16/C6 (SI6.0H-11/SI8.0H-11).*
### 5.2.3 Connecting the Master

#### Table: Connection Points

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AC power cable</td>
<td>Sunny Island: connection <strong>AC2 Gen/Grid</strong> terminals L, N&lt;sub&gt;TT&lt;/sub&gt;, and PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch: connection <strong>X3</strong> terminals L1, N, and PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 10 mm&lt;sup&gt;2&lt;/sup&gt; to 16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>B</td>
<td>Measuring cable for voltage measurement</td>
<td>Sunny Island: connection <strong>ExtVtg</strong> terminals L and N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatic transfer switch: connection <strong>X4</strong> terminals L1 and N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor cross-section: 1.5 mm&lt;sup&gt;2&lt;/sup&gt; to 2.5 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>C</td>
<td>DC+ cable</td>
<td>Battery connection</td>
</tr>
<tr>
<td>D</td>
<td>DC − cable</td>
<td>Conductor cross-section: 50 mm&lt;sup&gt;2&lt;/sup&gt; to 95 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable diameter: 14 mm to 25 mm</td>
</tr>
<tr>
<td>E</td>
<td>Measuring cable of the battery temperature sensor</td>
<td>Sunny Island: <strong>BatTmp</strong> connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You only have to connect a battery temperature sensor if lead-acid batteries are used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mount the battery temperature sensor in the middle of the battery connection, in the upper third of the battery cell.</td>
</tr>
</tbody>
</table>

---

Figure 15: Connecting the master
<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
</table>
| F        | Control cable of the tie switch               | Sunny Island: connection Relay 1 terminals C and NC  
Automatic transfer switch: connection X4 terminals 1 and 2  
If the multifunction relay activates, the contactor of the tie switch deactivates. Conductor cross-section: 1.5 mm² to 2.5 mm² |
| G        | Measuring cable for monitoring the tie switch | Sunny Island: connections DigIn+ and BatVtgOut+  
Automatic transfer switch: connection X5 terminals 3 and 4  
Inside the Sunny Island inverter, connect connections DigIn − and BatVtgOut − .  
Conductor cross-section: 0.2 mm² to 2.5 mm² |
| I        | Data cable to Sunny Remote Control            | Sunny Island: Display connection                                                                                                                                                                                                                                                                                                                      |
| K        | Speedwire network cable                       | Sunny Island: ComETH connection  
In order to connect the router/network switch, the Speedwire data module Sunny Island must be mounted in the Sunny Island (see Sunny Island Speedwire data module installation manual). The ComETH connection is on the data module. |
| L        | Data cable for battery management             | Sunny Island: ComSync In connection  
You only have to connect a data cable to the battery if lithium-ion batteries are used. The communication bus must be equipped with a terminator on both ends.  
If no data cable is plugged in, plug the terminator into ComSync In. |
| M        | Data cable for the internal communication in the cluster | Sunny Island: ComSync Out connection                                                                                                                                                                                                                                                                                                                      |
### 5.2.4 Connecting the Slaves

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description/information</th>
</tr>
</thead>
</table>
| A        | AC power cable | Sunny Island: connection AC2 Gen/Grid terminals L, N_{IT}, and PE  
Automatic transfer switch:  
  - Connect slave 1 to X3 terminals L2, N, and PE.  
  - Connect slave 2 to X3, terminals L3, N, and PE.  
Conductor cross-section: 10 mm² to 16 mm² |
| B        | Measuring cable for voltage measurement | Sunny Island: connection ExtVtg terminals L and N  
Automatic transfer switch:  
  - Connect slave 1 to X4 terminals L2 and N.  
  - Connect slave 2 to X4 terminals L3 and N.  
Conductor cross-section: 1.5 mm² to 2.5 mm² |
| C        | DC+ cable | Battery connection |
| D        | DC− cable | Conductor cross-section: 50 mm² to 95 mm²  
Cable diameter: 14 mm to 25 mm |
| E        | Data cable for the internal communication in the cluster | Sunny Island: ComSync In connection |
| F        | Data cable for the internal communication in the cluster | Sunny Island: ComSync Out connection  
With slave 2, leave terminator plugged in.  
Slave 2 is connected to slave 1 only. |
6 Connecting the Sunny Home Manager

Figure 17: Connection of the Sunny Home Manager in systems with an SMA Energy Meter

Requirements:
- All Speedwire devices must be connected to the same router or network switch.
- The router and optionally the network switch must fully support Multicast.
- The router must support "Internet Enabled Devices" with the interfaces SIP and STUN.

