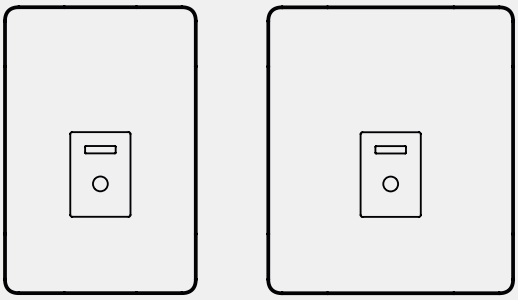

BPT-S 3–4.6
Betriebsanleitung

BOSCH

en Operating manual
es Instrucciones de servicio
it Manuale di servizio
fr Manuel de service

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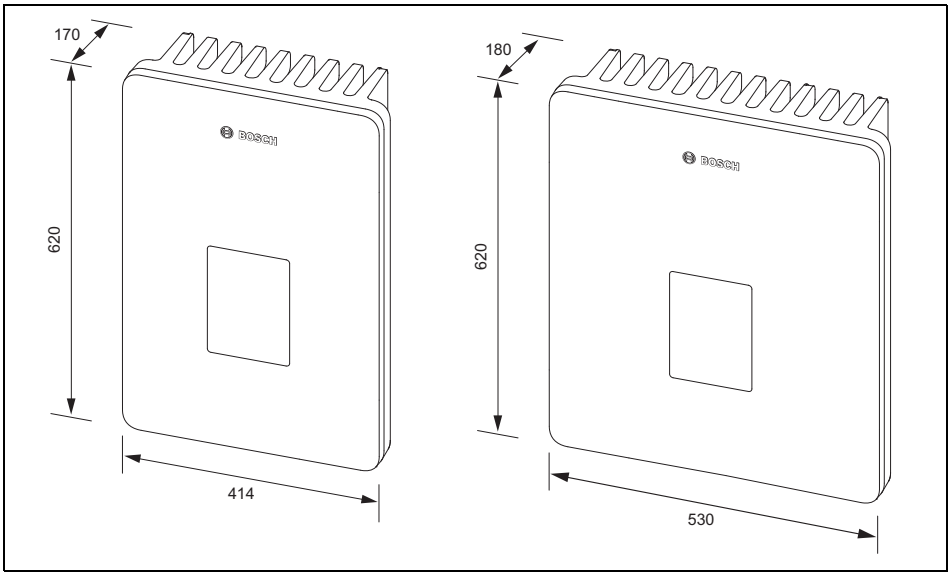
1 Introduction

1.1 Brief description

In photovoltaic systems, the Bosch BPT-S series string inverters convert the direct current of the solar modules into grid-compatible alternating current. They then feed the power into the public power grid. The Bosch BPT-S series string inverters are transformerless units for single-phase power feed to the grid.

The Bosch BPT-S series comprises of:

- Bosch BPT-S 3 string inverter
- Bosch BPT-S 3.68 string inverter
- Bosch BPT-S 4 string inverter
- Bosch BPT-S 4.6 string inverter



1.1: BPT-S 3/3.68 (left) and BPT-S 4/4.6 (right), dimensions in mm

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1.2 Intended use

The Bosch BPT-S series string inverters are designed exclusively for the conversion of direct current from solar generators into alternating current for feeding into the grid. Any other use is not considered intended use.

The product may only be operated in accordance with the technical data.

Intended use also includes compliance with the specifications of this manual.

1.3 Standards and directives

The standards and guidelines that the product fulfils can be found in the Declaration of Conformity provided.

1.4 National standards

All national standards must be observed during installation.

1.5 Foreseeable misuse

Any operation of the device beyond that described here is considered improper use.

