



Service manual

SUNNY TRIPOWER

5000TL / 6000TL / 7000TL / 8000TL / 9000TL



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1 Information on this Document

This document describes how to rectify certain errors and how to replace defective components. This document is a supplement to the documentation that is provided with each product. It does not replace any locally applicable standards or directives. Read and observe all documentation supplied with the product.

Validity

This document is valid for the following device types from firmware version 2.51:

- STP 5000TL-20 (Sunny Tripower 5000TL)
- STP 6000TL-20 (Sunny Tripower 6000TL)
- STP 7000TL-20 (Sunny Tripower 7000TL)
- STP 8000TL-20 (Sunny Tripower 8000TL)
- STP 9000TL-20 (Sunny Tripower 9000TL)

Target Group

This document is intended for qualified persons. Only persons with the appropriate skills are allowed to perform the tasks described in this document (see Section 2.1 "Skills of Qualified Persons", page 7).

Symbols

Symbol	Explanation
 DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
 WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
 CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
	Information that is important for a specific topic or goal, but is not safety-relevant
<input type="checkbox"/>	Indicates a requirement for meeting a specific goal
<input checked="" type="checkbox"/>	Desired result
×	A problem that might occur

Nomenclature

Complete designation	Designation in this document
Electronic Solar Switch	ESS
SMA Bluetooth® Wireless Technology	<i>Bluetooth</i>
Sunny Boy	Inverter, product

2 Safety

2.1 Skills of Qualified Persons

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

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

2.2 Safety Precautions

This section contains safety precautions that must be observed at all times when working on or with the product.

To prevent personal injury or property damage and to ensure long-term operation of the product, read this section carefully and follow all safety precautions at all times.

DANGER

Danger to life due to high voltages when working on the inverter

The inverter must be mounted, installed and commissioned by qualified persons only. This also applies to troubleshooting.

- Only operate the inverter in a closed state.
- Do not touch uninsulated cable ends.
- Only qualified persons with appropriate skills must mount, install and commission the inverter.
- If an error occurs, have it rectified by qualified persons.

⚠ DANGER**Danger to life due to high voltages of the PV array**

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur, leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Only qualified persons with appropriate skills must mount, install and commission the inverter.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 3, page 10).

⚠ DANGER**Danger to life due to electric shock**

Touching an ungrounded PV module or an array frame can cause a fatal electric shock.

- Connect and ground the PV modules, array frame and electrically conductive surfaces so that there is continuous conduction. Observe the applicable local regulations.

⚠ WARNING**Risk of burns due to hot enclosure parts**

Some parts of the enclosure can get hot during operation.

- During operation, do not touch any parts other than the enclosure lid of the inverter.

NOTICE**Damage to the seal of the enclosure lid in sub-zero conditions**

If you open the enclosure lid in sub-zero conditions, the seal of the enclosure lid can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5°C .
- If a layer of ice has formed on the seal of the enclosure lid in sub-zero conditions, remove it prior to opening the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

NOTICE**Damage to the inverter due to electrostatic discharge**

Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

- Ground yourself before touching any component.

NOTICE**Damage to the display or the type label due to the use of cleaning agents**

- If the inverter is dirty, clean the enclosure, the cooling fins, the enclosure lid, the type label, the display, and the LEDs using only water and a cloth.

3 Disconnecting the Inverter from Voltage Sources

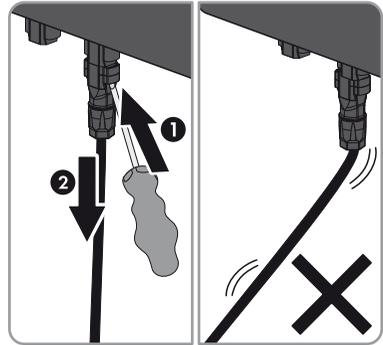
Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section. Always observe the prescribed sequence.

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to 1,000 V.

1. Disconnect the circuit breaker from all three line conductors and secure against reconnection.
2. Remove the ESS.
3. Loosen two screws of the protective cover using an Allen key (AF 5) and remove the protective cover.
4. Use a current clamp to ensure that no current is present in the DC cables.
5. Unlock and remove all DC connectors. Insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors straight out. Do not pull on the cable.



