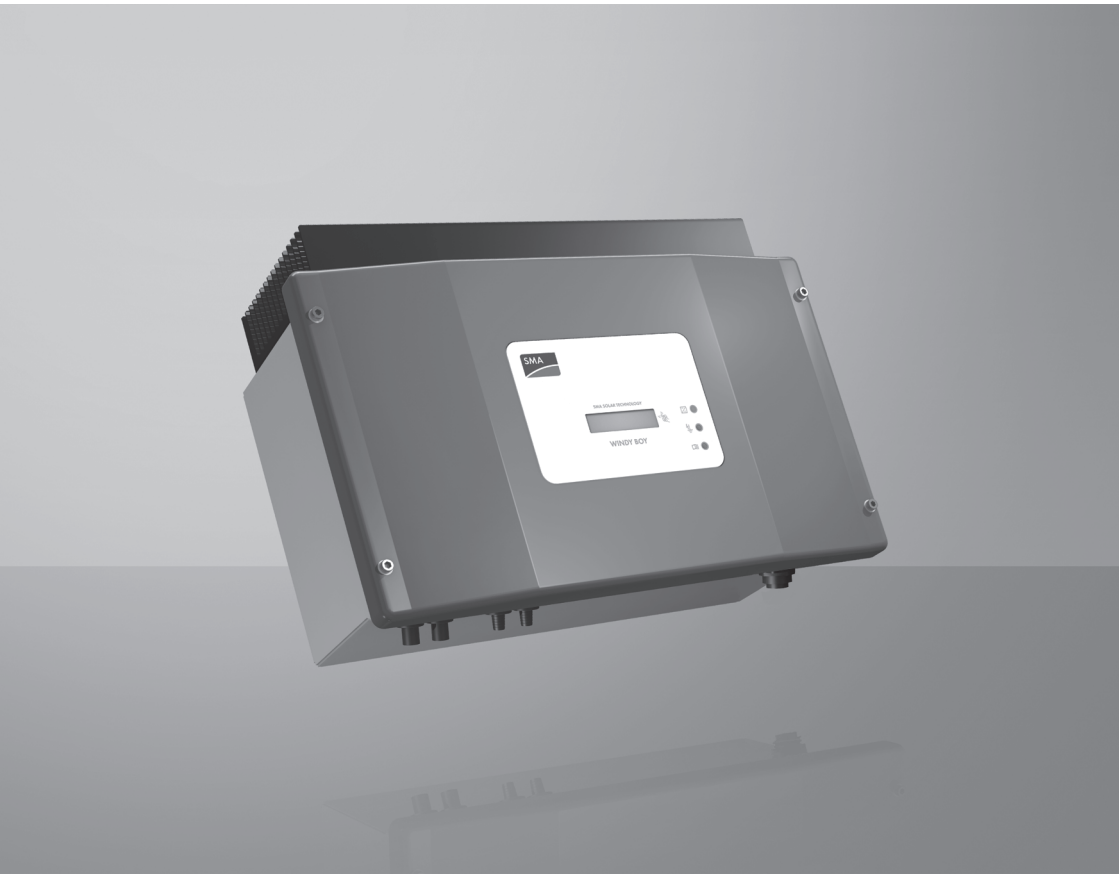
Wind Power Inverter

WINDY BOY 1200/1700

Installation Manual



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EN

Table of Contents

1 Information on this Document

1.1 Validity

This document describes the assembly, installation, commissioning, maintenance and failure search procedures for the following SMA inverters:

- Windy Boy 1200 (WB 1200)
- Windy Boy 1700 (WB 1700)

Keep this document in a convenient place for future reference.

1.2 Target Group

This document is for electrically skilled persons. The tasks described in this document may only be performed by electrically skilled persons.

1.3 Additional Information

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

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

1.4 Symbols Used

The following types of safety notes and general information are used in this document:

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 the product.

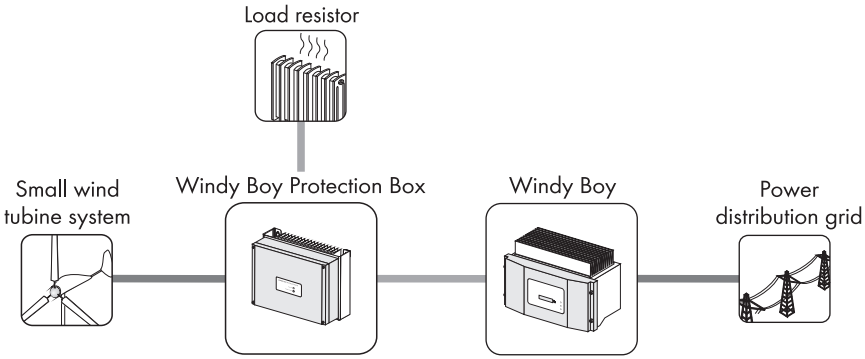
☑ This symbol indicates the result of an action.

2 Safety

2.1 Appropriate Usage

The Windy Boy is a wind power inverter that converts the rectified current of a small wind turbine system into alternating current and feeds this energy into the power distribution grid, domestic grid or stand-alone system.

Principle of a small wind turbine system with Windy Boy



The Windy Boy can additionally be used as inverter for energy converters based on permanent magnet generators (hydro-power systems, combined heat and power plants, diesel generator, etc.).

The manufacturer of the small wind turbine system or generator must have his plant approved for operation with this Windy Boy.

When designing the system, ensure that the permitted operating range of all components is maintained at all times. In addition ensure that through the use of appropriate protective measures the maximum permissible input voltage of the inverter is not exceeded. SMA Solar Technology AG offers corresponding components for this, e.g. the Windy Boy Protection Box.

Do not use the Windy Boy for purposes other than those described here. Alternative uses, modifications as well as the installation of component parts void the warranty claims and operation permit.

This document is part of the Windy Boy. Observe all of the activities described in this document. Keep this document in a convenient place for future reference.

2.2 Safety Instructions

DANGER!

Danger to life due to high voltages in the inverter.

- All work on the inverter may only be carried out by an electrically skilled person.

CAUTION!

Danger of burns due to hot enclosure parts.

- Only touch the enclosure lid during operation.

2.3 Explanation of Symbols

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

2.3.1 Symbols on the Inverter

Symbol	Explanation
	Operation display. Displays the operating state 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. Read section 9.3 "Red LED is Glowing Continuously" (page 50).
	An error has occurred. Read section 9 "Troubleshooting" (page 46).
	You can operate the display by tapping it: • 1 tap: the background light switches on or the display scrolls one message further. • 2 taps in quick succession: the inverter shows the display messages from the initialization phase again (see section 6.2 "Display Messages during Initialization" (page 36)).

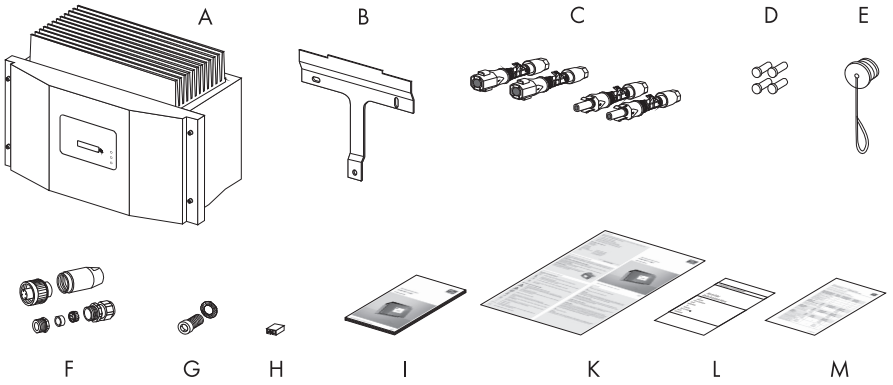
2.3.2 Symbols on the Type Label

Symbol	Explanation
	Warning of dangerous electrical voltage. The inverter operates at high voltages. All work on the inverter may only be carried out by an electrically skilled person.
	Warning of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Observe all documentation that is supplied with the inverter.
	The inverter must not be disposed of as household waste. For further information on disposal, see section 10.4 "Disposing of the Inverter" (page 56).
	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)
	Degree of protection IP65. 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	4	DC plug connectors (2 x positive / 2 x negative)
D	4	Sealing plugs for DC plug connectors
E	1	Protective cap for AC socket on the inverter
F	1	AC coupling socket: socket unit, threaded sleeve, pressure screw PG13.5, sealing ring PG13.5, fastening case PG13.5, cable gland PG16
G	1	M6x12 cylinder head screw and conical spring washer
H	1	Jumper
I	1	Installation guide
K	1	User manual
L	1	Documentation set with explanations and certificates
M	1	Supplementary sheet with the inverter factory settings

3.2 Identifying the Inverter

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

The serial number (Serial No.) and the type (Type / Model) of the inverter, as well as device-specific characteristics, are specified on the type label.

4 Mounting

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 burns due to hot enclosure parts.

