Wind Power Inverter

# WINDY BOY 1100LV

**Installation Guide**


WB1100LV-IA-IEN104130 | IME-WB1100LV | Version 3.0

EN

# Table of Contents

# 1 Notes on this Guide

## 1.1 Validity

This guide is valid for the device type WB 1100LV/WB 1100LV-IT.

## 1.2 Target Group

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

## 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 provided for detailed information on operating the inverter.

## 1.4 Symbols Used

The following types of safety warnings 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.**

**Important**

Important indicates important information.

# 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 power distribution grid, domestic grid or the stand-alone system.

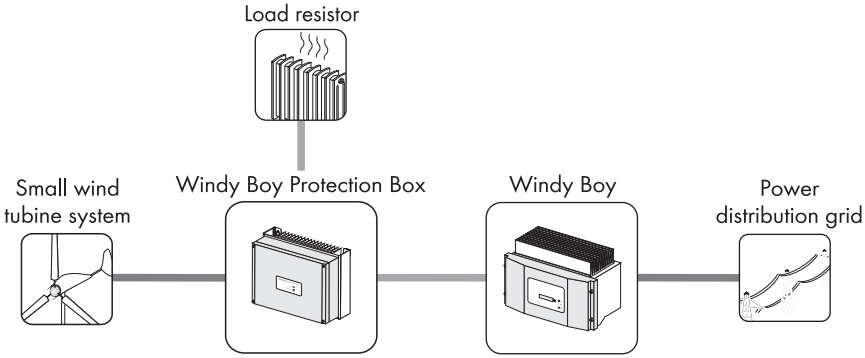



Figure 1: Small wind turbine systems a Windy Boy and Windy Boy Protection Box.

Furthermore, the Windy Boy can be used as an inverter for power conversion units based on the permanent magnet generators (e.g. hydro power systems, combined heat and power plant).

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. Also use appropriate protective measures to ensure that the maximum permissible input voltage of the Windy Boy 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, and the installation of components void the warranty claims and operation permit.

This guide is part of the Windy Boy. Follow all the tasks described in this guide. Keep this guide in a convenient place for future reference.

## 2.2 Safety Precautions

**⚠ DANGER**

**Danger to life due to high voltages.**

- All work on the inverter may be carried out by qualified personnel only.

**⚠ CAUTION**

**Danger of burn injuries due to hot enclosure parts.**

- Only touch the lid during operation.

## 2.3 Explanation of Symbols

### 2.3.1 Symbols on the Inverter

| Symbol | Description |
|---|---|
|  | Operation Display.<br>Indicates the operation condition of the inverter. |
|  | Ground fault or varistor defective.<br>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.<br>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 | Description |
|---|---|
|  | Beware of dangerous electrical voltage.<br>The inverter operates at high voltages. All work on the inverter must be carried out exclusively by qualified personnel. |
|  | Beware of hot surface.<br>The inverter can become hot during operation. Avoid contact during operation. |
|  | The inverter must not be disposed of together with the household waste. For more information on disposal, see section 10.4 "Disposing of the Inverter", page 35. |
|  | CE mark.<br>The inverter complies with the requirements of the applicable EC guidelines. |
|  | RAL quality mark for solar products.<br>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 Scope of Delivery

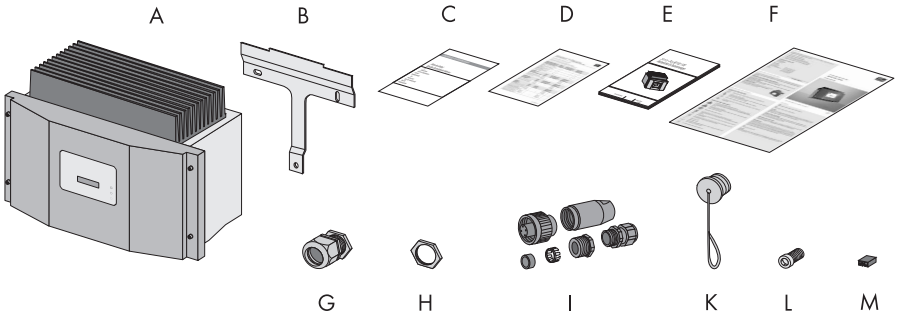



Figure 2: Components included in delivery

| Position | Quantity | Description |
|---|---|---|
| A | 1 | Inverter |
| B | 1 | Wall mounting bracket |
| C | 1 | Set of documents with explanations and certificates |
| D | 1 | Supplementary sheet with factory settings |
| E | 1 | Installation Guide |
| F | 1 | User Manual |
| G | 2 | Cable gland |
| H | 2 | Counter nut for cable gland |
| I | 1 | AC connection socket: socket unit, threaded sleeve, pressure screw PG16, sealing ring PG16, fastening case PG13.5, cable gland PG16 |
| K | 1 | Protective cap for AC socket |
| L | 1 | M6x12 cylinder head screw |
| M | 1 | Jumper |

# 4 Mounting the Inverter with the Wall Mounting Bracket

**Requirements for the mounting location:**

**⚠ DANGER**

**Danger to life due to fire or explosion.**

- 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.

☐ Mount on a solid surface.

☐ The mounting surface is suitable for the weight and dimensions of the inverter.

☐ The mounting location must be clear and have safe access without the use of additional aids (such as scaffolding or lifting platforms) at all times.

☐ The mounting location must not be exposed to direct sunlight.

☐ Observe climatic conditions (see chapter 11 "Technical Data", page 36).

☐ Observe minimum clearance to the walls as well as to other inverters or other objects.