The device must never be operated:

- ▶ in rooms with a potentially explosive atmosphere
- ▶ in rooms with a room temperature below -25 °C or above +60 °C
- ▶ in rooms which permanently house animals (stalls with corroding gases)
- ▶ with defective cables
- ▶ if the housing is damaged
- ▶ if components are clearly damaged or defective
- ▶ if the housing has been opened, drilled or modified
- ▶ with the ventilation slits covered

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1.6 About this manual

The German edition of this operating manual is the original version. Should you have any questions or comments about this manual, we are happy to receive your feedback. Contact details can be found on the back of the manual.

Subject of this manual

This manual covers the transport, assembly, installation, commissioning, maintenance and disassembly of the device, and help in the case of faults.

Target readership

This manual is intended for use by authorised electricians/authorised installers for transporting, assembly, installing, commissioning, maintaining and disassembling the device.

The "Technical description" chapter (including gesture control and display) is also intended for use by the operator of the photovoltaic system.

Operating steps

Operating steps are introduced by a triangle ▶ and closed with a square ■ to show the result of the action.

Text formatting

Text format	Indicates
Bold	Switches, connections, buttons on the display
[1]	Item numbers
1.	Sequence of steps. The sequence of the steps must be adhered to.
▶	Lists
–	Lists in tables/second list level

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Text format	Indicates
Info	Additional information or tips
Italics	LED indicators, text on the display, cross-references

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2 Safety

2.1 Obligations of the installer

The installer must ensure that

- applicable industrial safety regulations, professional association regulations and technical regulations are complied with
- the specified safety equipment for the photovoltaic system is fully functional
- any illegible warning and safety decals on the device are replaced immediately
- permissible operating conditions are observed
- assembly and operation are carried out under the conditions specified (*Specifications, p. 111*)
- the transport, assembly, installation, commissioning, maintenance and disassembly of the product are only performed by authorised specialist personnel
- the personnel commissioned with performing the work are able to evaluate their assigned tasks and recognise possible risks
- the manual and, in particular, safety instructions are read and understood by personnel commissioned with performing tasks
- the manual is available during transportation, assembly, installation, commissioning, maintenance and disassembly
- the manual is kept in proximity of the product (e.g. operating manual including appendixes in a folder in the control cabinet/meter box)
- the product is not opened
- the product is not used if it is defective
- the specifications of the grid operator are observed

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- the product is only used in the countries for which it is designed
- packaging material and the product are disposed of in an environmentally friendly manner

2.2 Qualified electrician

The qualified electrician must be authorised to carry out electrical work on the supply grid.

2.2.1 Qualification

A qualified electrician is a person who possesses the required knowledge as a result of technical training and experience, such as:

- Setting up, activating, deactivating, disconnecting, earthing, short-circuiting and repairing electrical circuits and devices.
- Standard maintenance and use of protective devices according to defined safety standards.
- Administering first-aid to injured parties.
- Compliance with the local regulations, applicable standards and directives.
- Working with direct current, while noting:
  - The solar generator is live during daylight.

2.2.2 Responsibilities

The electrician must ensure that:

- The general information, step-by-step instructions and, in particular, the safety instructions regarding assembly and installation are read in their entirety before commissioning and before switching on the disconnectors, and are complied with at all times
- Neither the size nor the rated value of automatic circuit breakers may be changed

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- Before any electrical work is performed, suitable measuring equipment is used to ensure that the device is fully de-energised, both on the DC side and AC side, in accordance with applicable directives. Please note the following here:
  - The solar generator is live during daylight.
- Measurements must only be taken using suitable measuring equipment which conforms to the applicable standards and directives
- The device is not opened

2.3 Safety signs on the device

	Indicates a hazard
	Indicates a hazard resulting from an excessive touch current if a protective earth has not been installed correctly
	Indicates risk of injury due to hot surfaces
	Denotes the disposal: Device must not be disposed of as household waste. Device must be disposed of correctly in accordance with national regulations.
	Indicates transformerless device
	Refer to the operating manual

2.4 Warnings

Warning instructions identify information relating to safety. They consist of the following:

- ▶ Warning sign (symbol)
- ▶ Indicator word to denote the level of risk
- ▶ Details on the nature and source of the risk
- ▶ Details of the possible consequences if the warning instructions are disregarded
- ▶ Measures for averting the danger and preventing injury or material damage

The warning instructions are classified according to the following levels of hazard:

⚠ DANGER	**Denotes an extraordinarily hazardous situation** This warning symbol indicates an immediate danger, which can lead to severe injury or death. ▶ Observe the warning
⚠ WARNING	**Denotes a very dangerous situation** This warning symbol indicates a potentially dangerous situation, which could lead to severe injury or death. ▶ Observe the warning
⚠ CAUTION	**Denotes a dangerous situation** This warning symbol indicates a potentially dangerous situation, which could lead to minor injury. ▶ Observe the warning
NOTICE	**Denotes a risk of material damage** This warning symbol indicates a situation that could lead to material damage. ▶ Observe the warning

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2.5 Basic safety information

This chapter contains the basic safety instructions. Failure to observe the safety instructions in this manual can result in accidents which can lead to serious injury and/or death as well as serious material damage.

If you have any questions: Contact Bosch Power Tec Service (see contact details on the back of the manual).

DANGER

Risk of fatal injury due to lack of assistance

In the event of an accident a second person can lend assistance.

- ▶ Work should only be carried out when a second person who has been trained to provide suitable assistance is present.

DANGER

Risk of fatal injury due to disregarding safety instructions

If the safety instructions and/or the sequence of steps for installation are not followed, the device may be permanently damaged and accidents with serious health consequences may occur.

- ▶ Observe the safety instructions
- ▶ Note the sequence of steps for installation

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DANGER

Risk of fatal injury due to high voltages

High voltages occur in photovoltaic systems (up to 265 V AC and 1000 V DC) as well as high currents (13 A to 20 A AC and 11.6 A to 16 A DC). Failure to observe standards, directives and local regulations when working on the photovoltaic system leads to risk of fatal injury. Please note the following here: The solar generator is live during daylight.

Before starting any work on electrical systems:

- ▶ Disconnect the system
- ▶ Ensure that it is secured against being switched back on
- ▶ Verify that the system is fully de-energised
- ▶ Earth and short-circuit the AC system
- ▶ Cover or shield any adjacent live components

DANGER

Risk of fatal injury due to residual voltages

The capacitors of the string inverter may still contain residual charges even after the device is switched off.

- ▶ Check that the system is fully de-energised using suitable measuring equipment

DANGER

Risk of fatal injury due to arcing

High DC voltages UDC = 1000 V (no zero point) may exist in photovoltaic systems, which can cause arcing if components such as fuses or plugs are not used in the specified manner.

- ▶ Use components of the photovoltaic system in accordance with their manual

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⚠ WARNING

Risk of injury due to incorrect earthing of the solar generator

If the solar generator is not earthed when the string inverter is feeding in power, there is a risk of an electric shock from touching the frame of the solar generator. This is caused by accidental energization resulting from capacitive leakage currents.

- ▶ We therefore recommend: Earth the frame of the solar generator: 10 mm^2 copper cable or 16 mm^2 aluminium cable

⚠ WARNING

Risk of injury due to modifications to the device

Modifications to the device can cause serious injury or death.

- ▶ Only use the device in its original condition
- ▶ Do not open the device
- ▶ Do not carry out any mechanical changes on the device (do not drill the device)
- ▶ Do not modify or paint the device
- ▶ Avoid contact with paints, thinners, etc.
- ▶ Do not overload the service switch

⚠ CAUTION

Risk of burns due to high temperatures

Metal surfaces on the back of the device (e.g. heat sink) can heat up to 100 °C and can cause burns.