6. **⚠ DANGER**

Danger to life due to high voltages

The capacitors in the inverter take five minutes to discharge.

- Wait five minutes before opening the enclosure lid.
7. Ensure that no voltage is present at the DC inputs of the inverter.
 8. Unscrew all the screws of the enclosure lid using an Allen key (AF 5) and remove the enclosure lid.
 9. Use an appropriate measuring device to ensure that there is no voltage at the AC connecting terminal plate between **L1** and **N**, **L2** and **N**, and **L3** and **N**. Insert a test probe in each round opening of the terminal.
 10. Use an appropriate measuring device to ensure that there is no voltage at the AC connecting terminal plate between **L1** and **PE**, **L2** and **PE**, and **L3** and **PE**. Insert a test probe in each round opening of the terminal.

11. Ensure that there is no voltage between any terminal of the multifunction relay and **PE** of the AC connecting terminal plate.

12. **NOTICE**

Damage to the inverter due to electrostatic discharge

The internal components of the inverter can be irreparably damaged by electrostatic discharge.

- Ground yourself before touching any component.

4 Cleaning the Inverter

NOTICE**Damage to the display or the type label due to the use of cleaning agents**

- If the inverter is dirty, clean the enclosure, the cooling fins, the enclosure lid, the type label, the display, and the LEDs using only water and a cloth.

5 Checking the PV System for Ground Faults

If the inverter displays the event numbers **3501**, **3601** or **3701**, there could be a ground fault. The electrical insulation from the PV system to ground is defective or insufficient.

WARNING

Danger to life due to electric shock

In the event of a ground fault, high voltages can be present.

- Touch the cables of the PV array on the insulation only.
- Do not touch any parts of the sub-structure or frame of the PV array.
- Do not connect PV strings with ground faults to the inverter.

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to 1,000 V.

Proceed as follows to check each string in the PV system for ground faults.

Procedure:

1. DANGER

Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 3, page 10).

2. Measure the voltages:

- Measure the voltages between the positive terminal and the ground potential (PE).
- Measure the voltages between the negative terminal and the ground potential (PE).
- Measure the voltages between the positive and negative terminals.

If the following results are present at the same time, there is a ground fault in the PV system.

- All measured voltages are stable.
- The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.
- Determine the location of the ground fault via the ratio of the two measured voltages.
- Eliminate the ground fault.

If there is no ground fault and the message is still displayed, contact the SMA Service Line.

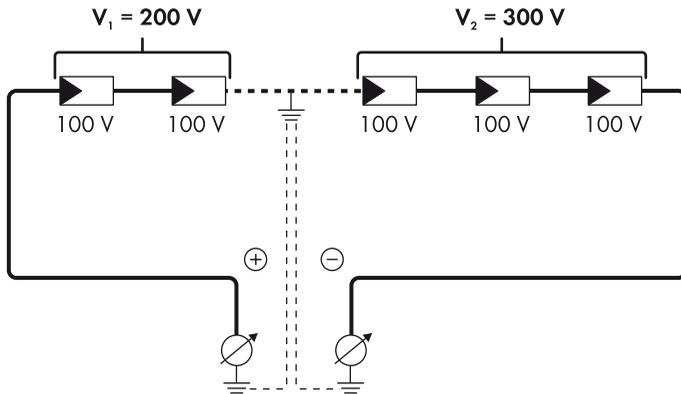
Example: Location of the ground fault

Figure 1: Example of a ground fault between the second and the third PV module

3. Recommision the inverter (see Section 11, page 29).

6 Checking the Function of the Varistors

If the inverter displays event number **7401**, one of the varistors is probably defective.

NOTICE

Destruction of the inverter due to overvoltage

If varistors are missing, the inverter is no longer protected against overvoltage.

- Do not operate the inverter without varistors in PV systems with a high risk of overvoltages.
- Do not recommission the inverter until the defective varistors have been replaced.

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to 1,000 V.

Check the function of each varistor according to the following procedure.

