

Accessories for Wind Power Inverter

WINDY BOY PROTECTION BOX

Technical Description



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1 Notes on this Manual

This manual describes the installation, commissioning and maintenance of the Protection Box.

1.1 Area of Validity

This manual applies for the following types of Protection Box:

- WBP Box 400
- WBP Box 500
- WBP Box 600

The device type is specified on the type label as shown in Section 3.3 "Identification of the Protection Box" (Page 10).

1.2 Target group

This manual is intended for the installer and the user.

1.3 Storage of the manual

All manuals for the device and for the installed components must be stored in the immediate vicinity of the device, and must be accessible at all times.

1.4 Symbols used

The following types of warnings and general information appear 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 could result in damage to property if not avoided!	



Information

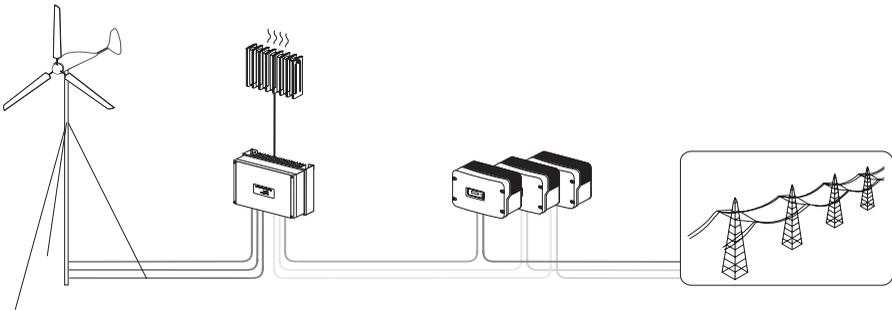
Information provides tips that are valuable for the optimal operation of the product.

2 Safety precautions

2.1 Appropriate usage

The Protection Box comprises a rectifier and overvoltage protection. The Protection Box's rectifier converts the variable AC voltage of a Small Wind Energy System into DC voltage, and uses this to power the Windy Boy. The integrated overvoltage protection safeguards the Windy Boy against overvoltage damage.

Principle of a Small Wind Energy System with the Protection Box



The Protection Box has a nominal power of 6 kW, a maximum input voltage range of 500 V AC and a maximum phase current of 11.5 A. The integrated overvoltage protection limits the DC voltage to 400 / 500 / 600 V DC, depending on the type of Protection Box.

The suitability of a Small Wind Energy System for the Protection Box primarily depends on the type, output voltage and output current of the Small Wind Energy System. In this regard, observe the limits specified by the manufacturer.

The Protection Box is only suitable for use with original SMA accessories, or with accessories recommended by SMA.

Appropriate usage also includes observing all documentation relating to this device and its components.

A maximum of three Windy Boys may be connected to a Protection Box. The different combinations should be born in mind.

The following combinations are recommended by SMA:

WBP Box 400

- max. 3 x Windy Boy 1100
- max. 2 x Windy Boy 1700

WBP Box 500

- 1 x Windy Boy 3300
- 1 x Windy Boy 3800

WBP Box 600

- max. 2 x Windy Boy 2500
- max. 2 x Windy Boy 2800i
- max. 2 x Windy Boy 3000
- 1 x Windy Boy 5000A
- 1 x Windy Boy 6000A

2.2 General safety instructions



DANGER!

Danger to life due to high voltages in the Protection Box.

- All work on the Protection Box must be carried out by a qualified electrician.



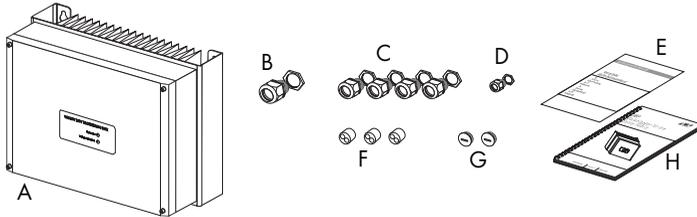
CAUTION!