The most common routers and network switches support Multicast and "Internet Enabled Devices".
7 Commissioning

7.1 Basic Configuration of the Sunny Island Inverter

NOTICE

Damage to the battery due to incorrect settings
Aging of the battery will be accelerated by incorrect settings of the parameters for battery type, nominal voltage, and battery capacity. The battery parameters influence the charging behavior of the Sunny Island inverter.

- During the basic configuration, ensure that you configure the battery values recommended by the battery manufacturer (for the battery technical data, see the documentation of the battery manufacturer).
- In the basic configuration, configure the battery capacity for a ten-hour electric discharge (C10). The battery manufacturer specifies the battery capacity in relation to discharge time.

Requirements:
- With a three-phase system, the Sunny Remote Control must be connected to the master. The master is thus defined during basic configuration.
- In the automatic transfer switch, all circuit breakers must be open. This means that the Sunny Island is not connected to any PV inverter.

Procedure:

Check the wiring (see the Sunny Island inverter installation manual).

Close all devices except the BatFuse. This protects all live components from being touched.

Close the BatFuse and switch on all Sunny Island inverters:
In systems with one Sunny Island, press the "On" button.
In systems with three Sunny Island inverters, press and hold the "On" button on the master until an acoustic signal sounds.
When the Sunny Remote Control shows `<Init System>`, press and hold the button on the Sunny Remote Control.

☑ An acoustic signal sounds three times and the Sunny Remote Control displays the Quick Configuration Guide.

Turn the button on the Sunny Remote Control and select **New System**.

☑ An entry confirmation prompt appears.

Set `Y` and press the button.

Set the date.

Set the time.

Set `OnGrid`.
Set the battery type.

**LiIon_Ext-BMS**: lithium-ion battery

**VRLA**: lead-acid battery with electrolyte absorbed in glass mat or immobilized in gel

**FLA**: lead-acid battery with liquid electrolyte

Set the battery capacity for ten-hour electric discharge (for determining the battery capacity, see the Sunny Island inverter installation manual).

Set the nominal voltage of the battery.

Also, during the first ten operating hours, set the country data set:

**AR-N4105**: configuration in accordance with the application rule VDE-AR-N 4105

**AS4777**: configuration in accordance with the standard AS4777

Set increased self-consumption:

**BackupOnly**: system without increased self-consumption

**SelfConsBackup**: system with increased self-consumption
Set the number of Sunny Island inverters in the system:

1Phase: system with one Sunny Island inverter

If the country data set of the Sunny Island inverter is VDE-AR-4105 and the system increases self-consumption (SelfConsBackup), set the type of feed-in of the PV system (see Section 3.1, page 12).

3Phase: system with three Sunny Island inverters

If the system does not increase self-consumption (BackupOnly) or the country data set of the Sunny Island inverter is AS4777, confirm the basic configuration with Y.

Asymmetric: The installation site is located in Germany and at least one PV inverter feeds in asymmetrically on a single line conductor.

Symmetric: The installation site is either located outside of Germany or all PV inverters feed in symmetrically on three line conductors.

Set the line conductor to which the Sunny Island is connected:

L1: connection to line conductor L1
L2: connection to line conductor L2
L3: connection to line conductor L3

Confirm the basic configuration with Y.

Wait until the upper LED (inverter LED) on slave 1 is flashing and the Sunny Remote Control is displaying To identify Slave1, press Tss on the Slv.

Press the start-stop button on slave 1.

Wait until the upper LED (inverter LED) on slave 2 is flashing and the Sunny Remote Control is displaying To identify Slave2, press Tss on the Slv.
The basic configuration is complete.