- Mount the inverter in such a way that the enclosure cannot be touched inadvertently.

CAUTION!

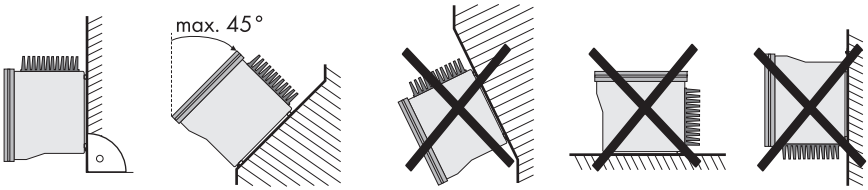
Risk of injury due to the heavy weight of the inverter.

- Note that the inverter weighs approx. 24.5 kg.

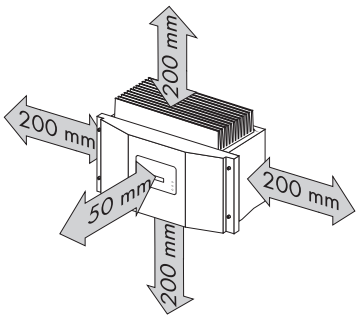
4.2 Selecting the Mounting Location

Consider the following requirements when selecting the installation site:

- The mounting method and location must be suitable for the weight and dimensions of the inverter (see section 11 "Technical Data" (page 57)).
- Mount on a solid surface.
- The mounting location must be clear and safely accessible at all times without the need for additional aids such as scaffolding or lifting platforms. Service actions may otherwise be restricted.



- Mount vertically or tilted backward by max. 45°.
- Never mount the device with a forward tilt.
- Do not mount horizontally.
- Never install the device with a sideways tilt.
- The connection area must face downwards.
- Mount at eye level in order that operating states can be read at all times.
- To ensure optimal operation, the ambient temperature should be below 40 °C.
- Do not expose the inverter to direct solar irradiation, as this can cause excessive heating and power reduction.
- In living areas, do not mount the unit on plasterboard walls or similar to avoid audible vibrations. When in use, the inverter emits noises 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.



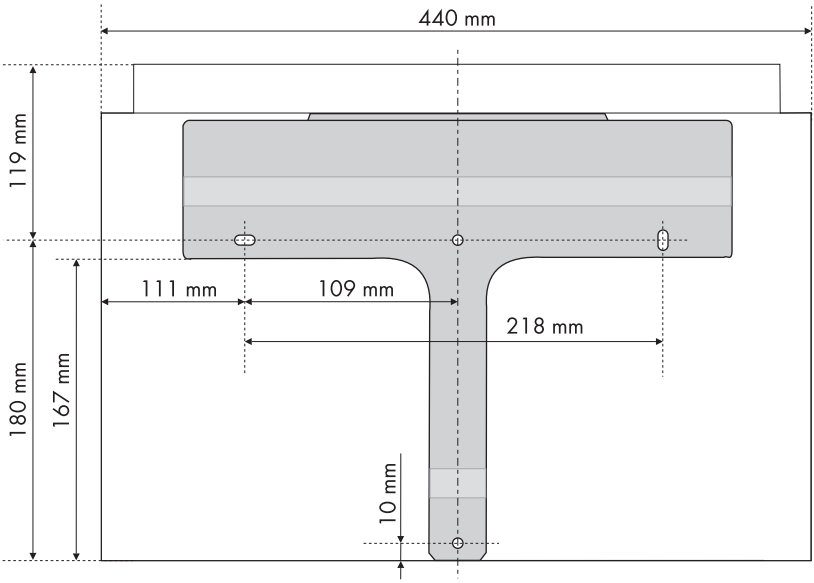
4.3 Mounting the Inverter with the Wall Mounting Bracket

CAUTION!

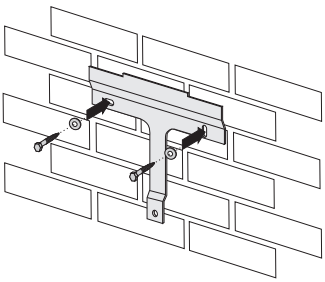
Risk of injury due to the heavy weight of the inverter.

- Note that the inverter weighs approx. 24.5 kg.
- Use mounting material suitable for the surface when attaching the wall mounting bracket.

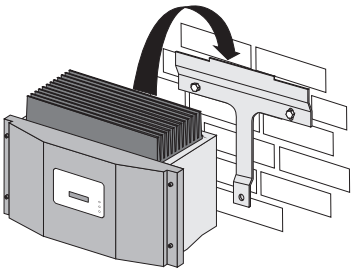
1. Use the wall mounting bracket as a drilling template and mark the positions of the drill holes.



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

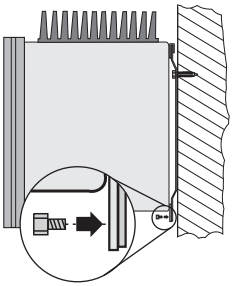


3. Mount the inverter with its upper fastening plates on the wall mounting bracket in such a way that it cannot slide out of the bracket sideways.



4. If a second protective conductor is required in the country of installation, ground the inverter and fix it securely, as described in section 5.2.3 "Connecting Additional Grounding" (page 25).

5. If a second protective conductor is not required, fix the inverter securely using the enclosed M6x12 screw.



6. Check to ensure that the inverter is securely in place.

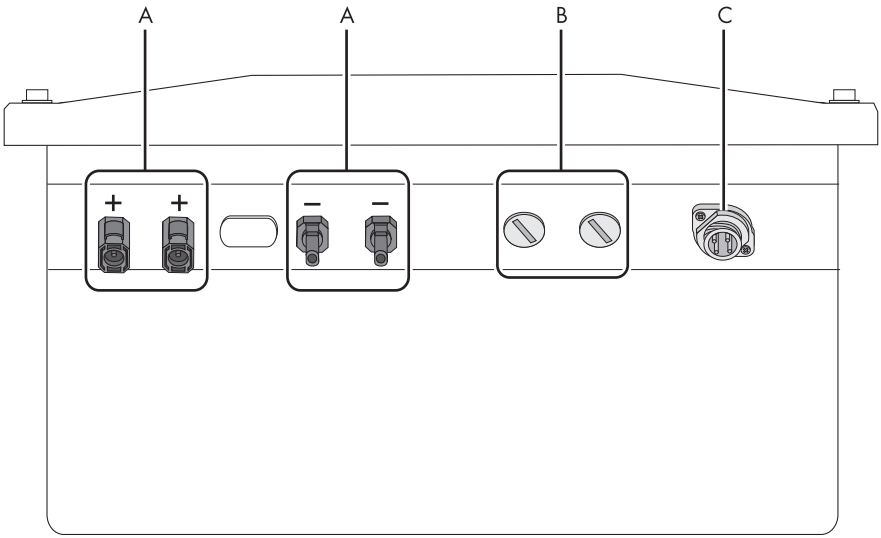
☑ The inverter is now mounted to the wall.

5 Electrical Connection

5.1 Overview of the Connection Area

5.1.1 Exterior View

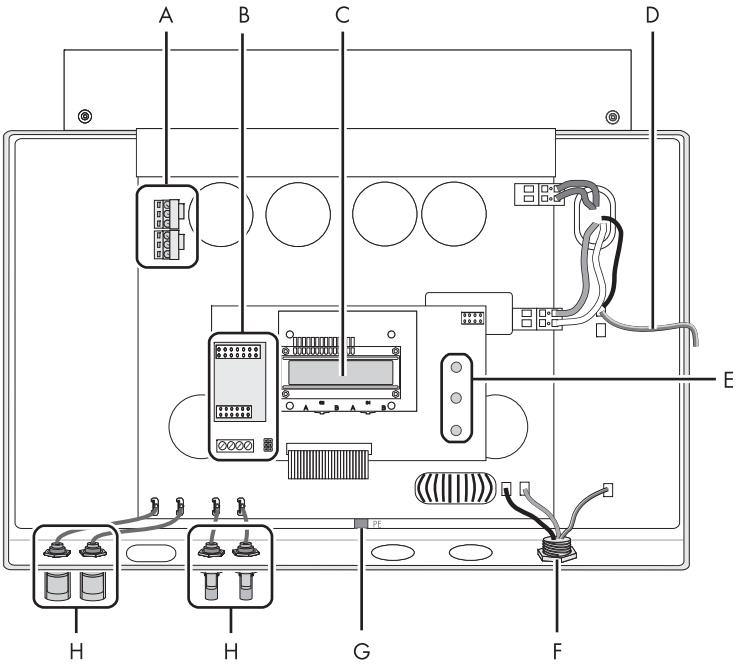
The following figure shows the assignment of the individual enclosure openings on the base of the inverter.