Danger of burn injuries due to hot housing parts.

- Do not touch the housing during operation.

3 Unpacking

3.1 Packing list



Object	Quantity	Description
A	1	Protection Box
B	1	M25 metric-thread cable screw connection
C	4	M20 metric-thread cable screw connection
D	1	M12 metric-thread cable screw connection
E	1	EC Declaration of Conformity
F	3	Multi-seal insert for M20 metric-thread cable screw connection
G	2	Sealing caps for unused housing openings
H	1	Installation manual

3.2 Check for transport damage

Check the Protection Box for visible external damage, such as cracks in the housing. Please contact your dealer if you find any damage.

3.3 Identification of the Protection Box

You can identify the Protection Box by means of the type label. The type label is found on the right-hand side of the housing.

The image shows a detailed type label for the WINDY BOY PROTECTION BOX. At the top, it identifies the manufacturer as SMA Solar Technology AG, www.SMA.de, and notes it is 'Made in Germany'. The device is labeled 'WINDY BOY PROTECTION BOX'. Two callouts point to specific fields: 'Device type' points to 'Type WBP-Box 600' and 'Serial number' points to 'Serial No. 1234567890'. The label contains two tables of technical specifications. The first table, marked with an AC symbol (~), lists AC parameters: U_{Alternator max} (3 x 440 V), I_{Alternator max} (11,5 A), Ø_{Alternator max} (4 mm²), and F_{Alternator max} (400 Hz). The second table, marked with a DC symbol (---), lists DC parameters: U_{DC nom} (600 V), I_{DC max} (30 A), Ø_{DC nom} (4 mm²), U_{LR nom} (600 V), I_{LR max} (13 A), and Ø_{LR nom} (2,5 mm²). Below the tables, it specifies 'IP54 Outdoor'. The label also features CE and WEEE symbols, a barcode with the number *2000165882*, and three safety icons: a lightning bolt in a triangle (high voltage), a flame in a triangle (fire), and a book in a circle (read manual).

SMA Solar Technology AG www.SMA.de		
WINDY BOY PROTECTION BOX Made in Germany		
Type	Serial No.	
WBP-Box 600	1234567890	
~	U _{Alternator max}	3 x 440 V
	I _{Alternator max}	11,5 A
	Ø _{Alternator max}	4 mm ²
	F _{Alternator max}	400 Hz
---	U _{DC nom}	600 V
	I _{DC max}	30 A
	Ø _{DC nom}	4 mm ²
	U _{LR nom}	600 V
	I _{LR max}	13 A
	Ø _{LR nom}	2,5 mm ²
IP54 Outdoor		
CE		
2000165882		

4 Installation

4.1 Selection of the mounting location



DANGER!

Danger to life due to fire or explosion.

The housing of the Protection Box can become hot during operation.

- Do not mount the Protection Box on flammable construction materials.
- Do not mount the Protection Box in areas where highly flammable materials are stored.
- Do not mount the Protection Box in areas where there is a risk of explosion.



CAUTION!

Danger of burn injuries due to hot housing parts!

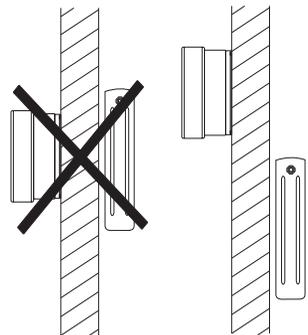
Mount the Protection Box in such a way that it cannot be touched inadvertently during operation.

NOTICE!

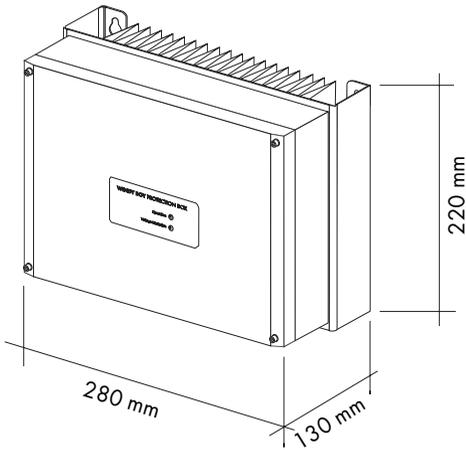
The Windy Boy could be irreparably damaged by overvoltage.

