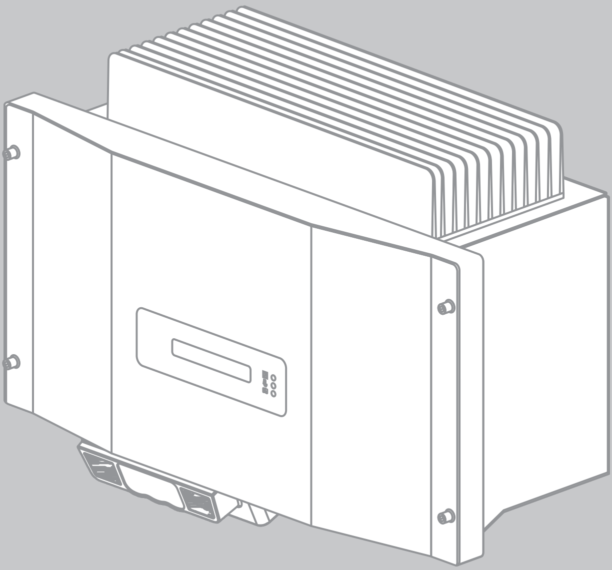
Operating Manual

SUNNY BOY 1300TL / 1600TL / 2100TL



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AMERICAN ENGLISH

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SMA Solar Technology AG

Sonnenallee 1

34266 Niestetal

Germany

Tel. +49 561 9522-0

Fax +49 561 9522-100

www.SMA.de

E-mail: info@SMA.de

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1 Information on this Document

Validity

This document is valid for the following device types from firmware version 4.50:

- Sunny Boy 1300TL (SB 1300TL-10)
- Sunny Boy 1600TL (SB 1600TL-10)
- Sunny Boy 2100TL (SB 2100TL)

Target Group

This document is intended for qualified persons and end users. Some of the tasks described in this document must only be performed by qualified persons with the appropriate skills (see Section 2.2 "Skills of Qualified Persons", page 7). Such tasks are marked with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by end users.

Additional Information

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

Document Title	Document type
Measured Values and Parameters	Technical Description
Order Form for the SMA Grid Guard Code	Certificate
Efficiency and Derating	Technical Description
Circuit Breaker	Technical Information
Module Technology	Technical Information
Insulation Resistance (Riso) of Non-Galvanically Isolated PV Systems	Technical Information
Leading Leakage Currents	Technical Information
Temperature Derating	Technical Information
Criteria for Selecting a Residual-Current Device	Technical Information
Overvoltage protection	Technical Information

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

Symbol	Explanation
NOTICE	Indicates a situation which, if not avoided, can result in property damage
⚠ QUALIFIED PERSON	Sections describing activities to be performed by qualified persons only
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

Nomenclature

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

2 Safety

2.1 Intended Use

The Sunny Boy is a transformerless PV inverter which converts the direct current of the PV array to grid-compliant alternating current and feeds it into the utility grid.

The product is suitable for indoor and outdoor use.

The product must only be operated with PV arrays of protection class II, in accordance with IEC 61730, application class A. The PV modules must be suitable for use with this product.

PV modules with a high capacity to ground must only be used if their coupling capacity does not exceed 1.4 μF (for information on how to calculate the coupling capacity, see the Technical Information "Leading Leakage Currents" at www.SMA-Solar.com).

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application can cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Making unauthorized changes will void the warranty and warranty claims and will normally result in invalidation of the operating permit. SMA Solar Technology AG shall not be held liable for any damages caused by such changes.

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

The enclosed documentation is an integral part of this product. Read and observe the documentation and keep it in a convenient place for future reference.

The type label must remain permanently attached to the product.

2.2 Skills of Qualified Persons

Only qualified persons are allowed to perform the activities labeled in this document with a warning symbol and the caption "Qualified person". 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

2.3 Safety Precautions

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

To prevent personal injury and 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 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.
- Have the inverter mounted, installed and commissioned by qualified persons with the appropriate skills only.
- 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 10, page 42).

⚠ 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.

⚠ CAUTION

Risk of burns from hot heat sink

During operation, the heat sink at the top of the inverter can reach temperatures of over 70°C.

- Do not touch the heat sink.
- If the heat sink is soiled, clean it with a soft brush or a vacuum cleaner.

NOTICE

Dust and water intrusion can damage the inverter.

If the inverter is equipped with an ESS, the inverter complies with degree of protection IP65 when the ESS is plugged in and the inverter is closed.

If the ESS is not plugged in, moisture and dust can penetrate and damage the inverter. In order to sufficiently protect the inverter during decommissioning, the DC inputs must be closed.

- Unlock and remove all DC connectors.
- Open all DC connectors.
- Close all DC inputs with the corresponding DC connectors and the supplied sealing plugs.
- Securely plug the ESS back in.

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 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

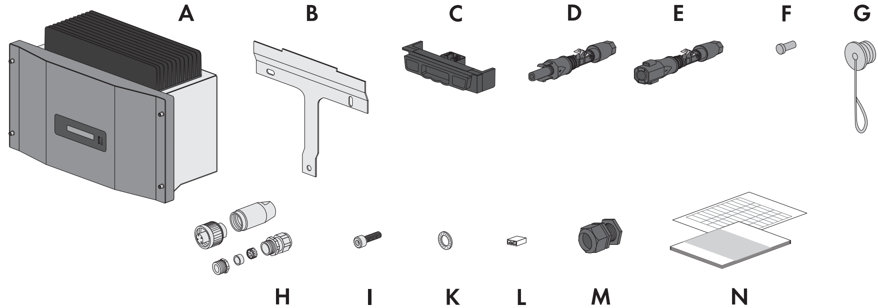


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Sunny Boy
B	1	Wall mounting bracket
C	1	Electronic Solar Switch (ESS)*
D	1/2	Positive DC connector SB 1300TL-10 / 1600TL-10: 1 pc. SB 2100TL: 2 pcs.
E	1/2	Negative DC connector SB 1300TL-10 / 1600TL-10: 1 pc. SB 2100TL: 2 pcs.
F	2/4	Sealing plug SB 1300TL-10 / 1600TL-10: 2 pc. SB 2100TL: 4 pcs.
G	1	Protective cap for AC pin connector on inverter
H	1	AC connection socket: bush insert, threaded sleeve, pressure screw PG13.5, sealing ring PG13.5, fastening case PG13.5, cable gland M20x1.5
I	1	M6x12 cylindrical screw
K	1	Conical spring washer
L	1	Jumper
M	1	Cable gland PG16 with single-hole cable support sleeve
N	1	Operating manual, supplementary sheet with inverter default settings

* Optional

4 Product Description

4.1 Sunny Boy

The Sunny Boy is a transformerless PV inverter which converts the direct current of the PV array to grid-compliant alternating current and feeds it into the utility grid.

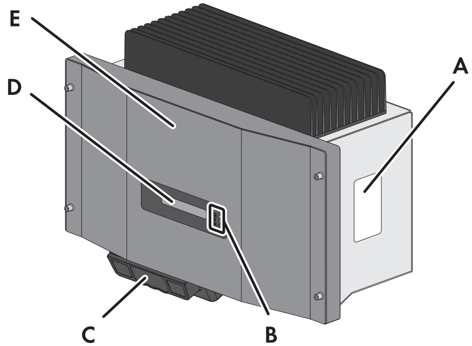


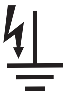
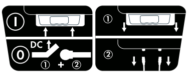
Figure 2: Sunny Boy design

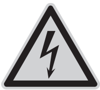
Position	Designation
A	Type label The type label uniquely identifies the inverter. You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. The type label must remain permanently attached to the product. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No.) • Date of manufacture • Device-specific characteristics
B	LEDs The LEDs indicate the operating state of the inverter.
C	Electronic Solar Switch* The ESS and the DC connectors form a DC load-break switch. When plugged in, the ESS forms a conductive path between the PV array and the inverter. Removing all DC connectors disconnects the PV array completely from the inverter.
D	Display The display shows the current operating data and errors.

Position	Designation
E	Enclosure lid

* Optional

Symbols on the Inverter and on the Type Label

Symbol	Explanation
	You can operate the display by tapping it: • Tapping once: switch on display illumination or switch to the next display message. • Tapping twice in quick succession: the inverter shows the display messages from the start-up phase. The backlight shuts off automatically after two minutes.
	Green LED: operating state of the inverter Green LED is glowing: the inverter is in operation. Green LED is flashing: the requirements for the connection to the utility grid have not been met.
	Red LED: ground fault Red LED is glowing: A ground fault has occurred or a varistor is defective (for information on troubleshooting, see service manual at www.SMA-Solar.com).
	Yellow LED: observe the documentation Yellow LED is glowing or flashing: An error or disturbance has occurred (for information on troubleshooting, see service manual at www.SMA-Solar.com).
	Operating principle of the ESS*: • I If the ESS is plugged in, the DC electric circuit is closed. • 0 To interrupt the DC electric circuit, you must perform the following steps in the given order: – 1 Remove the ESS. – 2 Unlock and remove all DC connectors.
	Grounding conductor This symbol indicates the position for the grounding conductor terminal.

