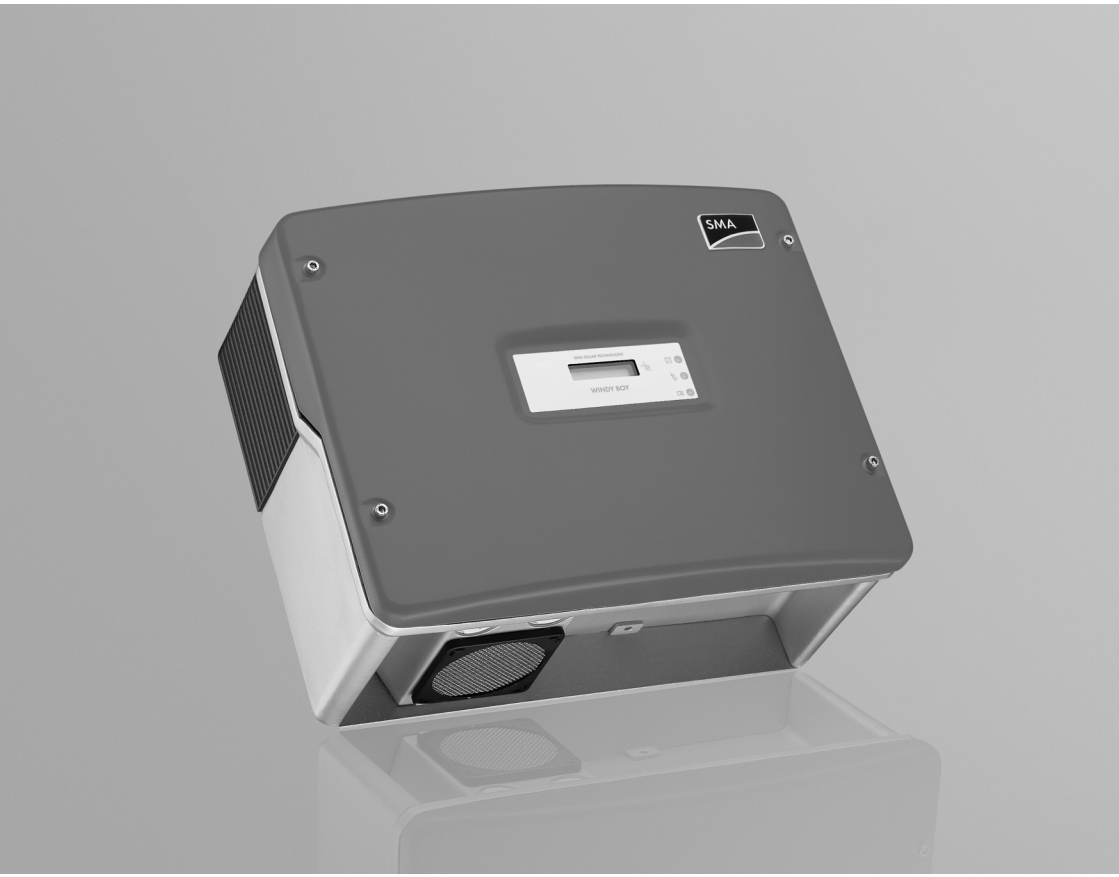
Wind Power Inverter

WINDY BOY 3300 / 3800

Installation Guide



WB33_38-IEN101830 | IME-WB3800 | Version 3.0

EN

Table of Contents

1 Notes on this Guide

This installation guide describes the assembly, installation, commissioning and maintenance of the following SMA inverters:

- Windy Boy 3300 (WB 3300)
- Windy Boy 3800 (WB 3800)

Store this guide where it can be accessed at all times.

1.1 Validity

This guide applies to all device types WB 3300 and WB 3800 with firmware version 2.94, and later.

1.2 Target Group

This guide is for qualified personnel. The tasks described in this guide may only be performed by qualified personnel.

1.3 Additional Information

You will find further information on special topics such as designing a line circuit breaker or the description of the operating parameters in the download area at www.SMA.de/en.

Refer to the user manual for detailed information on operating the inverter.

1.4 Symbols Used

The following types of safety precautions and general information are used in this guide:

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE!

"NOTICE" indicates a situation that can result in property damage if not avoided.

Information

Information provides tips that are valuable for the optimal installation and operation of your product.

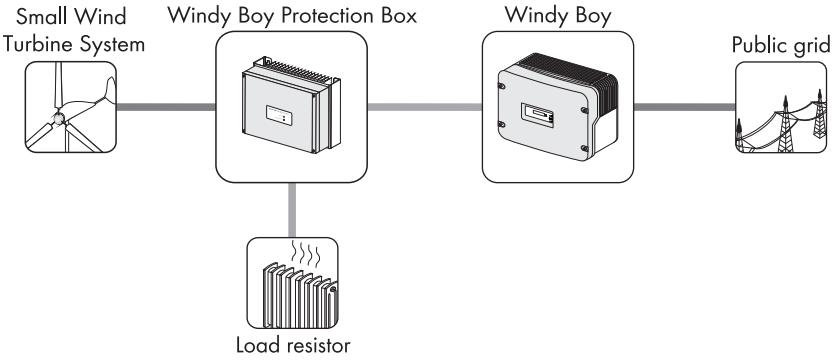
☑ This symbol indicates the result of an action.

2 Safety

2.1 Appropriate Usage

The Windy Boy is a wind power inverter, which converts rectified current of a small wind turbine system into AC current and feeds this energy into the public grid, domestic grid or the Sunny Island system.

Principle of a Small Wind Turbine System with Windy Boy



Furthermore, the Windy Boy can be used as an inverter for power conversion units based on permanent magnet generators (hydro power systems, combined heat and power plants, diesel generators, etc.). The manufacturer of the small wind turbine system or the generator must have his plant approved for operation with this Windy Boy (see also the Windy Boy planning guidelines in the download area at www.SMA.de/en).

When designing the system, ensure that the permitted operating range of all components is maintained at all times. Also use appropriate protective measures to ensure that the maximum permissible input voltage of the inverter is not exceeded. SMA Solar Technology AG offers you the corresponding components, such as the Windy Boy Protection Box (overvoltage protection for wind power inverters including the rectifier).

2.2 Safety Precautions

DANGER!

Electric shock due to high voltages in the inverter when connecting the device. Death or serious injury.

- All work on the inverter may be carried out by qualified personnel only.
- The appliance is not to be used by children or persons with reduced physical, sensoryor mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.
- Work on the inverter must only be carried out as described in this guide.
- All safety instructions listed must be observed.

CAUTION!

Risk of burns through contact with the hot enclosure during operation. Burns to the palm of the hand.

- Do not touch the inverter's enclosure during operation.

Problems while performing the described activities

If you have problems while performing any of the activities described in this guide, contact SMA Solar Technology AG (see section 13 "Contact" (page 70)).

2.3 Explanation of Symbols

This section contains an explanation of all symbols found on the inverter and type label.

2.3.1 Symbols on the Inverter

Symbol	Explanation
	Operation display. Indicates the operation condition of the inverter.
	Ground fault or varistor defective. There is either a ground fault in the system, or at least one of the varistors inside the inverter is defective.
	An error has occurred. Read the installation guide and the user manual to remedy the malfunction.
	Tap to switch on the display light and switch to the next message.

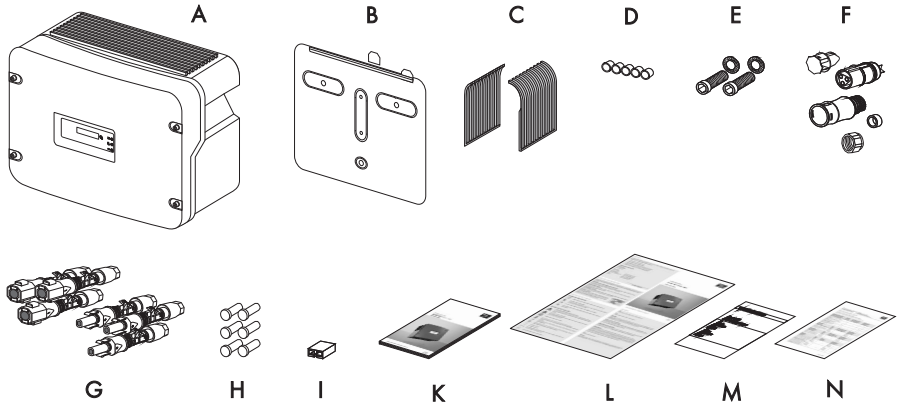
2.3.2 Symbols on the Type Label

Symbol	Explanation
	Beware of dangerous electrical voltage. The inverter operates at high voltages. All work on the inverter may be carried out by qualified personnel only.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Observe all documentation that accompanies the inverter.
	The inverter must not be disposed of with household waste. For more information on disposal, see section 10.4 "Disposing of the Inverter" (page 62).
	CE mark. The inverter complies with the requirements of the applicable EC guidelines.
	RAL quality mark for solar products. The inverter complies with the requirements of the German Institute for Quality Assurance and Labeling.
	The inverter has a transformer.
	Direct Current (DC).
	Alternating Current (AC).
	The inverter is protected against penetration by dust particles and water jets from any angle.

3 Unpacking

3.1 Scope of Delivery

Check the delivery for completeness and for any visible external damage. Contact your dealer if anything is damaged or missing.



Object	Quantity	Description
A	1	Inverter
B	1	Wall mounting bracket
C	2	Air grills (1x left, 1x right)
D	5	Sealing plugs for wall mounting bracket
E	2	Cylinder head screw and contact disk (M6)
F	1	AC coupling socket: socket unit, protective cap for socket unit, threaded sleeve, sealing ring, clamping nut.
G	6	PV connectors (3 x positive / 3 x negative)
H	6	Sealing plugs for PV connectors
I	1	Jumper for communication / fan test
K	1	Installation Guide
L	1	User Manual
M	1	Set of documents with explanations and certificates
N	1	Supplementary sheet with inverter factory settings

3.2 Identifying the Inverter

You can identify the inverter using the type label. The type label is on the right side of the enclosure.

On the type label you will find the type (Type/Model) and the serial number (Serial No.) of the inverter.

4 Mounting the Device

4.1 Safety

DANGER!

Danger to life due to fire or explosion.

Despite careful construction, electrical devices can cause fires.

- Do not mount the inverter on flammable construction materials.
- Do not mount the inverter in areas where highly flammable materials are stored.
- Do not mount the inverter in areas with a risk of explosion.

CAUTION!

Danger of burn injuries due to hot enclosure parts.

- Do not touch the enclosure during operation.

CAUTION!

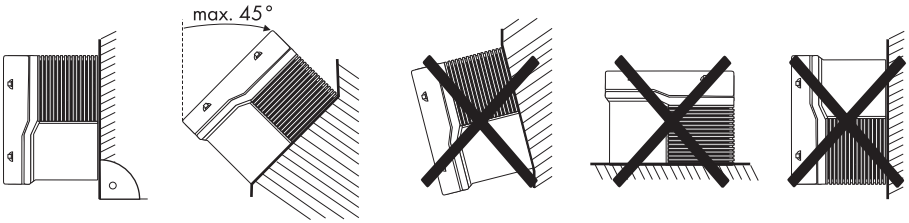
Risk of injury due to the heavy weight of the inverter.

- Note that the inverter weighs approx. 38 kg.