If the load resistor is installed opposite the Protection Box on the other side of the wall, the functionality of the Protection Box will be impaired. In this case the Protection Box can no longer protect the Windy Boy against overvoltage.

- Install the load resistor so it is offset to the Protection Box on the other side of the wall.



4.1.1 Dimensions and weight



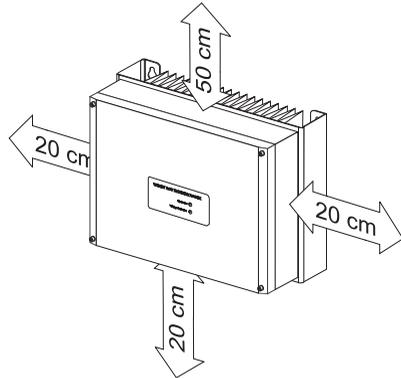
4.1.2 Ambient conditions

- The mounting location and mounting method must be suitable for the weight and dimensions.
- Mount on a solid surface.
- The mounting location must be accessible at all times.
- It must be easy to remove the Protection Box from the mounting location at any time.
- The ambient temperature should be between $-25\text{ }^{\circ}\text{C}$ and $+65\text{ }^{\circ}\text{C}$ to guarantee optimal operation.

4.1.3 Minimum clearance

Observe the following minimum clearances to walls, other devices or other objects, in order to ensure sufficient heat dissipation.

Direction	Minimum clearance
Right	20 cm
Left	20 cm
Above	50 cm
Below	20 cm

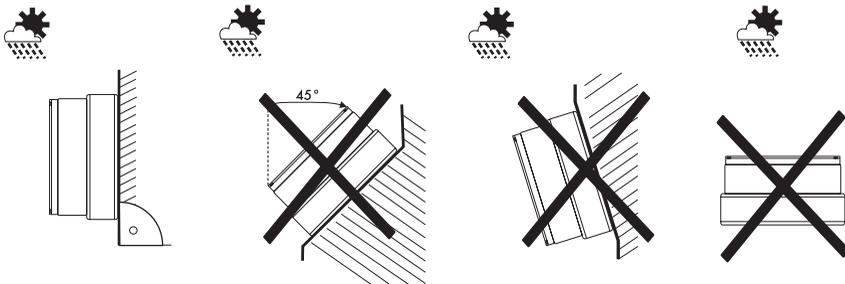


Multiple Protection Boxes installed in areas with high ambient temperatures

If necessary, increase the clearances between the individual Protection Boxes, and ensure that there is enough ventilation in order to guarantee sufficient cooling of the Protection Boxes.

4.1.4 Position

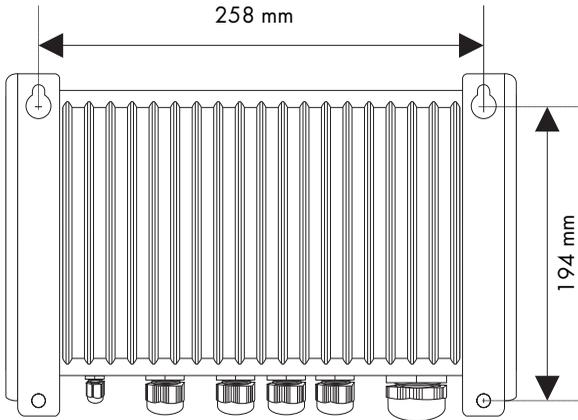
- Mount vertically



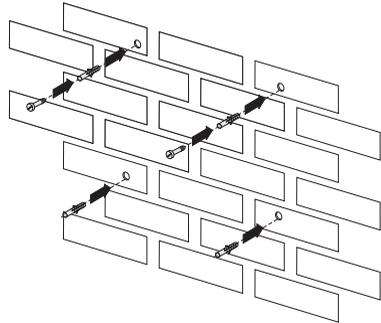
- Never install the device with a backward tilt
- Never install the device with a forward tilt
- Do not install horizontally