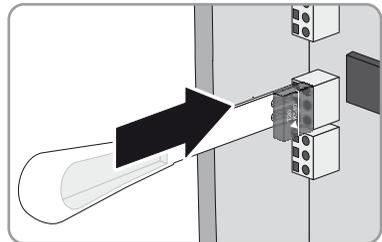
Procedure:

1. DANGER

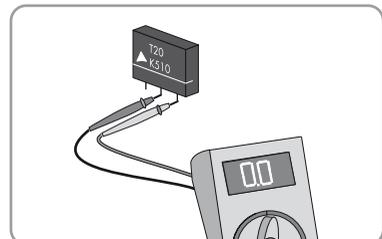
Danger to life due to high voltages

- Disconnect the inverter from all voltage sources and open the enclosure lid (see Section 3, page 10).

2. Insert the insertion tool into the clamping contacts of the connecting terminal plate.



3. Remove the varistor from the connecting terminal plate.
4. Use a measuring device to measure whether there is a conductive connection between the middle and the right-hand varistor lead. Hold the varistor with the labeling pointing forward.



If there is no conductive connection, the varistor is defective. SMA Solar Technology AG recommends replacing all varistors immediately.

- Order new varistors and insertion tools (see Section 12 "Accessories", page 31).
- Re-insert old varistors and leave in place until new varistors and insertion tools are available.
- If new varistors are available, replace all varistors (see Section 7, page 17).

If a conductive connection is present, contact the SMA Service Line.

7 Replacing the Varistors

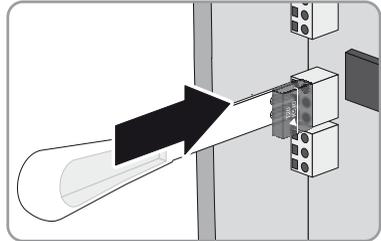
Proceed as follows to replace each varistor.

1. **⚠ DANGER**

Danger to life due to high voltages

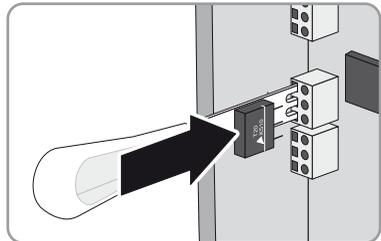
- Disconnect the inverter from all voltage sources and open the enclosure lid (see Section 3, page 10).

2. Insert the insertion tool into the clamping contacts of the connecting terminal plate.



3. Remove the varistor from the connecting terminal plate.

4. Insert the new varistor into the connecting terminal plate. The label of the varistor must face to the right in the inside of the inverter.



5. Remove the insertion tool from the clamping contacts of the connecting terminal plate.
6. Recommission the inverter (see Section 11, page 29).

8 Cleaning the Fans

Procedure:

- Clean the ventilation grids.
- Clean the fans.

Clean the ventilation grids.

Proceed as follows to clean each ventilation grid.

1. Remove the ventilation grid laterally.

NOTICE

Damage to the inverter due to foreign bodies

- Do not remove the ventilation grid permanently, otherwise foreign bodies could penetrate the enclosure.
3. Clean the ventilation grid with a soft brush, a paint brush, or compressed air.
 4. Close the recessed grips with the ventilation grids. Ensure that the assignment is correct. The correct assignment is marked on the inside of each ventilation grid: **links/left** for the left-hand side and **rechts/right** for the right-hand side.

Clean the fans.

Proceed as follows to clean each fan.

1. **⚠ DANGER**

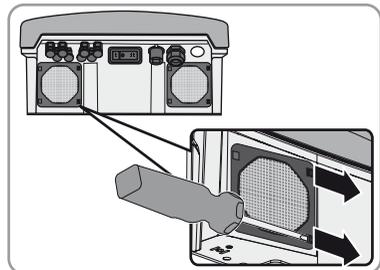
Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 3, page 10).
2. Wait for the fans to stop rotating.
 3. Check whether the fan guard is dusty or heavily soiled.

If the fan guard is dusty, clean the fan guard with a vacuum cleaner.

If the fan guard is heavily soiled, remove the fan guard and clean it:

- Use a screwdriver to push the two locking tabs at the right-hand edge of the fan guard to the right-hand side and remove them from the retainer.