4.2 Selecting the Mounting Location

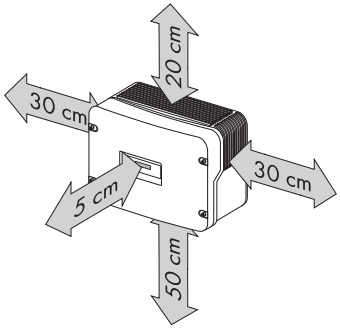
Observe the following conditions during mounting:

- The installation method and mounting location must be suitable for the inverter's weight and dimensions.
- Mount on a solid surface.
- The mounting location must at all times be clear and have safe access without the use of additional aids such as scaffolding or lifting platforms. Any possible service actions are otherwise limited.



- Mount vertically or tilted backward by max. 45°.
- Never mount the device with a forward tilt.
- Do not mount in a horizontal position.
- The connection area must point downward.
- Install at eye level to allow operating state to be read at all times.
- The ambient temperature should be below 40 °C to ensure optimal operation.
- Do not expose the inverter to direct sunlight to avoid a power reduction due to excessive heating.
- In living areas, do not mount the unit on plasterboard walls or similar to avoid audible vibrations. The inverter can make noises when in use which may be perceived as a nuisance in a living area.

- Observe the minimum clearances to walls, other inverters or objects as shown in the diagram in order to guarantee sufficient heat dissipation.



Multiple inverters installed in areas with high ambient temperatures

If necessary, increase the clearances between the individual inverters. In addition, make sure there is enough ventilation to ensure sufficient cooling of the inverters.

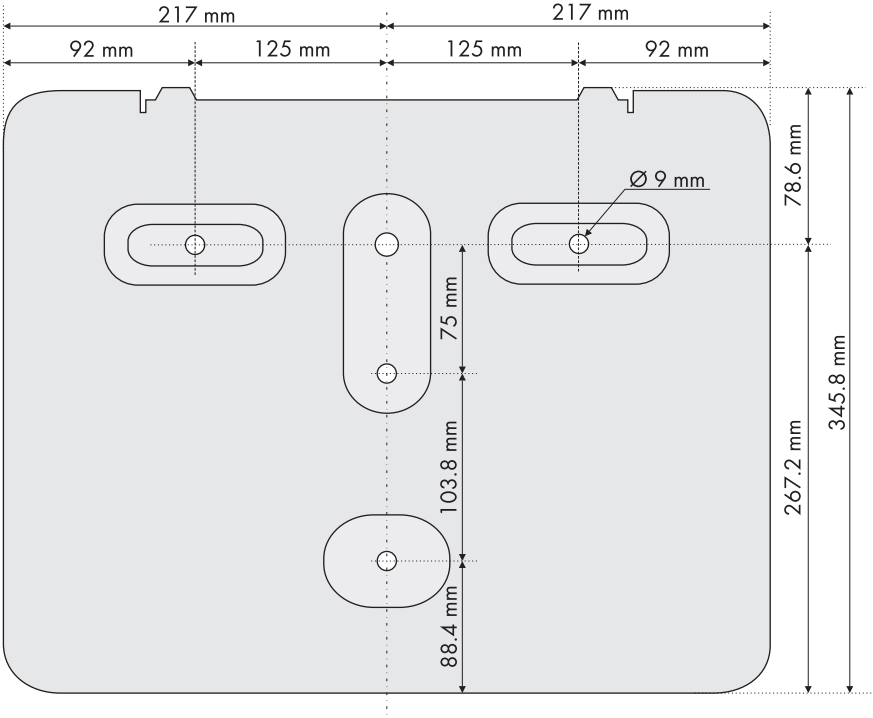
4.3 Mounting the Inverter with the Wall Mounting Bracket

CAUTION!

Risk of injury due to the heavy weight of the inverter.

- Note that the inverter weighs approx. 38 kg.

1. Use the wall mounting bracket as a drilling template and mark the positions of the drill holes.

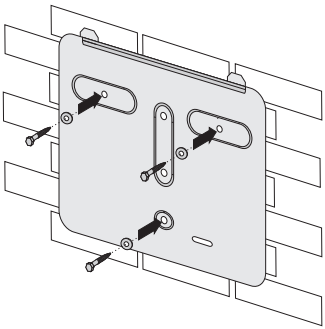


Mounting material

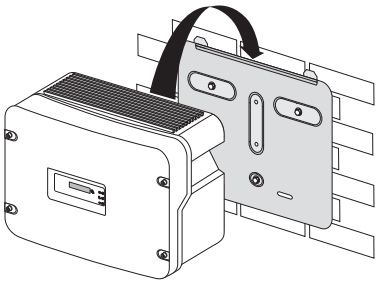
When mounting the bracket, use fastening material suitable for the mounting surface.

2. Fill in holes that are not required in the wall mounting bracket using the sealing plugs. Insert the sealing plugs into the wall mounting bracket from the outside (the side that will later be placed against the wall).

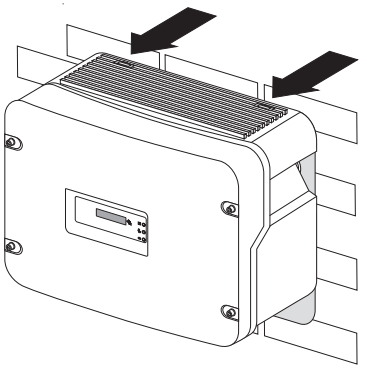
3. Attach the wall mounting bracket to the wall using appropriate screws and washers.



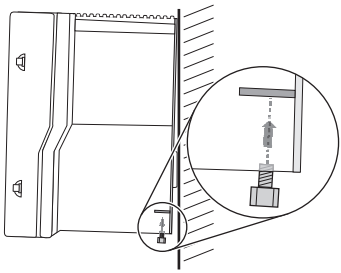
4. Mount the inverter with the upper fastening plates on the wall mounting bracket so that both plates on the upper edge of the bracket pass through the cutouts on the inverter.



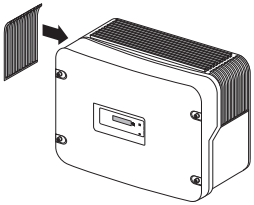
5. **Visual inspection**: The inverter is only correctly mounted when both rear panel mounting plates slightly protrude through the cutouts.



6. Secure the inverter in position by screwing the supplied M6 contact screw, located on the underside of the enclosure. Use the contact washers provided with the toothing against the enclosure. Tighten the screw with a torque of approx. 5 Nm.



7. Check to ensure that the inverter is firmly fastened. The wall mounting bracket is designed so that the inverter tilts backward slightly on a perfectly vertical wall.
8. Attach the air grills provided to the inverter. To help you identify the sides, "links/left" or "rechts/right" is printed on the inside of the air grids.



☑ The inverter is now mounted.

5 Electrical Connection

5.1 Safety

NOTICE!

Electrostatic discharges can damage the inverter.

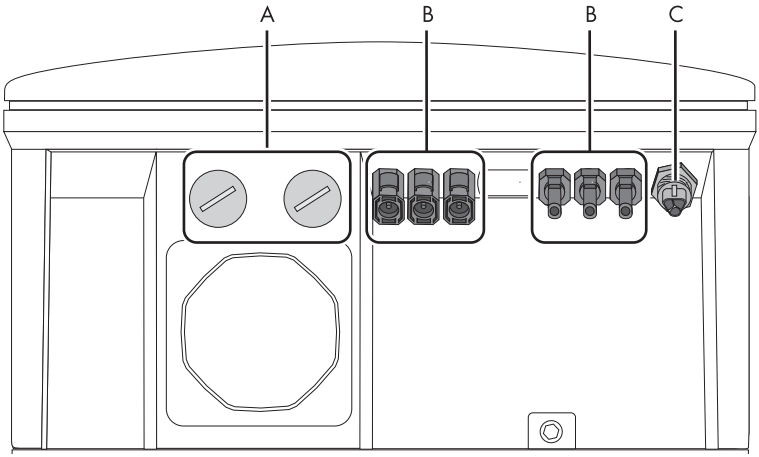
Internal components of the inverter can be irreparably damaged by static discharge.

- Before you touch a component inside the inverter, ground yourself by touching a grounded object.

5.2 Overview of the Connection Area

5.2.1 Exterior View

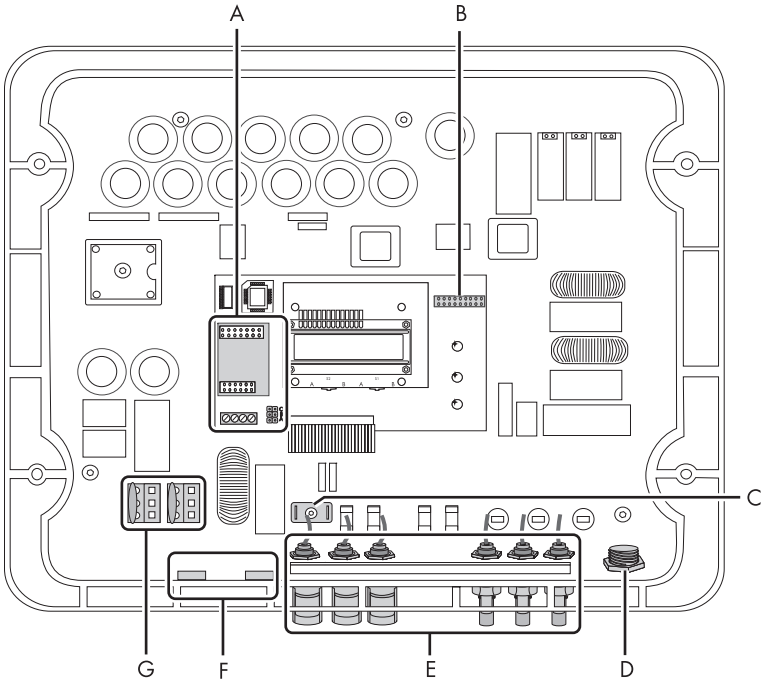
The following figure shows the assignment of the individual connection areas on the bottom of the inverter.



Object	Description
A	Enclosure openings for communication (with dummy plugs)
B	PV connectors for connecting the DC cables
C	AC socket for grid connection

5.2.2 Interior View

The following figure shows the various components and connection areas of the open inverter.



Object	Description
A	Socket and connection area for communication
B	Jumper slot for fan test
C	Tab for grounding the cable shield with line-conducted communication
D	AC socket for grid connection
E	PV connectors for connecting the small wind turbine system
F	Enclosure opening with sealing plugs for communication
G	Varistors

5.3 Connection to the Public Grid (AC)

Connection requirements of the utility operator

Always observe the connection requirements of the utility operator.

Cable Sizing

The cable cross-section should be dimensioned so output losses do not exceed 1 % at nominal power.

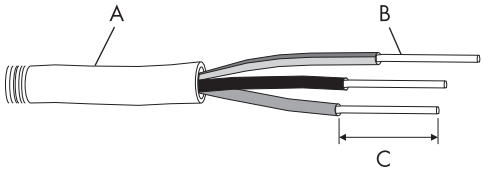
Maximum cable lengths relative to the cable cross-section are shown in the following table:

Cable cross-section	Maximum cable length	
	WB 3300	WB 3800
4 mm²	18.5 m	16 m

The conductor cross-sectional area required in individual cases depends on the following factors, among others:

- Ambient temperature,
- Routing method,
- UV resistance,
- Conduction losses,
- Valid installation guidelines of the respective country (of the installation location).