4.2 Mounting instructions

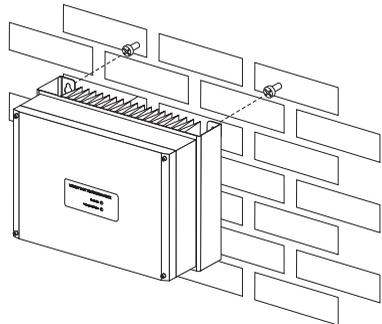
1. Mark the positions of the drill holes.
Use fastening material suitable for the surface.



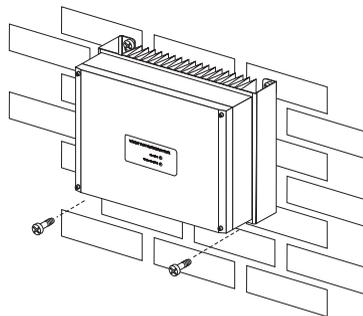
2. Drill the holes for the screws and insert the wall anchors.
3. Screw the two upper screws into the wall and let them protrude by 3 mm.



4. Hang the Protection Box on the protruding screws with the upper mounting plates.



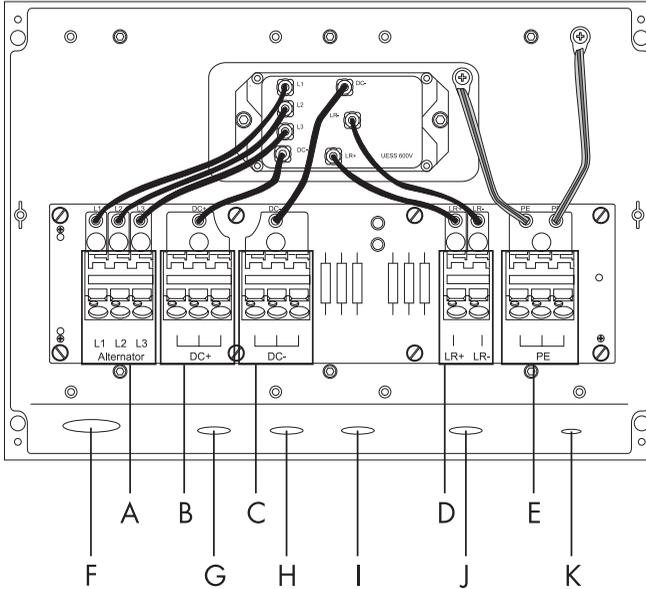
5. Screw the Protection Box tightly to the wall at the two lower drill holes.



6. Screw the two upper screws tightly into the wall.
7. Check that the unit is securely in place.

5 Electrical connection

5.1 Overview of connection area



Object	Description
A	Connection terminals for the wind turbine's AC cable
B	"DC+" connection terminals for max. three Windy Boys
C	"DC-" connection terminals for max. three Windy Boys
D	"LR+" and "LR-" connection terminals for load resistor
E	Connection terminals for grounding the Protection Box, load resistor and cable shield of the load resistor
F	Housing opening for the wind turbine cable
G	Housing opening for the first Windy Boy cable
H	Housing opening for the second Windy Boy cable
I	Housing opening for the third Windy Boy cable
J	Housing opening for the load resistor cable
K	Housing opening for the PE cable

5.2 Grounding the Protection Box

Connection procedure

1.

**DANGER!**

Danger to life due high voltages on the Protection Box.

- Brake the wind turbine and secure it to prevent it being restarted.
- Disconnect the Windy Boy from both the AC and DC connections.