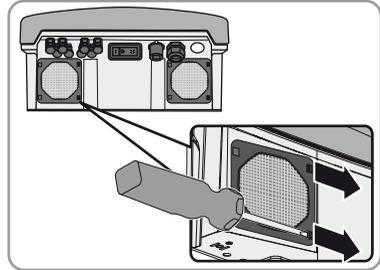
- Carefully remove the fan guard.

- Clean the fan guard with a soft brush, a paint brush, a cloth or compressed air.

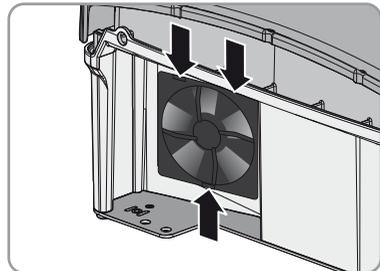
4. Check whether the fan is soiled.

If the fan is soiled, remove the fan:

- Use a screwdriver to push the two locking tabs at the right-hand edge of the fan guard to the right-hand side and remove them from the retainer.



- Carefully remove the fan guard.
- Push the locking tabs of the fan towards the center.



- Remove the fan slowly from the inverter.
- Release and remove the fan plug.

5. **NOTICE**

Damage to the fan due to compressed air

- Clean the fan with a soft brush, a paint brush, or a damp cloth.

6. Insert the plug of the fan into the pin connector until it audibly clicks into place.
7. Insert the fan into the inverter until it audibly clicks into place.
8. Push the fan guard into the retainer until it audibly clicks into place.
9. Recommission the inverter (see Section 11, page 29).
10. Check that the fan is working properly (see Section 9, page 20).

9 Checking the Function of the Fans

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

Requirements:

- A communication product corresponding to the type of communication used must be available.
- The inverter must be in operation.

Procedure:

1. Access the user interface of the communication product and log in as installer.
2. Select the parameter **Fan test** or **FanTst** and set it to **On**.
3. Save settings.
4. Check whether air is coming out of the ventilation grids and whether the fans are making any unusual noises.

If there is no air coming out of the ventilation grids or the fans are making unusual noises, presumably the fans were not installed properly. Check the installation of the fans.

If the fans were installed correctly, contact the SMA Service Line.

5. Select the parameter **Fan test** or **FanTst** and set to **Off**.
6. Save settings.

10 Troubleshooting

10.1 LED Signals

The LEDs indicate the operating state of the inverter.

LED	Status	Explanation
Green LED	is glowing	Feed-in operation If an event occurs during feed-in operation, the event message is shown on the display (see Section 10.3, page 28).
	is flashing	Grid connection conditions are not met.
Red LED	is glowing	Error The display shows an error message and an event number (see Section 10.2, page 21).
Blue LED	is glowing	<i>Bluetooth</i> communication is active.

10.2 Error Messages

Event number	Display message, cause and corrective measures
101 to 103	<p>Grid fault</p> <p>The line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. Ask the grid operator whether the voltage can be adjusted at the feed-in point or request approval to change the monitored operating limits. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.

Event number	Display message, cause and corrective measures
202 to 203	<p>Grid fault</p> <p>The utility grid has been disconnected, the AC cable is damaged or the line voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Ensure that the circuit breaker is switched on. <li>• Ensure that the AC cable is not damaged. <li>• Ensure that the AC cable is correctly connected. <li>• Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. <p>If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. Ask the grid operator whether the voltage can be adjusted at the feed-in point or request approval to change the monitored operating limits.</p> <p>If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.</p>
301	<p>Grid fault</p> <p>The ten-minute average line voltage is no longer within the permissible range. The line voltage or grid impedance at the connection point is too high. The inverter disconnects from the utility grid to comply with the power quality.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. <p>If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. Ask the grid operator whether the voltage can be adjusted at the feed-in point or request approval to change the monitored operating limits.</p> <p>If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.</p>
401 to 404	<p>Grid fault</p> <p>The inverter is no longer in grid-parallel operation. The inverter has stopped feeding into the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check the grid connection for significant, short-term frequency fluctuations.