- ▶ Do not touch metal surfaces
- ▶ After switching off the device, always wait for a period of 30 minutes before touching any components

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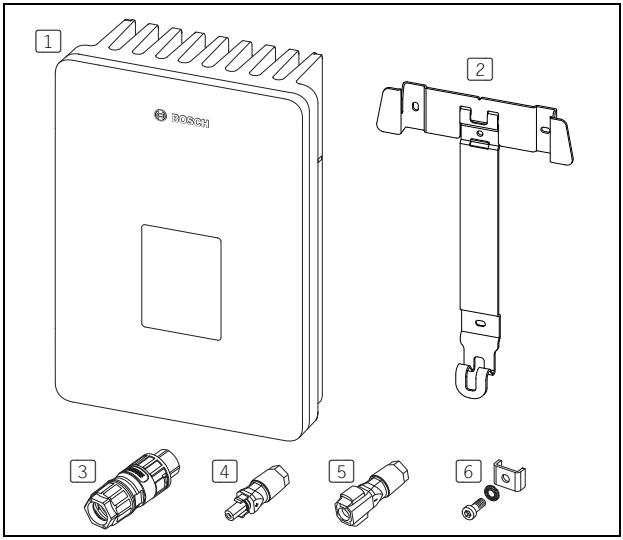
3 Technical description

3.1 Scope of delivery

If you have questions regarding your delivery: Contact Bosch Power Tec Service (see contact details on the back of the manual).

- ▶ String inverter
- ▶ Wall bracket
- ▶ AC mains plug (3-pin)
- ▶ DC socket positive
- ▶ DC plug negative
- ▶ PE earthing set



3.1: Scope of delivery

1	String inverter BPT-S 3/3.68 (the 4/4.6 devices are slightly larger)
2	Wall bracket for BPT-S 3/3.68 (slightly larger for 4/4.6)
3	AC mains plug (3-pin)
4	DC socket positive

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5 DC plug negative

6 PE earthing set (comprising: M6 flat-head screw, detent edged washer, terminal plate)

Supplied documentation

▶ Bosch BPT-S series operating manual

▶ Written guarantee

Completeness Check the scope of delivery for completeness and any visual damage. If something is missing or damaged: Contact Bosch Power Tec Service (see contact details on the back of the manual).

3.2 Functional description

In this chapter, the main properties of the string inverter are described.

The Bosch BPT-S series string inverters set new standards in the areas of user-friendliness and analysis options. New communications interfaces allow a fast and fault-free initial operation and simplified remote analysis.

3.2.1 Highly flexible

A photovoltaic system operates most efficiently at the Maximum Power Point (MPP). All string inverters make use of MPP tracking. This ensures that the system yield is optimised according to the momentary irradiation conditions. This function continually tracks and adjusts the optimum operating point on the characteristic curve of the solar generator.

The wide input voltage range of 170 V to 750 V enables maximum flexibility for the solar generator design. In addition, the number of MPP trackers is optimally set for the solar module performance and, combined with the new MPP Tracking concept, this enables the highest possible yields. This means that you can utilise the surfaces available to their maximum potential.

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3.2.2 Communication with the string inverter

There are 3 different ways that you can communicate with and activate the string inverter:

- e.Key
- Gesture control
- e.Data

With the e.Key

The first option: Thanks to contactless RFID technology, the installer is able to set the valid country parameters in seconds when commissioning a string inverter.

The installer holds the e.Key, which is about the size of a credit card, up to the marked field on the string inverter in order to transfer the data. This rules out any faults in the settings.

Information on commissioning with the **e.Key** can be found in chapter *Starting up the string inverter using the e.Key, p. 85*.

With gesture control

The second option: The country-specific parameters can also be set during commissioning using contactless gesture control. For this, the installer sets the language, country and grid standard manually, one after the other, on the device display: After a quick gesture, possible parameters are selected; after a long gesture, the parameters are set.

Information on manual commissioning with **gesture control** can be found in chapter *Starting up the string inverter by hand (gesture control), p. 86*.

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Using e.Data

The third option: The string inverter can be connected to a local network via an Ethernet connection. Using a standard internet browser, the installer can enter the serial number in the address line of the browser, gaining direct access to the menu of the string inverter.