Object	Description
A	DC plug connector for connecting the small wind turbine system
B	Enclosure opening with filler-plugs for communication
C	Plug for AC connection

5.1.2 Interior View

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



Object	Description
A	Varistors
B	Connection area and sockets for the optional communication via RS485.
C	Display
D	PE connection cable for the enclosure lid
E	Operating status LEDs
F	Plug socket (AC)
G	Flat male tab for grounding the cable shield with RS485 communication
H	DC connector

5.2 Connection to the Power Distribution Grid (AC)

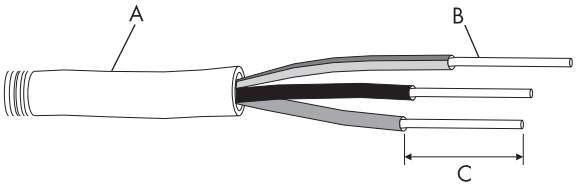
5.2.1 Conditions for the AC Connection

Observe all connection conditions of the utility operator for connecting to the power distribution grid!

Cable Sizing

Select a cable diameter that does not lead to cable losses of more than 1 % at rated output power.

Cable Requirements



Object	Description	Value
A	External diameter	9 mm ... 17 mm
B	Conductor cross-section	maximum 2.5 mm²
C	Stripped insulation	Approx. 4 mm

Load Disconnection Unit

You must install a **separate** miniature circuit-breaker for each inverter in order to ensure that the inverter can be securely disconnected under load. The maximum permissible rating can be found in section 11 "Technical Data" (page 57).

Detailed information and examples for the rating of a miniature 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.

In the event of parallel connection of more than one inverter to the same miniature circuit-breaker, the protective function of the miniature circuit-breaker is no longer guaranteed. It can result in a cable fire or destruction of the inverter.

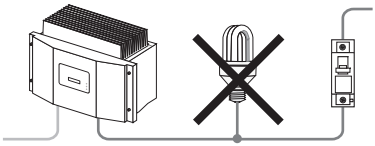
- Never connect several inverters to the same miniature circuit-breaker.
- Observe the maximum permissible fuse protection of the inverter when selecting the miniature circuit-breaker.

DANGER!

Risk of lethal electric shock!

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

- Never connect loads between the inverter and the miniature circuit-breaker without protection.
- Always protect consumers separately.



NOTICE!

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

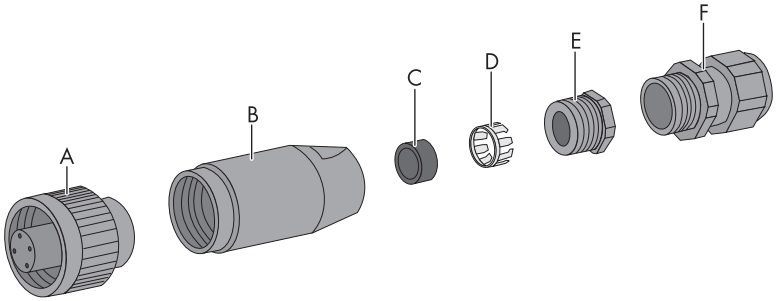
A screw type fuse element, e.g. D system (Diazed) or D0 system (Neozed), is **not** a load disconnection device, and thus may not be used as a load disconnection unit. A screw type fuse element serves as cable protection only.

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

- Use only a switch-disconnector or a miniature circuit-breaker as a load disconnection unit.

5.2.2 Connecting the Inverter to the Power Distribution Grid (AC)

Overview of the AC Coupling Socket



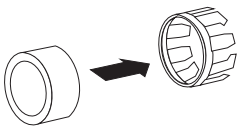
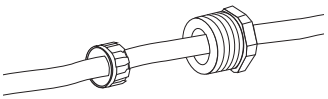
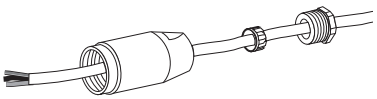
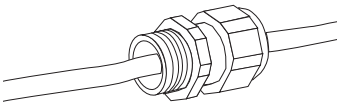
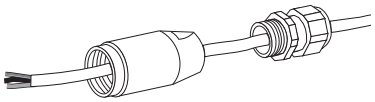
Object	Description
A	Socket element
B	Threaded sleeve
C	PG13.5 sealing ring
D	PG13.5 fastening case
E	Pressure screw PG13.5 (for a cable diameter between 9 mm ... 13.5 mm)
F	Cable gland PG16 (for a cable diameter between 13.5 ... 17 mm)

Procedure

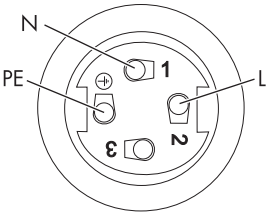
1. Choose an appropriate gland for the AC cable.
2. Check that the grid voltage is within the permissible voltage range.

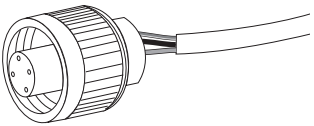
   The exact operating range of the inverter is specified in the operation parameters. The corresponding document can be found in the download area at www.SMA.de/en, in the "Technical Description" category of the respective inverter.
3. Disconnect the miniature circuit-breaker and secure against re-connection.
4. Strip approx. 30 mm from the AC cable.
5. Shorten L and N by approx. 5 mm.
6. Strip 4 to 5 mm of insulation from the AC cable wires.

7. Pass the pressure screw and/or cable gland and socket tube over the AC cable.

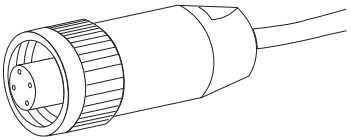
Size used	Procedure
PG13.5	• Push the sealing ring into the fastening case. 
	• Lead the pressure screw PG13.5 and the fastening case including the sealing ring over the AC cable. 
	• Pass the threaded sleeve over the AC cable. 
PG16	• Slide the PG16 cable gland over the AC cable. 
	• Pass the threaded sleeve over the AC cable. 

8. Insert the PE protective conductor (green-yellow) into the screw terminal with the earth sign on the socket element and tighten the screw.
9. Insert the neutral conductor N (blue) into the screw terminal 1 on the socket and tighten the screw.
10. Insert phase L (brown or black) into the screw terminal 2 on the socket element and tighten the screw.
11. Leave screw terminal 3 on the socket free.
12. Make sure the wires are securely connected.

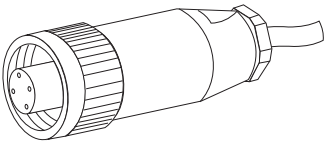
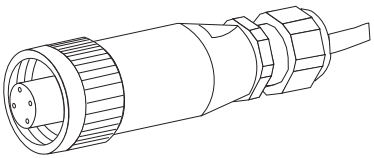




13. Screw the threaded sleeve tightly onto the socket element.

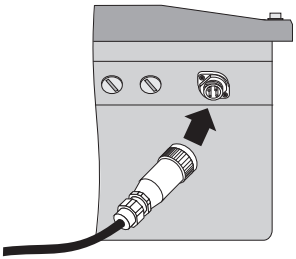


14. Tighten the pressure screw or cable gland tightly onto the threaded sleeve.

Size used	Procedure
PG13.5	 The fastening case along with the sealing ring is pressed into the threaded sleeve and can no longer be seen.
PG16	• Retighten the lock nut of the cable gland. 

☑ The AC connection socket has been screwed together.

15. If the AC connection socket is not immediately connected to the inverter, close the AC plug on the inverter with the protective cap provided.
16. Insert the AC connection socket into the AC socket on the inverter. Remove the protective cap beforehand, if required.
17. Turn the threaded ring of the AC connection socket tightly onto the AC socket on the inverter. The threaded ring serves to seal and relieve strain on the AC connection socket.

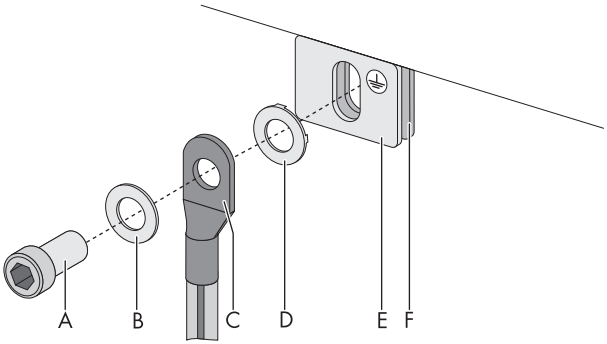


☑ The AC cable is now connected to the inverter.

5.2.3 Connecting Additional Grounding

If a second protective conductor, additional grounding or equipotential bonding is required, you can additionally ground the inverter on the enclosure.

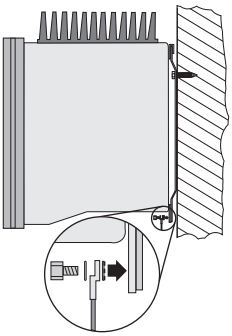
Overview of the Additional Grounding



Object	Description
A	M6x12 cylinder head screw (included in the scope of delivery)
B	Washer
C	Terminal lug (M6) with protective conductor
D	Conical spring washer (included in the scope of delivery)
E	Metal shackle on the underside of the enclosure
F	Wall mounting bracket of the inverter

Procedure

1. Attach the washer, terminal lug with protective conductor and the conical spring washer to the cylinder head screw. The teeth of the conical spring washer must be facing the metal shackle.
2. Insert the cylinder head screw into the metal shackle on the underside of the enclosure and screw into the wall mounting bracket. Tighten the cylinder head screw using a torque of 6 Nm.
3. Check that the contact between the protective conductor and the enclosure is in accordance with the regulations valid for the country of installation.