Cable Requirements



Object	Description	Value
A	External diameter	6 mm ... 14 mm
B	Conductor cross-section	4 mm²
C	Strip insulation	8 mm

Load Disconnection Unit

You must install a **separate** line circuit breaker for each inverter in order to ensure that the inverter can be securely disconnected under load. The maximum permissible rating is located in section 11 "Technical Data" (page 63).

Detailed information and examples for the design of a line circuit breaker can be found in the Technical Information "Line Circuit Breaker" in the SMA Solar Technology AG download area at www.SMA.de/en.

DANGER!

Danger to life due to fire.

When more than one inverter is connected to the same line circuit breaker, the protective function of the line circuit breaker is no longer guaranteed. It can result in a cable fire or the destruction of the inverter.

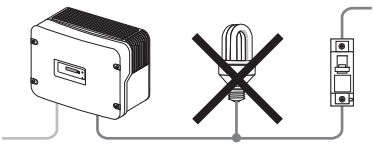
- Never connect several inverters to the same line circuit breaker.
- Comply with the maximum permissible fuse protection of the inverter when selecting the line circuit breaker.

DANGER!

Danger to life due to fire.

When a generator (inverter) and a consumer are connected to the same line circuit breaker, the protective function of the line circuit breaker is no longer guaranteed. The current from the inverter and the grid can accumulate to overcurrent, which is not detected by the line circuit breaker.

- Never connect the consumer between the inverter and the line circuit breaker without protection.
- Always protect the consumer separately.



NOTICE!

Damage to the inverter by using screw type fuse elements as a load disconnection unit.

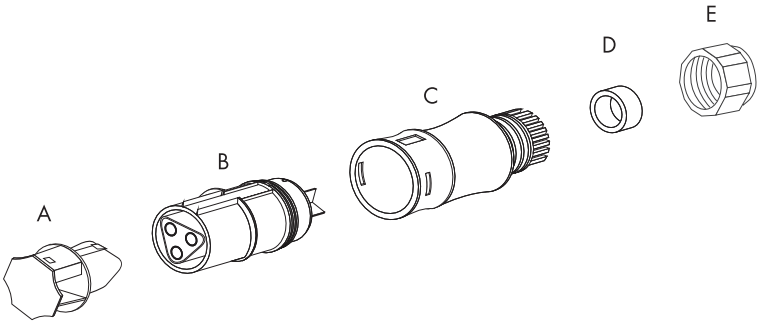
A screw type fuse element, e.g. D system (Diazed) or D0 system (Neozed) is not a load disconnection unit, and thus may **not** be used as a load disconnection unit. A screw type fuse element is only used as cable protection.

When disconnecting under load using a screw type fuse element, the inverter can be damaged.

- Use only a load disconnection switch or a line circuit breaker as a load disconnecting unit.

5.3.1 Connecting the Inverter to the Public Grid (AC)

Overview of the AC connection socket

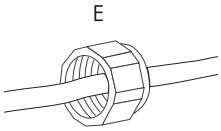


Object	Description
A	Protective cap for socket element
B	Socket element
C	Threaded sleeve with sealing ring for cable diameters from 10 mm ... 14 mm
D	Sealing ring for cable diameters of 6 mm ... 10 mm
E	Clamping nut

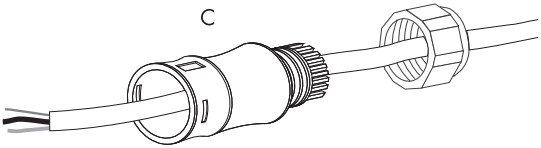
Procedure

1. Check that the grid voltage is within the permissible voltage range.

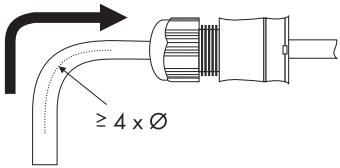
   The exact operating range of the inverter is specified in the operating parameters. The corresponding document is located in the download area at www.SMA.de/en, in the "Technical Description" category of the respective inverter.
2. Disconnect the line circuit breaker and secure against re-connection.
3. If necessary, exchange the sealing ring of the threaded sleeve with the sealing ring provided.
   - Pull the sealing ring out of the threaded sleeve.
   - Insert the smaller sealing ring.
4. Thread the clamping nut (E) over the AC cable.



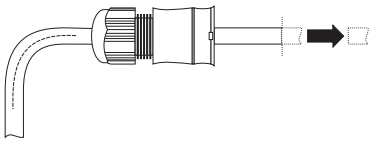
5. Thread the threaded sleeve (C) with the sealing ring over the AC cable.



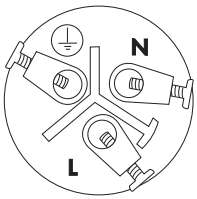
6. Bend the AC cable. The bend radius must be at least four times the cable diameter.



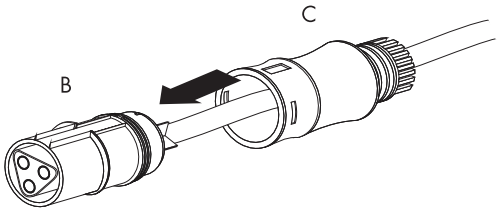
7. Shorten the cable.
8. Shorten phase L and neutral conductor N 4 mm to 5 mm.



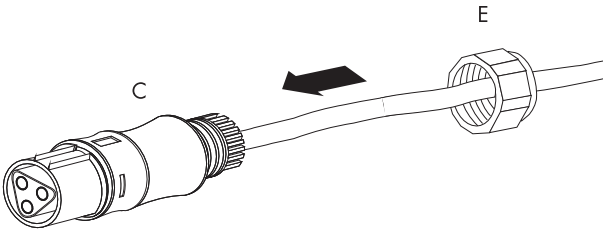
9. Insert the PE protective conductor (green-yellow) into the screw terminal with the earth sign on the socket element and tighten the screw.
   The PE protective conductor must be longer than the connection wires of N and L.
10. Insert the neutral conductor N (blue) in the screw terminal N on the socket element and tighten the screw.
11. Insert phase L (brown or black) into the screw terminal L on the socket element and tighten the screw.



12. Make sure the wires are securely connected.
13. Push the threaded sleeve (C) onto the socket element (B) until it audibly snaps into place.



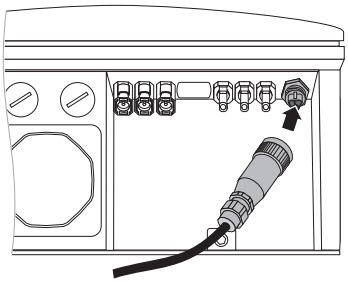
14. Screw the clamping nut (E) tightly onto the threaded sleeve (C). The clamping nut serves to seal and relieve strain.



☑ The AC connection socket has been screwed together.

15. Close the socket element with the provided protective cap, if it is not immediately connected to the inverter.

16. Insert the AC connection socket into the AC socket on the inverter. Remove the protective cap beforehand as required.



☑ The AC cable is now connected to the inverter.

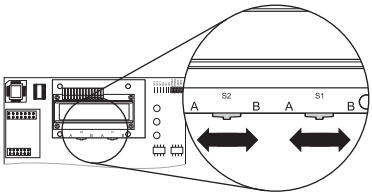
5.4 Setting the Display Language

You can set the language of the display using the switches on the underside of the display assembly inside the inverter.

Procedure

1. Open the inverter as described in section 7.2 "Opening the Inverter" (page 44).
2. Set the switches for the required language, as shown below.

Language	Switch S2	Switch S1
German	B	B
English	B	A
French	A	B
Spanish	A	A



For type WB 3300-IT / 3800-IT inverters, the following switch settings apply:

Language	Switch S2	Switch S1
Italian	B	A
English	A	A

3. Close the inverter as described in section 7.3 "Closing the Inverter" (page 45).

☑ The display language has now been set.

5.5 Connecting the Small Wind Turbine System (DC)

5.5.1 Conditions for the DC Connection

- The connection cables of the small wind turbine system must be equipped with plug connectors. You will find the necessary PV connector for DC connection in the delivery.
- The following limit values at the DC input of the inverter may not be exceeded:

Maximum input voltage	Maximum input current
500 V	20 A

DANGER!

Risk of lethal electric shock or fire.

The maximum possible input current is limited by the plug connectors used. If the plug connector is overloaded, an electric arc may occur and there is a fire risk.

- Ensure that the input current does not exceed the maximum flow current of the plug connectors used.

NOTICE!

Destruction of the inverter by overvoltage.

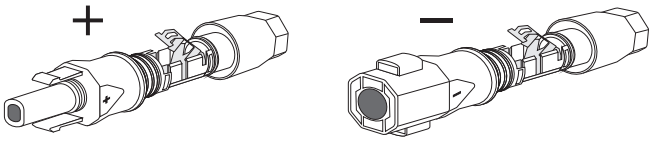
If the voltage of the small wind turbine system exceeds the maximum input voltage of the inverter, it can be destroyed by the overvoltage. All warranty claims become void.

- Install overvoltage protection, e.g. Windy Boy Protection Box, between the small wind turbine system and the inverter.

5.5.2 Assembling the PV connector

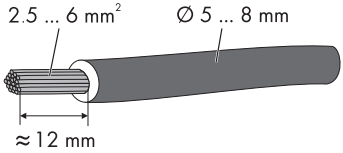
The connection cables of the small wind turbine system must be equipped with the PV connectors provided for connecting the inverter.

To assemble the PV connectors, proceed as detailed below. Ensure the plug connectors have the correct polarity. The PV connectors have the symbols "+" and " – ".



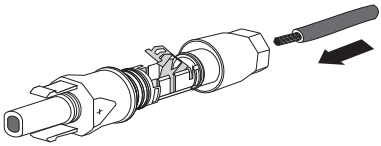
Cable Requirements

- Use a PV1-F cable.

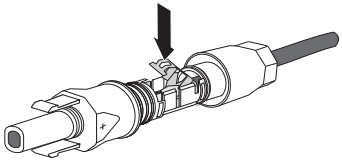


Procedure

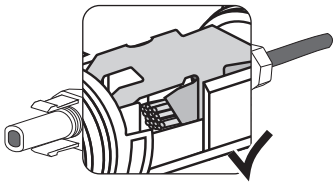
1. Insert stripped cable into the plug as far as it will go.

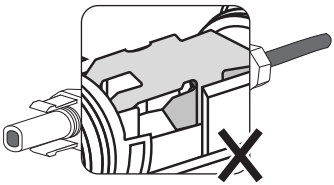
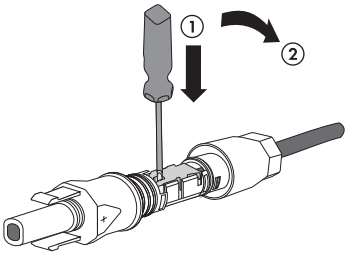


2. Press the clamping clip down until it audibly snaps into place.

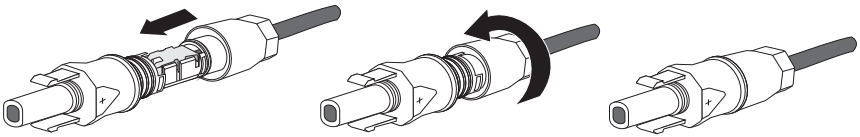


3. Ensure the cable is correctly in place.

Result	Action
☑ If the conductors are visible in the hollow cavity of the clamping clip, the cable is in the correct position. 	• Proceed to step 4.