The integrated e.Data setup tool can be called up via the menu. The installer can also set the specific parameters for a country using e.Data.

In addition, the installer can use e.Data to read all of the data saved by the string inverter, including fault messages.

Information on commissioning using **e.Data** can be found in chapter *Starting up the string inverter using e.Data, p. 89*.

3.2.3 Gesture control

The Bosch BPT-S series string inverters are fitted with a contactless sensor for navigating the device menu. If the installer approaches the device, the operation menu automatically switches on. It is now possible to scroll through and make settings in the operating menu using gesture control. Gesture control is characterised by the fact that the device can continue to be operated under difficult conditions.

In addition, the Bosch BPT-S series string inverters are equipped with a two-line display and a circle of status LEDs.

As an alternative to the e.Key or e.Data, once the start screen has appeared, the string inverter can be activated using gesture control.

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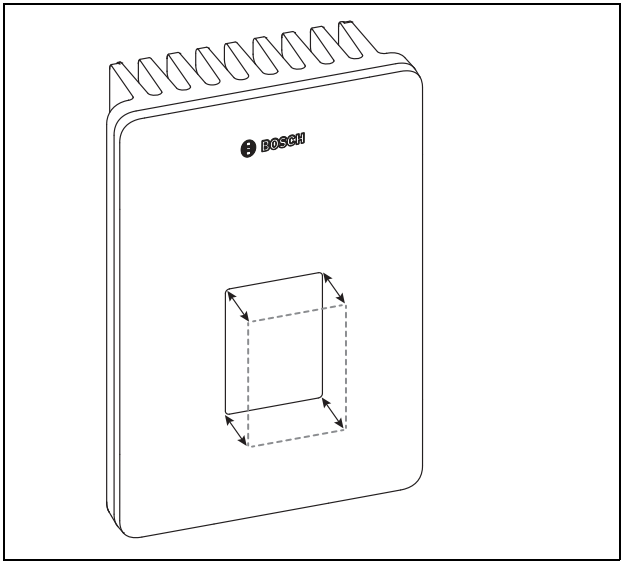
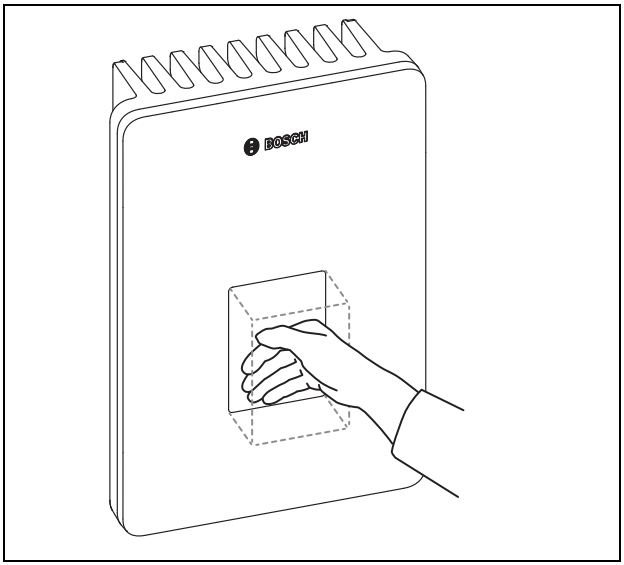


3.2: Area for gesture control



3.3: Area for gesture control (approach with hand)

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- ▶ You have understood the way that the gesture control works:
  - – **Short** gesture: Position your hand approx. 15 cm in front of the device and then pull your hand back again immediately
  - – **Long** gesture: Place your hand approx. 15 cm in front of the device and hold your hand in this position for approx. 5 seconds
- ▶ Start screen is displayed

With the long gesture, a progress bar is immediately displayed on the screen.