Symbol	Explanation
	Danger to life due to high voltages in the inverter; observe the waiting time of ten minutes. High voltages that can cause fatal electric shocks are present in the live components of the inverter. The capacitors take ten minutes to discharge. • Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 10, page 42).
	QR Code® Links to additional information on the inverter can be found at www.SMA-Solar.com.
	Risk of burns from hot surfaces The product can get hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work. Wear personal protective equipment such as safety gloves.
	Danger to life due to high voltages The product operates at high voltages. All work on the product must be carried out by qualified persons only.
	Observe the documentation Observe all documentation supplied with the product.
	Direct current
	The product does not have a transformer.
AC 	Alternating current
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the locally applicable disposal regulations for electronic waste.
CE	CE marking The product complies with the requirements of the applicable EU directives.

Symbol	Explanation
IP65	Degree of protection IP65 The product is protected against dust intrusion and water jets from any angle.
	The product is suitable for outdoor installation.
RAL GÜTEZEICHEN Solar	RAL quality mark for solar products The product complies with the requirements of the German Institute for Quality Assurance and Certification.
N23114	C-Tick The product complies with the requirements of the applicable Australian EMC standards.

* Optional

4.2 Interfaces and Functions

Fault Indicator Relay

The inverter is equipped with a fault indicator relay which will signal faults depending on the type of output device connected. You can connect your own load to this relay (e.g. warning light, acoustic signal) (see Section 6.5 "Connecting the Fault Indicator Relay", page 30).

Error message required by standard

In some countries, signaling of errors is required by standards, e.g. IEC 62109-2.

- the requirements of IEC 62109-2, a display device signaling an error must be connected to the fault indicator relay **or** the inverter must be registered in Sunny Portal where the fault alert must be activated (for information on fault alert via Sunny Portal, see Sunny Portal user manual at www.SMA-Solar.com).

Grid Management Services

The inverter is equipped with service functions for grid management.

Depending on the requirements of the grid operator, you can activate and configure the functions (e.g. active power limitation) via operating parameters.

Bluetooth

Via *Bluetooth*, the inverter can communicate with various *Bluetooth* devices (for information on supported SMA products, see www.SMA-Solar.com). The *Bluetooth* interface can be retrofitted.

Speedwire/Webconnect

Speedwire is a type of communication based on Ethernet allowing you to connect the inverter to a Speedwire network. Webconnect allows for data exchange between the inverter and Sunny Portal. Sunny Portal is an Internet portal which allows you to monitor PV systems and to visualize and present PV system data. The Speedwire/Webconnect Piggy-Back can be retrofitted.

RS485

The inverter can communicate with SMA communication products via the RS485 interface (information on supported SMA products at www.SMA-Solar.com). The RS485 interface can be retrofitted.

All-Pole Sensitive Residual-Current Monitoring Unit

The all-pole sensitive residual-current monitoring unit detects alternating and direct differential currents. The integrated differential current sensor detects the current difference between the neutral conductor and the number of line conductors for single-phase and three-phase inverters. If the current difference increases suddenly, the inverter disconnects from the utility grid.

5 Mounting

5.1 Requirements for Mounting

Requirements for the mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fire.

- Do not mount the product in areas containing highly flammable materials or gases.
- Do not mount the product in potentially explosive atmospheres.

☐ The mounting location must be inaccessible to children.

☐ A solid support surface must be available for mounting, e.g. concrete or masonry. When mounted on drywall or similar materials in a living area, the inverter will develop audible vibrations during operation, which could be perceived as annoying.

☐ The mounting location must be suitable for the weight and dimensions of the inverter (see Section 11 "Technical Data", page 44).

☐ Climatic conditions must be met (see Section 11 "Technical Data", page 44).

☐ The ambient temperature must be below 40°C to ensure the optimum operation of the inverter.

☐ The mounting location should be clear and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.

☐ The mounting location should not be exposed to direct solar irradiation. Direct solar irradiation can cause the inverter to overheat. As a result, the inverter reduces its power output.

Dimensions for wall mounting:

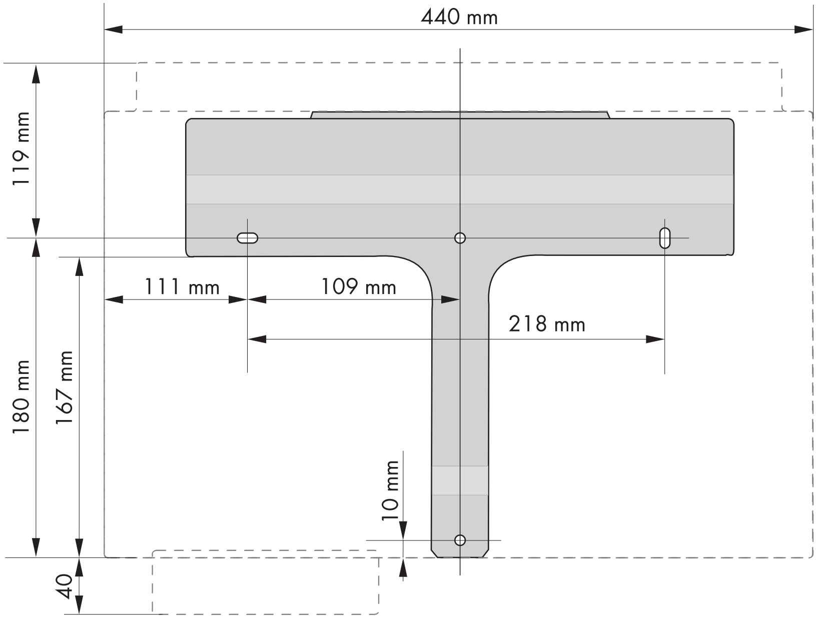


Figure 3: Wall mounting bracket dimensions

Recommended clearances:

Provided that the recommended clearances are observed, adequate heat dissipation will be ensured as well as sufficient space to remove the ESS if necessary. Sufficient heat dissipation prevents a reduction in inverter power as a result of high temperatures (details on temperature derating can be found in the Technical Information "Temperature Derating" at www.SMA-Solar.com).

☐ Observe the recommended clearances to walls as well as to other inverters or objects.

☐ If multiple inverters are mounted in areas with high ambient temperatures, increase the clearances between the inverters and ensure sufficient fresh-air supply.

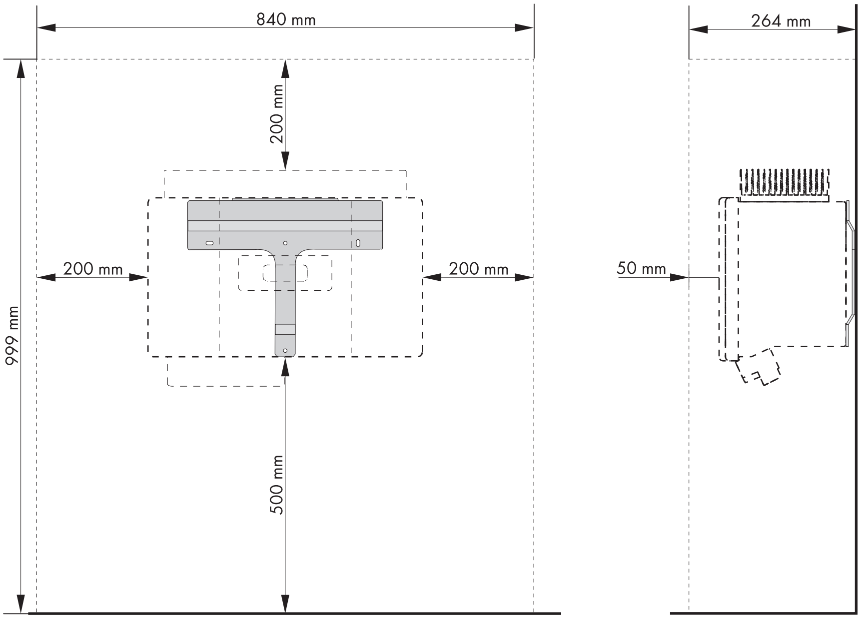


Figure 4: Recommended clearances

Permitted and prohibited mounting positions:

☐ Mount the inverter in a permitted position. This will ensure that no moisture can penetrate the inverter.

☐ The inverter should be mounted at eye level. This will ensure that display messages and LED signals can be read without difficulty.

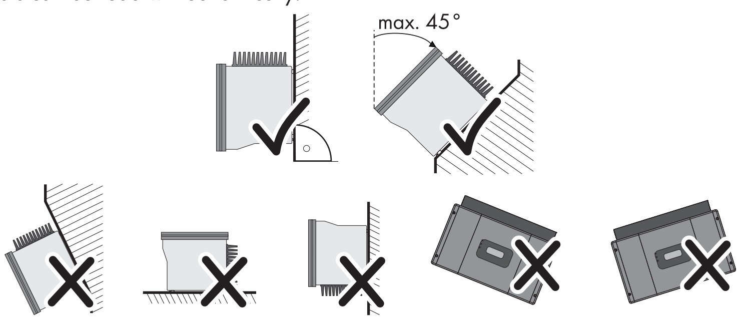


Figure 5: Permitted and prohibited mounting positions

5.2 Mounting the Inverter

Additionally required mounting material (not included in the scope of delivery):

- ☐ Two screws that are suitable for the support surface and the weight of the inverter
- ☐ Two washers suitable for the screws
- ☐ Two screw anchors that are suitable for the support surface and the screws, if necessary

⚠ CAUTION

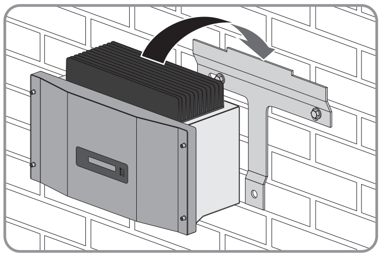
Risk of injury when lifting the inverter, or if it is dropped

The inverter is heavy (see Section 11 "Technical Data", page 44). There is risk of injury if the inverter is lifted incorrectly or dropped while being transported or when attaching it to or removing it from the wall mounting bracket.