Event number	Display message, cause and corrective measures
501	<p>Grid fault</p> <p>The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• If possible, check the power frequency and observe how often fluctuations occur. <p>If fluctuations occur frequently and this message is displayed often, contact the grid operator and request permission to change the operating parameters of the inverter.</p> <p>If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.</p>
601	<p>Grid fault</p> <p>The inverter has detected an excessively high proportion of direct current in the line current.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check the grid connection for direct current. <li>• If this message is displayed frequently, contact the grid operator and check whether the monitoring limiting value on the inverter can be raised.
701	<p>Frq. not permitted > Check parameter</p> <p>The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• If possible, check the power frequency and observe how often fluctuations occur. <p>If fluctuations occur frequently and this message is displayed often, contact the grid operator and request permission to change the operating parameters of the inverter.</p> <p>If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.</p>

Event number	Display message, cause and corrective measures
1302	<p>Waiting for grid voltage > Installation failure grid connection > Check grid and fuses</p> <p>The inverter has detected an error in the AC cabling or the potential difference between N and the protective conductor in the installation is higher than 50 V. The inverter cannot connect to the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Ensure that the AC connection is correct (see operating manual of the inverter). <li>• Ensure that there is no potential difference between N and the protective conductor in the building installation. <li>• Ensure that the country data set has been configured correctly. Check the positions of the rotary switches A and B or select and check the parameter for the country data set.
1501	<p>Reconnection fault grid</p> <p>The changed country data set or the value of an operating parameter you have set does not correspond to the local requirements. The inverter cannot connect to the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Ensure that the country data set has been configured correctly. Check the positions of the rotary switches A and B or select and check the parameter for the country data set.
3302 to 3303	<p>Unstable operation</p> <p>There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Ensure that the PV array is designed correctly.
3401 to 3402	<p>DC overvoltage > Disconnect generator</p> <p>Overvoltage at DC input. This can destroy the inverter.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Immediately disconnect the inverter from all voltage sources (see Section 3, page 10). <li>• Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC connectors to the inverter. <li>• If the DC voltage is above the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the installer of the PV array. <li>• If this message is repeated frequently, contact the SMA Service Line.

Event number	Display message, cause and corrective measures
3501	<p>Insulation resist. > Check generator</p> <p>The inverter has detected a ground fault in the PV array.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check the PV system for ground faults (see Section 5, page 13).
3601	<p>High discharge curr. > Check generator</p> <p>The leakage current from the inverter and the PV array is too high. There is a ground fault, a residual current or a malfunction.</p> <p>The inverter interrupts feed-in operation immediately after exceeding a threshold and then automatically reconnects to the utility grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check the PV system for ground faults (see Section 5, page 13).
3701	<p>Resid.curr.too.high > Check generator</p> <p>The inverter has detected a residual current due to temporary grounding of the PV array.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Check the PV system for ground faults (see Section 5, page 13).
3801 to 3802	<p>DC overcurrent > Check generator</p> <p>Overcurrent at the DC input. The inverter briefly interrupts feed-in.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• If this message is displayed frequently, ensure that the PV array has been correctly rated and wired.
3901 to 3902	<p>Waiting for DC start conditions > Start cond. not met</p> <p>The feed-in conditions for the utility grid have not been met.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Wait for higher irradiation. <li>• If this message is displayed frequently in the morning, increase the voltage limit for starting feed-in. Change the parameter Critical voltage to start feed-in. <li>• If this message is displayed frequently with medium irradiation, ensure that the PV array is correctly rated.
6001 to 6438	<p>Self diagnosis > Interference of device</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Contact the SMA Service Line.

Event number	Display message, cause and corrective measures
6501 to 6509	<p>Self diagnosis > Overtemperature</p> <p>The inverter has switched off due to excessive temperature.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Clean the fans (see Section 8, page 18) • Ensure that the inverter has sufficient ventilation.
6511	<p>Overtemperature</p> <p>The inverter has switched off due to excessive temperature.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Clean the fans (see Section 8, page 18). • Ensure that the inverter has sufficient ventilation.
6603 to 6604	<p>Self diagnosis > Overload</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the SMA Service Line.
6801 to 6802	<p>Self diagnosis > Input A defective</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the SMA Service Line.
6901 to 6902	<p>Self diagnosis > Input B defective</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the SMA Service Line.
7001 to 7002	<p>Sensor fault fan permanently on</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the SMA Service Line.
7401	<p>Varistor defective</p> <p>At least one of the thermally monitored varistors is defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the function of the varistors (see Section 6, page 15).
7701 to 7703	<p>Self diagnosis > Interference of device</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the SMA Service Line.