3.2.4 Integrated data logger

The integrated data logger function records all data and makes it available in graphical form in the e.Web monitoring portal. Additionally, a visualisation is possible on smartphones with the e.UserApp. The integrated setup tool e.Data helps keep servicing requirements to a minimum and plan them in advance.

3.2.5 Protection systems

Grid monitoring

For safety reasons, all photovoltaic systems must be disconnected from the public power grid in the following situations:

- ▶ In the case of disconnection or failure of the electricity grid
- ▶ In the case of electricity grid faults such as voltage fluctuations, fault currents or frequency changes

For this reason, an automatic circuit breaker is integrated in the string inverter, which automatically disconnects the string inverter from the grid in case of faults.

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Integrated DC switch disconnector

In addition, the string inverter is fitted with an intelligent DC switch disconnector. Before connecting, the string inverter checks the installation on the DC and AC side. If an error occurs during operation, the switch disconnector automatically disconnects the solar generator from the string inverter, thus providing additional operational safety.

In combination with the Bosch Service concept, this ensures continuous and smooth operation of the string inverter.

The inputs of the solar generator are fitted with overvoltage protection (type 3).

The overvoltage protection does not provide protection from prohibitively high open-circuit voltages of the solar generator (for voltages, see *Specifications, p. 111*).

3.2.6 Improved cooling concept

The new, maintenance-free cooling concept, PowerCool, optimizes the heat distribution of the string inverter. The innovative cooling concept and the use of components that meet the stringent Bosch quality requirements guarantee a worthwhile financial return on your investment. The protection type and the ambient temperature range of -25 °C to 60 °C mean that the device can be installed in almost any environment. Above an ambient temperature of approx. 40 °C and increased output, the string inverter may reduce its output (derating). This prevents the power electronics from premature ageing.

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3.2.7 Innovative housing

The plastic housing of the string inverter has both a robust and weight-optimised design. The contemporary design with its sleek shape and colouring combines high visual demands with technical and user-friendly necessities. As a result of the skilful construction and innovative assembly concept, there are no screws within sight of the user, and the ergonomic access handles provide easy wall mounting and integrated anti-theft protection (using a standard padlock) in the housing. In addition, the plastic housing is pleasing to the touch, rather than being purely technical in appearance.

3.3 Display

The two-line display is used to configure and operate the device.

Faults

The Bosch BPT-S series string inverters are fully automatic and maintenance-free. If a fault occurs in the string inverter, the current fault message will be shown in the display *(Messages on the display screen and LED status indicator, p. 105)*.

Older fault messages can be read using the e.Data setup tool and via the e.Web online portal.

3.4 LED status indicators

The device has four circular LED status indicators.

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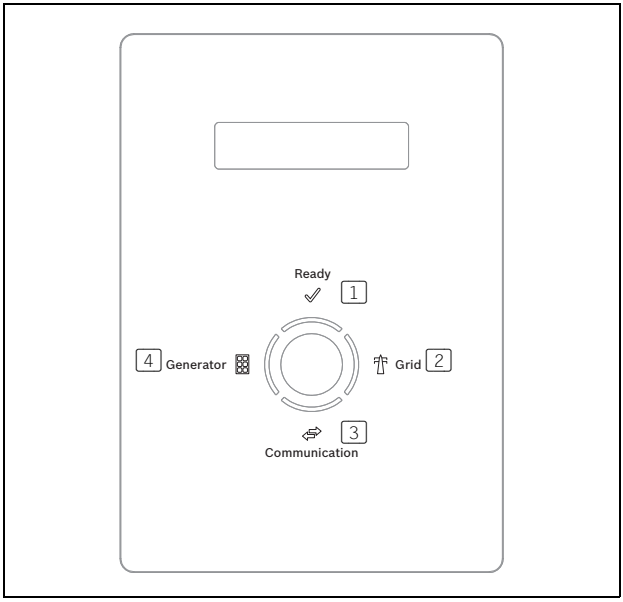

3.4: LED status indicators [1], [2], [3], [4]