**Minimum clearances:**

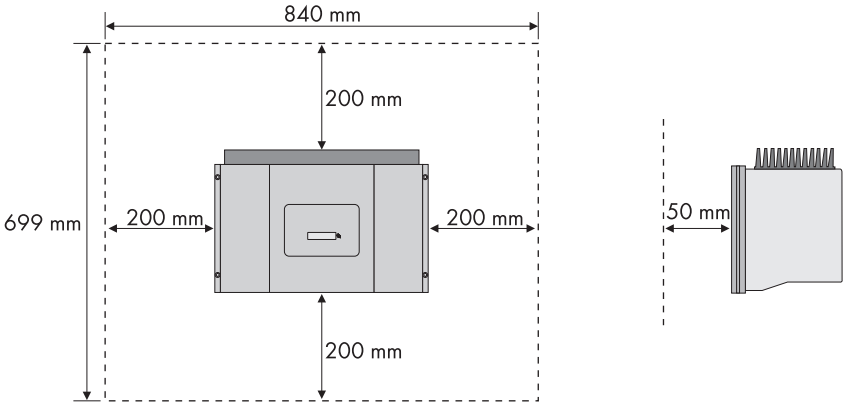



Figure 3: Minimum clearances to be observed

## Mounting position:

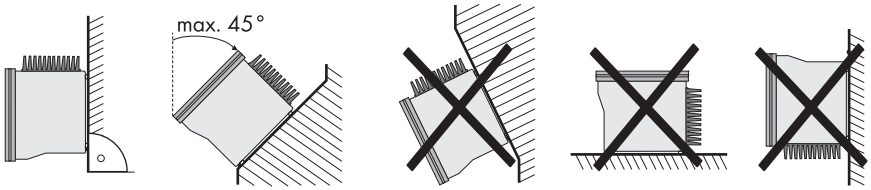



Figure 4: Permitted and prohibited mounting positions

## Dimensions:

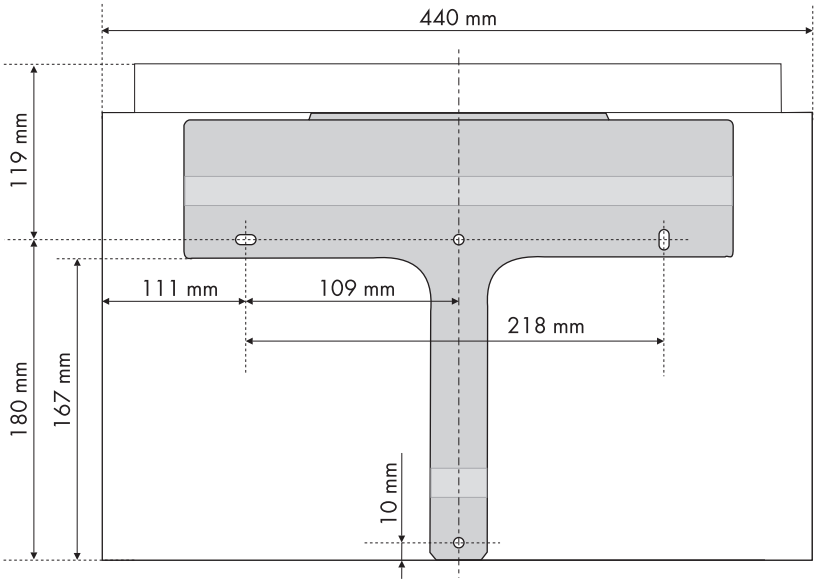


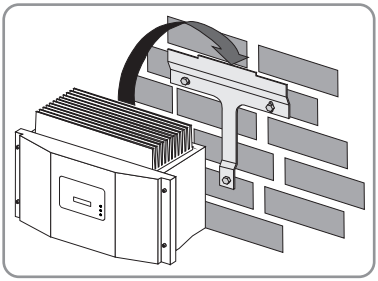

Figure 5: Wall mounting bracket dimensioning

**⚠ CAUTION**

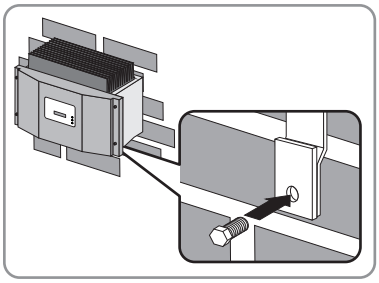
**Risk of injury due to the heavy weight of the inverter.**

- Note the weight of the inverter (see section 11 "Technical Data", page 36).
- Use fastening material suitable for the surface.

1. Mark the position of the drill holes. Use the wall mounting bracket when marking the holes.
2. Fasten the wall bracket using suitable fastening material.
3. Attach the inverter in the wall mounting bracket using the upper mounting clips. Make sure that the inverter cannot be being pushed out of the wall mounting bracket from the side.



4. To secure the inverter from lifted out, fasten the inverter on the wall mounting bracket using the provided M6x12 cylinder head screw.