Result	Action
☑ If the conductors are **not** visible in the hollow cavity, the cable is not in the correct position. 	• Loosen the clamping clip using a screwdriver.  • Remove cable and start again from step 1.

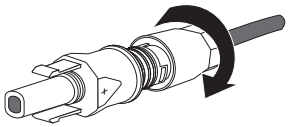
4. Push the threaded joint to the thread and screw into place.



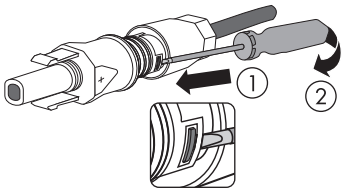
☑ The PV connectors are now assembled and can be connected to the inverters, as described in section 5.5.4 "Connecting the Small Wind Turbine System (DC)" (page 32).

5.5.3 Opening the PV connector

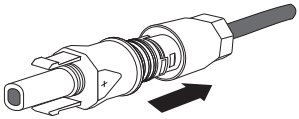
1. Screw the threaded joint off.



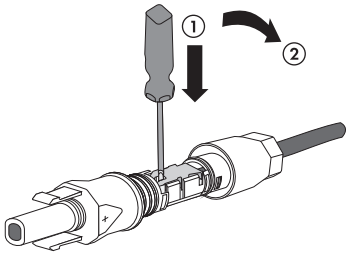
2. To release the plug connector, slot a screwdriver into the side catch mechanism and lever out.



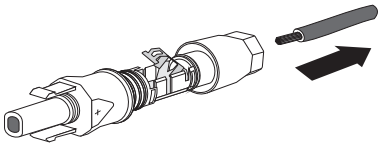
3. Carefully pull the PV connector apart.



4. Loosen the clamping clip using a screwdriver.



5. Remove the cable.



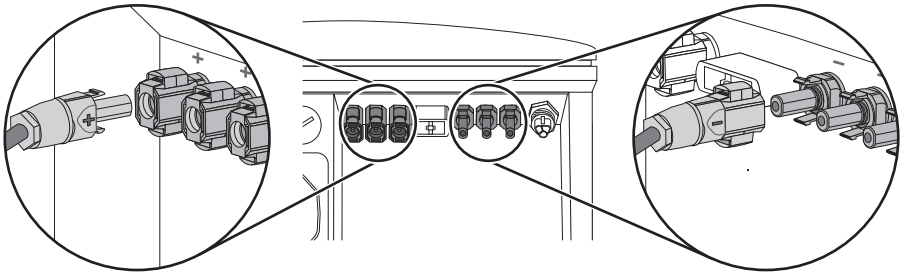
☑ The cable is now removed from the PV connector.

5.5.4 Connecting the Small Wind Turbine System (DC)

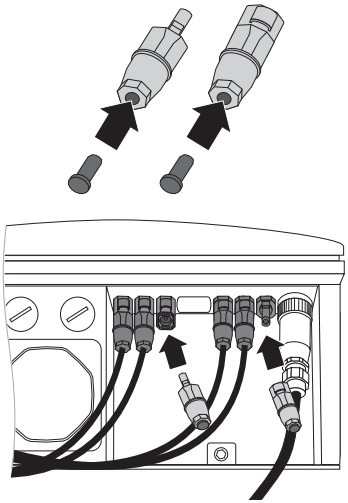
DANGER!
Danger to life due to high voltages in the inverter.

- Before connecting the small wind turbine system, ensure that the small wind turbine system is stopped.

1. Check the DC plug connectors for correct polarity and connect them to the inverter. To release the DC connectors see section 7.2 "Opening the Inverter" (page 44).



2. To create the seal on the inverter, all DC inputs that are not required must be closed as follows:
   - Insert the sealing plugs provided into the DC plug connectors that are not needed. Do **not** insert the sealing plugs into the DC inputs on the inverter.
   - Insert the PV connectors with sealing plugs into the corresponding DC inputs on the inverter.



☑ The small wind turbine system is connected.

You can now commission the inverter as described in section 6 "Commissioning" (page 36). The following connection options are optional.

5.6 Communication

The inverter is equipped with a slot for communication interfaces, so that it can communicate using special data acquisition devices (e.g. Sunny WebBox) or a PC with appropriate software.

Refer to the communication interface manual for a detailed circuit diagram and a description of the mounting.

5.7 Setting the Grid and Country Parameters

Changing Grid-Relevant and Country Parameters

To change grid-relevant parameters, you need a personal access code - the so-called SMA Grid Guard Code. The application form for the personal access code is located in the download area at www.SMA.de/en, in the "Certificate" category for each inverter.

Confirm the changes to these parameters with your utility operator.

A detailed description of the operating parameters for the inverter is available in the download area at www.SMA.de/en in the category "Technical Description" of the respective inverter.

5.7.1 Setting the Installation Country

Using the "Default" parameter you can set the installation country and/or the grid connection standard valid for the country via a communication device (e.g. Sunny WebBox) or a PC with corresponding software (e.g. Sunny Data Control). This, however, is only required if the inverter was originally ordered for another country. You can see the standard to which the inverter was set upon delivery from the type label and the supplementary document provided with the factory settings.

5.7.2 Setting Off-Grid Operation

To operate the inverter in an off-grid system with Sunny Island, you must set the inverter via the "Default" parameter to off-grid ("OFF-Grid") operation.

You have several possibilities to set the inverter to off-grid operation:

- Setting via Sunny WebBox

  or

- Setting via Sunny Data Control.

DANGER!

Danger to life due to high voltages in the event of outage of the public grid.

If you set the inverter to off-grid operation, it does not fulfill any country-specific standards and regulations. Therefore, if there is an outage of the public grid, there is a danger of back feed.

- **Never** operate the inverter directly on the public grid when set to off-grid operation.

5.8 Polynomial Characteristic Curve

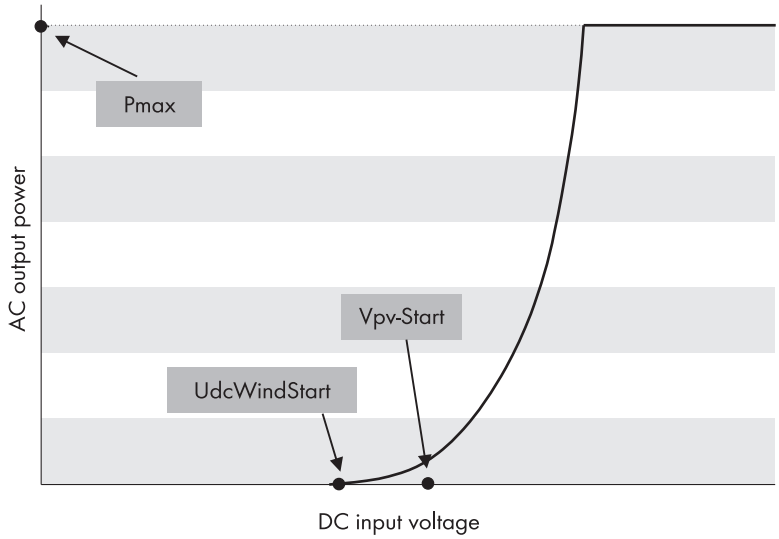
The polynomial characteristic curve is a programmable power curve depending on the DC input voltage. By adapting the default polynomial characteristic curve to the small wind turbine system being used, you can optimize the energy output of the small wind turbine system.

To optimally adapt the polynomial characteristic curve of the inverter to the small wind turbine system being used, you can change the following parameters on the PC with the "Windy Boy Setup Tool" (www.SMA.de/en):

- Vpv-Start
- UdcWindStart
- Wind_a0 ... Wind_a3
- Pmax
- P-Wind-Ramp
- KP-Wind-Reg
- KI-Wind-Reg
- T-Stop

A description of the operating parameters is available in the download area at www.SMA.de/en in the category "Technical Description" of the respective inverter.

The inverter regulates its output power according to the generator voltage. The following illustration shows the function of a typical polynomial characteristic curve of a WB 3300 / WB 3800. Here, the fed-in AC power is shown according to the DC input voltage of the inverter



6 Commissioning

Self test in accordance with DK 5940, Ed. 2.2 for initial commissioning (applies to Italy only)

The Italian DK 5940 standard prescribes that an inverter can only operate on the public grid after the disconnection times for overvoltage, undervoltage, minimum frequency and maximum frequency have been checked.

Start the self-test as described in the section 6.2 "Self-Test in accordance with DK 5940, Ed. 2.2 (Applies to Italy Only)" (page 37). The test takes approx. 8 minutes.

6.1 Commissioning the Inverter

1. Check the following requirements before commissioning:
   - Correct mounting and correct connection of the inverter.
   - Correct layout of the line circuit breaker.
   - Correct grounding of the small wind turbine system in accordance with the instructions of the manufacturer.
   - The rectifier and overvoltage protection (e.g. Windy Boy Protection Box) are installed between the small wind turbine system and the inverter.
   - Unnecessary DC inputs are closed with the corresponding DC connectors and sealing plugs.
2. Switch on the line circuit breaker.
3. Commission the small wind turbine system in accordance with the instructions of the manufacturer.

   ☑ If green LED glows: commissioning has been successful.

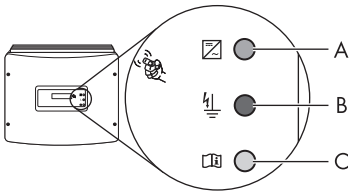
   or

   ☑ If green LED flashes: network connection conditions have not yet been reached. Wait until the green LED lights up.

   or

   ☑ The red or yellow LED is glowing or flashing: there is an error. Proceed to step 3.

Object	Description
A	Green LED: Operation
B	Red LED: Ground fault or varistor defective
C	Yellow LED: Disturbance



4. Read section 9 "Troubleshooting" (page 51) and if necessary eliminate the fault or disturbance.

6.2 Self-Test in accordance with DK 5940, Ed. 2.2 (Applies to Italy Only)

6.2.1 Starting the Self-Test by Tapping

You can start testing the disconnection times by tapping on the enclosure lid. A prerequisite here is that the country configuration of the inverter has been set to Italy (IT/DK5940) or "trimmed". Proceed as follows for checking the disconnection times:

1. Connect the small wind turbine system with the inverter. The inverter can only initialize if the small wind turbine system produces enough power. It is therefore not possible to test the disconnection times at night.
2. Connect the inverter on the AC side. For this, you have to create the AC connection (AC plug or direct connection) and/or switch on the line circuit breaker of the grid cable (fuse or automatic circuit breaker).
3. The inverter is now in the initialization phase, i.e. all 3 LEDs are glowing at the same time.

   Start the self-test **immediately** after all 3 LEDs have gone out by tapping on the display of the inverter.
4. The question of whether you would like to start the test sequence appears in the display. Tap on the display again within 30 seconds to confirm the question.

Once you have started the test sequence, the inverter checks the disconnection times for overvoltage, undervoltage, maximum frequency and minimum frequency one after the other. During the tests, the inverter shows the values in the display which are described in section 6.2.2 "Completion of the Self-Test" (page 37).

6.2.2 Completion of the Self-Test

Note the values which are displayed during the self-test. These values must be entered into a test protocol. The test results of the individual tests are displayed 3 times, one after the other.
The respective display message is displayed for 10 seconds.