The LED status indicators can light up, flash or pulsate in the colours white, blue and red:

- ▶ Light up: LED is permanently on
- ▶ Flash: LED alternates on/off
- ▶ Pulsate: LED slowly on/off (like a dimmer)

The colours of the LEDs indicate the operating conditions:

- ▶ Individual or all LEDs white: Operation
- ▶ Individual or all LEDs blue: Operation
- ▶ Individual or all LEDs red: Fault

Detailed fault table: *Help in the event of faults, p. 101*

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During the switching on process (blue rotating pattern): Do **not** set the service switch to 0 since undefined LED statuses could occur.

BPT-S 3/3.68 / 4/4.6		LED status indicators			
Status	**Condition**	**Ready**	**Grid**	**Generator**	**Communication**
Off	Inverter off	Off	Off	Off	Off
Service switch	From 0 to 1: Inverter switches on	Blue rotating pattern **in** a clockwise direction			
	From 1 to 0: Inverter switches off	Blue rotating pattern **in** an anti-clockwise direction			
Commissioning	Device is waiting for commissioning via e.Key or manually	White pulsating			
	e.Key is transferring data	White rotating pattern in clockwise direction			
Standby	Inverter is in grid monitoring mode	Blue pulsating			
	PV voltage is present, however there is not yet sufficient power	Blue pulsating			
	Insufficient PV output to feed into grid	Blue pulsating			
Operation	Inverter feeding in	Blue	Blue	Blue	Blue

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BPT-S 3/3.68 / 4/4.6		LED status indicators			
Status	**Condition**	**Ready**	**Grid**	**Generator**	**Communication**
Fault *(Help in the event of faults, p. 101)*	Fault on the inverter (operating error display mode)	Red	Blue	Blue	Blue
	Display mode for safety-relevant errors	Red flashing	Red flashing	Red flashing	Red flashing
	PV generator fault (generator fault display mode)	Blue	Blue	Red	Blue
	Communication fault (communication fault display mode)	Blue	Blue	Blue	Red
	AC grid fault (grid fault display mode)	Blue	Red	Blue	Blue
	Display mode for internal errors (device needs to be replaced)	Red	Red	Red	Red
Operation	Operating mode on approach	White	White	White	White
	Operating mode when a selection is confirmed on the display	White flashing	White flashing	White flashing	White flashing

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BPT-S 3/3.68 / 4/4.6		LED status indicators			
Status	**Condition**	**Ready**	**Grid**	**Generator**	**Communication**
Fault and operation on approach *(Help in the event of faults, p. 101)*	Fault on the inverter (operating error display mode)	Red	White	White	White
	PV generator fault (generator fault display mode)	White	White	Red	White
	Communication fault (communication fault display mode)	White	White	White	Red
	AC grid fault (grid fault display mode)	White	Red	White	White

3.5 Housing dimensions

The housing dimensions are shown in the following graphic.

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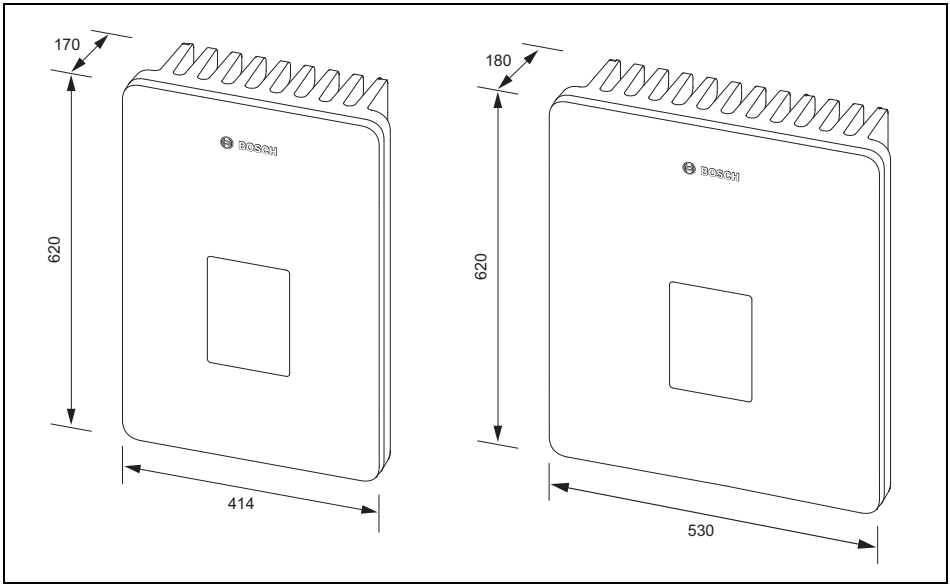