# 5 Electrical Connection

## 5.1 Overview of the Connection Area

### 5.1.1 Exterior View

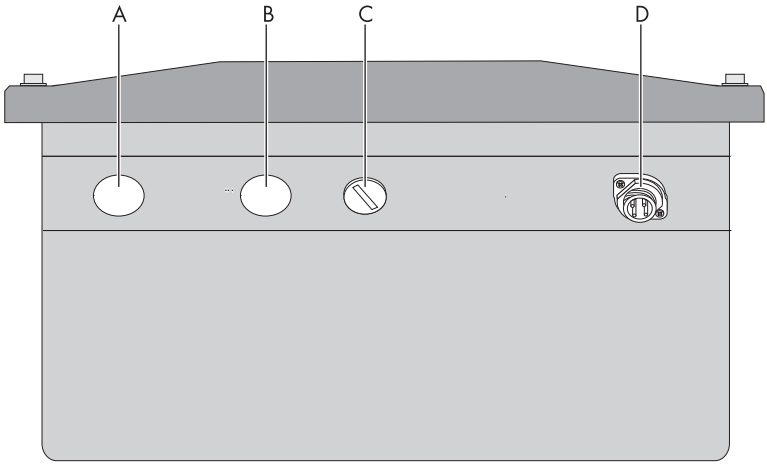



Figure 6: Enclosure openings and plug at the bottom of the inverter

| Position | Description |
|---|---|
| A | Enclosure opening for the DC+ cable |
| B | Enclosure opening for the DC − cable |
| C | Enclosure opening with sealing plugs for communication |
| D | Socket for AC Connection |

## 5.1.2 Interior View

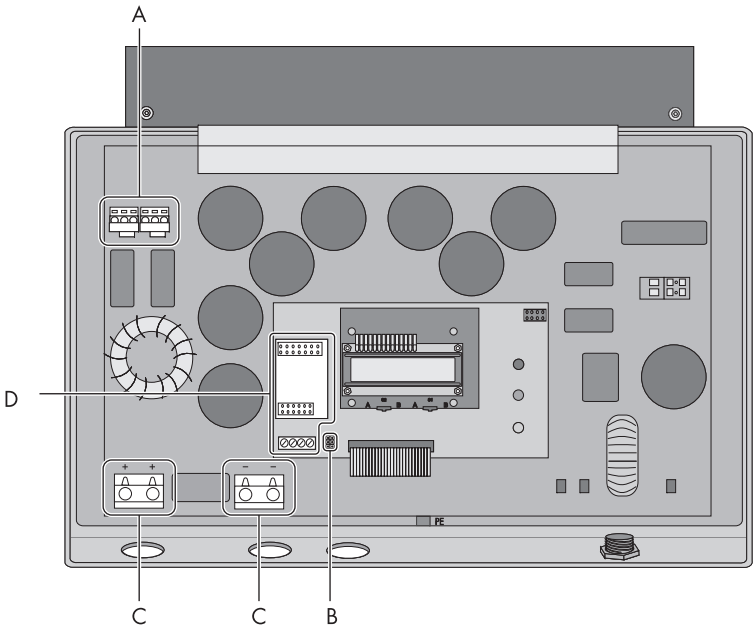



Figure 7: Connections inside the inverter

| Position | Description |
|---|---|
| A | Varistors |
| B | Jumper slot |
| C | Connection terminals for DC+ and DC – |
| D | Socket and connection area for communication |

## 5.2 Connecting the Inverter to the Public Distribution Grid

**Cable sizing:**

- ☐ The conductor cross-section must be dimensioned so output losses do not exceed 1 % at nominal power.
- ☐ Conductor cross-section is maximum 2.5 mm².
- ☐ Cable length is maximum 21 m for 1.5 mm² and maximum 35 m for 2.5 mm².
- ☐ External cable diameter is 9 mm ... 17 mm.

**Load Disconnection Unit and Cable Protection:**

- Install a separate line circuit breaker or load disconnection unit for each inverter to ensure that the inverter can be safely disconnected under load. Here, observe the maximum permissible fuse protection (see section 11 "Technical Data", page 36).

Detailed information and examples for the design of a line circuit breaker can be found in the Technical Information "Line Circuit Breaker" in the 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 in parallel, 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.

- Do not connect more than one inverter to a line circuit breaker. Here, observe the maximum permissible fuse protection (see section 11 "Technical Data", page 36).

**⚠ DANGER**

**Risk of lethal electric shock**

When a generator (inverter) and a load 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 public electrical grid can accumulate to overcurrent which is not be detected by the line circuit breaker.

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

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

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

## Required Materials

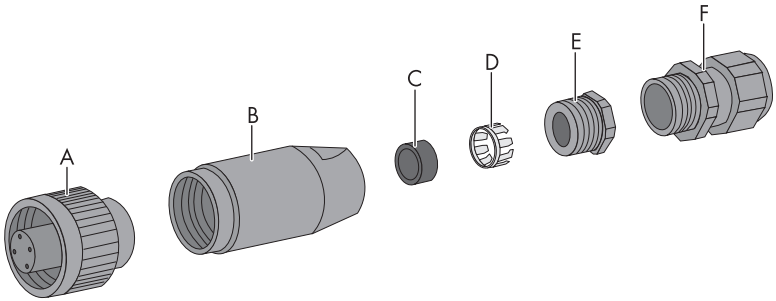
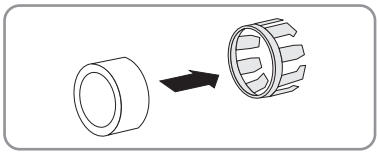


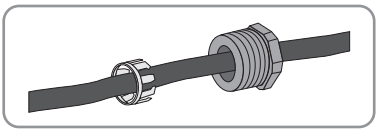

Figure 8: AC plug components (included in delivery)

| Position | Description |
|---|---|
| A | Socket tube |
| B | Threaded sleeve |
| C | Sealing ring |
| D | Fastening case |
| E | Pressure screw |
| F | Cable gland |

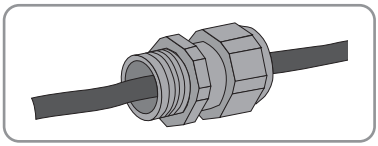
1. Check that the grid voltage is within the permissible voltage range. Here, observe the inverter's exact operating range (see Technical Description of "Operating Parameters" at www.SMA.de/en).
2. Disconnect the line circuit breaker and secure against re-connection.
3. Strip approx. 30 mm from the AC cable.
4. Shorten L and N by 5 mm.
5. Strip 4 mm ... 5 mm of the L, N and PE wires.
6. If the cable diameter is 9 mm ... 13.5 mm, use sealing ring, fastening case and pressure screw:
   - Push the sealing ring into the fastening case.