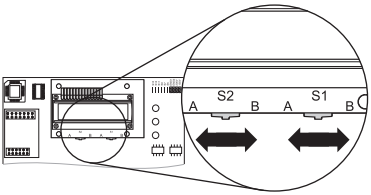
5.3 Setting the Display Language

You can set the display language using the switches underneath the display assembly inside the inverter.

Procedure

1. Open the inverter as described in section 7.2 "Opening the Inverter" (page 42).
2. Set the switches to the required language, as shown below.

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



* For the country standard setting DK 5940 the Italian language applies.

** For the country standard setting DK 5940 the English language applies.

3. Close the inverter as described in section 7.3 "Closing the Inverter" (page 44).

☑ The display language is set.

5.4 Connecting the Small Wind Turbine System (DC)

5.4.1 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 DC connectors for DC connection in the delivery.
- The following limit values at the DC input of the inverter must not be exceeded:

Maximum input voltage	Maximum input current
400 V	12.6 A

DANGER!

Risk of lethal electric shock or fire.

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

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

NOTICE!

Destruction of the inverter through overvoltage.

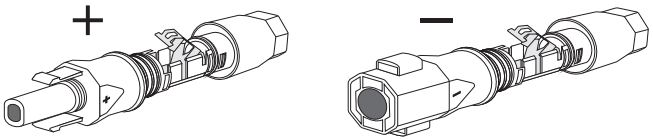
If the voltage of the small wind turbine system exceeds the maximum input voltage of the inverter, it can be destroyed by the overvoltage. This will void all warranty claims.

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

5.4.2 Assembling the DC Plug Connector

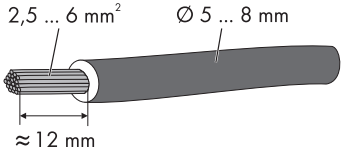
The connection cables of the small wind turbine system must be equipped with the DC plug connectors provided for connecting the inverter.

To assemble the DC connectors, proceed as follows. Ensure the plug connectors have the correct polarity. The DC connectors have the symbols "+" and "–".



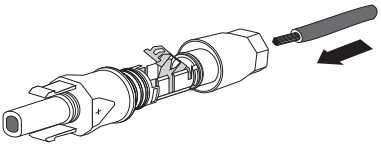
Cable requirements:

- Use a PV1-F cable.

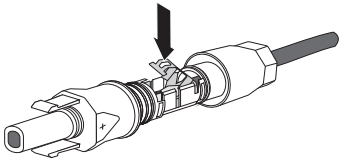


Procedure

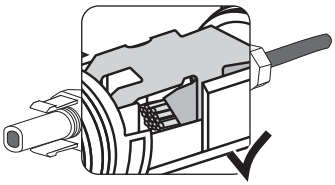
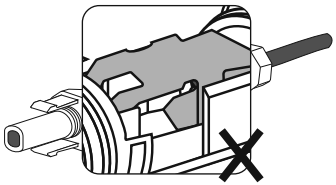
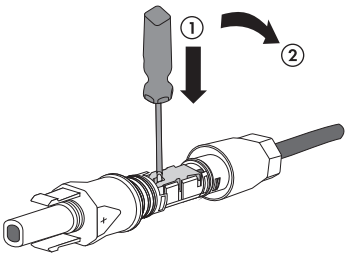
1. Insert stripped cable into the plug up to the limit.



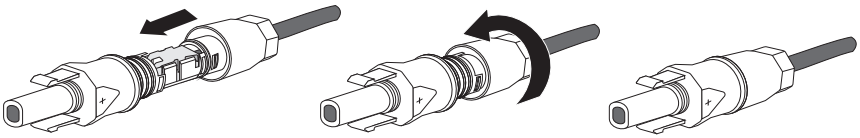
2. Press the clamping clip down until it audibly snaps into place.



3. Ensure the cable is correctly in place:

Result	Measure
☑ If the conductors are visible in the hollow cavity of the clamping clip, the cable is in the correct position. 	• Proceed to step 4.
☑ If the conductors are **not** visible in the hollow cavity, the cable is not in the correct position. 	• Declamp the clamping clip. For this purpose, use a screwdriver with a width of 3.5 mm.  • Remove cable and start again from step 1.

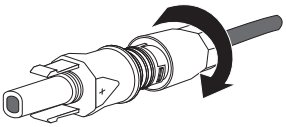
4. Push the threaded joint up to the thread and screw into place with a torque of 2 Nm.



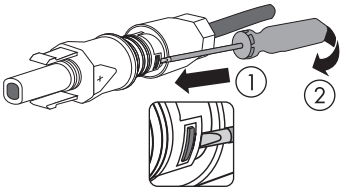
☑ The DC connectors are now assembled and can be connected to the inverters, as described in section 5.4.4 "Connecting the Small Wind Turbine System (DC)" (page 31).

5.4.3 Opening the DC Connector

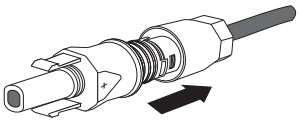
1. Unscrew the threaded joint.



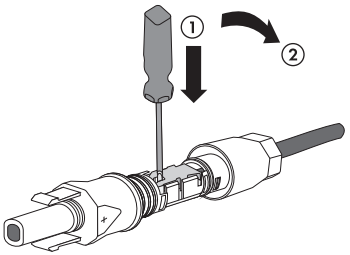
2. To release the plug connector, slot a screw driver into the side catch mechanism and lever out. For this purpose, use a screwdriver with a width of 3.5 mm.



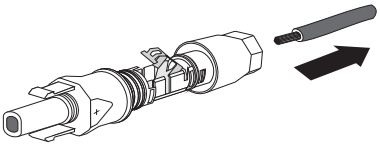
3. Carefully pull the DC connector apart.



4. Declamp the clamping clip. For this purpose, use a screwdriver with a width of 3.5 mm.



5. Remove the cable.



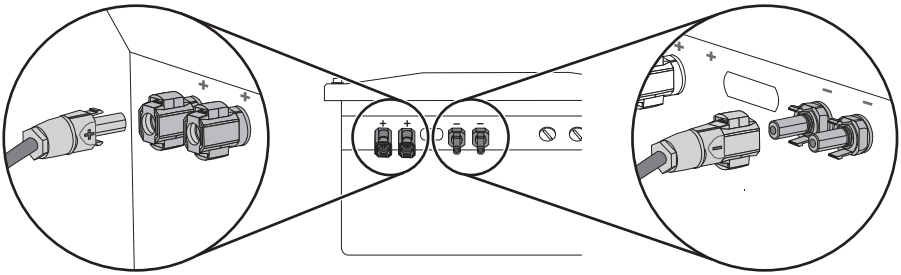
☑ The cable is now removed from the DC connector.

5.4.4 Connecting the Small Wind Turbine System (DC)

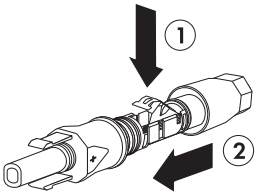
DANGER!
Danger to life due to high voltages in the inverter.

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

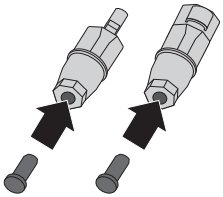
1. Remove the transport plugs from all the DC inputs on the inverter.
2. Check the DC plug connectors for correct polarity and connect them to the inverter.
   To release the DC connectors, see section 7.2 "Opening the Inverter" (page 42).



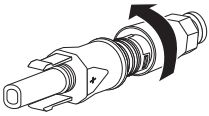
3. In order to seal the inverter, all the DC inputs that are not required have to be closed as follows:
   - Push the clamping clip down for all unnecessary DC plug connectors and push the gland to the thread.



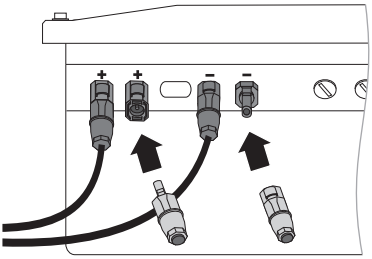
   - Insert the provided sealing plugs into the DC connectors that are not needed.
     Do **not** insert the sealing plugs into the DC inputs on the inverter.



   - Tighten the DC plug connector to a torque of 2 Nm



– Insert the DC 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 35). The following connection options are optional.

5.5 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 wiring diagram and a mounting description.

5.6 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 available in the download area at www.SMA.de/en, in the "Certificate" category of the respective inverter.

Ensure that you discuss the changes to these parameters with your utility operator.

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

5.6.1 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 default standard to which the inverter was set on the type label and on the included supplementary sheet with the factory settings.