If an SD memory card is inserted in the Sunny Remote Control, the message

Do not remove MMC/SD memory card ... appears.

Close the circuit breaker F1 and the residual-current device F2 in the distribution board
and leave the Sunny Island switched on, but do not start it.

7.2 Testing the Automatic Transfer Switch Function

**WARNING**

Danger to life from electric shock due to live voltage

During the test, high voltages are present in the automatic transfer switch. Touching live components can result in death or serious injury.

- Ensure that you do not touch any live components while measuring and testing.
- Disconnect the automatic transfer switch from voltage sources while you are eliminating any faults.

The sequence of the test applies to all types of automatic transfer switches and is independent of the automatic transfer switch installed. Ignore tests for non-existent devices.

Requirements:

☐ In the automatic transfer switch, all circuit breakers F1, F3, ..., F6 must be open.
☐ The residual-current devices F2 and F7 must be closed.
☐ All Sunny Island inverters must be switched on but not operational.
☐ PV system and all loads at connection X2 must be disconnected from voltage sources.

Procedure:

1. Open the automatic transfer switch and ensure that at connection X1, there is voltage present and a right-hand rotating magnetic field.

2. Measure whether the individual terminals are voltage-free:

<table>
<thead>
<tr>
<th>Check point</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection X2</td>
<td>If AC voltage is present, correctly wire contactors Q1 and Q2.</td>
</tr>
<tr>
<td>Connection X3</td>
<td>If AC voltage is present, stop the Sunny Island.</td>
</tr>
<tr>
<td>Connection X4</td>
<td>If AC voltage is present, correctly wire circuit breaker F1.</td>
</tr>
<tr>
<td>Connection X5, terminals L1, N, 1, and 2</td>
<td>If AC voltage is present, stop the Sunny Island.</td>
</tr>
<tr>
<td>Connection X5, terminals 3 and 4</td>
<td>If DC voltage is present, correctly wire contactor or auxiliary contact Q2.</td>
</tr>
</tbody>
</table>

3. Check whether the grounding device is correctly wired:

<table>
<thead>
<tr>
<th>Check point</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contactors Q3 and Q4</td>
<td>Ensure that the wiring is correct.</td>
</tr>
<tr>
<td>Connection X2, terminals N and PE</td>
<td>Ensure that no voltage is present between the terminals and that conductivity can be measured.</td>
</tr>
</tbody>
</table>
4. Close circuit breaker F1 and check the following:

<table>
<thead>
<tr>
<th>Check point</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contactors Q1, Q2, and Q3</td>
<td>Check whether the contactors activate and whether there is voltage present and a right-hand rotating magnetic field at connection X2. If the contactors do not activate or no voltage is present at connection X2, ensure the following:</td>
</tr>
<tr>
<td>Connection X2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• At the master, ensure that the control cable is correctly connected to connections Relay1 C and Relay1 NC.</td>
</tr>
<tr>
<td></td>
<td>• Ensure that, in the automatic transfer switch, contactors Q1, Q2, and Q3 are correctly wired.</td>
</tr>
</tbody>
</table>

☑ Voltages are present at connection X3.

6. Check whether the residual-current devices trip correctly and are correctly wired:

<table>
<thead>
<tr>
<th>Check point</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual-current device F7</td>
<td>Press the test button and measure whether there is voltage present at connection X3. If voltage is present, correctly wire residual-current device F7. Switch on residual-current device F7 again.</td>
</tr>
</tbody>
</table>

| Residual-current device F2 | Press the test button and check if contactors Q1, Q2, and Q3 go into non-operative mode. If the contactors do not deactivate, wire the residual-current device F2 correctly. Switch on residual-current device F2 again. |

7. Start the Sunny Island. Press and hold the button on the Sunny Remote Control until you hear an acoustic signal.

8. Check whether error messages are displayed on the Sunny Remote Control. If the error message F365 VAcExtPhsFail is displayed, correctly connect connection ExtVtg on the Sunny Island.