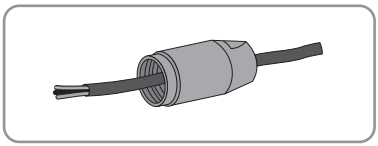
   - Pass the pressure screw and the fastening case including the sealing ring over the AC cable.



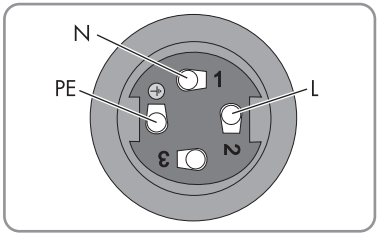
7. If the cable diameter is between 13.5 mm ... 17 mm, pass the cable gland over the AC cable.



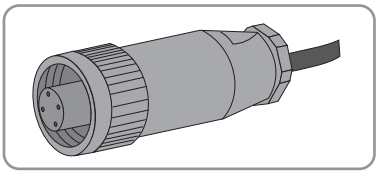
8. Pass the threaded sleeve over the AC cable.



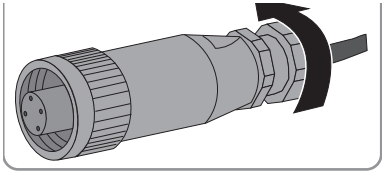
9. Connect PE, N and L to socket element:
   - Insert the PE in the screw terminal with the ground symbol on the socket element and tighten the screw.
   - Insert the N into screw terminal 1 and tighten the screw.
   - Insert the L into screw terminal 2 and tighten the screw.



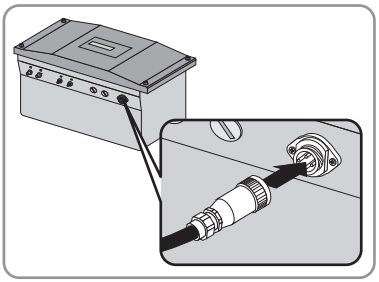

10. Check that the PE, N and L are securely in place.
11. Screw the threaded sleeve tightly onto the socket tube.
    ☑ If the cable diameter is between 9 mm ... 13.5 mm, the AC plug is assembled.



12. If the cable diameter is between 13.5 mm ... 17 mm, tighten the cable gland lock nut firmly on the threaded sleeve.

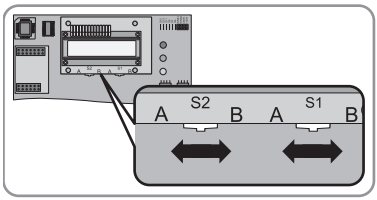


13. If the AC plug is not immediately connected to the inverter, attach the protective cap onto the AC socket on the inverter.
14. Insert the AC plug into the AC socket on the inverter and tighten it.



## 5.3 Setting the Display Language

1. Disconnect the inverter from the power supply (see section 7).
2. To set the display language for WB 1100LV, set the switches as follows:




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

3. To set the display language for WB 1100LV-IT, set the switches as follows:

| Language | Switch S2 | Switch S1 |
|---|---|---|
| Italian | B | A |
| English | A | A |

4. Close the lid:
   - Create a PE connection to the enclosure cover.
   - Place the lid onto the enclosure and secure with 4 screws.

## 5.4 Connecting the Small Wind Turbine System

**Requirements:**

☐ The AC line circuit breaker is switched off and secured so it cannot be reactivated.

☐ The small wind turbine system is stopped and secured so it will not restart.

***NOTICE***

**Destruction of the inverter due to excessive power from the small wind turbine system. All warranty claims become void.**

- Observe the maximum power that can be connected (see section 11 "Technical Data", page 36).
- Install overvoltage protection between the small wind turbine system and the inverter.

1. Remove the adhesive tape from the enclosure openings for DC+ and DC − .
2. Attach the cable glands on the enclosure openings for DC+ and DC − .
3. Unscrew the cable gland lock nuts and pass each cable gland over DC+ and DC − .
4. ***NOTICE***

   **Electrostatic discharges can damage the inverter.**

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

   - Make sure you are grounded before touching any component.
5. Open the lid:
   - Loosen all screws of the enclosure lid and carefully pull the lid forward.
   - Disconnect the PE connection from the enclosure cover. Loosen the locking on the PE connection on the lid.
6. Connect the cables to the + and − connection terminals. Ensure the connection terminals have the correct polarity.
7. Tighten the lock nut onto the cable gland.

## 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 Changing the Country Data Set

**⚠ DANGER**

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

If the PV inverter is set to "OFF-Grid", it does not fulfill any country-specific standards and regulations. If there is a public grid outage, there is a danger of feedback.

- If "OFF-Grid" is set, the inverter only operates in a stand-alone grid.

**Changing the Country Data Set and grid-relevant Parameters**

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

- If the inverter's factory-set country data set does not apply to your country, set the country data set with a communication product using the "Default" parameter. HINT: You can see which country data set was set at the factory on the type label and the supplementary document provided with the factory settings.

## 5.7 Setting the Polynomial Characteristic Curve

The polynomial characteristic curve is an adjustable power curve depending on the DC input voltage. To optimize the energy yield, the inverter's polynomial characteristic curve must be adjusted to the small wind turbine system used.