5.6.2 Setting Stand-Alone Grid Operation

In order to be able 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 stand-alone grid operation:

- Setting via Sunny WebBox

  or

- Setting via Sunny Data Control or Sunny Explorer

DANGER!

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

If you set the inverter to stand-alone grid operation, it does not fulfill any country-specific standards and guidelines. If there is a power distribution grid outage, there is consequently a danger of feedback.

- **Never** operate the inverter directly on the power distribution grid when set to stand-alone grid operation.

5.7 Polynomial characteristic curve

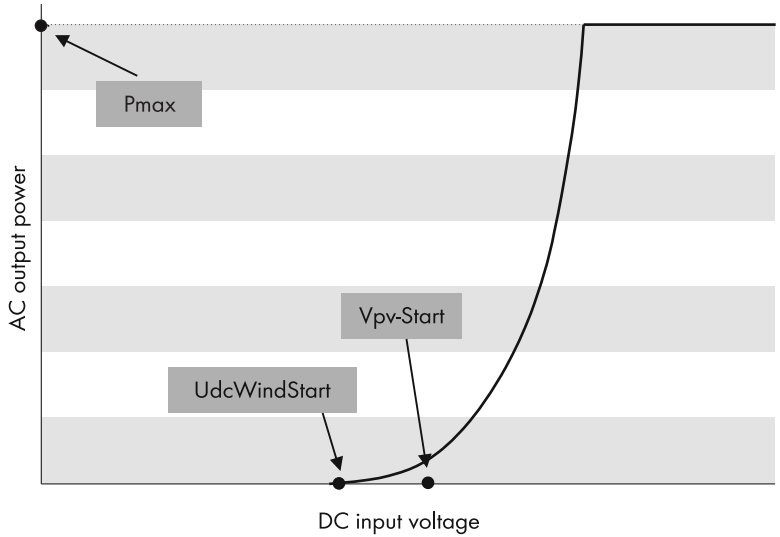
The polynomial characteristic curve is a programmable power curve depending on the DC input voltage. By adapting the default polynomial characteristic curve to the small wind turbine system being used, you can optimize the energy output of the small wind turbine system.

To optimally adapt the polynomial characteristic curve of the inverter to the 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 1200/WB 1700. Here, the fed-in AC power is shown according to the DC input voltage of the inverter.



6 Commissioning

6.1 Commissioning the Inverter

1. Check the following requirements before commissioning:
   - Correct mounting and correct connection of the inverter
   - The enclosure lid is securely closed.
   - The miniature circuit-breaker is rated correctly.
   - 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. Commission the small wind turbine system in accordance with the instructions of the manufacturer.

   ☑ Green LED lights permanently: the commissioning was successful.

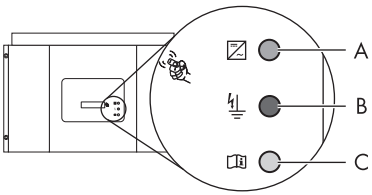
   or

   ☑ Green LED flashes: the grid connection conditions have not yet been reached. Wait until the green LED lights permanently.

   or

   ☑ The red or yellow LED is glowing or flashing: a disturbance has occurred. Proceed to step 3.

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



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

The Italian DK 5940 standard requires that an inverter must only be connected to the power distribution grid if the disconnection times for overvoltage, undervoltage, minimum frequency and maximum frequency have been checked.

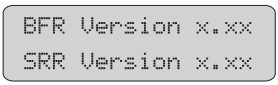
Start the self-test as described in section 6.3.1 "Starting the Self-Test by Tapping" (page 36). The test takes approx. 8 minutes.

3. Read section 9 "Troubleshooting" (page 46) and if necessary eliminate the fault or disturbance.

6.2 Display Messages during Initialization

- After startup of the inverter, the display first shows the device type.

- After 5 seconds, or when you tap again on the enclosure cover, the firmware version of the internal processors is displayed.



- After a further 5 seconds, or when you tap again, the configured standard is displayed (example: "GER/VDE 0126-1-1").

Show display messages again

In order to display the display messages from the initialization phase again during operation, tap twice in quick succession on the enclosure cover.

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

6.3.1 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. Commission the inverter (see section 6.1 "Commissioning the Inverter" (page 35)).
2. If the inverter displays the display message shown here, tap on the enclosure lid within 30 seconds.

☑ Test Sequence starts.

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 36).

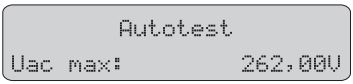
6.3.2 Completion of the Self-Test

Note the values which are displayed during the self-test. These values must be entered into a test report. 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 measured value is outside the permitted range (altered disconnection threshold), the inverter disconnects itself from the power distribution 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.

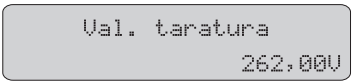


The voltage limit is reduced successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

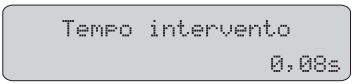
Once the inverter has disconnected from the power distribution grid, the display successively shows the following values one after the other:

- Disconnection value

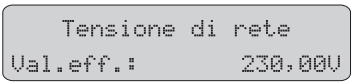
- Calibration value



- Reaction time



- Current line voltage



Undervoltage Test

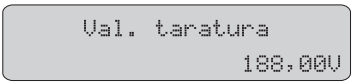
After the overvoltage test, the inverter performs the undervoltage test. During the test sequence, the current calibration value of the voltage limit applied is shown in the display of the inverter.

The voltage limit is increased successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

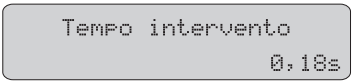
Once the inverter has disconnected from the power distribution grid, the display successively shows the following values one after the other:

- Disconnection value

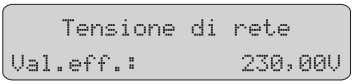
- Calibration value



- Reaction time



- Current line voltage



Maximum Frequency

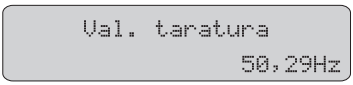
In a third step, the inverter tests the maximum frequency. During the test sequence, the frequency limit applied is shown in the display of the inverter.

The frequency limit is reduced successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

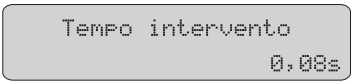
Once the inverter has disconnected from the power distribution grid, the display successively shows the following values one after the other:

- Disconnection value

- Calibration value



- Reaction time



- Current grid frequency

Minimum Frequency

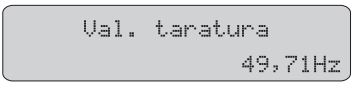
In the last step, the inverter tests the minimum frequency. During the test sequence, the frequency limit applied is shown in the display of the inverter.

The frequency limit is increased successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

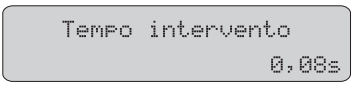
Once the inverter has disconnected from the power distribution grid, the display successively shows the following values one after the other:

- Disconnection value

- Calibration value



- Reaction time



- Current grid frequency

When the inverter has carried out the four tests, it switches to the "Turbine" operating mode. The original calibration values are then reset and the inverter automatically connects to the power distribution 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 section 6.3.1 "Starting the Self-Test by Tapping" (page 36). The inverter starts again the test sequence, as described in section 6.3.2 "Completion of the Self-Test" (page 37).

6.4 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 value defined in the "Vpv-Start" parameter is reached, the inverter starts a number of self-tests and measurement processes and synchronizes with the power distribution 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 power distribution 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 process, the inverter switches to characteristic curve operation, and regulates the output power 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 power distribution grid. The maximum output corresponds to the maximum AC power of the inverter. However, this can be set using the parameter "Pmax".

Shutdown Procedure

If the wind strength is so low that the DC input voltage falls below an internally calculated value, then the inverter stops the feed-in of power into the power distribution 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 switches off immediately.

7 Opening and Closing

7.1 Safety

DANGER!

Danger to life due to high voltages in the inverter.

Pay attention to the following points before opening the inverter:

- Ensure that no voltage is present on the AC side.
- Ensure that neither voltage nor current is present on the DC side.

NOTICE!

Damage to the inverter due to electrostatic discharge.

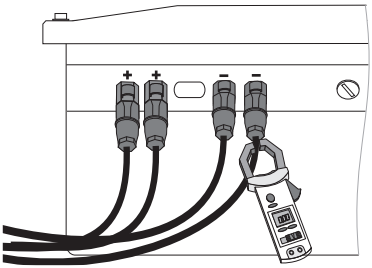
Internal components of the inverter can be irreparably damaged by electrostatic discharge.

- Ground yourself before touching a component.

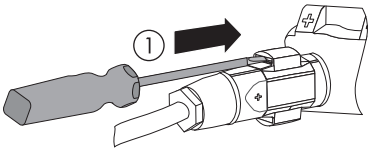
7.2 Opening the Inverter

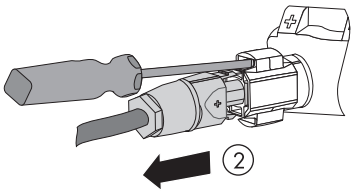
1. Stop the small wind turbine system and make sure that it will not restart.
2. Using a current probe, ensure that no current is present at all DC cables.