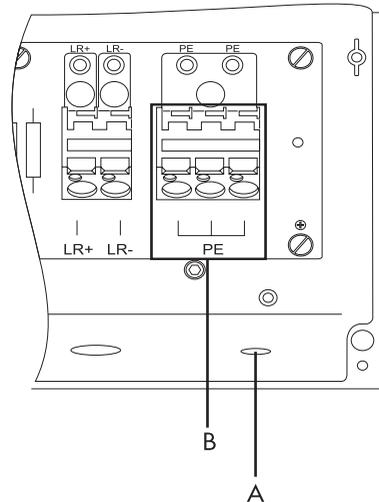
2. Open the Protection Box. Unscrew the housing lid screws and remove the lid.

3. Attach the M12 metric-thread cable screw connection to the housing opening (A).

4. Unscrew the lock nut from the cable screw connection and slide it over the PE cable.

5. Pull the PE cable through the cable screw connection and connect it to the connection terminal "PE" (B) in the Protection Box.

6. Tighten the lock nut of the cable screw connection.

**DANGER!**

Danger to life due to high voltages on the Protection Box.

- Only start the wind turbine and the Windy Boy when all the cables have been connected.

5.3 Wind turbine connection

NOTICE!

Excessive wind turbine power will damage the Protection Box and the Windy Boy irreparably.

- Connect one wind turbine with max. 7 kW per WBP Box 600.
- Connect one wind turbine with max. 5 kW per WBP Box 500.
- Connect one wind turbine with max. 3 kW per WBP Box 400.



Connecting a wind turbine with more power than the maximum allowed.

You must connect several Protection Boxes if the wind turbine power is greater than the maximum power of the Protection Boxes.

Example: For a wind turbine with max. 18 kW connect three Protection Box 600s.

Connection procedure

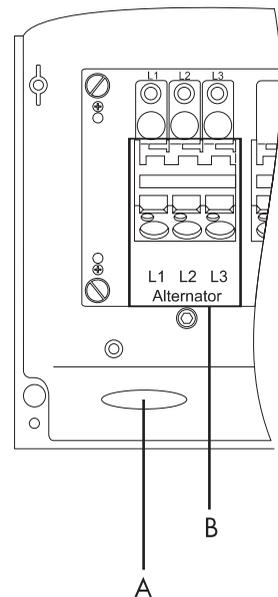
Grounding the wind turbine

The wind turbine is not grounded via the Protection Box. Observe all instructions provided by the wind turbine manufacturer.

1.

Deinstalling existing rectifiers and overvoltage protection.

- Remove existing rectifiers and overvoltage protection between the wind turbine and the Windy Boy.
2. Attach the M25 metric-thread cable screw connection to the housing opening (A).
 3. Unscrew the lock nut from the cable screw connection and slide it over the cable.
 4. Connect L1, L2 and L3 according to the labeling on the "Alternator" connection terminal (B) in the Protection Box.
 5. Tighten the lock nut of the cable screw connection.



DANGER!

Danger to life due to high voltages on the Protection Box.

- Only start the wind turbine and the Windy Boy when all the cables have been connected.

5.4 Windy Boy connection

Cabling instructions

When connecting the Windy Boys use a cable that is suitable for conducting the maximum power of the Windy Boys. Observe the following properties:

- Cable length: max. 2 m
- Recommended cross section: 4 mm²
- Maximum cross section: 6 mm²

The following cable type is recommended:

- Silivolt-E 4 mm² stranded cable

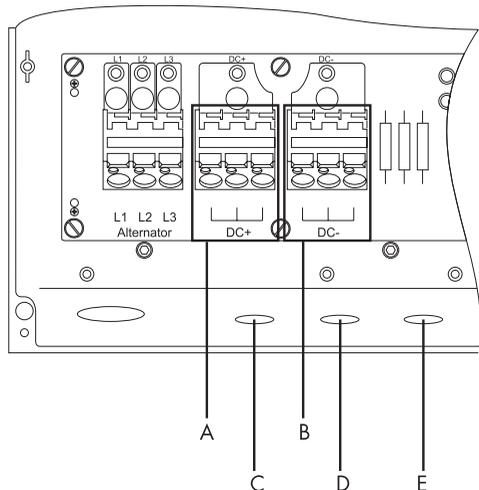
Connection procedure

NOTICE!