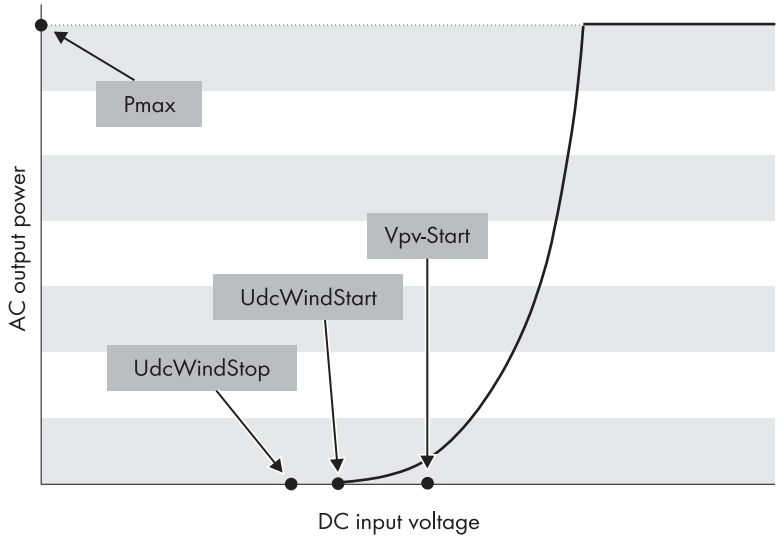



Figure 9: The feed-in AC power in relation to the inverter's DC input voltage.

**Communication Problems due to incorrect Setting**

Before transferring the set parameters to the inverter, make sure that the "UdcWindStart" is greater than "UdcWindStop".

- If "UdcWindStart" is less than "UdcWindStop", reduce "UdcWindStop".

- Set the following parameters with Windy Boy Setup Tool, software version 1.0.5 or higher:
  - "Vpv-Start"
  - "UdcWindStart"
  - "UdcWindStop"
  - "Wind_a0" ... "Wind_a3"
  - "Pmax"
  - "P-Wind-Ramp"
  - "KP-Wind-Reg"
  - "KI-Wind-Reg"
  - "T-Stop"

# 6 Commissioning

**Requirements:**

☐ The inverter is mounted correctly.

☐ All cables are correctly connected.

☐ The line circuit breaker is correctly rated.

☐ The small wind turbine system is grounded according to the manufacturer specifications.

☐ The rectifier and overvoltage protection are installed between the small wind turbine system and the inverter.

1. Close the lid:
   - Create a PE connection to the enclosure cover.
   - Place the lid onto the enclosure and secure with 4 screws.
2. Switch on the line circuit breaker.
3. Commission the small wind turbine system in accordance with the instructions of the manufacturer.

☑ Green LED is illuminated.

✖ Is green LED flashing?

The wind is currently too weak. The inverter begins to operate as the wind becomes stronger.

✖ Is the red or yellow LED illuminated or blinking?

An error or fault may have occurred.

- Eliminate the error or fault (see section 9 "Troubleshooting", page 25).

# 7 Disconnect the Inverter from Voltage Sources

1. **⚠ DANGER**

   **Risk of lethal electric shock.**

   - Disconnect the line circuit breaker and secure against re-connection.
   - Stop the small wind turbine system and secure it so that it cannot restart.
   - Ensure that no voltage is present on the DC side.

2. Pull out the AC plug.

3. **⚠ DANGER**

   **Danger to life due to high voltages.**

   The capacitors in the inverter require 15 minutes to discharge.

   - Wait 15 minutes before opening the lid.

4. ***NOTICE***

   **Electrostatic discharges can damage the inverter.**

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

   - Make sure you are grounded before touching any component.

5. Open the lid:
   - Loosen all screws of the enclosure lid and carefully pull the lid forward.
   - Disconnect the PE connection from the enclosure cover. Loosen the locking on the PE connection on the lid.
6. Remove the cables from the + and − connection terminals.

# 8 Maintenance and Cleaning

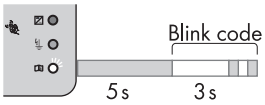
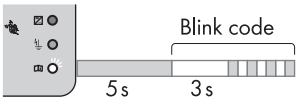
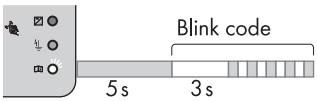
Impurities (e.g. dust or pollen) can cause heat accumulation, which can lead to yield losses.

1. Check the inverter and cables for any signs of external damage.
2. Contact the SMA Serviceline if the inverter is damaged.
3. If the cables are damaged, repair or replace them.

# 9 Troubleshooting

## 9.1 Blink Codes

- If the inverter displays blink codes other than those described in the following section, contact the SMA Serviceline.
- Only perform the repair work described in this section.
- If the inverter is defective, use the replacement and repair service from SMA Solar Technology AG (see www.SMA.de/en).