Event number	Display message, cause and corrective measures
8001	<p>Derating occurred</p> <p>The inverter has reduced its power output for more than ten minutes due to excessive temperature.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• If this message is displayed frequently, clean the fans (see Section 8, page 18). <li>• Ensure that the inverter has sufficient ventilation.
8101 to 8104	<p>Comm. disturbed</p> <p>The cause must be determined by the SMA Service Line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Contact the SMA Service Line.
8801 to 8803	<p>No display</p> <p>This error message can have three causes, but the inverter continues to feed into the utility grid.</p> <p>The ambient temperature is lower than -25 °C. The display switched off for reasons of protection.</p> <p>The inverter cannot identify the display type.</p> <p>No display is connected to the inverter or the connection is defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• If the display switched off due to the ambient temperature being too low, wait until the ambient temperature is above -25 °C. <li>• If the ambient temperature is above -25 °C, contact the SMA Service Line.
9002	<p>Inst. code invalid</p> <p>The SMA Grid Guard code entered is not correct. The operating parameters are still protected and cannot be changed.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Enter the correct SMA Grid Guard code.
9003	<p>Grid param. locked</p> <p>The parameters are now locked. You cannot change the parameters.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> <li>• Unlock the parameters with the SMA Grid Guard code.

10.3 Event Messages

Display message	Cause
Update file OK	The update file found is valid.
Grid param. locked	The parameters have been locked and cannot be changed.
Update communication	The inverter is updating the communication component.
Update main CPU	The inverter is updating the inverter component.
Update Bluetooth	The inverter is updating the <i>Bluetooth</i> component.
Update language table	The inverter is updating the language table.
Update completed	The inverter has successfully completed the update.
Grid parameter unchanged	The selected rotary switch position is not assigned or the grid parameters cannot be changed.
Inst. code valid	The SMA Grid Guard code entered is valid. Protected operating parameters have now been unlocked and you can adjust the parameters. The parameters will be automatically locked again after ten feed-in hours.
Self-test	The self-test is being carried out.

1.1 Recommissioning the Inverter

If you have disconnected the inverter from all voltage sources (e.g. for configuration purposes) and want to recommission it, proceed as follows.

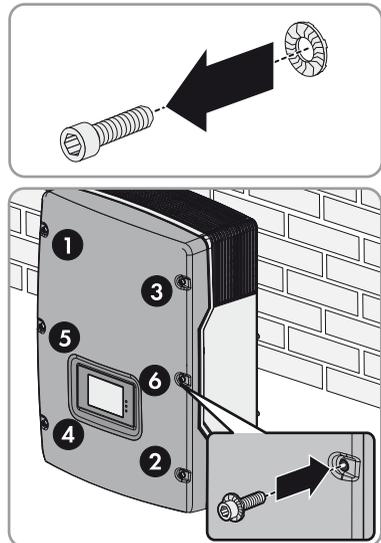
Requirements:

- The circuit breaker must be correctly rated.
- The inverter must be correctly mounted.

Procedure:

1. Close the inverter and ground the enclosure lid:

- Attach one conical spring washer to each screw. The grooved side of the conical spring washer must face the screw head.
- Position the enclosure lid with the six screws on the enclosure and tighten all screws diagonally to each other using an Allen key (AF 5) (torque: $6 \text{ Nm} \pm 0.5 \text{ Nm}$).



- The teeth of the conical spring washers are pushed into the enclosure lid. This ensures that the enclosure lid is grounded.
2. Connect the DC connectors to the inverter.
 3. Seal all unused DC inputs using the DC connectors with sealing plugs.
 4. Secure the protective cover using two screws and an Allen key (AF 5).
 5. Securely plug in the ESS.
 6. Switch on the circuit breaker of all three line conductors.
 7. If the multifunction relay is used, switch on the load supply voltage, if necessary.
- The start-up phase begins.
 - The green LED is glowing and the display alternates automatically between the firmware version, the serial number or designation of the inverter, the NetID, the IP address, the subnet mask, the configured country data set and the display language.