The self-test changes the upper and lower disconnection thresholds for each protective function on a linear basis with a modification of 0.05 Hz/s and 0.05 Vn/s for the frequency and voltage monitoring. As soon as the actual measurement value is outside the permitted range (altered disconnection threshold), the inverter disconnects itself from the grid. In this way, the inverter determines the reaction time and checks itself.

Overvoltage Test

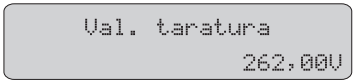
The inverter begins with the overvoltage test. During the test sequence, the voltage limit applied is shown in the display of the inverter.

The voltage limit is reduced successively until the disconnection threshold is reached and the inverter disconnects from the grid.

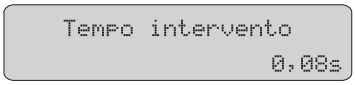
Once the inverter has disconnected from the grid, the display successively shows the following values one after the other:

- Disconnection value,

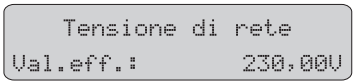
- Calibration value,



- Reaction time,



- Present grid voltage.



Undervoltage Test

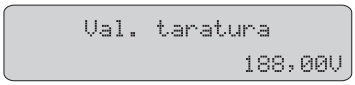
After the overvoltage test, the inverter performs the undervoltage test. During the test sequence, the current calibration value of the voltage limit applied is shown in the display of the inverter.

The voltage limit is increased successively until the disconnection threshold is reached and the inverter disconnects from the grid.

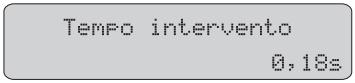
Once the inverter has disconnected from the grid, the display successively shows the following values one after the other:

- Disconnection value,

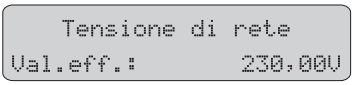
- Calibration value,



- Reaction time,



- Present grid voltage.



Maximum Frequency

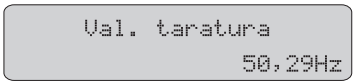
In the third step, the inverter tests the maximum frequency. During the test sequence, the frequency limit applied is shown in the display of the inverter.

The frequency limit is reduced successively until the disconnection threshold is reached and the inverter disconnects from the grid.

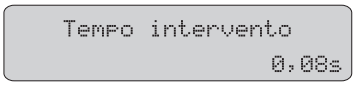
Once the inverter has disconnected from the grid, the display successively shows the following values one after the other:

- Disconnection value,

- Calibration value,



- Reaction time,



- Present grid frequency.

Minimum Frequency

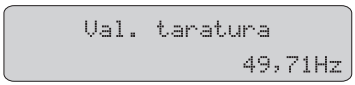
In the last step, the inverter tests the minimum frequency. During the test sequence, the frequency limit applied is shown in the display of the inverter.

The frequency limit is increased successively until the disconnection threshold is reached and the inverter disconnects from the grid.

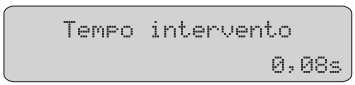
Once the inverter has disconnected from the grid, the display successively shows the following values one after the other:

- Disconnection value,

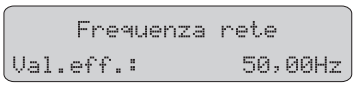
- Calibration value,



- Reaction time,



- Present grid frequency.



When the inverter has carried out the 4 tests, it switches to "Turbine" mode. The original calibration values are then re-set and the inverter automatically connects to the grid. If you would like to carry out the test again, you must disconnect the inverter, i.e. disconnect it on the AC and DC sides and then later re-activate it. You can then restart the self-test as described in the section 6.2.1 "Starting the Self-Test by Tapping" (page 37). The inverter begins the test sequence again, as described in section 6.2.2 "Completion of the Self-Test" (page 37).

6.3 Operating Conditions of the Inverter

Startup Procedure

If the inverter has enough voltage and power, the startup process is displayed by means of simultaneous lighting of the three LEDs on the inverter.

As soon as the DC input voltage reaches the value defined in the parameter "Vpv-Start", the inverter starts a number of self-tests and measurement processes and synchronizes with the grid. This operating mode is indicated by the green LED flashing on the inverter.

When the tests are successfully completed and the DC input voltage is above "Vpv-Start" for the time configured in "T-Start," the inverter connects to the grid and the green LED lights up. The inverter then switches to characteristic curve operation, and regulates the input current according to the generator voltage.

Characteristic Curve Operation

After the startup procedure, the inverter switches to characteristic curve operation and regulates the input current according to the generator voltage.

The inverter then begins to put a load on the small wind turbine system, takes power from the small wind turbine system according to the present input voltage and then feeds it into the grid. The maximum output corresponds to the maximum AC power of the inverter. However, it can be reduced using the "Pmax" parameter.

Shutdown

If the wind strength is so low that the DC input voltage falls below an internally calculated value, then the inverter stops feeding power into the mains grid for the period defined in "T-Stop". When the DC input voltage increases again, the inverter switches back to characteristic curve operation.

If the DC input voltage remains below an internally calculated value for the time set in "T-Stop", the inverter will switch off.

If the DC input voltage is no longer sufficient to supply the on-board electronics with power, the inverter deactivates immediately.

7 Opening and Closing

7.1 Safety

DANGER!

Electric shock due to high voltages in the inverter. This can result in death or serious burns.

Observe the following before opening the inverter:

- Ensure the AC side is not live.
- Ensure the DC side is not live.

NOTICE!

Electrostatic discharges can damage the inverter.

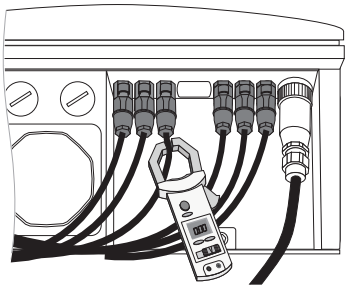
Internal components of the inverter can be irreparably damaged by electrostatic discharge.

- Ground yourself before touching a component inside the inverter.

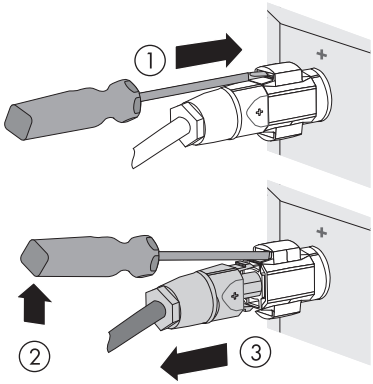
7.2 Opening the Inverter

1. Disconnect the line circuit breaker and secure against re-connection.
2. Stop the small wind turbine system and make sure that it will not restart.
3. Using a current probe, ensure that there is no current to all DC cables.

   ☑ If there is a current present, check the installation.

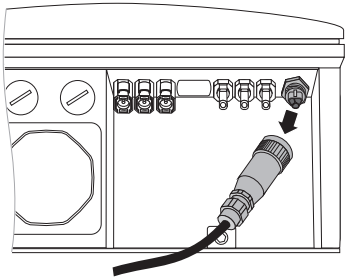


4. Unlock all DC connectors using a screwdriver:
   - Insert a screwdriver into one of the side slits (1).
   - Lever the screwdriver upward (2) and pull out the plug connector (3).



5. Ensure that there is no voltage at the DC plugs at the inverter.

   ☑ If there is a voltage present, check the installation.
6. Pull out the AC plug.



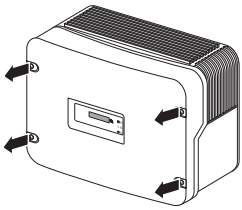
7. Check whether all LEDs and the display have gone out.

DANGER!
Danger to life due to high voltages in the inverter.

The capacitors in the inverter require 15 minutes to discharge.

- Wait 15 minutes before opening the inverter.

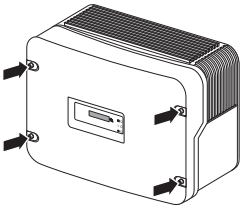
8. Loosen the screws of the enclosure lid.
9. Carefully remove the lid forward.



☑ The inverter is now open and is not live.

7.3 Closing the Inverter

1. Secure the lid with the 4 screws and the lock washers with the toothing facing toward the lid. The screws must be tightened with approximately 6 Nm torque to ensure the sealing of the enclosure and the grounding of the lid.

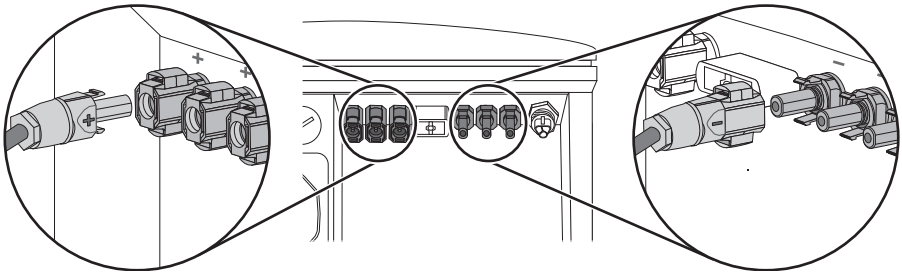


DANGER!
Danger to life due to live lid.

The grounding of the lid is ensured by the toothed lock washers.

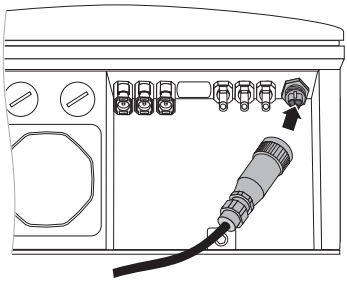
- Fasten the lock washers for all 6 screws with the toothing facing toward the lid.

2. Check the PV connector for correct polarity and connect it.
   To release the plug connectors see section 7.2 "Opening the Inverter" (page 44).

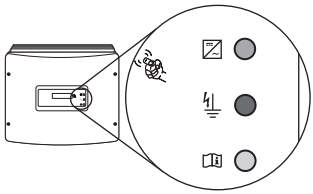


3. Close all unnecessary DC inputs as described in section 5.5.4 "Connecting the Small Wind Turbine System (DC)" (page 32) to seal the inverter.

4. Connect the AC plug.



5. Switch on the line circuit breaker.
6. Check whether the inverter's display and LED display indicate normal operating mode (see section 6 "Commissioning" (page 36)).



☑ The inverter is now closed and in operation.

8 Maintenance and Cleaning

Check for correct inverter operation at regular intervals. Impurities such as dust or airborne blossoms can cause heat concentration that can lead to yield losses. Also check the inverter and the cables for visible external damage. Undertake repairs if necessary.

8.1 Checking Heat Dissipation

You only need to check the heat dissipation of the inverter if, during a visual inspection, you notice a marked build-up in the fan screen or the inverter is increasingly observed to be in derating mode. Whether the inverter switches to derating mode depends on the ambient temperature and cooling efficiency.

8.1.1 Cleaning the Fan

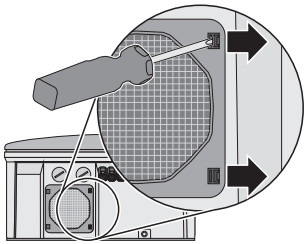
If the fan screen is only covered in loose dust it can be cleaned with a vacuum cleaner. If you do not achieve satisfactory results with a vacuum cleaner, dismantle the fans for cleaning.