| Blink code | Fault indication |
|---|---|
| The yellow LED blinks twice   | < ACVtgRPro > (Remedy see "ACVtgRPro", page 27) |
| | < Fac-Bfr > (Remedy see "Fac-Bfr", page 28) |
| | < Fac-Srr > (Remedy see "Fac-Srr", page 28) |
| | < FacFast > (Remedy see "FacFast", page 28) |
| | < Vac-Bfr > (Remedy see "Vac-Bfr", page 30) |
| | < Vac-Srr > (Remedy see "Vac-Srr", page 31) |
| Yellow LED flashes 4 times and the display background flashes   | < !PV-Overvoltage! - !DISCONNECT DC! > (Remedy see "!PV-Overvoltage! - !DISCONNECT DC!", page 26) |
| The yellow LED blinks 5 times   | < Bfr-Srr > (Remedy see "Bfr-Srr", page 27) |
| | < EEPROM > (Remedy see "EEPROM", page 27) |
| | < EEPROM dBh > (Remedy see "EEPROM dBh", page 27) |
| | < EeRestore > (Remedy see "EeRestore", page 27) |
| | < Imax > (Remedy see "Imax/Overcurrent", page 28) |
| | < K1-Close > (Remedy see "K1-Close", page 28) |
| | < K1-Open > (Remedy see "K1-Open", page 28) |
| | < Offset > (Remedy see "Offset", page 29) |
| | < ROM > (Remedy see "ROM", page 29) |
| | < Shut-Down > (Remedy see "Shut-Down", page 29) |

| Blink code | Fault indication |
|---|---|
| Yellow LED is continuously illuminated | < MSD-Fac ><br>(Remedy see "MSD-Fac", page 29) |
| | < MSD-Vac ><br>(Remedy see "MSD-Vac", page 29) |
| | < MSD-Timeout ><br>(Remedy see "MSD-Timeout", page 29) |

## 9.2 Error Messages

| Fault indication | Description and Corrective Measures |
|---|---|
| !PV-Overvoltage! - !DISCONNECT DC! | Overvoltage at DC input!<br>Overvoltage can destroy the inverter. |
| | Disconnect the inverter from the public grid immediately:<br>1. Disconnect the inverter from voltage sources (see section 7).<br>2. Check DC voltage.<br>3. If the DC voltage is above the maximum input voltage, check the plant design.<br>4. If the DC is below the maximum input voltage, connect the small wind turbine system (see section 5.4).<br>5. If the message occurs again, contact the SMA Serviceline. |

| Fault indication | Description and Corrective Measures |
|---|---|
| ACVtgRPro | The average grid voltage over 10 minutes is no longer within the permissible range. This can have the following causes:<br>• The grid voltage at the connection point is too high.<br>• The grid impedance at the connection point is too high.<br>The inverter disconnects to assure compliance with the voltage quality of the public grid. |
| | 1. Check the grid voltage at the point of connection of the inverter:<br>2. If the grid voltage is at 253 V or higher due to the local grid conditions, contact the utility operator and ask the following:<br>– Can the voltage be adjusted to the grid connection point?<br>**or**<br>– Can the limit value of parameter "ACVtgRPro" be adjusted for monitoring the voltage quality?<br>3. If the grid voltage is continually within the acceptable range and the error still occurs, contact the SMA Serviceline. |
| Bfr-Srr | Internal measurement comparison disturbance or hardware defect. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| EEPROM | Transition fault while data is read out or written from EEPROM. This data is not essential for safe operation.<br>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 inverter functions. |
| | • Contact the SMA Serviceline. |
| EeRestore | One of the duplicate data sets in the EEPROM is defective and has been reconstructed without loss of data.<br>The error message only serves to inform you and has no effect on the performance of the inverter. |

| Fault indication | Description and Corrective Measures |
|---|---|
| Fac-Bfr | The grid frequency has left the allowable range. "Bfr" is an internal message and has no meaning.<br>The inverter disconnects itself from the public grid for safety reasons. |
| | • Check the grid connection and contact the utility operator if necessary.<br>• If the grid frequency is within the acceptable range and the error still occurs, contact the SMA Serviceline. |
| Fac-Srr | The grid frequency has left the allowable range. "Srr" is an internal message and has no meaning.<br>The inverter disconnects itself from the public grid for safety reasons. |
| | • Check the grid connection and contact the utility operator if necessary.<br>• If the grid frequency is within the acceptable range and the error still occurs, contact the SMA Serviceline. |
| FacFast | The grid frequency has left the allowable range.<br>The inverter disconnects itself from the public grid for safety reasons. |
| | • Check the grid connection and contact the utility operator if necessary.<br>• If the grid frequency is within the acceptable range and the error still occurs, contact the SMA Serviceline. |
| Imax/Overcurrent | Overcurrent on the AC side. The current in the AC grid is greater than specified. |
| | • Check the plant design and grid conditions. |
| K1-Close | Fault during relay test. |
| | • If this disturbance occurs often or several times in succession, contact the SMA Serviceline. |
| K1-Open | Fault during relay test. |
| | • If this disturbance occurs often or several times in succession, contact the SMA Serviceline. |

| Fault indication | Description and Corrective Measures |
|---|---|
| MSD-Fac | Internal measurement comparison disturbance or hardware defect. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| MSD-Vac | Internal measurement comparison disturbance or hardware defect. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| MSD-Timeout | Internal measurement comparison disturbance or hardware defect. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| Offset | Fault in the acquisition of measurement data. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| ROM | Problem accessing the memory. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| Shut-Down | Temporary inverter disturbance. |
| | • Contact the SMA Serviceline. |

| Fault indication | Description and Corrective Measures |
|---|---|
| Vac-Bfr | The grid voltage has left the allowable range. "Bfr" is an internal message and has no meaning.<br>Causes:<br>• Disconnection from the public grid<br>• AC cable is broken<br>**or**<br>• AC cable is highly resistive<br>The inverter disconnects itself from the public grid for safety reasons. |
| | 1. Check the grid current and grid connection on the inverter.<br>2. If the grid voltage is outside the permissible range due to local grid conditions, contact the utility operator and ask the following:<br>– Can the voltage be adjusted to the grid connection point?<br>**or**<br>– May the monitored operational limits "Vac-Min" and "Vac-Max" be changed?<br>3. If the grid voltage is within the acceptable range and the error still occurs, contact the SMA Serviceline. |