   ☑ If current is present, check the installation.

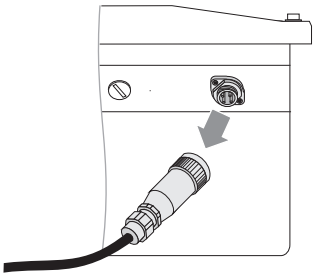


3. Unlock all DC connectors. For this purpose, use a screwdriver with a width of 3.5 mm.
   - Insert a screwdriver into one of the side slits (1).
   - Disconnect DC connectors (2).





4. Pull out the AC plug.



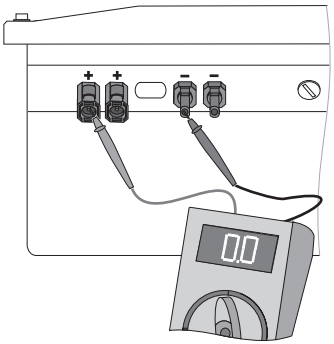
5. Check whether all LEDs and the display have gone out.

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

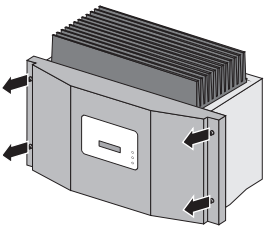
The capacitors in the inverter require 15 minutes to discharge.

- Wait 15 minutes before opening the inverter.

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



7. Remove all screws from the enclosure lid and pull the enclosure lid forward smoothly.

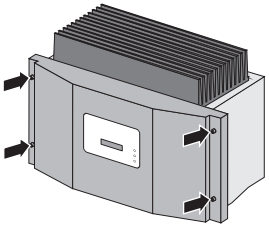


8. Remove the protective conductor (PE) connection from the enclosure lid by loosening the PE connection lock on the enclosure lid.

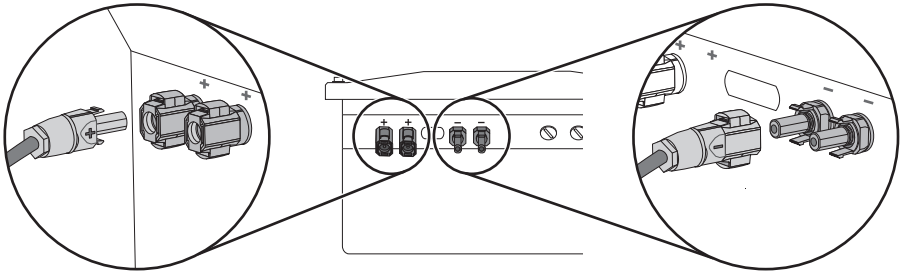
☑ The inverter is now open and free of voltage.

7.3 Closing the Inverter

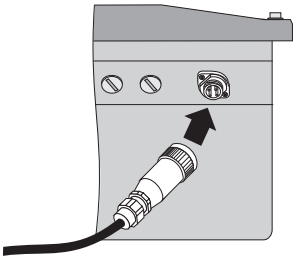
1. Establish the protective conductor (PE) connection to the lid.
2. Secure the enclosure lid of the inverter by evenly tightening the 4 lid screws.



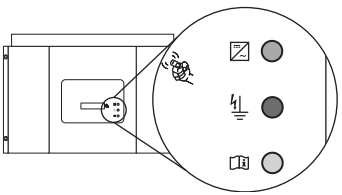
3. Check the DC plug connectors for correct polarity and connect them to the inverter. To release the DC connectors, see section 7.2 "Opening the Inverter" (page 42).



4. Close all the DC inputs that are not needed as described in section 5.4.4 "Connecting the Small Wind Turbine System (DC)" (page 31) in order to seal the inverter.
5. Attach the AC plug.
6. Switch on the line circuit breaker.
7. Commission the small wind turbine system in accordance with the instructions of the manufacturer.



8. Check whether the display and the LEDs indicate a normal operating state (see section 6 "Commissioning" (page 35)).



☑ The inverter is now closed and in operation.

8 Maintenance and Cleaning

Dirt such as dust or pollen can cause heat concentration that can lead to yield losses. Check the inverter and cables for any signs of external damage. Undertake repairs if necessary.

9 Troubleshooting

If the inverter displays other blink codes or fault messages than those described below, contact the SMA Serviceline.

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

Do not perform any repairs that are not described here and take advantage of the 24-hour replacement service (inverter ready for shipping and handed over to a freight-forwarding company within 24 hours) and the SMA Solar Technology AG repair service instead.

9.1 Blink Codes

Green	Red	Yellow	Status
is glowing continuously	is not glowing	is not glowing	OK (feed-in operation)
	is glowing continuously	is not glowing	Ground fault or varistor defective
		is glowing continuously	OK (initialization)
Flashes quickly (3x per second)	is not glowing	is not glowing	OK (stop)
	is glowing 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)
Goes out briefly (approx. 1 x per second)	is glowing continuously	is not glowing	Ground fault or varistor defective
	is not glowing	is not glowing	OK (derating)
is not glowing	is not glowing	is not glowing	OK (disconnection)
		Glows / flashes	Disturbance
	is glowing continuously	is not glowing	Ground fault or varistor defective
		Glows / flashes	Ground fault or varistor defective and disturbance

9.2 Fault Messages

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

Message	Description and corrective measure
!PV-Overvoltage! **!DISCONNECT DC!**	Overvoltage at DC input! Overvoltage can destroy the inverter.
	Corrective measures 1. Stop the small wind turbine system. 2. Turn off the miniature circuit-breaker. 3. Release all DC plug connectors, (see section 7.2 "Opening the Inverter" (page 42). 4. Check the DC voltage of the DC overvoltage protection (e.g. Windy Boy Protection Box) during operation of the small wind turbine for adherence to the maximum input voltage of the inverter before reconnecting the DC plug connector to the inverter. If the message occurs again, disconnect the inverter again and contact the SMA Serviceline.
ACVtgRPro	The 10-minute-average line voltage is no longer within the permissible range. This can have the following causes: • The line 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 power distribution grid.
	Corrective measures Check the line voltage at the connection point of the inverter: • If, due to the local grid conditions, the grid voltage is 253 V or more, contact the distribution grid operator and ask whether the voltage at the feed-in point can be adjusted, or contact the distribution grid operator and ask whether they agree to an alteration of the limiting value of the "ACVtgRPro" parameter for the monitoring of the power quality. • If the grid voltage is continually within the tolerance range and this fault message is still displayed, contact the SMA Serviceline.
Bfr-Srr	Internal measurement comparison disturbance or hardware defect.
	Corrective measures • If this disturbance occurs frequently, contact the SMA Serviceline.

Message	Description and corrective measure
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.
	Corrective measures • Contact the SMA Serviceline.
EeRestore	One of the duplicate data sets in the EEPROM is defective and has been reconstructed without loss of data. • This fault 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). The inverter disconnects itself from the power distribution grid for safety reasons.
	Corrective measures • Check the grid connection and contact the utility operator if necessary. • If the power frequency is within the tolerable range, but "Fac-Bfr", "Fac-Srr", "FacFast" disturbances are still displayed, contact the SMA Serviceline.
Imax / overcurrent	Overcurrent on the AC side. This indicator is displayed when the current at the AC grid is greater than specified.
	Corrective measures • Check the plant design and grid conditions.
K1-Close **K1-Open**	Fault during relay test.
	Corrective measures • If this fault frequently occurs or occurs several times consecutively, contact the SMA Serviceline.
MSD-Fac	Internal measurement comparison disturbance or hardware defect.
MSD-Vac **MSD-Timeout**	**Corrective measures** • If this disturbance occurs frequently, contact the SMA Serviceline.
Offset	The "Offset" operating state is a normal operating condition that occurs prior to grid monitoring. If "Offset" is displayed as a fault, then there is a disturbance in the data logging.
	Corrective measures • If this disturbance occurs frequently, contact the SMA Serviceline.

Message	Description and corrective measure
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.
	Corrective measures • 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 51).
ROM	The inverter's firmware is faulty.
	Corrective measures • If this disturbance occurs frequently, contact the SMA Serviceline.
Shut-Down	Temporary inverter disturbance.
	Corrective measures • Contact the SMA Serviceline.
Vac-Bfr **Vac-Srr**	The line voltage on line 2 is no longer within the permissible range ("Bfr" or "Srr" is an internal message that has no meaning for the user). This fault can be caused by any of the following conditions: • Power distribution grid disconnected (miniature circuit-breaker, fuse) • AC cable is broken or • AC cable is high-resistance. The inverter disconnects itself from the power distribution grid for safety reasons.
	Corrective measures • Check the line voltage and connection on the inverter. • If the line voltage lies outside the acceptable range because of local grid conditions, ask the utility operator if the voltages can be adjusted at the feed-in point or if they agree to changes in the values of the monitored operational limits (operation parameters: Vac-Min and Vac-Max). • If the line voltage lies within the tolerance range, yet "Vac-Bfr" or "Vac-Srr" faults are still displayed, contact the SMA Serviceline.