Proceed as follows:

1. Disconnect the inverter from both the DC and AC connections, as described in section 7.2 "Opening the Inverter" (page 44).
2. Wait for the fan to stop rotating.

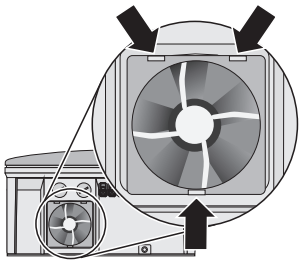
Cleaning the Fan Screen

3. Remove the fan screen:
   - Press both latches on the right of the fan screen to the right using a screwdriver and loosen from the bracket.
   - Carefully remove the fan screen.
4. Clean the fan screen with a soft brush, a paint brush, a cloth or pressurized air.



Cleaning the Fan

5. Push the two upper latches backward and the lower latch forward.
6. Remove the fan by pulling it slowly and carefully downward.



7. Unlock and unplug the fan plug inside the inverter.

   The fan cables are long enough that you can lift the fan far enough out to disconnect the internal plug connector in the inverter.
8. Remove the fan.
9. Clean the fan with a soft brush, a paint brush, or a damp cloth.

NOTICE!

Damage to the fan through the use of pressurized air.

- Do not use pressurized air to clean the fan. This can damage the fan.

10. After cleaning, assemble everything in reverse order.
11. Check the functioning of the fan as described in the following section.

8.1.2 Checking the Fan

You can check that the fan is working in 2 ways:

- Set the "Fan-Test" parameter to "1" in the installer mode using Sunny Data Control or Sunny WebBox.

  or
- Plug the provided jumper into the sequential control system board.

Setting Parameters

1. Request the installer password from the SMA Serviceline (contact: see page 70).
2. Set the "Fan-Test" parameter to "1" in the installer mode.
3. Check the air-flow of the fan.

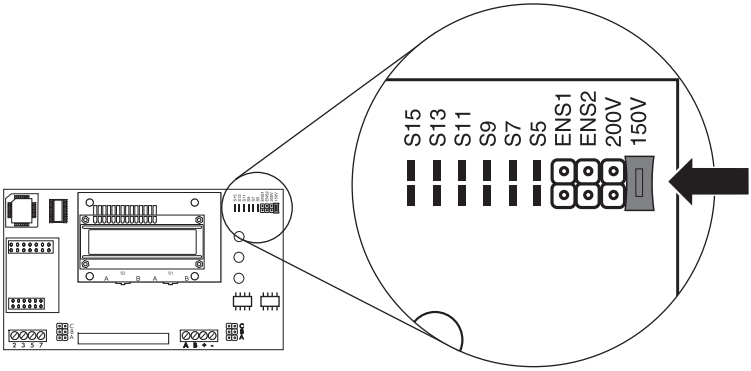
   The inverter sucks air in from underneath and then blows it back out on the upper left side. Listen for any unusual noise that could indicate incorrect installation or that the fan is faulty.
4. After checking the fan, set the "Fan-Test" parameter back to "0".

☑ You have finished checking the fan.

Plugging the Jumper

The inverter recognizes the jumper only after the system has been restarted (i.e. all LEDs must have gone out before a restart).

1. Open the inverter as described in section 7.2 "Opening the Inverter" (page 44).
2. Plug the provided jumper in the socket on the sequential control system board as shown below.



3. Close the inverter as described in section 7.3 "Closing the Inverter" (page 45).
4. Restart the inverter.
5. Check the air-flow of the fan.

   The inverter sucks air in from underneath and then blows it back out on the upper left side. Listen for any unusual noise that could indicate incorrect installation or that the fan is faulty.
6. Remove the jumper. Open and close the inverter as described in section 7 "Opening and Closing" (page 43).

☑ You have finished checking the fan.

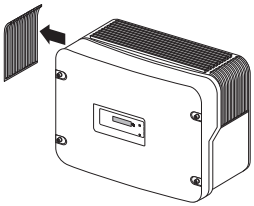
8.1.3 Cleaning the Air Grills

There are air grills on either side of the inverter. The inverter sucks air in from underneath through the fan and blows it out again on the upper left side via the air grills. For optimal heat dissipation of the inverter, you only have to clean the left air grill.

Procedure

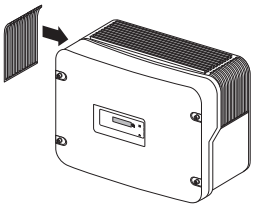
1. Remove the left air grill.

   Insert your finger in the space between the air grill and the upper part of the enclosure and remove the air grill to the side.



2. Clean the air grill with a soft brush, a paint brush, or pressurized air.
3. Re-attach the air grill to the inverter.

   To help you identify the sides, the air grills are marked with "links/left" or "rechts/right" on the inside.



☑ The air grills are cleaned.

NOTICE!

Risk of damage to the inverter through intrusion of insects.

- The air grills must not be removed permanently, because otherwise the device is not protected against the entrance of insects.

9 Troubleshooting

If the inverter displays blink codes or error messages other than those described in the following section, contact the SMA Serviceline.

In the user manual provided, you will also find a description of the display messages during operation, the status messages and measuring channels.

Do not try to carry out repairs other than those described here. Instead, use the SMA Solar Technology AG 24-hour replacement service (the inverter will be ready for dispatch within 24 hours and sent to a forwarding agency) and repair service.

9.1 Blink Codes

Green	Red	Yellow	Status
Glows continuously	Is not glowing	Is not glowing	OK (feeding operation)
	Glows continuously	Is not glowing	Ground fault or varistor defective
		Glows continuously	OK (initialization)
Flashes quickly (3 x per second)	Is not glowing	Is not glowing	OK (stop)
	Glows continuously	Is not glowing	Ground fault or varistor defective
Flashes slowly (1 x per second)	Is not glowing	Is not glowing	OK (waiting, grid monitoring)
Briefly goes out (approx. 1 x per second)	Is not glowing	Is not glowing	OK (derating)
	Glows continuously	Is not glowing	Ground fault or varistor defective
Is not glowing	Is not glowing	Is not glowing	OK (night-time deactivation)
		Is not glowing	Disturbance
	Glows continuously	Is not glowing	Ground fault or varistor defective
		Glowing/flashing	Ground fault or varistor defective and disturbance

9.2 Error Messages

When en error occurs, the inverter generates a message, which depends on the operating mode and the type of the detected error.

Message	Description / Remedy
!PV-Overvoltage! **!DISCONNECT DC!**	DC overvoltage! Disconnect the small wind turbine system from the inverter immediately. 1. Turn off the line circuit breaker. 2. Stop the small wind turbine system. 3. Disconnect the PV connectors. 4. Check DC voltage: – If the DC voltage is above the maximum input voltage, check the plant design. – If the DC voltage is under the maximum input voltage, reconnect the small wind turbine system to the inverter as described in section 5.5.4 "Connecting the Small Wind Turbine System (DC)" (page 32). If the message occurs again, disconnect the inverter again and contact the SMA Serviceline.
ACVtgRPro	The 10-minute-average grid voltage is no longer within the permissible range. This can have the following causes: • The grid voltage at the connection point is too high. • The grid impedance at the connection point is too high. The inverter disconnects to assure compliance with the voltage quality of the grid. • Check the grid voltage at the connection point of the inverter: – If, due to the local grid conditions, the grid voltage is 253 V or more, ask the utility operator whether the voltage at the feed-in point can be adjusted, or whether it would agree to an alteration of the limit value "ACVtgRPro" for voltage quality monitoring. – If the grid voltage is continually within the acceptable range and this error is still displayed, contact the SMA Serviceline.
Bfr-Srr	Internal measurement comparison fault or hardware defect. • If this fault occurs often, contact the SMA Serviceline.

Message	Description / Remedy
Derating	The "Derating" operating mode is a normal operating mode which may occur occasionally and can have several causes. Once the inverter enters the "Derating" mode, it will display the "Derating" warning until the next total shutdown of the device (when the wind is insufficient). • Check heat dissipation, as described in section 8.1 "Checking Heat Dissipation" (page 47).
dZac-Bfr **dZac-Srr**	Sudden changes in grid impedance exceed the permissible range ("Bfr" or "Srr" are internal messages of no relevance for the user). For safety reasons, the inverter disconnects itself from the grid. • Check the grid impedance and observe how often major deviations occur. – If repeated frequency variations occur and this is causing "dZac-Bfr" or "dZac-Srr" errors, ask the utility operator if it would agree to modify the operating parameters (dZac-Max). – Discuss changing the operating parameter with the SMA Serviceline.
EEPROM	Transition disturbance while data is being written or read from EEPROM. The data is not relevant for safe operation. • The disturbance has no effect on the performance of the inverter.
EEPROM dBh	EEPROM data is defective, the inverter has switched itself off because the loss of data has disabled important functions of the inverter. • Contact the SMA Serviceline.
EeRestore	One of the duplicate data sets in the EEPROM is defective and has been reconstructed without loss of data. • The error message only serves to inform you and has no effect on the performance of the inverter.
Fac-Bfr **Fac-Srr** **FacFast**	The grid frequency is no longer within the permissible range ("Bfr" or "Srr" is an internal message of no relevance for the user). For safety reasons, the inverter disconnects itself from the grid. • If the grid frequency is within the tolerance range, yet "Fac-Bfr," "Fac-Srr", or "FacFast" faults are being displayed often, contact the SMA Serviceline.
Imax	Overcurrent on the AC side. This indicator is displayed when the current at the AC grid is greater than specified. • Check the system design and grid conditions.
K1-Close **K1-Open**	Fault during relay test. • Contact the SMA Serviceline if this problem occurs often or several times in succession.

Message	Description / Remedy
MSD-Fac **MSD-Vac** **MSD-Timeout** **MSD-Zac**	Internal measurement comparison fault or hardware defect. • If this fault occurs often, contact the SMA Serviceline.
Offset	The "Offset" operating condition is a normal operating condition that occurs prior to grid monitoring. If "offset" is displayed as an error, then there is a disturbance in the data logging. • If this fault occurs often, contact the SMA Serviceline.
Riso	The electrical insulation between the small wind turbine system and ground is faulty. The resistance between the DC plus and/or DC minus connection and ground is outside the defined limit range. • Check the system insulation. • Check the system for ground faults as described in section 9.3.1 "Checking the Small Wind Turbine System for a Ground Fault" (page 57).
ROM	The inverter's firmware is faulty. • If this fault occurs often, contact the SMA Serviceline.
Shutdown	Temporary inverter disturbance. • Contact the SMA Serviceline.
Trafo-Temp-F	Temperatures in the transformer have exceeded the acceptable limit. The inverter stops feeding the grid until the temperature reverts to within the admissible range. • If this problem recurs, check the heat dissipation of the inverter, as described in section 8.1 "Checking Heat Dissipation" (page 47).
Trafo-Temp-W	If the transformer reaches an unacceptably high temperature, the inverter stops feeding-in the grid until the transformer has reached an acceptable temperature and the system can begin feeding-in the grid again. The "Trafo-Temp-W" warning is displayed until the device is completely switched off. • Check heat dissipation, as described in section 8.1 "Checking Heat Dissipation" (page 47).