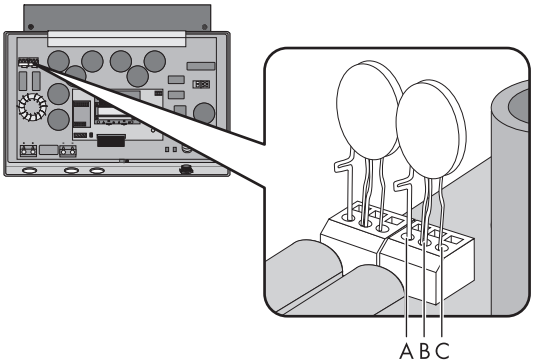
| Fault indication | Description and Corrective Measures |
|---|---|
| Vac-Srr | The grid voltage has left the allowable range. "Srr" is an internal message and has no meaning.<br>Causes:<br>• Disconnection from the public grid<br>• AC cable is broken<br>**or**<br>• AC cable is highly resistive.<br>The inverter disconnects itself from the public grid for safety reasons. |
| | 1. Check the grid current and grid connection on the inverter.<br>2. If the grid voltage is outside the permissible range due to local grid conditions, contact the utility operator and ask the following:<br>– Can the voltage be adjusted to the grid connection point?<br>**or**<br>– May the monitored operational limits "Vac-Min" and "Vac-Max" be changed?<br>3. If the grid voltage is within the acceptable range and the error still occurs, contact the SMA Serviceline. |
| VpvMax | Overvoltage at DC input!<br>Overvoltage can destroy the inverter. |
| | Disconnect the inverter from the public grid immediately:<br>1. Disconnect the inverter from voltage sources (see section 7).<br>2. Check DC voltage.<br>3. If the DC voltage is above the maximum input voltage, check the plant design.<br>4. If the DC is below the maximum input voltage, connect the small wind turbine system (see section 5.4).<br>5. If the message occurs again, contact the SMA Serviceline. |

| Fault indication | Description and Corrective Measures |
|---|---|
| Watchdog | Internal program run fault. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |
| Watchdog-Srr | Internal program run fault. |
| | • If this disturbance occurs frequently, contact the SMA Serviceline. |

## 9.3 Checking the Function of the Varistors

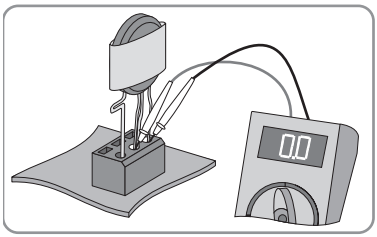
Varistors are wear parts. Their functional efficiency diminishes with age or repeated strain as a result of overvoltage. It is therefore possible that one of the thermally monitored varistors has lost its protective function, and thus the red LED is lit.

**Position of Varistors**




| Position | Description | Varistor connection |
|---|---|---|
| A | Outer terminal | With loop or crimp |
| B | Middle terminal | Without loop or crimp |
| C | Outer terminal | Without loop or crimp |

1. Disconnect the inverter from the power supply (see section 7).
2. Use a multimeter to check all the varistors in their installed state to ascertain whether there is a conducting connection between the middle and outer terminal.



☑ There is no conducting connection.

– The respective varistor is not working and must be replaced. SMA Solar Technology AG recommends that you replace both varistors.

✖ Is there a conducting connection?

There is probably a different fault in the inverter.

- Contact the SMA Serviceline.

3. **NOTICE**

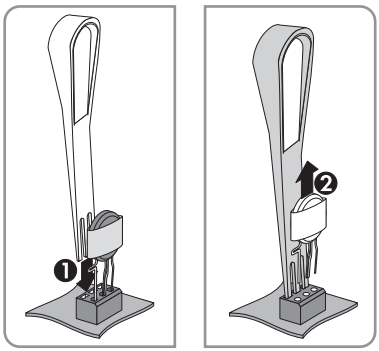
   **Destruction of the inverter by overvoltage.**

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

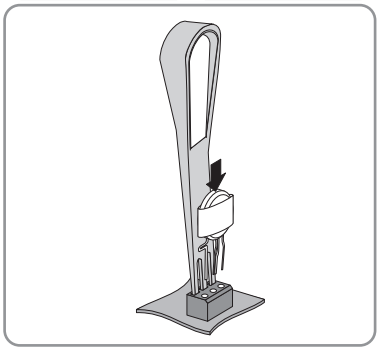
   - Replacement varistors should be obtained immediately. The varistors are specially manufactured for use in the inverter and are not commercially available. You can order replacement varistors directly from SMA Solar Technology AG (see section 12 "Accessories", page 40).
   - Do not operate inverters with faulty varistors or no varistors at all in systems with a high risk of overvoltage.

4. Insert insertion tool into the terminal contact and varistor opening.

   HINT: If there is no insertion tool, you can provisionally use a screwdriver with 3.5 mm blade width.




5. Insert new varistor. Insert the loop or crimp into the outer terminal (see "Position of Varistors", page 33).



6. Commission the inverter (see section 6).

# 10 Decommissioning

## 10.1 Dismantling the Inverter

**⚠ CAUTION**

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

- Note the weight of the inverter (see section 11 "Technical Data", page 36).

1. Disconnect the inverter from the power supply (see section 7).
2. Close the lid:
   - Create a PE connection to the enclosure cover.
   - Place the lid onto the enclosure and secure with 4 screws.
3. Loosen the screw between the inverter and the wall mounting bracket.
4. Lift the inverter off the wall mounting bracket.

## 10.2 Packaging the Inverter

- Package the inverter in the original packaging if it is available.
- If the original packaging is not available, use a box that is suitable for the weight and dimensions of the inverter.