9. Close circuit breaker F5 and check whether contactors Q4 and Q6 remain in non-operative mode. If the contactors activate, correctly wire connections Relay2 C and Relay2 NO on the Sunny Island.

10. Simulate a grid failure. To do this, open circuit breaker F1. As a result, contactors Q1, Q2, and Q3 deactivate. If the error message F367 ExtCtcNotOpen is displayed, correctly connect connections DigIn and BatVtgOut to the Sunny Island.

11. Check whether contactors Q4 and Q6 activate approximately five seconds after circuit breaker F1 is opened. If the contactors do not activate, correctly wire the control cables of the contactors and correctly connect connections Relay2 C and Relay2 NO to the master.

12. Check whether the grounding device switches correctly.
   • Ensure that no voltage is present at connection X2 between terminals N and PE and that conductivity can be measured.
   • Open circuit breaker F5.
   • Ensure that no voltage is present at connection X2 between terminals N and PE and that conductivity can be measured.
   • Close circuit breaker F5.
13. Check whether the phase coupling switches correctly. To do this, close circuit breakers F3 and F4 and check the following:

<table>
<thead>
<tr>
<th>Check point</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection X2</td>
<td>Measure if there is voltage present between the line conductors and the neutral conductor. If no voltage is present, correctly wire contactor Q6. Ensure that no voltage is present between the line conductors.</td>
</tr>
</tbody>
</table>

- Contactors Q4 and Q6 deactivate within five minutes and the tie switch then connects the battery backup grid to the utility grid.

### 7.3 Adjusting the Configuration of the Sunny Island Inverter

#### 7.3.1 Countries in Which the Configuration Must Be Adjusted

In the SMA Flexible Storage System, the Sunny Island inverters are connected to the utility grid and must meet the requirements of the grid operators. Depending on the settings, the Sunny Island inverters satisfy the requirements of the application rule VDE-AR-N 4105:2011-08 or the standard AS4777. The application rule is stored in the Sunny Island as the standard country data set VDE-AR-4105 or AS4777.

The configuration must be adjusted for the following countries (status: July 2014):
- Denmark (see Section 7.3.2, page 47)
- France (see Section 7.3.3, page 47)
- Austria (see Section 7.3.4, page 47)
- Switzerland (see Section 7.3.5, page 48)

The configuration may only be adjusted on request or with permission of the grid operator in the following countries (status: July 2014):
- Australia
  Country data set: AS4777
- Belgium
  Country data set: VDE-AR-4105
- Germany
  Country data set: VDE-AR-4105

Use in other countries is possible with the agreement of the grid operator. Consult the grid operator on whether adjustment is necessary.
7.3.2 Adjusting the Configuration for Denmark

When using the Sunny Island 6.0H / 8.0H in Denmark, you must reduce the discharge/charging current (default setting: max. 20.0 A).

When using the Sunny Island 3.0M / 4.4M in Denmark, you can retain the default setting of the discharge/charging current (default setting: max. 16.0 A).

Requirement:

☐ The extended configuration must be performed within the first ten operating hours of the Sunny Island inverter, otherwise an SMA Grid Guard code is required in order to change grid-relevant parameters (application form for the SMA Grid Guard code available at www.SMA-Solar.com).

☐ The country data set of the Sunny Island inverter must be set to VDE-AR-4105 (see Section 7.1 "Basic Configuration of the Sunny Island Inverter", page 40).

Procedure:

1. Switch to expert mode on the Sunny Remote Control (see the Sunny Island inverter operating manual).
2. Set the parameter 210.03 InvChrgCurMax to 16.0 A.

7.3.3 Adjusting the Configuration for France

The following limiting values must be adjusted in order to meet the requirements of the Union technique de l’électricité (UTE):

- Maximum power frequency
- The upper frequency difference for valid grid connection
- Minimum observation time for grid voltage and frequency before grid connection

Requirement:

☐ The extended configuration must be performed within the first ten operating hours of the Sunny Island inverter, otherwise an SMA Grid Guard code is required in order to change grid-relevant parameters (application form for the SMA Grid Guard code available at www.SMA-Solar.com).