Message	Description / Remedy
Vac-Bfr **Vac-Srr**	The grid voltage is no longer within the permissible range ("Bfr" or "Srr" is an internal message of no relevance for the user). This disturbance can be caused by any of the following conditions: • Grid disconnected (line circuit breaker, fuse), • AC cable is broken or • AC cable is highly resistive For safety reasons, the inverter disconnects itself from the grid. • Check the grid current and grid connection on the inverter. • If the grid voltage lies outside the acceptable range because of local grid conditions, ask the utility provider if the voltage can be adjusted at the feed-in point or if it would agree to changes in the values of the monitored operational limits (operating parameters: Vac-Min and Vac-Max). • If the grid voltage is within the tolerable range, yet "Vac-Bfr," or "Vac-Srr" faults are still being displayed, please contact the SMA Serviceline.
Vpv-Max	Overvoltage at DC input. The inverter may be damaged. Disconnect the small wind turbine system from the inverter immediately. 1. Turn off the line circuit breaker. 2. Stop the small wind turbine system. 3. Disconnect all the DC connectors. 4. Check DC voltage: – If the DC voltage is above the maximum input voltage, check the system design. – If the DC voltage is under the maximum input voltage, reconnect the small wind turbine system to the inverter as described in section 5.5.4 "Connecting the Small Wind Turbine System (DC)" (page 32). If the message occurs again, disconnect the inverter again and contact the SMA Serviceline.
Watchdog **Watchdog Srr**	Internal disturbance during program operation. • If this fault occurs often, contact the SMA Serviceline.

Message	Description / Remedy
Zac-Bfr **Zac-Srr**	The grid impedance has left the permissible range. The suffixes "Bfr" und "Srr" are not relevant. For safety reasons, the inverter disconnects itself from the grid. The impedance is calculated from both the grid impedance and the impedance of the AC cable of the inverter. • Check the grid impedance and grid connection on the inverter. • Use an AC cable with an adequate cross-sectional area (= low impedance) as described in section 5.3.1 "Connecting the Inverter to the Public Grid (AC)" (page 24). If required, check and re-tighten the screws on the AC terminals. • Check the grid impedance and the AC connection on the inverter. Use a cable with an adequate cross-sectional area (= low impedance), observing the advice on this matter in section 5.3 "Connection to the Public Grid (AC)" (page 22). • If this fault recurs, please contact the SMA Serviceline.

9.3 Red LED is Glowing Continuously

If the red LED of the status display is continuously on during operation, there is either a ground fault in the system or at least one of the varistors for the overvoltage protection is defective.

In intentionally grounded systems, the red LED has been lit up since the commissioning of the inverter. However, this has no impact on the functioning of the inverter. Before you check the small wind turbine system for a ground fault, make sure an intentional connection to the ground has been carried out.

With intentionally grounded small wind turbine systems, check occasionally that the varistors inside the inverter function correctly, since a fault with the varistors can no longer be displayed.

9.3.1 Checking the Small Wind Turbine System for a Ground Fault

DANGER!
Danger to life due to high voltages in the inverter.

- Stop the small wind turbine system and ensure that it can not restart accidentally.
- Disconnect the line circuit breaker and secure against re-connection.

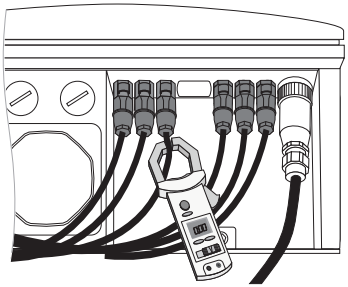
1. Wait until LEDs have gone out.

DANGER!
Danger to life due to high voltages in the inverter.

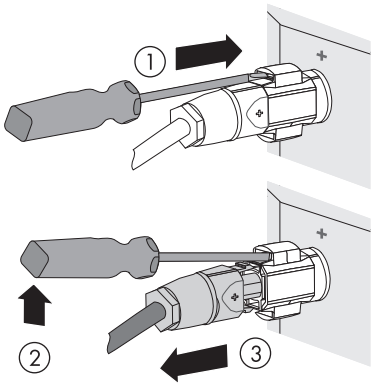
The capacitors in the inverter require 15 minutes to discharge.

- Wait 15 minutes before opening the inverter.

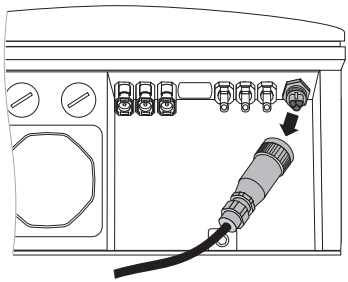
2. Ensure there is no current at any DC cables using a clip-on ammeter.
   ☑ If there is a current present, check the installation.



3. Unlock all DC connectors using a screwdriver:
   - Insert a screwdriver into one of the side slits (1).
   - Lever the screwdriver upward (2) and pull out the plug connector (3).



4. Remove the AC connection socket from the inverter.



5. Measure the resistance between the phases of the small wind turbine system and the earth potential:
   - Measure the resistance between L1 of the small wind turbine system and the earth potential.
   - Measure the resistance between L2 of the small wind turbine system and the earth potential.
   - Measure the resistance between L3 of the small wind turbine system and the earth potential.

Result	Action
The measured resistance is almost infinite. ☑ There is no ground fault in the small wind turbine system.	There is probably a ground fault in the Windy Boy Protection Box or in the supply lines to the inverter. • Separate the Windy Boy Protection Box from the inverter and measure the resistance of all connections and the earth potential.
The measured resistance is very small (< 10 Ω). ☑ There is a ground fault in the small wind turbine system.	• Have the installer of the small wind turbine system correct the ground fault before reconnecting the small wind turbine system to the inverter.

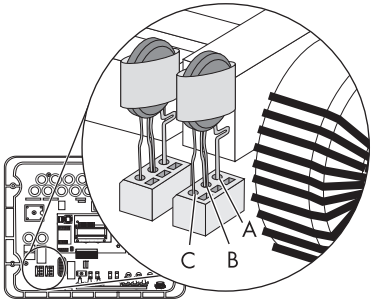
9.3.2 Checking the Functioning of the Varistors

Varistors are wear parts. Their functional efficiency diminishes with age or following repeated responses as a result of overvoltages. It is therefore possible that one of the thermally monitored varistors has lost its protective function.

Position of Varistors

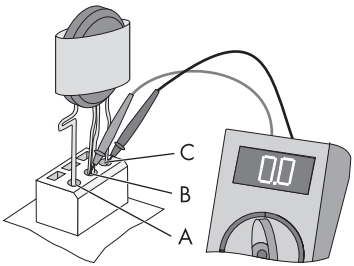
The position of the varistors is to be determined with the help of the diagram below. Observe the following allocation of the terminals:

- Terminal A: outer terminal (varistor connection **with crimp**)
- Terminal B: middle terminal
- Terminal C: outer terminal (varistor connection **without crimp**)



You can check the functionality of the varistors in the following manner:

1. Open the inverter as described in section 7.2 "Opening the Inverter" (page 44).
2. Use a multimeter to check all the varistors in the installed state to ascertain whether there is a conducting connection between connectors B and C.



Result	Action
There is **a conducting** connection.	There is probably a different fault in the inverter. 1. Close the inverter as described in section 7.3 "Closing the Inverter" (page 45). 2. Contact the SMA Serviceline.

Result	Action
There is **no conducting** connection.	The respective varistor is defective and must be replaced. Varistor failure is generally due to influences which affect all varistors similarly (temperature, age, induced overvoltage). SMA Solar Technology AG recommends that you replace both varistors. The varistors are specially manufactured for use in the inverter and are not commercially available. You must order replacement varistors directly from SMA Solar Technology AG (see section 13 "Contact" (page 70)). • For the replacement of the varistors, proceed to step 3.

NOTICE!

Overvoltage due to faulty varistors. Destruction of the inverter by overvoltage.

- Procure replacement varistors as soon as possible and replace the defective ones immediately.
- For systems with a high risk of overvoltage, do **not** operate inverters using faulty varistors or no varistors at all.

3. Insert an insertion tool into the openings of the terminal contacts (1).

   ☑ This releases the terminals.

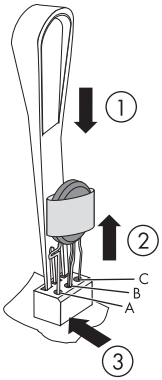
   If you did not receive an extractor tool together with the replacement varistors for the servicing of the terminals, contact SMA Solar Technology AG. As an alternative, the individual terminal contacts can be operated using a 3.5 mm wide screwdriver.

4. Remove the varistor (2).
5. Insert new varistor (3).

   The pole with the small loop (crimp) must be fitted to terminal A when remounting (3).

6. Close the inverter as described in section 7.3 "Closing the Inverter" (page 45).

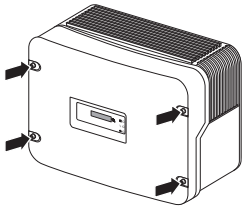
☑ The check and replacement of the varistors is completed.



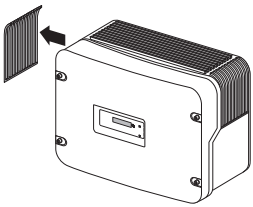
10 Decommissioning

10.1 Dismantling the Inverter

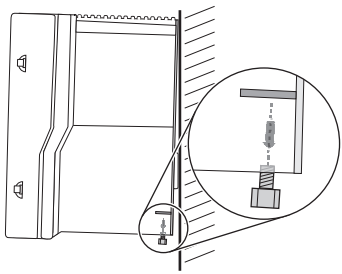
1. Open the enclosure lid as described in section 7.2 "Opening the Inverter" (page 44).
2. Remove all cables from the inverter.
3. Close the inverter with the 4 screws and the corresponding lock washers.



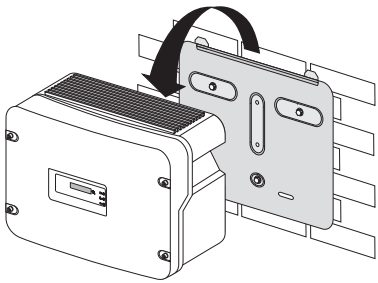
4. Remove the air grills on both sides.



5. Remove the screw between the product and the wall mounting bracket.



6. Remove the inverter upwards from the wall mounting bracket.



☑ The inverter is dismantled.

10.2 Packing the Inverter

If possible, always pack the inverter in its original packaging. If it is no longer available, you can also use an equivalent carton. The box must be capable of being closed completely and made to support both the weight and the size of the inverter.

10.3 Storing the Inverter

Store the inverter in a dry place where ambient temperatures are always between − 25 °C and +60 °C.

10.4 Disposing of the Inverter

Dispose of the inverter at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Alternatively, send it back to SMA Solar Technology AG with shipping paid by sender, and labeled "ZUR ENTSORGUNG" ("FOR DISPOSAL") (see section 13 ”Contact” (page 70)).