## 10.3 Storing the Inverter

**Requirements for the storage location:**

☐ The storage location is dry.

☐ The ambient temperature is between − 25 °C and +60 °C.

## 10.4 Disposing of the Inverter

- Dispose of the inverter in accordance with the applicable disposal regulations for electronic waste.

  **or**

- Return the inverter to SMA Solar Technology AG, assuming shipping costs. When doing so, label the packaging "ZUR ENTSORGUNG" ("FOR DISPOSAL").

# 11 Technical Data

## DC Input

| | |
|---|---|
| Turbine control | Polynomial characteristic curve |
| Maximum DC power at cos ϕ = 1 | 1 240 W |
| Maximum DC voltage | 60 V |
| Voltage range at AC nominal power | 21 V ... 60 V |
| DC nominal voltage | 25 V |
| Minimum DC voltage at 230 V AC | 21 V |
| Start voltage, adjustable | 21 V |
| Maximum input current | 62 A |
| Maximum input current per input | 62 A |

## AC Output

| | |
|---|---|
| Nominal AC power at 230 V, 50 Hz | 1 000 W |
| Maximum AC apparent power | 1 000 VA |
| Nominal AC voltage | 220 V/230 V/240 V |
| Nominal AC current at 230 V | 4.4 A |
| Maximum AC current | 5 A |
| Harmonic distortion of output current at<br>AC THD voltage < 2 %,<br>AC power > 0.5 nominal AC power | ≤ 3 % |
| AC voltage range | 160 V ... 260 V |
| AC side | 50 Hz/60 Hz |
| Operating range at AC grid frequency 50 Hz | 45.5 Hz ... 54.5 Hz |
| Operating range at AC grid frequency 60 Hz | 55.5 Hz ... 64.5 Hz |
| cos ϕ at nominal AC power | 1 |
| Supply phases | 1 |
| Connection phases | 1 |
| Overvoltage category | III |

## Protective Devices

| | |
|---|---|
| DC reverse-polarity protection | Short circuit diode |
| DC overvoltage protection | Thermally monitored varistors/<br>optional: Windy Boy Protection Box |
| AC short circuit protection | Current control |
| Personnel protection | Insulation monitoring: Riso > 1 MΩ |
| Galvanic isolation | Available |

## Climatic conditions according to IEC 60721-3-4, installation type C, class 4K4H

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

## Climatic conditions according to IEC 60721-3-4, installation type E, class 2K3

| | |
|---|---|
| Temperature range | − 25 °C ... +70 °C |

## General Data

| | |
|---|---|
| Width x height x depth | 440 mm x 299 mm x 214 mm |
| Weight | 29 kg |
| Operating temperature range | − 25 °C ... +60 °C |
| Maximum operating altitude above mean sea level | 2 000 m |
| Noise emission (typical) | ≤ 33 dB(A) |
| Internal consumption in night mode | 0.1 W |
| Topology | LF transformer |
| Cooling concept | Convection |
| Electronics protection degree* | IP 65 |
| Connection area protection degree** | IP 65 |

* according to IEC 60529
** according to IEC 62103

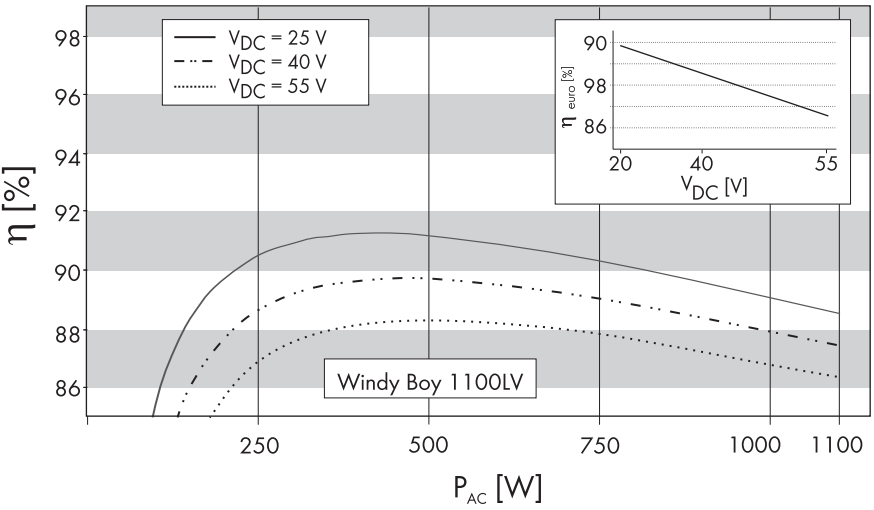
## Features

| | |
|---|---|
| DC connection | Spring-type terminal |
| AC connection | AC plug connector |
| Display | LC text display |
| *Bluetooth*® Wireless Technology | Optional |
| RS485, galvanically isolated | Standard |

## Grid forms

| | |
|---|---|
| IT grid | Suitable |
| TN-C grid | Suitable |
| TN-S grid | Suitable |
| TT grid, if $U_{N\_PE}$ < 30 V | Suitable |

## Efficiency




| | |
|---|---|
| Peak efficiency | 92 % |
| European efficiency | 90.4 % |

# 12 Accessories

The following table contains the corresponding accessory and spare parts for your inverter. If required, you can order these from SMA Solar Technology AG or your dealer.

| Description | Brief description | SMA order number |
|---|---|---|
| Replacement varistors | 2 thermally monitored varistors, including insertion tool | SB-TV4 |
| 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 |

# 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:

- Type (see "Type/Model" on type label)
- Series number (see "Serial No." on the type label)
- Type of connected small wind turbine system
- Communication type
- Blink code or display message of the inverter

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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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