☐ The country data set of the Sunny Island inverter must be set to VDE-AR-4105 (see Section 7.1 "Basic Configuration of the Sunny Island Inverter", page 40).

Procedure:

1. Switch to expert mode on the Sunny Remote Control (see the Sunny Island inverter operating manual).
2. Set the parameter 232.07 GdFrqMax to 50.6 Hz.
3. Set the parameter 232.15 GdFrqMaxDel to 0.05 Hz.
4. Set the parameter 232.08 GdVldTm to 30 s.

7.3.4 Adjusting the Configuration for Austria

If your grid operator does not permit frequency-dependent control of active power feed-in in the case of overfrequency, you must switch off this function (see VDE-AR-N 4105 item 5.7.3.3).

If your grid operator specifies a maximum grid feed-in per line conductor, you must reduce the discharge/charging current (default setting in the Sunny Island is 20.0 A).

Requirement:

☐ The extended configuration must be performed within the first ten operating hours of the Sunny Island inverter, otherwise an SMA Grid Guard code is required in order to change grid-relevant parameters (application form for the SMA Grid Guard code available at www.SMA-Solar.com).

☐ The country data set of the Sunny Island inverter must be set to VDE-AR-4105 (see Section 7.1 "Basic Configuration of the Sunny Island Inverter", page 40).
Procedure:
1. Switch to expert mode on the Sunny Remote Control (see the Sunny Island inverter operating manual).
2. If frequency-dependent control of active power feed-in is not permitted, set the parameter 232.41 P-WCtLHzMod to **Off**.
3. If your grid operator specifies a maximum grid feed-in per line conductor, set the parameter 210.03 InvChrgCurMax to the value specified by the grid operator.

### 7.3.5 Adjusting the Configuration for Switzerland

The following limiting values must be adjusted in order to meet the requirements of the grid operators in Switzerland:
- Maximum power frequency
- The upper frequency difference for valid grid connection
- Minimum observation time for grid voltage and frequency before grid connection

If your grid operator specifies a maximum grid feed-in per line conductor, you must reduce the discharge/charging current (default setting in the Sunny Island is 20.0 A).

Requirement:
- ☐ The extended configuration must be performed within the first ten operating hours of the Sunny Island inverter, otherwise an SMA Grid Guard code is required in order to change grid-relevant parameters (application form for the SMA Grid Guard code available at www.SMA-Solar.com).
- ☐ The country data set of the Sunny Island inverter must be set to **VDE-AR-4105** (see Section 7.1 "Basic Configuration of the Sunny Island Inverter", page 40).

Procedure:
1. Switch to expert mode on the Sunny Remote Control (see Sunny Island inverter operating manual).
2. Set the parameter 232.07 GdFrqMax to **50.2 Hz**.
3. Set the parameter 232.15 GdFrqMaxDel to **0.05 Hz**.
4. Set the parameter 232.08 GdVldTm to **30 s**.
5. If your grid operator specifies a maximum grid feed-in per line conductor, set the parameter 210.03 InvChrgCurMax to the value specified by the grid operator.

### 7.4 Adjusting the Configuration of the PV Inverters

Countries in which the configuration should be adjusted

In battery backup systems, the active power of the PV inverters should be controllable depending on the frequency (see Planning Guidelines "SMA Flexible Storage System with Battery Backup Function"). If your grid operator prohibits control of active power feed-in in the case of overfrequency, you can also use the PV inverters without changing the configuration. SMA Solar Technology AG recommends activating the frequency-dependent control of the PV inverters.

<table>
<thead>
<tr>
<th>Country</th>
<th>Does the current country data set valid for the site include frequency-dependent control?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>no</td>
</tr>
<tr>
<td>Belgium</td>
<td>yes</td>
</tr>
<tr>
<td>Denmark</td>
<td>yes</td>
</tr>
<tr>
<td>Germany</td>
<td>yes</td>
</tr>
<tr>
<td>France</td>
<td>no</td>
</tr>
<tr>
<td>Austria</td>
<td>no</td>
</tr>
<tr>
<td>Switzerland</td>
<td>no</td>
</tr>
</tbody>
</table>
Activating frequency-dependent control of active power

Requirements:
☐ The PV inverters are part of a battery backup system and the automatic transfer switch can disconnect the PV inverters from the utility grid.
☐ Adjustment must be coordinated with the grid operator.
☐ You must be authorized to change Grid Guard parameters. You can find the application form at www.SMA-Solar.com in the download area of the relevant PV inverter.
☐ The firmware version of the PV inverter must support the frequency-dependent control of active power (for "PV inverters", see Planning Guidelines "SMA Flexible Storage System with Battery Backup Function" at www.SMA-Solar.com).