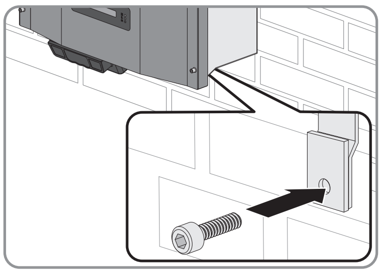
- Transport and lift the inverter upright.

Procedure:

1. Ensure that no cables are laid in the wall which could be damaged when drilling holes.
2. Align the wall mounting bracket horizontally on the wall and mark the position of the drill holes.
3. Set the wall mounting bracket aside and drill the marked holes.
4. Insert screw anchors into the drill holes if necessary.
5. Secure the wall mounting bracket horizontally using screws and washers.
6. Hook the inverter into the wall mounting bracket, ensuring that it cannot slide sideways out of the bracket.



7. If an additional grounding or equipotential bonding is required on site, additionally ground the enclosure (see Section 6.3.3 "Connecting An Additional Grounding", page 26).
8. If no additional grounding or equipotential bonding is required, secure the inverter to the wall mounting bracket with the M6x12 screw to prevent it from being lifted off.



9. Ensure that the inverter is securely in place.

6 Electrical Connection

6.1 Safety during Electrical Connection

⚠ 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.
- Have the inverter mounted, installed and commissioned by qualified persons with the appropriate skills only.
- 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 10, page 42).

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.

6.2 Overview of the Connection Area

6.2.1 View from Below

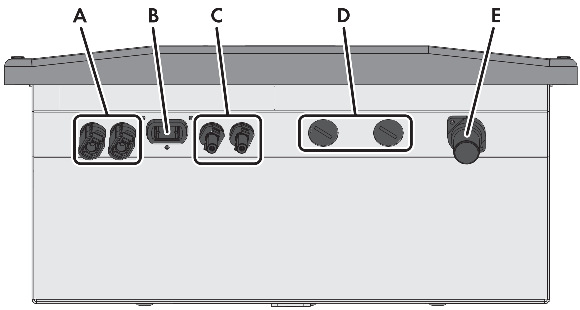


Figure 6: Connection areas and enclosure openings at the bottom of the inverter

Position	Designation
A	Positive DC connectors for positive DC cables (in SB 1300TL-10 and SB 1600TL-10 there is only one positive connector each)
B	Pin connector for the ESS*
C	Negative DC connectors for negative DC cables (in SB 1300TL-10 and SB 1600TL-10 there is only one negative connector each)
D	Enclosure openings with filler plugs for data cables
E	Pin connector for the AC connection socket

* Optional

6.2.2 Interior View

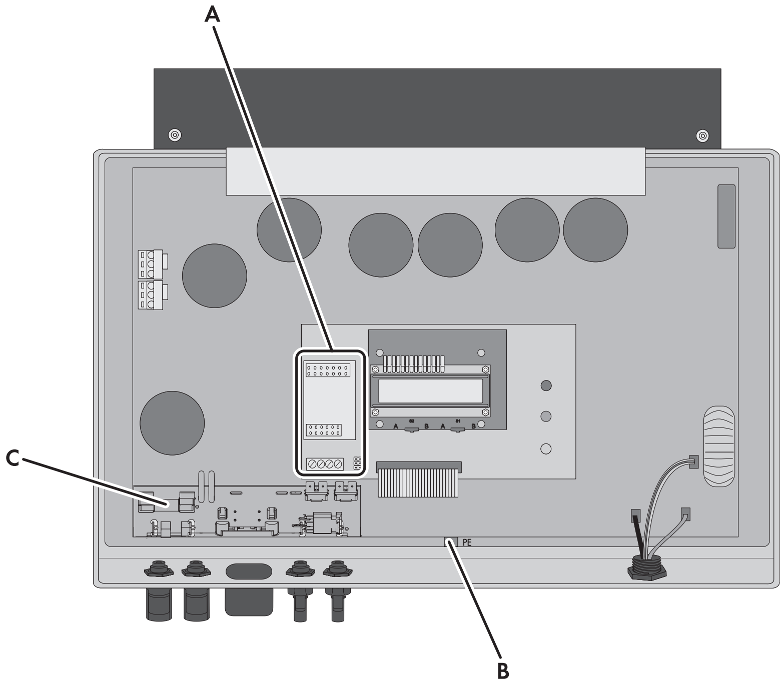


Figure 7: Connection areas in the interior of the inverter

Position	Designation
A	Slot and connection area for SMA communication interface
B	Flat male tab for grounding the cable shield when communication takes place via RS485

Position	Designation
C	Fuse for the Electronic Solar Switch (ESS)*

* Optional

6.3 AC Connection

6.3.1 Requirements for the AC Connection

Cable requirements:

- ☐ External diameter: 7 mm to 14 mm
- ☐ Maximum conductor cross-section: maximum 2.5 mm²
- ☐ Insulation stripping length: 4 mm
- ☐ The cable must be dimensioned in accordance with any local and national guidelines on cable dimensions which specify requirements for the minimum conductor cross-section. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see design software Sunny Design from software version 2.0 at www.SMA-Solar.com).

Load-break switch and cable protection:

NOTICE

Damage to the inverter due to the use of screw-type fuses as load-break switches

Screw-type fuses (e.g. DIAZED fuse or NEOZED fuse) are not load-break switches.

- Do not use screw-type fuses as load-break switches.
- Use a load-break switch or circuit breaker as a load disconnection unit (for information and design examples, see the Technical Information "Circuit Breaker" at www.SMA-Solar.com).

- ☐ In PV systems with multiple inverters, protect each inverter with a separate circuit breaker, always observing the maximum permissible fuse protection Technical Data. This will prevent residual voltage being present at the corresponding cable after disconnection.
- ☐ Loads installed between the inverter and the circuit breaker must be fused separately.

Residual-current monitoring unit:

- ☐ If an external residual-current device is required, install a residual-current device which trips at a residual current of 100 mA or higher (for details on selecting a residual-current device, see the Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com).

Grounding conductor monitoring:

The inverter is equipped with a grounding conductor monitoring device. This grounding conductor monitoring device detects when there is no grounding conductor connected and disconnects the inverter from the utility grid if this is the case. Depending on the installation site and grid configuration, it may be advisable to deactivate the grounding conductor monitoring. This is necessary, for example, in an IT system with no neutral conductor present and you intend to install the inverter between two line conductors. If you are uncertain about this, contact your grid operator or SMA Solar Technology AG.

☐ Grounding conductor monitoring must be deactivated after commissioning depending on the grid configuration (see Section 8.4 "Deactivating Grounding Conductor Monitoring", page 39).

Safety according to IEC 62109 when the grounding conductor monitoring is deactivated

In order to guarantee safety according to IEC 62109 when the grounding conductor monitoring is deactivated, one of the following measures must be met:

- Connect a grounding conductor made of copper wire with a cross-section of at least 10 mm² to the connecting terminal plate for the AC cable.
- Connect additional grounding with the same cross-section as the connected grounding conductor to the connecting terminal plate for the AC cable (see Section 6.3.3 "Connecting An Additional Grounding", page 26). This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

Connection of additional grounding

In some countries an additional grounding is always required. In each case, observe the locally applicable regulations.

Overvoltage category:

The inverter can be used in grids of installation category III or lower in accordance with IEC 60664-1. That means that the inverter can be permanently connected to the grid-connection point of a building. In case of installations with long outdoor cabling routes, additional measures to reduce overvoltage category IV to overvoltage category III are required (for information see technical information "Overvoltage protection" at www.SMA-Solar.com).

6.3.2 Connecting the Inverter to the Utility Grid

⚠ QUALIFIED PERSON

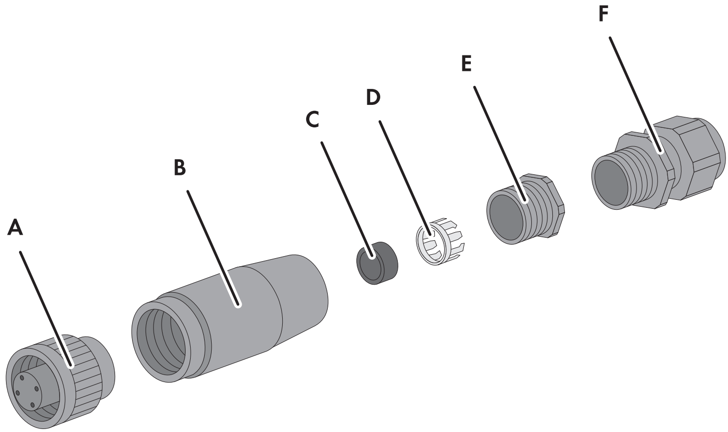


Figure 8: Components of the AC connection box

Position	Designation
A	Bush insert
B	Threaded sleeve
C	Sealing ring PG13.5
D	Fastening case 13.5
E	Pressure screw PG13.5 for cable diameter 7 mm to 10 mm
F	Cable gland M20x1.5 for cable diameter 10 mm to 14 mm

Requirements:

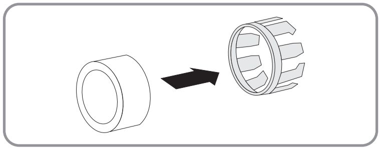
☐ The connection requirements of the grid operator must be met.