11 Technical Data

11.1 Windy Boy 3300

DC Input

Turbine control		Polynomial characteristic curve
Nominal power	$P_{DC, nom}$	3,500 W
Maximum power	$P_{DC, max}$	3,820 W
Recommended generator power at 2,500 full-load hours per year	$P_{DC, 2500}$	3,100 W
Recommended generator power at 5,000 full-load hours per year	$P_{DC, 5000}$	2,800 W
Minimum power for feed-in operation	$P_{DC, min}$	7 W
Nominal operating voltage	$U_{DC, nom}$	200 V
Maximum voltage at U_{AC} = 230 V	$U_{DC, max}$	500 V
Minimum voltage at U_{AC} = 230 V	$U_{DC, min}$	200 V
Voltage range at U_{AC} = 230 V		200 V ... 500 V
Minimum adjustable open circuit voltage for grid synchronization	Vpv-Start	200 V
Voltage ripple	UPP	< 10 %
Nominal input current	$I_{DC, nom}$	17.5 A
Overall maximum input current	$I_{DC, max}$	20 A
Number of inputs		3
Maximum current per input		20 A

AC Output

Nominal power	$P_{AC, nom}$	3,300 W
Maximum power	$P_{AC, max}$	3,600 W
Nominal current	$I_{AC, nom}$	14.5 A
Maximum output current	$I_{AC\ max}$	18 A
Maximum permissible fuse protection		25 A
Harmonic distortion of grid current at $K_{Ugrid} < 2$ % and $P_{AC} > 0.5\ P_{nom}$	K_{IAC}	< 3 %
Nominal voltage	$U_{AC, nom}$	230 V
Grid voltage range		220 V ... 240 V
Minimum grid voltage	$U_{AC, min}$	180 V
Maximum grid voltage	$U_{AC, max}$	260 V
Nominal frequency (self-adjusting)	f_{AC}	50 Hz / 60 Hz
Operating range, grid frequency		±4.5 Hz
Power factor at P_{ACnom}	cos φ	1
Overvoltage category		III
AC connection		AC connection socket
Maximum cable diameter		14 mm
Maximum wire cross-section		4 mm²

Protective Device

AC short circuit protection	Current control
Islanding detection	Yes
Galvanically isolated	Yes, LF transformer
All-pole disconnection unit on the AC side	Independent disconnection device SMA Grid Guard 2
All-pole disconnection unit on the DC side	DC plug system SUNCLIX
DC reverse-polarity protection	Short-circuit diode
DC overvoltage protection (Windy Boy Protection Box)	Optional

Mechanical Data

Width x height x depth	450 mm x 352 mm x 236 mm
Weight	38 kg

Climatic Conditions

Operating temperature range	– 25 °C ... +60 °C
Relative air humidity (permissible)	0 % ... 100 %
Maximum operating altitude above mean sea level	2,000 m

General Data

Protection rating *	IP65
Protection class	I
Noise emission (typical)	≤ 33 dB(A)

* according to IEC 60529

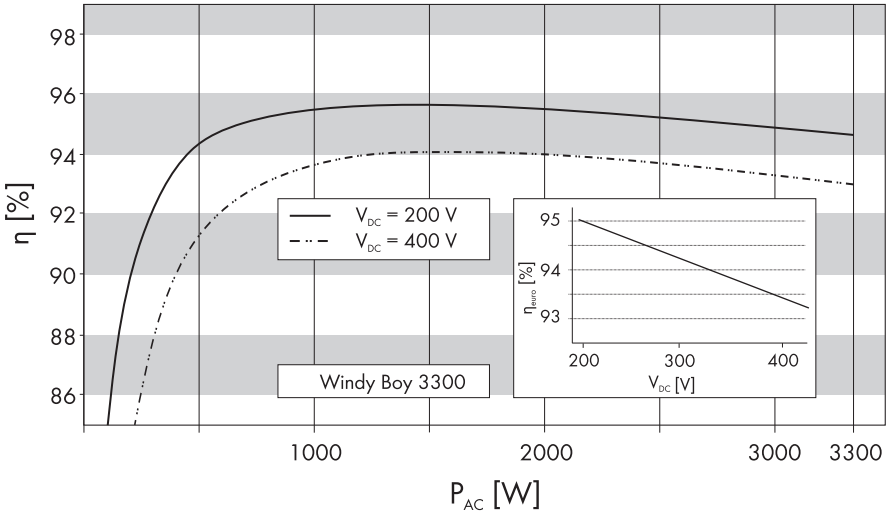
Features

Topology	LF transformer
Cooling concept	OptiCool

Internal Consumption

Internal consumption in operation	< 7 W
Internal consumption in standby	0.25 W

Efficiency



Peak efficiency	$\eta_{max.}$	95.2 %
Euro-eta	η_{euro}	94.4 %

11.2 Windy Boy 3800

DC Input

Turbine control		Polynomial characteristic curve
Nominal power	$P_{DC, nom}$	4,040 W
Maximum power	$P_{DC, max}$	4,040 W
Recommended generator power at 2,500 full-load hours per year	$P_{DC, 2500}$	3,600 W
Recommended generator power at 5,000 full-load hours per year	$P_{DC, 5000}$	3,300 W
Minimum power for feed-in operation	$P_{DC, min}$	7 W
Nominal operating voltage	$U_{DC, nom}$	200 V
Maximum voltage at U_{AC} = 230 V	$U_{DC, max}$	500 V
Minimum voltage at U_{AC} = 230 V	$U_{DC, min}$	200 V
Voltage range at U_{AC} = 230 V		200 V ... 500 V
Minimum adjustable open circuit voltage for grid synchronization	VpvStart	200 V
Voltage ripple	UPP	< 10 %
Nominal input current	$I_{DC, nom}$	20 A
Overall maximum input current	$I_{DC, max}$	20 A
Number of inputs		3
Maximum current per input		20 A

AC Output

Nominal power	$P_{AC, nom}$	3,800 W
Maximum power	$P_{AC, max}$	3,800 W
Nominal current	$I_{AC, nom}$	16.5 A
Maximum output current	$I_{AC, max}$	18 A
Maximum permissible fuse protection		25 A
Harmonic distortion of grid current at $K_{Ugrid} < 2$ % and $P_{AC} > 0.5\ P_{nom}$	K_{IAC}	< 3 %
Nominal voltage	$U_{AC, nom}$	230 V
Grid voltage range		220 V ... 240 V
Minimum grid voltage	$U_{AC, min}$	180 V
Maximum grid voltage	$U_{AC, max}$	260 V
Nominal frequency (self-adjusting)	f_{AC}	50 Hz / 60 Hz
Operating range, grid frequency		±4.5 Hz
Power factor at P_{ACnom}	cos φ	1
Overvoltage category		III
AC connection		AC connection socket
Maximum cable diameter		14 mm
Maximum wire cross-section		4 mm²

Protective Device

AC short circuit protection	Current control
Islanding detection	Yes
Galvanically isolated	Yes, LF transformer
All-pole disconnection unit on the AC side	Independent disconnection device SMA Grid Guard 2
All-pole disconnection unit on the DC side	DC plug system SUNCLIX
DC reverse-polarity protection	Short-circuit diode
DC overvoltage protection (Windy Boy Protection Box)	Optional

Mechanical Data

Width x height x depth	450 mm x 352 mm x 236 mm
Weight	38 kg

Climatic conditions

Operating temperature range	– 25 °C ... +60 °C
Relative air humidity (permissible)	0 % ... 100 %
Maximum operating altitude above mean sea level	2,000 m

General Data

Protection rating *	IP65
Protection class	I
Noise emission (typical)	≤ 33 dB(A)

* according to IEC 60529

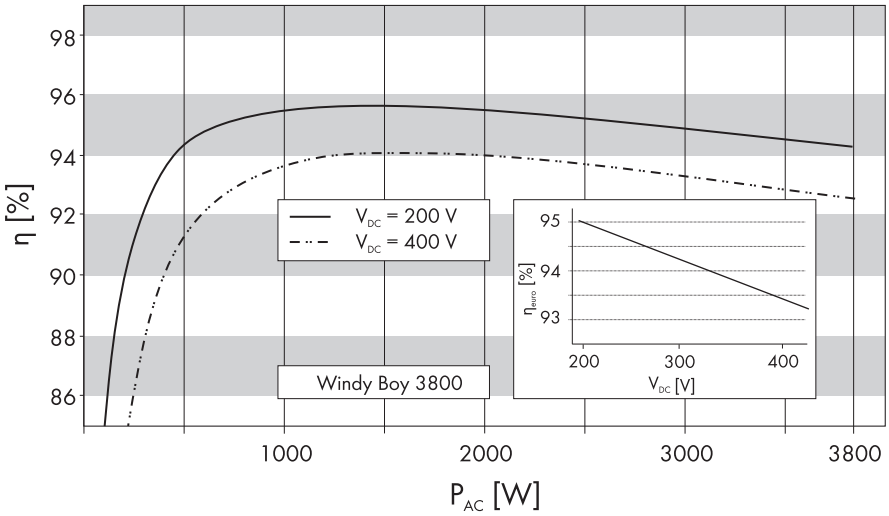
Features

Topology	LF transformer
Cooling concept	OptiCool

Internal Consumption

Internal consumption in operation	< 7 W
Internal consumption in standby	0.25 W

Efficiency



Peak efficiency	$\eta_{max.}$	95.6 %
Euro-eta	η_{euro}	94.7 %

12 Accessories

You will find the corresponding accessories and replacement parts for your inverter in the following overview. If required, you can order these from SMA Solar Technology AG or your dealer.

Designation	Brief description	SMA order number
Windy Boy Protection Box	Rectifiers and overvoltage protection for small wind turbine systems with Windy Boy	WBP-Box 500
Air grills	Air grill set "right and left" as spare part	45-7202
Replacement varistors	Set of thermally monitored varistors (2) including installation tool	SB-TV 4
Insertion tool for replacing the varistors	Installation tool for varistors	SB-TVWZ
RS485 upgrade kit	RS485 communication interface	485PB-NR
Bluetooth® Wireless Technology upgrade kit	*Bluetooth* communication interface	BTPBINV-NR
SUNCLIX PV connector	Field plug for conductor cross sections of 2.5 mm² ... 6 mm²	SUNCLIX-FC6-SET

13 Contact

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

- Inverter type
- Inverter serial number
- Type of connected small wind turbine system
- Optional equipment, e.g. communication devices
- Blink code or display message of the inverter

SMA Solar Technology AG

Sonnenallee 1

34266 Niestetal, Germany

www.SMA.de

SMA Serviceline

Inverters:	+49 561 9522 1499
Communication:	+49 561 9522 2499
Fax:	+49 561 9522 4699
E-Mail:	Serviceline@SMA.de

Exclusion of liability

The general terms and conditions of delivery of SMA Solar Technology AG shall apply.

The content of these documents is continually checked and amended, where necessary. However, discrepancies cannot be excluded. No guarantee is made for the completeness of these documents. The latest version is available online at www.SMA.de or from the usual sales channels.

Guarantee or liability claims for damages of any kind are excluded if they are caused by one or more of the following:

- Damages during transportation
- Improper or inappropriate use of the product
- Operating the product in an unintended environment
- Operating the product whilst ignoring relevant, statutory safety regulations in the deployment location
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
- In case of unforeseen calamity or force majeure

The use of supplied software produced by SMA Solar Technology AG is subject to the following conditions:

- SMA Solar Technology AG rejects any liability for direct or indirect damages arising from the use of software developed by SMA Solar Technology AG. This also applies to the provision or non-provision of support activities.
- Supplied software not developed by SMA Solar Technology AG is subject to the respective licensing and liability agreements of the manufacturer.

SMA Factory Warranty

The current guarantee conditions come enclosed with your device. These are also available online at www.SMA.de and can be downloaded or are available on paper from the usual sales channels if required.

Trademarks

All trademarks are recognized even if these are not marked separately. Missing designations do not mean that a product or brand is not a registered trademark.

The *Bluetooth*® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by SMA Solar Technology AG is under license.

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

SMA Solar Technology AG

www.SMA.de