Procedure:
1. With existing PV systems, make sure that the firmware of the installed PV inverters supports frequency-dependent active power control (see the Planning Guidelines "SMA Flexible Storage System with Battery Backup Function" at www.SMA-Solar.com).
2. Set the following parameters of the PV inverters to the specified value (see the documentation of the communication product).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values for the relevant country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>France **</td>
</tr>
<tr>
<td></td>
<td>Austria **</td>
</tr>
<tr>
<td></td>
<td>Switzerland**</td>
</tr>
<tr>
<td></td>
<td>Australia***</td>
</tr>
<tr>
<td>P-WCtlHzMod</td>
<td>On or WCtlHz</td>
</tr>
<tr>
<td>Operating mode of active power limitation in the case of overfrequency P(f)*</td>
<td>On or WCtlHz</td>
</tr>
<tr>
<td>P-WGra</td>
<td>40</td>
</tr>
<tr>
<td>Active power gradient, linear instantaneous power gradient configuration*</td>
<td>77</td>
</tr>
<tr>
<td>P-HzStr</td>
<td>0.2</td>
</tr>
<tr>
<td>Difference between starting frequency and power frequency, linear instantaneous power gradient configuration*</td>
<td>0.2</td>
</tr>
<tr>
<td>P-HzStop</td>
<td>0.2</td>
</tr>
<tr>
<td>Difference between reset frequency and power frequency, linear instantaneous power gradient configuration*</td>
<td>0.05</td>
</tr>
<tr>
<td>P-HzStopWGra</td>
<td>10</td>
</tr>
<tr>
<td>Active power gradient after reset frequency, linear instantaneous power gradient configuration*</td>
<td>10</td>
</tr>
</tbody>
</table>

* Menu Equipment & device control system
** The adjustments are based on the requirements for PV inverters from the application rule "VDE-AR-N 4105:2011-08".
*** The adjustments are based on the requirements for PV inverters from the product standard "AS 4777 2014".

7.5 Attaching the Labels

The warning label for battery backup systems is included in the scope of delivery of the Sunny Island inverter.
• Attach the warning label "Battery Backup System" to the AC main distributor from the outside.
7.6 Activating Phase Coupling in Single-Phase Battery Backup Systems

With phase coupling it is possible, in the event of utility grid failure, to supply loads which are not connected to the line conductor of the Sunny Island inverter (see Section 3.4.4 "Phase Coupling for Single-Phase Battery Backup Systems", page 19). As soon as the utility grid returns, the contactor disconnects the coupled line conductors again. The switchover times for the loads to the coupled line conductors are longer than to the line conductor of the Sunny Island. The switchover times are a matter of seconds.

Disconnection of the Sunny Island inverter as a result of overload:
The Sunny Island switches itself off when overloaded. Only activate phase coupling for line conductors whose loads do not exceed the maximum AC power of the Sunny Island inverter (for technical data, see the Sunny Island inverter installation manual).

**NOTICE**

Damage to three-phase loads during phase coupling

If three-phase loads are connected to a single-phase utility grid during phase coupling, SMA Solar Technology AG cannot rule out damage to the three-phase loads.

- Ensure that, during phase coupling, only single-phase loads are connected to the battery backup grid.

Procedure:

- In the automatic transfer switch, switch on circuit breaker F3 or F4 or both.

7.7 Commissioning System With Increased Self-Consumption

7.7.1 Preparing BLUETOOTH Communication

To allow SMA BLUETOOTH devices in the battery backup system to communicate with each other, all devices must be set to the same NetID. The NetID is used to distinguish between systems with SMA BLUETOOTH operating in close proximity to one another.