☐ The line voltage must be in the permissible range. The exact operating range of the inverter is specified in the operating parameters (see Technical Description "Operating Parameters" at www.SMA-Solar.com).

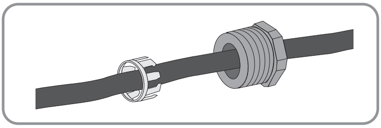
Procedure:

1. Select a suitable cable gland for the AC cable.
2. Disconnect the circuit breaker and secure against reconnection.
3. Dismantle the AC cable by 30 mm.
4. Shorten L and N by 5 mm each.
5. Strip 4 mm of the L, N and PE insulation each.
6. If the cable diameter is between 7 mm and 10 mm, use sealing ring, fastening case and pressure screw as follows:

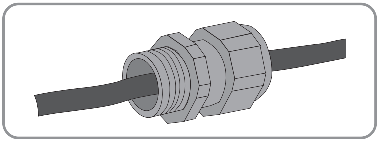
- Push the sealing ring into the fastening case.



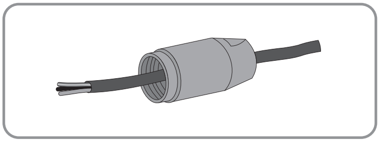
- Thread the PG13.5 pressure screw and the fastening case with sealing ring onto the AC cable.



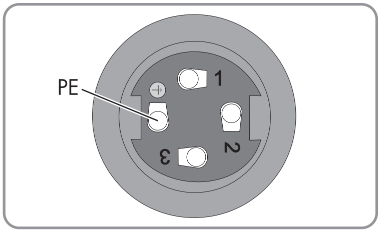
7. If the external cable diameter is between 10 mm and 14 mm, thread cable gland M20x1.5 onto the AC cable.



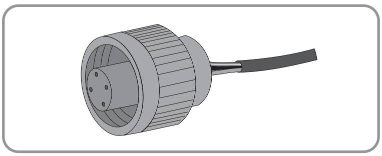
8. Slide the threaded sleeve over the AC cable.



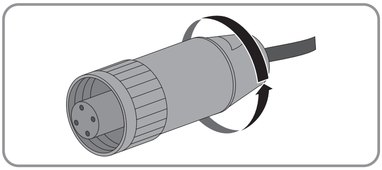
9. Connect PE, N and L to the bush insert as follows:
   - Insert PE into the screw terminal with the ground symbol on the bush insert and tighten the screw.



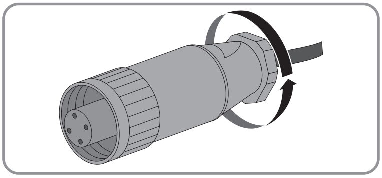
   - Insert N (or respectively L2 in case of split phase) into screw terminal 1 on the bush insert and tighten the screw.
   - Insert L (or respectively L1 in case of split phase) into screw terminal 2 on the bush insert and tighten the screw.
10. Ensure that the insulated conductors are firmly in place.



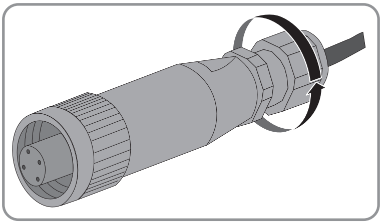
11. Screw the threaded sleeve tightly onto the bush insert.



12. When using pressure screw, fastening case and sealing ring, screw the pressure screw firmly onto the threaded sleeve. The fastening case will be pressed into the threaded sleeve and no longer be visible.

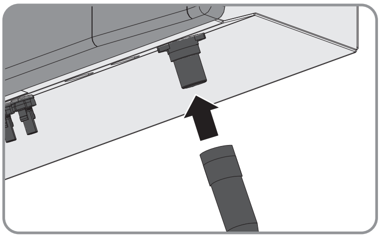


13. When using the cable gland, screw the cable gland firmly onto the threaded sleeve.



☑ The AC connection box is mounted.

14. Insert the AC connection socket into the AC pin connector on the inverter. If necessary, remove the protective cap beforehand.



15. If the AC connection socket is not to be connected to the inverter immediately, close the AC pin connector on the inverter with the protective cap provided.

6.3.3 Connecting An Additional Grounding

⚠ QUALIFIED PERSON

If a second grounding conductor or equipotential bonding is locally required, you can also ground the inverter enclosure. This prevents touch current if the original grounding conductor fails.

Additionally required material (not included in the scope of delivery):

☐ Ring terminal lug M6

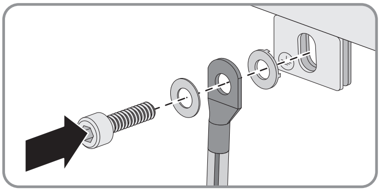
☐ One grounding cable

Cable requirement:

☐ Grounding cable cross-section: 16 mm^2 at maximum

Procedure:

1. Strip the grounding cable insulation.
2. Thread the ring terminal lug onto the grounding cable.
3. Align washer, grounding cable with ring terminal lug and conical spring washer on the cylindrical screw M6x12. The teeth of the conical spring washer must be facing the metal shackle on the inverter.



4. Insert the cylindrical screw through the metal shackle on the inverter and screw it onto the wall mounting bracket (torque: 6 Nm).

6.4 DC Connection

6.4.1 Requirements for the DC Connection

Requirements for the PV modules:

- ☐ All PV modules must be of the same type.
- ☐ The same number of series-connected PV modules must be connected to all strings.
- ☐ All PV modules must be aligned identically.
- ☐ All PV modules must have the same tilt angle.
- ☐ The maximum input current per string must be maintained and must not exceed the through-fault current of the DC connectors (see Section 11 "Technical Data", page 44).
- ☐ The thresholds for the input voltage and the input current of the inverter must be adhered to (see Section 11 "Technical Data", page 44).
- ☐ On the coldest day based on statistical records, the open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter.
- ☐ The positive connection cables of the PV modules must be fitted with the positive DC connectors (for information on assembling DC connectors, see the DC connector installation manual).
- ☐ The negative connection cables of the PV modules must be fitted with the negative DC connectors (for information on assembling DC connectors, see the DC connector installation manual).
- ☐ If the inverter is not equipped with an ESS and the regulations in the country of installation require an external DC load-break switch, you must install an external DC load-break switch.

i **Use of Y adapters for parallel connection of strings**

The Y adapters must not be used to interrupt the DC electric circuit.

- Do not use the Y adapters in the immediate vicinity of the inverter. The adapters must not be visible or freely accessible.
- In order to interrupt the DC electric circuit, disconnect the inverter (see Section 10, page 42).

6.4.2 Connecting the PV Array

⚠ QUALIFIED PERSON

NOTICE

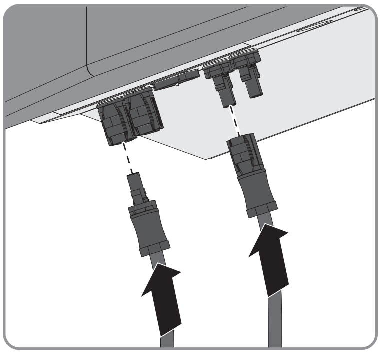
Destruction of the inverter due to overvoltage

If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, the inverter can be destroyed due to overvoltage.

- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

1. Ensure that the circuit breaker is switched off and ensure that it cannot be accidentally reconnected.
2. If an external DC load-break switch is installed, disconnect it from voltage sources.
3. If the ESS is installed and plugged in, carefully remove the ESS.
4. Ensure that there is no ground fault in the PV array (see service manual at www.SMA-Solar.com).
5. Check whether the DC connectors have the correct polarity.

   If the DC connector is equipped with a DC cable having the wrong polarity, the DC connector must be assembled again. The DC cable must always have the same polarity as the DC connector.
6. Ensure that the open-circuit voltage of the PV array does not exceed the maximum input voltage.
7. Connect the assembled DC connectors to the inverter.



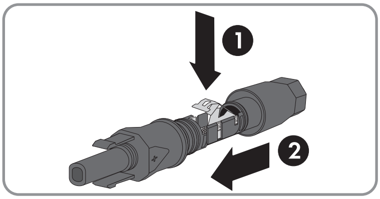
☑ The DC connectors snap into place.

8. **NOTICE**

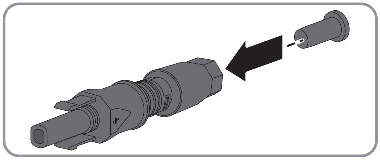
Damage to the inverter due to moisture ingress

The inverter is only properly sealed when all unused DC inputs are closed with DC connectors and sealing plugs.