✘ The green LED is flashing?

Possible cause of error: the DC input voltage is still too low or the inverter is monitoring the utility grid.

- Once the DC input voltage is sufficiently high and the grid connection conditions are met, the inverter will start operation.

✘ The red LED is glowing and an error message and event number appear in the display?

- Eliminate the error (see Section 10 "Troubleshooting", page 21).

12 Accessories

You will find the corresponding accessories and spare parts for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
Electronic Solar Switch	ESS as spare part	ESS-HANDLE*
Replacement varistors	Set with four thermally-monitored varistors incl. insertion tool	STP-TV10
Insertion tool for replacing varistors	Insertion tool for varistors	SB-TVWZ
Ventilation grid	Ventilation grid set (right and left) as spare part	45-7202
SUNCLIX DC connector	Field plug for conductor cross-sections of 2.5 mm ² to 6 mm ²	SUNCLIX-FC6-SET
SMA Power Control Module	Multifunction interface for implementing grid management services	PWCBRD-10
RS485 interface	RS485 interface for establishing wired connection	485BRD-10

* When ordering a new ESS, always indicate the device type and serial number of the inverter.

13 Contact

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

- Inverter device type
- Inverter serial number
- Inverter firmware version
- Special country-specific settings of the inverter (if applicable)
- Type and number of PV modules connected
- Mounting location and mounting altitude of the inverter
- Three-digit or four-digit event number and display message
- Optional equipment, e.g. communication products
- Use of the multifunction relay

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: 1 800 SMA AUS (1 800 762 287) International: +61 2 9491 4200
Belgien/ Belgique/ België	SMA Benelux BVBA/SPRL Mecheln	+32 15 286 730
Brasil	Vide España (Espanha)	
Česko	SMA Central & Eastern Europe s.r.o. Praha	+420 235 010 417
Chile	Ver España	
Danmark	Se Deutschland (Tyskland)	
Deutschland	SMA Solar Technology AG Niestetal	Medium Power Solutions Wechselrichter: +49 561 9522-1499 Kommunikation: +49 561 9522-2499 SMA Online Service Center: www.SMA.de/Service
		Hybrid Energy Solutions Sunny Island: +49 561 9522-399
		Power Plant Solutions Sunny Central: +49 561 9522-299
España	SMA Ibérica Tecnología Solar, S.L.U. Barcelona	Llamada gratuita en España: 900 14 22 22 Internacional: +34 902 14 24 24

France	SMA France S.A.S. Lyon	Medium Power Solutions Onduleurs : +33 472 09 04 40 Communication : +33 472 09 04 41
		Hybrid Energy Solutions Sunny Island : +33 472 09 04 42
		Power Plant Solutions Sunny Central : +33 472 09 04 43
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Italia	SMA Italia S.r.l. Milano	+39 02 8934-7299
Κύπρος/Κίβρις	Βλέπε Ελλάδα/ Bkz. Ελλάδα (Yunanistan)	
Luxemburg/ Luxembourg	Siehe Belgien Voir Belgique	
Magyarország	lásd Česko (Csehország)	
Nederland	zie Belgien (België)	
Österreich	Siehe Deutschland	
Perú	Ver España	
Polska	Patrz Česko (Czechy)	
Portugal	SMA Solar Technology Portugal, Unipessoal Lda Lisboa	Isetno de taxas em Portugal: 800 20 89 87 Internacional: +351 212377860
România	Vezi Česko (Cehia)	
Schweiz	Siehe Deutschland	
Slovensko	pozri Česko (Česká republika)	
South Africa	SMA Solar Technology South Africa Pty Ltd. Centurion (Pretoria)	08600 SUNNY (08600 78669) International: +27 (12) 643 1785
United Kingdom	SMA Solar UK Ltd. Milton Keynes	+44 1908 304899
Ελλάδα	SMA Hellas AE Αθήνα	801 222 9 222 International: +30 212 222 9 222
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+971 2 698-5080	SMA Middle East LLC أبو ظبي		الإمارات العربية المتحدة
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