Procedure:

1. For PV inverters with integrated BLUETOOTH interface that communicate via Speedwire, set NetID 0 [see PV inverter installation manual]. This deactivates communication via BLUETOOTH.
2. Determine the NetID of the BLUETOOTH system.
   - Install Sunny Explorer on a computer. Either run the installation file on the CD provided or download free of charge at www.SMA-Solar.com.
   - Determine a free NetID for the BLUETOOTH system using Sunny Explorer [see Sunny Explorer user manual].
   - Quit Sunny Explorer. This will ensure that the BLUETOOTH network is set up via the Sunny Home Manager.
3. Set the determined NetID on the Sunny Home Manager and on all devices with active BLUETOOTH interface [see documentation of the BLUETOOTH devices]. Note that the NetID must not be set to 1 if the Sunny Home Manager is intended to communicate with more than one BLUETOOTH node.
7.7.2 Commissioning a System With Increased Self-Consumption

Deactivation of the intermediate storage of PV energy during certain charging procedures

To increase the service life of the battery, the system regularly carries out full charges and equalization charges (see Technical Information "Battery Management" at www.SMA-Solar.com). During this charging process, the intermediate storage of PV energy is deactivated and electricity may have to be purchased to perform the full and equalization charges.

Required data for registration in Sunny Portal:

<table>
<thead>
<tr>
<th>Device/customer data</th>
<th>Required data and explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny Home Manager</td>
<td>• Serial number (PIC) and registration ID (RID)</td>
</tr>
<tr>
<td></td>
<td>Register the new system in Sunny Portal using the PIC and RID.</td>
</tr>
<tr>
<td>SMA Energy Meter</td>
<td>• Only when two SMA Energy Meters are installed, note down the serial number and purpose (e.g., PV production meter) in each case. This way you can identify the energy meters in the Sunny Portal.</td>
</tr>
<tr>
<td>PV inverter</td>
<td>• PV system password</td>
</tr>
<tr>
<td></td>
<td>The PV system password is the same as the device password for the user group &quot;Installer&quot;. All devices in a PV system must be set to the same password (for user groups and security concept, see the Sunny Explorer user manual).</td>
</tr>
<tr>
<td></td>
<td>The default password is 1111.</td>
</tr>
<tr>
<td></td>
<td>• Serial number of the PV inverters</td>
</tr>
<tr>
<td></td>
<td>You can uniquely identify the PV inverters in the Sunny Portal using the serial number.</td>
</tr>
<tr>
<td></td>
<td>• PV array power in kWp</td>
</tr>
<tr>
<td>SMA radio-controlled socket</td>
<td>• The serial number and connected load of each SMA radio-controlled socket</td>
</tr>
<tr>
<td></td>
<td>In Sunny Portal, configure the SMA radio-controlled socket in accordance with the requirements of the connected load. To do so, you require the serial number of the SMA radio-controlled socket.</td>
</tr>
<tr>
<td>Customer data</td>
<td>• E-mail address</td>
</tr>
<tr>
<td></td>
<td>• Password for Sunny Portal access</td>
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<td></td>
<td>• Address of the PV system</td>
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<tr>
<td></td>
<td>• Electricity tariff data</td>
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<td>• Electricity price for purchased electricity</td>
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<td>• Tariff times, if applicable (e.g., for tariffs with peak and off-peak tariff)</td>
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<tr>
<td></td>
<td>• Feed-in tariff</td>
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<tr>
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<td>• Self-consumption tariff, if applicable</td>
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Requirements:

☐ The basic configuration of the Sunny Island inverter must have been performed (see Section 7.1, page 40).
☐ The functionality of the automatic transfer switch must be checked (see Section 7.2, page 44).
☐ The Sunny Home Manager, the Sunny Island and all other Speedwire devices must be connected to the same router.
☐ DHCP must be enabled for the router of the system.
☐ The router of the system must have an Internet connection.
Procedure:

1. In the distribution board, switch on circuit breaker F1 and residual-current device F2.
2. Commission the PV system (see PV inverter documentation).
3. On the Sunny Island, press and hold the "On" button until you hear an acoustic signal. This starts the system.
4. Only when two SMA Energy Meters are installed in the local network, assign the grid feed-in meter and purchased electricity meter to the Sunny Island using Sunny Explorer. To do this, enter the serial number of the grid feed-in meter and purchased electricity meter (see the Sunny Explorer user manual).
5. Open Sunny Portal via www.SunnyPortal.com/Register and run the PV System Setup Assistant. The required data for registration in Sunny Portal must be at hand.