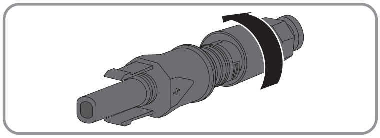
- Do not insert the sealing plugs directly into the DC inputs on the inverter.
- For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.



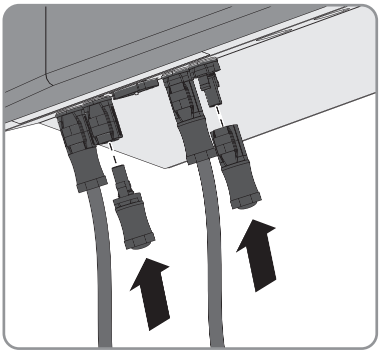
- Insert the sealing plug into the DC connector.



- Tighten the DC connector (torque: 2 Nm).



- Insert the DC connectors with sealing plugs into the corresponding DC inputs on the inverter.



☑ The DC connectors snap into place.

9. Ensure that all DC connectors are securely in place.
10. If the ESS is installed, check the ESS for signs of wear (see service manual at www.SMA-Solar.com).

11. **NOTICE**

Risk of fire due to tightening the screw within the ESS

A perfect contact between the ESS and the inverter is only guaranteed if the ESS plug remains flexible.

- Do not tighten the screw in the plug of the ESS.

12. **NOTICE**

Damage to the inverter due to moisture and dust intrusion

If the ESS is not plugged in or incorrectly plugged in during operation, moisture and dust can penetrate the inverter. If the ESS is not correctly plugged in, this can cause contacts in the ESS to wear or the ESS might fall out. This can result in yield loss and damage to the ESS.

Always plug in the ESS as follows:

- Firmly plug the ESS in until it is flush with the enclosure.
- Ensure that the gap between the ESS and the enclosure is no more than 1 mm.

6.5 Connecting the Fault Indicator Relay

QUALIFIED PERSON

You can use the fault indicator relay to have inverter errors displayed or reported. Alternatively, you can choose to have fault-free operation displayed or reported. It is possible to connect several inverters to one fault indicator or operation indicator. To enable this function, the fault indicator relays of all the inverters must be connected.

Error message required by standard

In some countries, signaling of errors is required by standards, e.g. IEC 62109-2.

- the requirements of IEC 62109-2, a display device signaling an error must be connected to the fault indicator relay **or** the inverter must be registered in Sunny Portal where the fault alert must be activated (for information on fault alert via Sunny Portal, see Sunny Portal user manual at www.SMA-Solar.com).

In case of critical disturbances, the fault indicator relay will close immediately and trip the warning signal through the load. In case of non-critical disturbances, the fault indicator relay will only close after several flashing cycles of the yellow LED. When the inverter reconnects to the electricity grid, the fault indicator relay opens again.

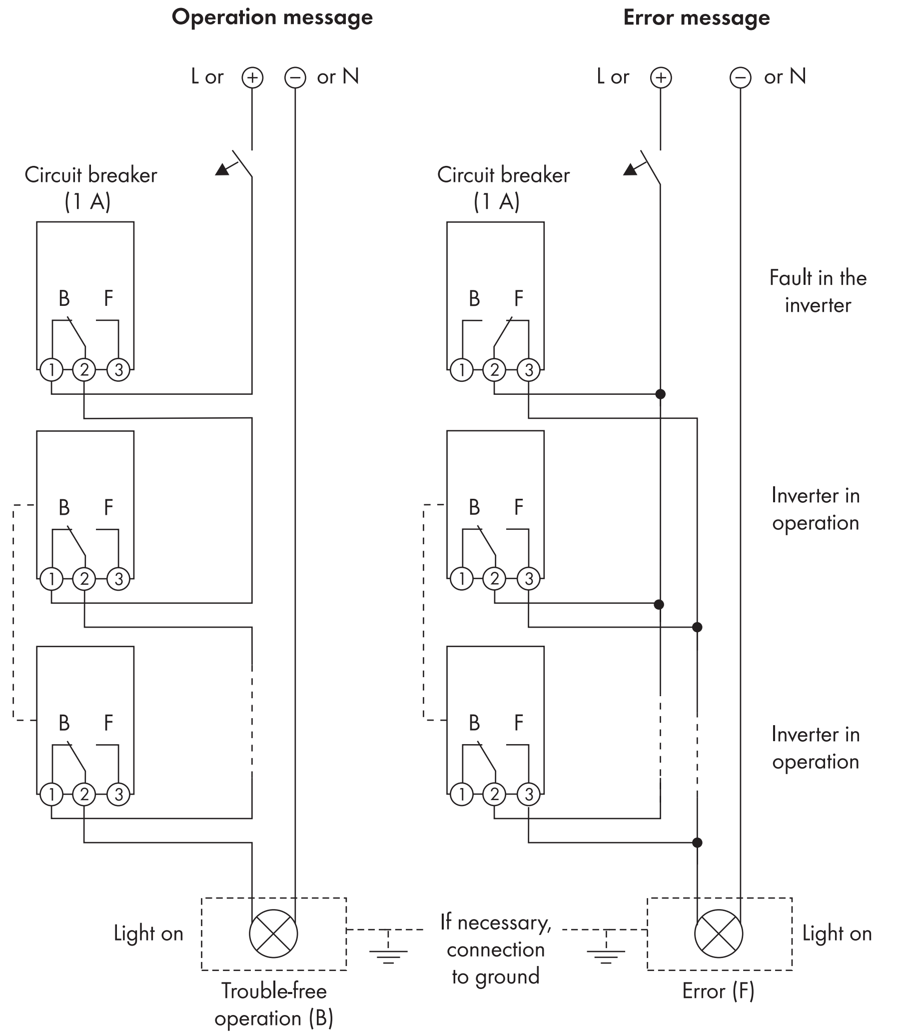


Figure 9: Circuit diagram with multiple inverters for connection to an operation indicator and circuit diagram for connection to a fault indicator (example)

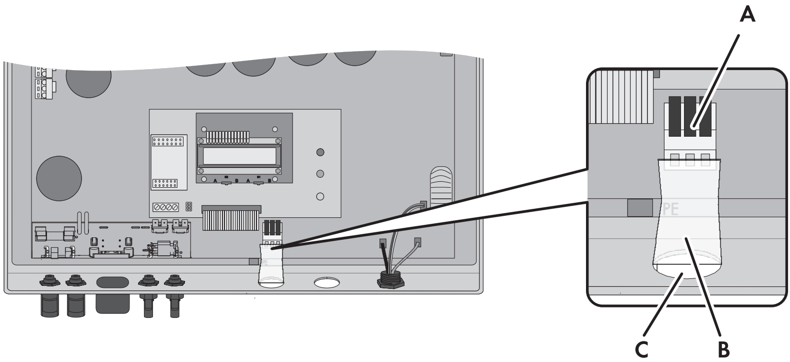


Figure 10: Position of the fault indicator relay and cable route

Position	Designation
A	Terminals of the fault indicator relay
B	Cable route
C	Enclosure opening with filler plug

Requirement:

☐ The technical requirements of the fault indicator relay must be complied with Technical Data.

Cable requirements:

☐ The cable must be double-insulated.

☐ External diameter: 5 mm to 12 mm

☐ Conductor cross-section: 0.08 mm² to 2.5 mm²

☐ The cable type and cable-laying method must be appropriate for the application and location.

NOTICE

Destruction of the fault indicator relay as a result of contact overload

- Observe the maximum switching voltage and maximum switching current Technical Data.
- When connecting the fault indicator relay to the utility grid, protect it with an individual circuit breaker.

Procedure:

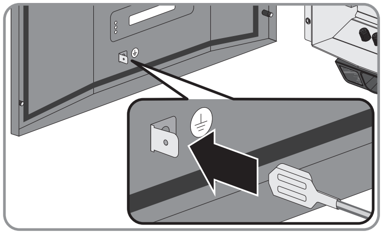
1. **⚠ DANGER**

   Danger to life due to electric shock

   - Ensure that the inverter is disconnected from all voltage sources Disconnecting the Inverter from Voltage Sources.

2. Remove all screws from the enclosure lid and pull the enclosure lid forward smoothly.
3. Remove the grounding conductor from the bottom of the enclosure lid.

4. Prepare the cable:
   - Dismantle the cable jacket by a maximum of 15 mm.
   - Strip 8 mm of the insulated conductors at maximum.
5. Prepare the cable gland PG16 for connection to the fault indicator relay as follows:
   - Remove the swivel nut from the cable gland and remove the filler plug.
   - Remove the one-hole cable support sleeve from the cable gland and insert the cable into the one-hole cable support sleeve.
   - Press the one-hole cable support sleeve with the cable into the cable gland and lead the cable into the inverter.
   - Slide the swivel nut over the cable.
6. Connect the cable to the fault indicator relay in accordance with the circuit diagram.
7. Tighten the swivel nut of the cable gland.
8. Connect the grounding conductor of the inverter to the bottom side of the enclosure lid.