Excessive input voltage will damage the Windy Boy irreparably.

- The installed Protection Box must be suitable for the installed Windy Boy. See Section 2.1 "Appropriate usage" (Page 7).

1. Attach the M20 metric-thread cable screw connection to the housing opening (C). To connect additional Windy Boys, use housing openings D and E.
2. Unscrew the lock nut from the cable screw connection and slide it over the Windy Boy cable.
3. Remove the rubber seal from the cable screw connection.
4. Feed the the Windy Boy's "DC+" and "DC-" cables through the multi-seal insert and pull them through the cable screw connection into the Protection Box. Press the multi-seal insert firmly into the cable screw connection.



5. Connect the Windy Boy's "DC+" cable to the "DC+" connection terminal (A) in the Protection Box.
6. Connect the Windy Boy's "DC-" cable to the "DC-" connection terminal (B) in the Protection Box.
7. Tighten the lock nut of the cable screw connection.
8. Repeat steps 1 to 7 to connect additional Windy Boys.
9. Close unused housing openings with the sealing caps included in the packing list.

**DANGER!**

Danger to life due to high voltages on the Protection Box.

- Only start the wind turbine and the Windy Boy when all the cables have been connected.

5.5 Load resistor connection

NOTICE!

The wrong bad resistance will damage the Protection Box and the Windy Boy irreparably.

- Never exceed the resistance value of 54 Ω when the device is at operating temperature.
- Never go below the resistance value of 30 Ω when the device is switched off (cooled).
- The maximum voltage of the Protection Box should be observed.
- Ensure that heat is permanently dissipated.

**Load resistor**

You can obtain a suitable load resistor for your Protection Box from SMA.

Cabling instructions

The load resistor should be connected using a cable with the following properties:

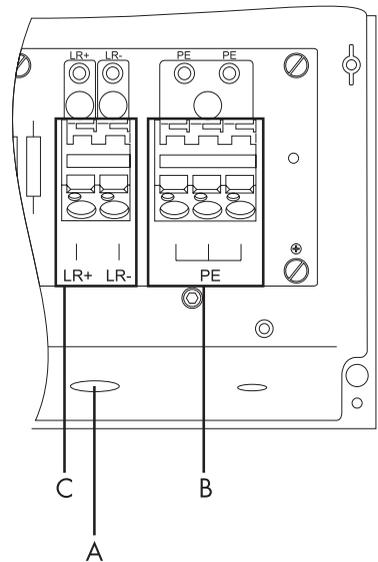
- Cable with shield
- Cable length: max. 3 m
- Recommended cross section: 2.5 mm^2
- Maximum cross section: 6 mm^2

The following cable type is recommended:

- RADOX GWK - LW/S $3 \times 2.5 \text{ mm}^2$

Connection procedure

1. Attach the M20 metric-thread cable screw connection to the housing opening (A).
2. Unscrew the lock nut from the cable screw connection and slide it over the load resistor cable.
3. Ground the load resistor by connecting it to the "PE" connection terminal (B).
4. Ground the cable shield of the load resistor by connecting it to the "PE" connection terminal (C).
5. Connect the load resistor's "LR+" cable to the "LR+" connection terminal (C) in the Protection Box.
6. Connect the load resistor's "LR-" cable to the "LR-" connection terminal (C) in the Protection Box.
7. Tighten the lock nut of the cable screw connection.
8. Close the Protection Box. Fasten the lid to the housing with four screws.



6 Commissioning

Check the following requirements before commissioning:

- Wind turbine's AC cable is connected correctly
- Connection of DC cables (Windy Boy, load resistor) is complete
- Connection to ground via PE connector
- Wind turbine is grounded (as described in the wind turbine documentation)
- The housing lid is securely screwed in place

Commissioning procedure

1. Commission the Windy Boy as described in the wind power inverter manual.
2. Start the wind turbine, as described in the wind turbine documentation.
3. Once sufficient DC voltage is generated by the wind turbine, a green LED lights up to indicate that the turbine is in operation. If this is the case, commissioning was completed successfully. If both LEDs (red and green) light up, the Protection Box is limiting overvoltage. This occurs because the Windy Boy needs a few minutes before it begins feeding power into the grid. After a few minutes the red LED goes out.