Representation of the Sunny Island inverters in Sunny Portal

In Sunny Portal, the Sunny Island inverters are always displayed as one device, even if the system consists of three Sunny Island inverters. If there are three Sunny Island inverters, the data is added together.

6. Activate the automatic update of the Sunny Home Manager and the PV system in Sunny Portal.
7. Only in systems with active power limitation, ensure that the limitation of the active power feed-in is configured and functioning in Sunny Portal ("Configuring Active Power Feed-In Limitation", see the User Manual "Sunny Home Manager in Sunny Portal" at www.SunnyPortal.com).

7.8 Commissioning a System Without Increased Self-Consumption

Requirement:

☐ The functionality of the automatic transfer switch must be checked (see Section 7.2, page 44).

Procedure:

- Commission the PV system (see PV inverter documentation).
- To start the system, press and hold the "On" button on the Sunny Island until an acoustic signal sounds.
8 Contact

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

- Sunny Island inverter type
- Sunny Island inverter serial number
- Sunny Island inverter firmware version
- Displayed error message
- Type of battery connected
- Nominal battery capacity
- Nominal battery voltage
- Type of the communication products connected
- Type and size of additional energy sources

<table>
<thead>
<tr>
<th>Country</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>SMA Australia Pty Ltd. Sydney</td>
</tr>
<tr>
<td></td>
<td>Toll free for Australia: 1800 SMA AUS (1800 762 287)</td>
</tr>
<tr>
<td></td>
<td>International: +61 2 9491 4200</td>
</tr>
<tr>
<td>Belgien/</td>
<td>SMA Benelux BVBA/SPRL Mechelen</td>
</tr>
<tr>
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<td>+32 15 286 730</td>
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<tr>
<td>Česko</td>
<td>SMA Central &amp; Eastern Europe s.r.o. Praha</td>
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<tr>
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<td>Danmark</td>
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<td></td>
<td>Medium Power Solutions</td>
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<tr>
<td></td>
<td>Wechselrichter: +49 561 9522-1499</td>
</tr>
<tr>
<td></td>
<td>Kommunikation: +49 561 9522-2499</td>
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<tr>
<td></td>
<td>SMA Online Service Center: <a href="http://www.SMA.de/Service">www.SMA.de/Service</a></td>
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<tr>
<td></td>
<td>Hybrid Energy Solutions</td>
</tr>
<tr>
<td></td>
<td>Sunny Island: +49 561 9522-399</td>
</tr>
<tr>
<td></td>
<td>PV-Diesel Hybridsysteme: +49 561 9522-3199</td>
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<tr>
<td>España</td>
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<td></td>
<td>Llamada gratuita en España: 900 14 22 22</td>
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<tr>
<td></td>
<td>Internacional: +34 902 14 24 24</td>
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<tr>
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<tr>
<td>United Kingdom</td>
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<tr>
<td>Ταϊλάνδη</td>
<td>SMA Solar (Thailand) Co., Ltd.  &quot;กิจการพาณิชย์&quot;</td>
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<tr>
<td>대한민국</td>
<td>SMA Technology Korea Co., Ltd. 서울</td>
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</tbody>
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## Contact

<table>
<thead>
<tr>
<th>Other countries</th>
<th>International SMA Service Line Niestetal</th>
<th>Toll free worldwide: 00800 SMA SERVICE (+800 762 7378423)</th>
</tr>
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<tbody>
<tr>
<td>SMA Middle East LLC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+971 2 234-6177</td>
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