Message	Description and corrective measure
Vpv-Max	Overvoltage at DC input! Overvoltage can destroy the inverter.
	Corrective measures 1. Stop the small wind turbine system. 2. Turn off the miniature circuit-breaker. 3. Release all DC plug connectors, (see section 7.2 "Opening the Inverter" (page 42). 4. Check the DC voltage of the DC overvoltage protection (e.g. Windy Boy Protection Box) during operation of the small wind turbine for adherence to the maximum input voltage of the inverter before reconnecting the DC plug connector to the inverter. If the message occurs again, disconnect the inverter again and contact the SMA Serviceline.
Watchdog **Watchdog-Srr**	Internal program run disturbance.
	Corrective measures • If this disturbance occurs frequently, contact the SMA Serviceline.

9.3 Red LED is Glowing Continuously

Should the red LED on the inverter illuminate continuously during operation, either there has been a ground fault in the system or at least one of the varistors inside the inverter 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.

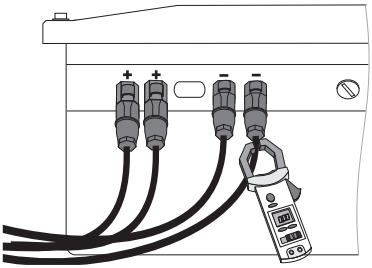
With intentionally grounded small wind turbine systems, check occasionally that the varistors inside the inverter function correctly, since a fault with the varistors can no longer be displayed.

9.3.1 Checking the Small Wind Turbine System for a Ground Fault

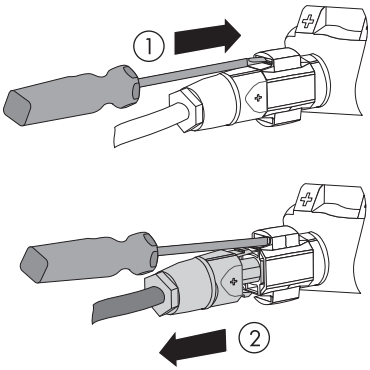
DANGER!
Danger to life due to high voltages in the inverter.

- Stop the small wind turbine system and make sure that it will not restart.
- Disconnect the miniature circuit-breaker and secure against re-connection.
- Ensure that no voltage is present on the AC side.

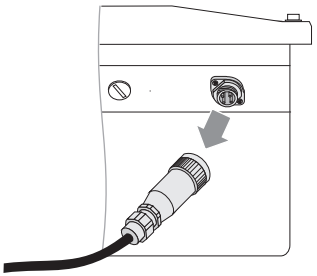
1. Using a current probe, ensure that no current is present at all DC cables.
   ☑ If current is present, check the installation.



2. Unlock all DC connectors. For this purpose, use a screwdriver with a width of 3.5 mm.
   – Insert a screwdriver into one of the side slits (1).
   – Disconnect DC connectors (2).



3. Pull out the AC plug.



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

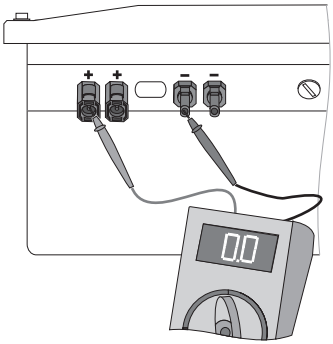
DANGER!

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.

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



6. Measure the resistance between L1 of the small wind turbine and the ground potential.
7. Measure the resistance between L2 of the small wind turbine and the ground potential.
8. Measure the resistance between L3 of the small wind turbine and the ground potential.

Result	Measure
The measured resistance is virtually infinite. ☑ There is no ground fault in the small wind turbine system.	There is probably a ground fault in the supply cables to the inverter or at least one of the thermally monitored varistors is defective. • Measure the resistance of all terminals and the ground potential. • Check the function of the varistors (see section 9.3.2 "Checking the Function of the Varistors" (page 53)).
The measured resistance is very small (< 10 Ω). ☑ There is no ground fault in the small wind turbine.	• Have the installer of the small wind turbine system correct the ground fault before reconnecting the small wind turbine system.

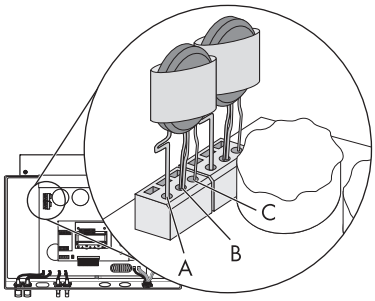
9.3.2 Checking the Function of the Varistors

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

Position of the varistors

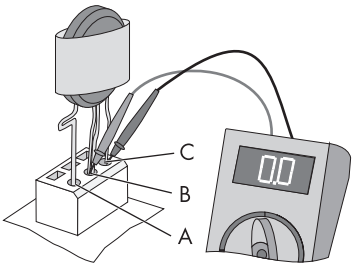
The position of the varistors is to be determined with the help of the diagram below. Observe the following allocation of the terminals:

- Terminal A: outer terminal (varistor connection **with loop** [crimp])
- Terminal B: middle terminal
- Terminal C: outer terminal (varistor connection **without loop** [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 42).
2. Use a multimeter to ensure that all of the varistors in the installed state have a conducting connection between connectors B and C.



Result	Measure
☑ 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 44). 2. Contact the SMA Serviceline.

Result	Measure
☑ There is **no conducting** connection.	The respective varistor is defective and must be replaced. Varistor failure is generally due to influences that 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 12 "Accessories" (page 65)). • To replace the varistors, proceed to step 3.

NOTICE!

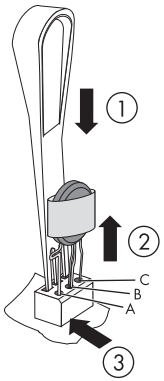
Destruction of the inverter through overvoltage.

- Provide for replacement varistors immediately and replace the faulty varistors.
- 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 do not receive an insertion tool for operating the terminal clamps with your replacement varistors, please contact SMA Solar Technology AG. As an alternative, the terminal contacts can be operated using a 3.5 mm wide screwdriver.



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

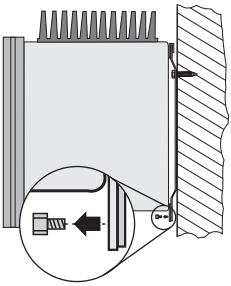
   The pole with the small loop (crimp) must be mounted into terminal A when reinstalling it (3).
6. Close the inverter as described in section 7.3 "Closing the Inverter" (page 44).

☑ The check and replacement of the varistors is completed.

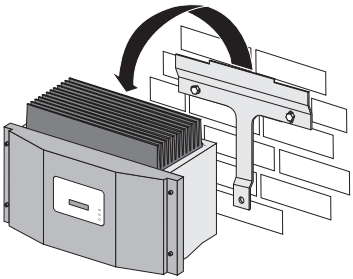
10 Decommissioning

10.1 Disassembling the Inverter

1. Open the inverter as described in section 7.2 "Opening the Inverter" (page 42).
2. Remove all cables from the inverter.
3. Close the inverter with the 4 screws.
4. Loosen the lower screw between the inverter and the wall mounting bracket.



5. Lift the inverter off the wall mounting bracket.



☑ The inverter is disassembled.

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 location 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 66)).

11 Technical Data

11.1 Windy Boy 1200

DC Input

Turbine control		Polynomial characteristic curve
Maximum DC power at cos φ = 1	P_{DC}	1 320 W
Recommended generator power at 2 500 full-load hours per year	$P_{DC, 2500}$	1 050 W
Recommended generator power at 5 000 full-load hours per year	$P_{DC, 5000}$	1 000 W
Maximum DC voltage	$V_{DC\ Max}$	400 V
Voltage range at 230 V AC	V_{DC}	100 V ... 400 V
DC nominal voltage	$V_{DC\ Nom}$	120 V
Minimum DC voltage at 230 V AC	$V_{DC\ Min}$	100 V
Start voltage, adjustable	$V_{PV\ Start}$	120 V
Maximum input current	I_{DC}	12.6 A
Number of inputs		2
Voltage ripple of input voltage	V_{pp}	< 10 %
Self-consumption during operation		< 4 W