9. Position the enclosure lid on the enclosure and tighten it using the four screws (torque: 2 Nm).

7 Commissioning

7.1 Changing the Display Language

⚠ QUALIFIED PERSON

Use the following figure to check whether the display language of the inverter is set correctly. If the display language is not correct, you can change the display language of the inverter as described in the following. Various languages are available depending on the country data set selected.

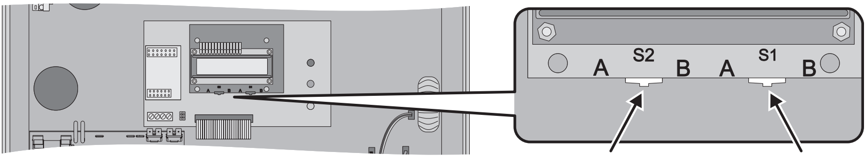


Figure 11: Switch for setting the display language

Language	Switch S2	Switch S1
German	B	B
English / Italian*	B	A
French	A	B
Spanish / English**	A	A

* When country data set CEI 0-21 is selected, the language is Italian.
** When country data set CEI 0-21 is selected, the language is English.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock

   - Ensure that the inverter is disconnected from all voltage sources Disconnecting the Inverter from Voltage Sources.
2. Remove all screws from the enclosure lid and pull the enclosure lid forward smoothly.
3. Remove the grounding conductor from the bottom of the enclosure lid.
4. Set the switches **A** and **B** in accordance with the desired language.
5. Connect the grounding conductor of the inverter to the bottom side of the enclosure lid.
6. Position the enclosure lid on the enclosure and tighten it using the four screws (torque: 2 Nm).
7. Commission the inverter (see Section 7.2, page 35).

7.2 Commissioning the Inverter

⚠ QUALIFIED PERSON

Requirements:

- ☐ The inverter must be correctly mounted.
- ☐ The circuit breaker must be correctly rated and mounted.
- ☐ All cables must be correctly connected.
- ☐ Unused DC inputs must be sealed using the corresponding DC connectors and sealing plugs.
- ☐ The country data set must be set correctly for the country or the purpose.
- ☐ If the *Bluetooth* Piggy-Back is installed, the NetID must be set (see installation manual of the SMA *Bluetooth* Piggy-Back Plus).
- ☐ The grounding conductor of the inverter must be connected to the bottom of the enclosure lid.
- ☐ The enclosure lid of the inverter must be firmly tightened.

Procedure:

1. If an ESS is available, plug it in.
2. If an external DC load-break switch is installed, switch it on.
3. Switch on the circuit breaker.

☑ The start-up phase begins.

Self-test in accordance with CEI 0-21 during comissioning (applies to Italy only)

The Italian standard prescribes that an inverter can only operate on the utility grid after the disconnection times for overvoltage, undervoltage, minimum frequency and maximum frequency have been checked.

- If the country data set **CEI 0-21 Int / CEI 0-21 internal** is set, start the self-test as soon as the display shows the country data set (see Section 7.3.1, page 36).

☑ The green LED is glowing and the display alternates automatically between the device type, the designation of the inverter, the firmware version and the configured country data set.

✖ The green LED is flashing?

The DC input voltage is still too low or the inverter is checking 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?

The inverter has detected a ground fault or one of the varistors is defective.

- Rectify the error (see service manual at www.SMA-Solar.com).

✖ The yellow LED is glowing or flashing?

An error or disturbance has occurred.

- Rectify the error or disturbance (see service manual at www.SMA-Solar.com).

✖ All LEDs are flashing?

The DC voltage is still too low and the start-up phase begins again. No error has occurred.

- Waiting for sufficient irradiation

✖ All LEDs have gone out?

The inverter is switched off because the ESS is not plugged in, the external DC load-break switch is not switched on or irradiation is not sufficient.

- Make sure that the ESS is plugged in correctly and that the external DC load-break switch is switched on, respectively.

7.3 Self-Test in Accordance with CEI 0-21 for PV Systems ≤6 kW

7.3.1 Starting the Self-Test

⚠ QUALIFIED PERSON

i The self-test only applies to inverters that are configured with the country data set CEI 0-21 Int or CEI 0-21 internal.

The self-test is only valid for inverters licensed for Italy and configured with the country data set **CEI0-21 Int** or **CEI 0-21 internal**.

The self-test is only required for inverters which are commissioned in Italy. The Italian standard requires that all inverters feeding into the utility grid are equipped with a self-test function in accordance with CEI 0-21. During the self-test, the inverter will consecutively check the reaction times for overvoltage, undervoltage, maximum frequency and minimum frequency.

The self-test changes the upper and lower disconnection values for each protective function on a linear basis for frequency monitoring and voltage monitoring. As soon as the measured value exceeds the permitted disconnection threshold, the inverter disconnects from the utility grid. In this way, the inverter determines the reaction time and checks itself.

After the self-test has been completed, the inverter automatically switches back to the feed-in operation, resets the original shutdown conditions and connects to the utility grid. The test takes approximately three minutes.

Requirements:

☐ Configured country data set: **CEI 0-21 Int** or **CEI 0-21 internal** or amended country data set **trimmed** or **special setting** based on one of the country data sets mentioned above.

☐ A report for entering the test results according to CEI 0-21 must be available.

☐ The inverter must be in operation and in the start-up phase.

Procedure:

1. As soon as the configured country data set appears in the display, tap once on the display within ten seconds.

   ☑ A message informing you that the self-test has started is shown in the display: **Avvio Autotest**.

   ✖ The message **Avvio Autotest** is not shown in the display?

   Ten seconds have passed and the self-test has not started.

   - Restart the self-test (see Section 7.3.2, page 37).
2. Tap on the display within 20 seconds and enter the test results that follow into the test report.

☑ The self-test starts.

☑ The inverter displays the results of the individual tests for overvoltage, undervoltage, maximum frequency and minimum frequency. The results are displayed three times in succession for ten seconds each.
Useful hint: If you want to have the next result displayed without waiting ten seconds, tap twice on the enclosure lid.

✖ The information **Autotest interroto** is shown in the display?

The self-test was cancelled due to an unexpected disconnection condition or the DC voltage was too low so that grid feed-in could not continue.

- Restart the self-test (see Section 7.3.2, page 37).

Example: Display messages for overvoltage test

- Name of the test: **Autotest (59.S1) 240.00V**
- Disconnection value: **Valore di soglia con 230.00V**
- Normative value: **Va. taratura 253.00V**
- Disconnection time: **Tempo die intervento 0.02 s**
- Current line voltage: **Tensione di rete Val.eff.: 229.80V**

7.3.2 Restarting the Self-Test

⚠ QUALIFIED PERSON

1. Disconnect the circuit breaker and secure against reconnection.
2. If the fault indicator relay is used, switch off the load supply voltage, if necessary.
3. If an external DC load-break switch is in use, switch it off for five minutes and then switch it on again.
4. If an ESS is in use, pull it out of the inverter for five minutes and then plug it in again firmly.
5. Recommission the inverter.

☑ The inverter is now back in the start-up phase and you can start the self-test once again (see Section 7.3.1, page 36).

8 Configuration

8.1 Procedure

⚠ QUALIFIED PERSON

Once you have commissioned the inverter, you may have to adjust various settings via a communication product. This section describes the procedure for configuration and gives an overview of the steps you must perform in the prescribed order.

Procedure		Refer to
1.	Check which country data set the inverter is set to.	Supplementary sheet with the default settings, type label or display
2.	If the country data set is not set correctly for your country or your purpose, adjust to the required country data set.	Section 8.3, page 39
3.	If the inverter is equipped with a communication interface, detect the inverter by means of a communication product.	Manual of the communication product at www.SMA-Solar.com
4.	Change the PV system time and PV system password.	Manual of the communication product at www.SMA-Solar.com
5.	If the inverter is equipped with a Speedwire/Webconnect Piggy-Back, integrate the inverter in a Speedwire network and register it in Sunny Portal, if necessary.	Manual of the communication interface at www.SMA-Solar.com
6.	If the inverter was installed in an IT system for example, deactivate the grounding conductor monitoring.	Section 8.4, page 39

8.2 Changing Operating Parameters

⚠ QUALIFIED PERSON

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section. Some parameters that have sensitive functions can only be seen and changed by qualified persons (for further information on changing parameters, refer to the manual of the communication product).

The operating parameters of the inverter are set to certain values by default. You can change the operating parameters using a communication product to optimize inverter operation.

Requirements:

☐ Depending on the type of communication, a computer with a *Bluetooth* or Ethernet interface must be available.

☐ A communication product corresponding to the type of communication used must be available.

☐ The inverter must be registered in the communication product.

☐ The changes to the grid-relevant operating parameters must be approved by the responsible grid operator.

☐ When changing grid-relevant parameters, the SMA Grid Guard code must be available (see Certificate "Order Form for the SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Call up the user interface of the communication product or software and log in as an installer or user.
2. If required, enter the SMA Grid Guard code.
3. Select and set the required parameter.
4. Save settings.

8.3 Changing the Country Data Set

⚠ QUALIFIED PERSON

By default, the inverter is set to a specific country data set. You can find the country data set to which the inverter has been set on the enclosed supplementary sheet with the default settings or on the type label. Each country data set contains various operating parameters, which can be individually set according to the respective country. You can change the parameters by means of a communication product.

Basic procedure for changing operating parameters

The basic procedure for changing operating parameters is explained in a separate section (see Section 8.2 "Changing Operating Parameters", page 38).