7 Opening and closing

7.1 Opening the Protection Box

1.



DANGER!

Danger to life due to high voltages in the Protection Box.

- Brake the wind turbine and secure it to prevent it being restarted.
- Disconnect the Windy Boy from both the AC and DC connections.

2. Unscrew the housing lid screws and set them aside.
3. Remove the housing lid and set it aside.

7.2 Closing the Protection Box

1. Fasten the lid to the housing using four screws.
2. Commission the Protection Box as described in Section 6 "Commissioning" (Page 23).

8 Maintenance and cleaning

8.1 Cleaning the cooling fins

It is only necessary to clean the cooling fins if the Protection Box's heat dissipation is restricted by dirt.

- Carefully remove dirt with a suitable soft brush.

9 Operation display and troubleshooting

9.1 LEDs

Green	Red	Status	Remedy
on	off	In operation	-
on	on	Voltage limitation	-
off	off	Not in operation (no voltage present, wind turbine at stand still)	<ul style="list-style-type: none"> Start wind turbine.
		Not in operation (no voltage present)	<ul style="list-style-type: none"> Check wind turbine connection. See Section 5.3 "Wind turbine connection" (Page 18). If the Protection Box is permanently in this state contact the SMA Service Line.

10 Decommissioning

10.1 Disassembly

1. Open the Protection Box as described in Section 7.1 "Opening the Protection Box" (Page 24).
2. Disconnect the PE cables from the Protection Box.
3. Disconnect the wind turbine from the Protection Box.
4. Disconnect Windy Boy from the Protection Box.
5. Disconnect the load resistor from the Protection Box.
6. Close the Protection Box. Fasten the lid to the housing with four screws.
7. Remove the Protection Box.

10.2 Packaging

If possible, please pack the Protection Box in the original packaging. If this is no longer available, you can use an equivalent box which fulfills the following requirements:

- suitable for loads of up to 5 kg
- with handle system
- can be closed fully

10.3 Storage

Store the Protection Box in a dry place where the ambient temperature is always between $-25\text{ }^{\circ}\text{C}$ and $+65\text{ }^{\circ}\text{C}$.

10.4 Disposal

Dispose of the Protection Box at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Alternatively, send the Protection Box back to SMA with shipping paid by sender, and labeled "ZUR ENTSORGUNG" ("for disposal").

11 Technical data

	WBP Box 400	WBP Box 500	WBP Box 600
General data			
EC Declaration of Conformity	enclosed, download area www.SMA.de		
Rectifier	integrated		
Dimensions (W / H / D) in mm	280 / 220 / 130		
Weight	5 kg		
Ambient conditions	-25 °C ... +65 °C		
Protection class according to DIN EN 60529	IP54		
Efficiency	> 99,95 %		
Conduction losses with continuous output power	15 W	20 W	30 W

Generator connection				
Quantity		1 x 3-phase		
AC voltage	U_{AC}	3 x 0 ... 500 V		
AC current	I_{AC}	3 x 0 ... 11.5 A		
Generator frequency	f_{AC}	0 ... 400 Hz		
Nominal power		1 ... 3 kW	3 ... 5 kW	2 ... 7 kW

Windy Boy connection				
Quantity		max. 3		
Voltage limitation	U_{DC}	400 V	500 V	600 V
Total power	P_{DC}	3 kW	5 kW	7 kW

Load resistor connection				
Quantity		1		
Nominal voltage	U_{LR}	400 V	500 V	600 V
Continuous output power	P_{LR}	3 kW	5 kW	7 kW

12 Contact

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

- Protection Box device type
- Protection Box serial number
- Connected wind turbine
- Connected Windy Boys and number of Windy Boys
- Connected load resistor

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- 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
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SMA Factory Warranty

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