AC Output

nominal AC power at 230 V, 50 Hz	$P_{AC\ nom}$	1 200 W
Maximum apparent AC power	$S_{AC\ max}$	1 200 VA
Nominal AC current	$I_{AC\ nom}$	5.2 A
Maximum output current	$I_{AC\ max}$	6.1 A
Maximum fuse protection		16 A
Total harmonic distortion of output current at AC total harmonic distortion voltage < 2 %, AC power > 0.5 nominal AC power	K_{IAC}	< 3 %
Nominal AC voltage	$V_{AC\ Nom}$	220 V/230 V/240 V
AC voltage range	V_{AC}	180 V ... 265 V
AC power frequency	$f_{AC\ nom}$	50 Hz/60 Hz
Operating range at AC grid frequency	f_{AC}	50 Hz: 45.5 Hz ... 54.5 Hz 60 Hz: 55.5 Hz ... 64.5 Hz
Power factor at nominal AC power	cos φ	1
Overvoltage category		III
Testing voltage at 50 Hz		1.7 kV
Surge testing voltage		4 kV
Surge testing voltage with serial interface		6 kV
Self-consumption in night operation		0.1 W

Mechanical Data

Width x height x depth	440 mm x 299 mm x 214 mm
Weight	23 kg

Climatic Conditions

Extended temperature range*	− 25 °C ... +60 °C
Extended humidity range*	0 % ... 100 %
Extended air pressure range*	79.5 kPa ... 106 kPa
Temperature range**	− 25 °C ... +70 °C
Operating temperature range	− 25 °C ... +60 °C
Maximum operating altitude above mean sea level	2 000 m

* According to DIN EN 50178:1998-04, installation type C, class 4K4H

** According to DIN EN 50178:1998-04, transport type E, class 2K3

Features

Topology	LF transformer

General Data

Protection rating*	IP65
Protection class	I
Noise emission (typical)	≤ 41 dB(A)

* According to IEC 60529

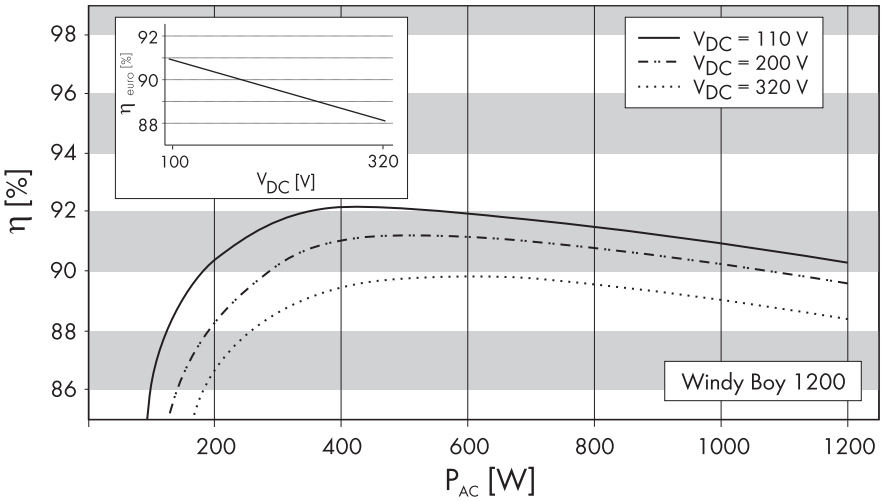
Protective Devices

All-pole DC disconnection unit	DC connection system SUNCLIX
DC overvoltage protection	Thermally monitored varistors, Windy Boy Protection Box (optional)
Personal protection (R_{iso} > 1 M Ω)	Insulation monitoring
Reverse polarity protection	Short circuit diode
AC short-circuit current capability	Current control
All-pole AC disconnection unit	Automatic disconnection device SMA Grid Guard 2.1, double design

Communication Interfaces

Bluetooth® Wireless Technology	Optional
RS485, galvanically isolated	Optional

Efficiency



Maximum efficiency	$\eta_{max.}$	92.1 %
Euro-eta	η_{EU}	90.9 %

11.2 Windy Boy 1700

DC Input

Turbine control		Polynomial characteristic curve
Maximum DC power at cos φ = 1	P_{DC}	1 850 W
Recommended generator power at 2 500 full-load hours per year	$P_{DC, 2500}$	1 400 W
Recommended generator power at 5 000 full-load hours per year	$P_{DC, 5000}$	1 300 W
Maximum DC voltage	$V_{DC\ Max}$	400 V
Voltage range at 230 V AC	V_{DC}	139 V ... 400 V
DC nominal voltage	$V_{DC\ Nom}$	180 V
Minimum DC voltage at 230 V AC	$V_{DC\ Min}$	139 V
Start voltage, adjustable	$V_{PV\ Start}$	180 V
Maximum input current	I_{DC}	12.6 A
Number of inputs		2
Voltage ripple of input voltage	V_{pp}	< 10 %
Self-consumption during operation		< 4 W

AC Output

nominal AC power at 230 V, 50 Hz	$P_{AC\ nom}$	1 550 W
Maximum apparent AC power	$S_{AC\ max}$	1 700 VA
Nominal AC current	$I_{AC\ nom}$	6.7 A
Maximum output current	$I_{AC\ max}$	8.6 A
Maximum fuse protection		16 A
Total harmonic distortion of output current at AC THD voltage < 2 %, AC power > 0.5 nominal AC power	K_{IAC}	< 3 %
Nominal AC voltage	$V_{AC\ Nom}$	220 V/230 V/240 V
AC voltage range	V_{AC}	180 V ... 265 V
AC power frequency	$f_{AC\ nom}$	50 Hz/60 Hz
Operating range at AC grid frequency	f_{AC}	50 Hz: 45.5 Hz ... 54.5 Hz 60 Hz: 55.5 Hz ... 64.5 Hz
Power factor at nominal AC power	Cos φ	1
Overvoltage category		III
Testing voltage at 50 Hz		1.7 kV
Surge testing voltage		4 kV
Surge testing voltage with serial interface		6 kV
Self-consumption in night operation		0.1 W

Mechanical Data

Width x height x depth	440 mm x 299 mm x 214 mm
Weight	25 kg

Climatic Conditions

Extended temperature range*	− 25 °C ... +60 °C
Extended humidity range*	0 % ... 100 %
Extended air pressure range*	79.5 kPa ... 106 kPa
Temperature range**	− 25 °C ... +70 °C
Operating temperature range	− 25 °C ... +60 °C
Maximum operating altitude above mean sea level	2 000 m

* According to DIN EN 50178:1998-04, installation type C, class 4K4H

** According to DIN EN 50178:1998-04, transport type E, class 2K3

Features

Topology	LF transformer

General Data

Protection rating*	IP65
Protection class	I
Noise emission (typical)	≤ 46 dB(A)

* According to IEC 60529

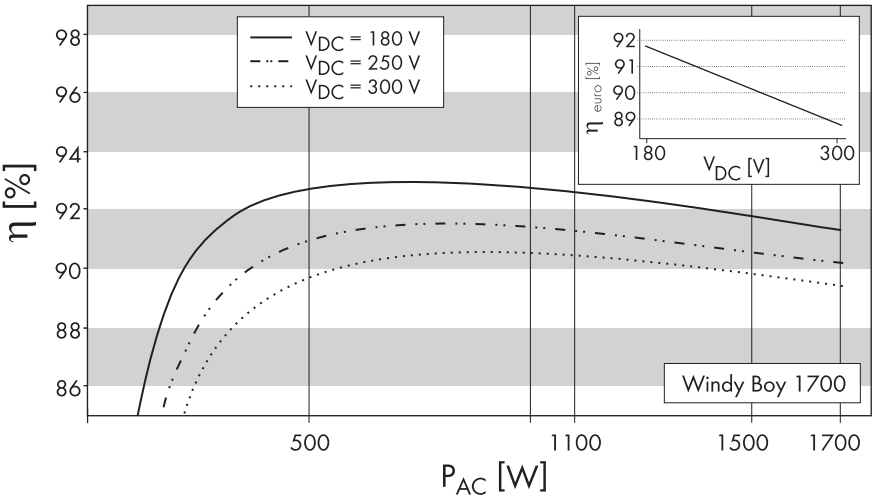
Protective Devices

All-pole DC disconnection unit	DC connection system SUNCLIX, Windy Boy Protection Box (optional)
DC overvoltage protection	Thermally monitored varistors
Personal protection (R_{iso} > 1 M Ω)	Insulation monitoring
Reverse polarity protection	Short circuit diode
AC short-circuit current capability	Current control
All-pole AC disconnection unit	Automatic disconnection device SMA Grid Guard 2.1, double design

Communication Interfaces

Bluetooth	Optional
RS485, galvanically isolated	Optional

Efficiency



Maximum efficiency	$\eta_{max.}$	93.5 %
Euro-eta	η_{EU}	91.8 %

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 400
Replacement varistors	Set of thermally monitored varistors (2) including insertion tool	SB-TV3
Installation tool for varistors	Tool for installing the varistors	SB-TVWZ
RS485 upgrade kit	RS485 interface	485PB-NR
Bluetooth® upgrade kit	*Bluetooth* interface	BTPBINV-NR
SUNCLIX DC connector	Field plug for cable diameters between 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
- Serial number of inverter
- Type of connected small wind turbine system
- Optional equipment, e.g. communication devices
- Blink code or display message of the inverter

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www.SMA.de/en

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- 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

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