Procedure:

- Select the parameter **Default** or **Set country standard** and adjust the required country data set.

8.4 Deactivating Grounding Conductor Monitoring

⚠ QUALIFIED PERSON

If the inverter is installed in an IT system or another grid configuration where deactivation of the grounding conductor monitoring is required, deactivate the grounding conductor monitoring as follows:

The basic procedure for changing operating parameters is explained in another section (see Section 8.2, page 38).

- Set the parameter **PE connection monitoring** or **PEOpnMon** to **Aus** or **Off**.

9 Operation

9.1 Activating and Operating the Display

You can activate and operate the display by tapping on the enclosure lid.

1. Activate the display. Tap on the enclosure lid once.
   ☑ The backlight is switched on.
2. To move to the next line, tap on the enclosure lid once.

9.2 Calling Up Display Messages of the Start-Up Phase

Various inverter information is displayed during the start-up phase that can be called up whenever required during operation.

- Tap on the enclosure lid twice.

☑ The display alternates between firmware version, serial number or designation of the inverter, configured country data set and display language.

9.3 Display Messages

9.3.1 Measuring Channels

Measuring channels are measured values shown on the display. Additionally, you can read out further measuring channels via a communication product.

Measuring channel	Explanation
E-Today	Total amount of energy fed in
Status	Indicates the current operating state (see Section 9.3.2 "Status Messages", page 40).
Pac	AC power supplied
Vpv	PV input voltage
E-total	Total amount of energy fed in
h-total	Total number of operating hours in feed-in operation
Warning / Disturbance / Error	Display of a current disturbance or error with corresponding error message (for troubleshooting see service manual at www.SMA-Solar.com). When certain disturbances occur, the shutdown value and the current value are also displayed.

9.3.2 Status Messages

Status messages are shown in the second line of the display and always start with the word “Mode”. Status messages indicate operating states which do not represent errors or disturbances. The inverter continues feeding into the utility grid.

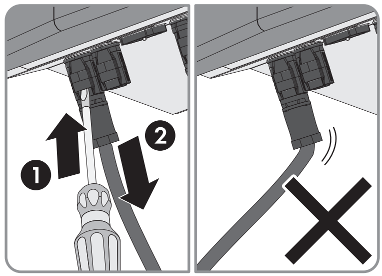
Message	Explanation
Derating	This message can have several causes: • Overtemperature in the inverter. The inverter reduces its power to prevent overheating. • External active power limitation via the Power Reducer Box and Sunny WebBox. The inverter reduces its power output automatically due to the grid operator's specifications. The Power Reducer Box transfers the signal from the grid operator to the inverter via the Sunny WebBox.
Error	The inverter has detected an error. The specific error message is also displayed (for troubleshooting see service manual at www.SMA-Solar.com).
MPP	The inverter is operating in MPP mode. MPP is the standard display message when operating under normal irradiation conditions.
MPP-Peak	The inverter is operating in MPP mode above its nominal power.
MPP-Search	The inverter is calculating the MPP.
Grid monitoring	Grid monitoring. This message appears before the inverter is connected to the utility grid, if irradiation is low, and following an error.
Offset	Offset alignment of the measurement electronics
Earthfault	Measurement of the insulation resistance of the PV system
Disturbance	The inverter has detected a disturbance. The specific disturbance message is also displayed (for troubleshooting see service manual at www.SMA-Solar.com).
Stop	Operation interrupted
V-Const	Constant voltage mode
Waiting	The conditions for grid connection are not (yet) fulfilled.

10 Disconnecting the Inverter from Voltage Sources

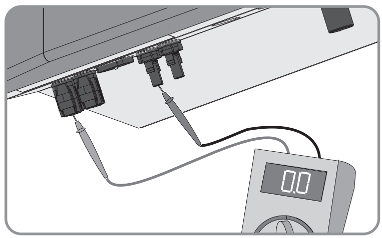
⚠ QUALIFIED PERSON

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.

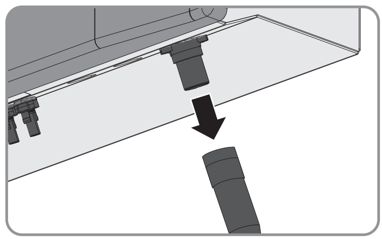
1. Disconnect the circuit breaker and secure against reconnection.
2. If an external DC load-break switch is installed, disconnect it from voltage sources.
3. If an ESS is installed, carefully remove the ESS.
4. Wait until the LEDs and the display have gone out.
5. Use a current clamp to ensure that no current is present in the DC cables.
6. 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.



7. Ensure that no voltage is present at the DC inputs on the inverter.



8. Pull the AC connection socket out of the AC pin connector on the inverter.



9. **⚠ DANGER**

   Danger to life due to high voltages

   The capacitors in the inverter take ten minutes to discharge.

   - Wait ten minutes before opening the inverter.

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.

11 Technical Data

DC Input

	SB 1300TL-10	SB 1600TL-10	SB 2100TL
Maximum DC power at cos φ = 1	1400 W	1700 V	2200 W
Maximum input voltage	600 V	600 V	600 V
MPP voltage range	115 V to 480 V	155 V to 480 V	200 V to 480 V
Rated input voltage	400 V	400 V	400 V
Minimum input voltage	100 V	125 V	125 V
Start input voltage	120 V	150 V	150 V
Maximum input current	12 A	12 A	12 A
Maximum input current per string	12 A	12 A	12 A
Number of independent MPP inputs	1	1	1

AC Output

	SB 1300TL-10	SB 1600TL-10	SB 2100TL
Rated power at 230 V, 50 Hz	1,300 W	1600 W	1950 W
Maximum apparent AC power at cos φ = 1	1300 VA	1600 VA	2100 VA
Rated grid voltage	230 V	230 V	230 V
Nominal AC voltage	220 V / 230 V / 240 V	220 V / 230 V / 240 V	220 V / 230 V / 240 V
AC voltage range	180 V ... 260 V	180 V to 260 V	180 V to 260 V
Nominal AC current at 220 V	5.9 A	7.3 A	8.7 A
Nominal AC current at 230 V	5.7 A	7.0 A	8.5 A
Nominal AC current at 240 V	5.4 A	6.7 A	8.1 A
Maximum output current	7.2 A	8.9 A	11.0 A
Total harmonic distortion of output current at AC voltage < 2 %, AC power > 0.5 rated power	≤ 3 %	≤ 3 %	≤ 3 %
Rated power frequency	50 Hz	50 Hz	50 Hz
AC power frequency	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz
Operating range at AC power frequency 50 Hz	44 Hz to 55 Hz	44 Hz to 55 Hz	44 Hz to 55 Hz

	SB 1300TL-10	SB 1600TL-10	SB 2100TL
Operating range at AC power frequency 60 Hz	54 Hz to 65 Hz	54 Hz to 65 Hz	54 Hz to 65 Hz
Power factor at rated power	1	1	1
Feed-in phases	1	1	1
Connection phases	1	1	1
Overvoltage category as per IEC 60664-1	III	III	III

Efficiency

	SB 1300TL-10	SB 1600TL-10	SB 2100TL
Maximum efficiency, η_{max}	96.0 %	96.0 %	96.0 %
European efficiency, η_{EU}	94.3 %	95.0 %	95.2 %

General Data

Width x height x depth	440 mm x 299 mm x 214 mm
Width x height x depth, with ESS	440 mm x 339 mm x 214 mm
Weight	16 kg
Length x width x height of the packaging	532 mm x 392 mm x 318 mm
Weight including packaging	21.5 kg
Climatic category in accordance with IEC 60721-3-4	4K4H
Operating temperature range	−25 °C to +60 °C
Maximum permissible value for relative humidity, non-condensing	100 %
Maximum operating altitude above mean sea level	2000 m
Noise emission, typical	≤ 33 dB(A)
Power loss in night mode	0.1 W
Topology	Transformerless
Cooling concept	Convection
Degree of protection in accordance with IEC 60529	IP65
Protection class in accordance with IEC 62103	I
Grid configurations	TN-C, TN-S, TN-CS, TT (if V_{N_PE} > 30 V), IT, Delta IT, split phase

National standards and approvals, as per 11/2013*	VDE0126-1-1, G83/1-1, RD 661/2007, PPC, AS 4777, EN 50438, C10/11, PPDS, UTE C15-712-1, VDE-AR-N 4105, CEI 0-21, RD1699, NRS 097-2-1, DIN EN 62109-1, IEC 62109-2, VFR 2013, G83/2

* **RD1699:** Contact the SMA Service Line for restrictions in specific regions.
NRS 097-2-1: This standard requires a separate label attached to the AC distribution board, which indicates the AC-side disconnection of the inverter in case of a grid failure (for further details, see NRS 097-2-1, Sect. 4.2.7.1 and 4.2.7.2)
IEC 62109-2: In order to meet the requirements of this standard, use of the fault indication relay must be activated in the inverter or there must be a link to Sunny Portal with the fault alert via e-mail activated.

Protective Devices

DC reverse polarity protection	Short-circuit diode
Input-side disconnection point*	Electronic Solar Switch
DC overvoltage protection	Thermally monitored varistors
AC short-circuit current capability	Current control
Grid monitoring	SMA Grid Guard 2.1
Maximum permissible fuse protection	16 A
Ground-fault monitoring	Insulation monitoring: R_{iso} > 1 MΩ
All-Pole Sensitive Residual-Current Monitoring Unit	Available

* Optional

Climatic Conditions in Accordance with IEC 60721-3-4, Installation Type C, Class 4K4H

Extended temperature range	−25°C to +60°C
Extended humidity range	0 % ... 100 %
Extended air pressure range	79.5 kPa to 106 kPa

Climatic Conditions in Accordance with IEC 60721-3-4, Transport Type E, Class 2K3

Extended temperature range	−25°C to +70°C

Features

DC connection	SUNCLIX DC connector
AC connection	AC connector
Display	LC text display
Bluetooth	Optional

RS485, galvanically isolated	Optional
Speedwire with Webconnect function	Optional

Fault Indicator Relay

Maximum AC switching voltage	240 V
Maximum DC switching voltage	30 V
Maximum AC switching current	1.0 A
Maximum DC switching current	1.0 A
Minimum electrical endurance when the maximum switching voltage and maximum switching current are complied with*	1000000 switching cycles

* Corresponds to 20 years at 12 switching operations per day

Electronic Solar Switch

Electrical endurance in the event of short circuit, at nominal current of 35 A	At least 50 switching processes
Maximum switching current	35 A
Maximum switching voltage	800 V
Maximum PV power	11 kW
Degree of protection when plugged in	IP65
Degree of protection when unplugged	IP21
Fuse for the Electronic Solar Switch	F200, 600 V / 4 A, fast acting (soldered, not replaceable)

Torques

Enclosure lid screws	2.0 Nm
Screw for additional grounding	6.0 Nm
Cylindrical screw for attaching the enclosure to the wall mounting bracket	6.0 Nm
SUNCLIX swivel nut	2.0 Nm
RS485 communication connection	1.5 Nm

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 of thermally monitored varistors (2 pcs.)	SB-TV4
Insertion tool for replacing varistors	Insertion tool for varistors	SB-TVWZ
RS485 retrofit kit	RS485 interface	485PB-NR
Bluetooth retrofit kit	*Bluetooth* interface	BTPBINV-NR
Speedwire/Webconnect retrofit kit	Speedwire/Webconnect interface for Speedwire networks and data exchange with Sunny Portal	SWPB-10
SUNCLIX DC connector	Field plug for wire sizes of 2.5 mm² - to 6 mm²	SUNCLIX-FC6-SET

* 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 type
- Inverter serial number
- Type and number of PV modules connected
- Optional equipment e.g. communication interfaces
- Blink code or display message of the inverter

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: 1800 SMA AUS (1800 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 PV-Diesel Hybridsysteme: +49 561 9522-3199
		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
India	SMA Solar India Pvt. Ltd. Mumbai	+91 22 61713888
Italia	SMA Italia S.r.l. Milano	+39 02 8934-7299
Κύπρος/Kıbrıs	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	Isento 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
България	Вижте Ελλάδα (Гърция)	
ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ	+66 2 670 6999

대한민국	SMA Technology Korea Co., Ltd. 서울	+82 2 508-8599
中国	SMA Beijing Commercial Company Ltd. 北京	+86 10 5670 1350
الإمارات العربية المتحدة	SMA Middle East LLC أبو ظبي	+971 2 698-5080
Other countries	International SMA Service Line Niestetal	Toll free worldwide: 00800 SMA SERVICE (+800 762 7378423)

SMA Solar Technology AG | Sonnenallee 1 | 34266 Niestetal | Germany
Phone: +49 561 9522-0 | Fax: +49 561 9522-100 | Internet: www.SMA.de | E-Mail: info@SMA.de
Amtsgericht (District court) Kassel HRB (registration number) 3972
Vorsitzender des Aufsichtsrats (Chairman of the Supervisory Board): Günther Cramer
Managing Board: Roland Grebe, Lydia Sommer, Pierre-Pascal Urbon, Marko Werner

EC Declaration of Conformity

with the Guidelines of the European Community

- Electromagnetic compatibility 2004/108/EC (EMC)
- Low-voltage directive 2006/95/EC (LVD)
- Radio and telecommunications terminal equipment 1999/05/EC (R&TTE)

The products stated below have been developed, constructed and manufactured in accordance with the above mentioned EC directives. The applied harmonized standards are shown in the following table.

	Sunny Boy	**Sunny Mini Central**	**Sunny Boy/ Sunny Tripower**	**Sunny Boy**	**Sunny Boy/ Sunny Tripower**
	SB 1300TL-10, SB 1600TL-10, SB 2100TL	SMC 6000A-11, SMC 9000TLRP-10, SMC 10000TLRP-10, SMC 11000TLRP-10	SB 2500TLST-21, SB 3000TLST-21, SB 3000TL-21, SB 3600TL-21, STP 5000TL-20, STP 6000TL-20, STP 7000TL-20, STP 8000TL-20, STP 9000TL-20, STP 10000TL-10	SB 2000HF-30, SB 2500HF-30, SB 3000HF-30	SB 4000TL-21, SB 5000TL-21, SB 6000TL-21, STP 12000TL-10, STP 15000TL-10, STP 15000TLEE-10, STP 17000TL-10, STP 20000TLEE-10
Electromagnetic Interference (EMC directive, Article 5 – Annex I.1.a)					
EN 61000-6-3:2007 + A1:2011	✓	✓	✓	✓	✓
EN 61000-6-4:2007 + A1:2011	✓	✓	✓	✓	✓
Electromagnetic interference emissions (EMC Directive Article 5 – Annex I.1.a)					
EN 61000-3-3:2008	✓	✖	✓	✓	✖
EN 61000-3-2:2006 + A1:2009 + A2:2009	✓	✖	✓	✓	✖
EN 61000-3-11:2000	✖	✓	✖	✖	✓
EN 61000-3-12:2005	✖	✓	✖	✖	✓
Immunity to interference (EMC Directive Article 5 – Annex I.1.b)					
EN 61000-6-1:2007	✓	✓	✓	✓	✓
EN 61000-6-2:2005	✓	✓	✓	✓	✓
Device safety (LVD Article 2 – Annex I)					
EN 62109-1:2010	✓	✓	✓	✓	✓
EN 62109-2:2011	✓	✖	✓	✖	✓
Health and safety (R&TTE Article 3.1.a)					
EN 62311:2008	✓	✓	✓	✓	✓
Electromagnetic compatibility (R&TTE Directive Article 3.1.b)					
EN 301 489-1 V1.9.2	✓*	✓*	✓	✓	✓
EN 301 489-17 V2.2.1	✓*	✓*	✓	✓	✓
Effective use of frequency spectrum (R&TTE Article 3.2.)					
EN 300 328 V1.7.1	✓*	✓*	✓	✓	✓
	CE	CE	CE	CE	CE

* Only when equipped with SMA *Bluetooth* Piggy-Back.

✓ Standard applicable
✖ Standard not applicable

Niestetal, 2013-12-12
SMA Solar Technology AG

ppa. Frank Greizer
(Vice President MPTPD)

Information:
Without an explicit written confirmation by SMA, this declaration of conformity is no longer valid if:

- the product is modified, supplemented or changed in any other way,
- components which are not part of the SMA accessories kit, are integrated in the product, as well as if the product is used or installed improperly.

Declaration of Conformity

with German, European and International (Non-European) standards used for SUNNY BOY, SUNNY MINI CENTRAL and SUNNY TRIPOWER inverters

German Standard DIN EN		European Standard EN		International Standard IEC (IEC/CISPR)
DIN EN 61000-6-1:2007-10	based on	EN 61000-6-1:2007	based on	IEC 61000-6-1:2005
DIN EN 61000-6-2:2006-03	based on	EN 61000-6-2:2005	based on	IEC 61000-6-2:2005
DIN EN 61000-6-3:2011-09	based on	EN 61000-6-3:2007 + A1:2011	based on	IEC 61000-6-3:2006 + A1:2010
DIN EN 61000-6-4:2011-09	based on	EN 61000-6-4:2007 + A1:2011	based on	IEC 61000-6-4:2006 + A1:2010
DIN EN 61000-3-2:2010-03	based on	EN 61000-3-2:2006 + A1:2009 + A2:2009	based on	IEC 61000-3-2:2005 + A1:2008 + A2: 2009
DIN EN 61000-3-3:2009-06	based on	EN 61000-3-3:2008	based on	IEC 61000-3-3:2008
DIN EN 61000-3-11:2001-04	based on	EN 61000-3-11:2000	based on	IEC 61000-3-11:2000
DIN EN 61000-3-12:2005-09	based on	EN 61000-3-12:2005	based on	IEC 61000-3-12:2004
DIN EN 62109-1:2010	based on	EN 62109-1:2010	based on	IEC 62109-1:2010
DIN EN 62109-2:2011	based on	EN 62109-2:2011	based on	IEC 62109-2:2011
DIN EN 62311:2008-09	based on	EN 62311:2008	based on	IEC 62311:2007
DIN EN ———		EN 301 489-1 V1.9.2		IEC ———
DIN EN ———		EN 301 489-17 V2.2.1		IEC ———
DIN EN ———		EN 300 328 V1.7.1		IEC ———

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