3.5: Housing dimensions in mm: BPT-S 3/3.68 (left) and BPT-S 4/4.6 (right)

3.6 Interface

All the connections of the device are touch-safe and designed to be accessible from outside. To enable the device to be used outdoors as well, the device is fitted with high-grade seals that have been tested in the plant.

The device must therefore not be opened.

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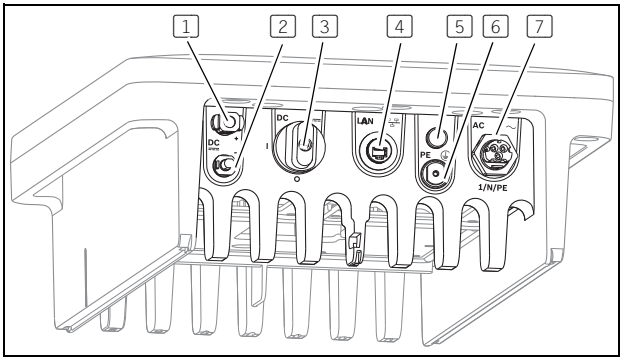

3.6: Connection area

1 **DC+** connection, solar generator

2 **DC-** connection, solar generator

3 **Service switch** position **0**: Solar generator disconnected from the string inverter. Switch position **1**: String inverter ready for operation, connects to the solar generator

4 **Ethernet** Direct connection to PC and router or switch

5 **Pressure equalization element** Element for pressure equalization in the inverter housing

6 **Separate PE connection** Earth connection for separate earthing

7 **AC connection** Grid connection

Symbol	Code designation	Explanation
DC	DC	Direct current
LAN	LAN	Ethernet connection
PE	PE	Earthing

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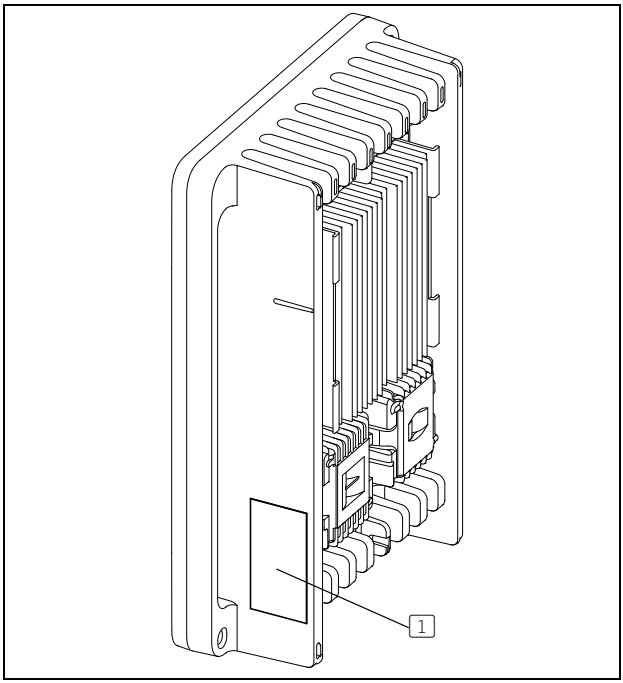
Symbol	Code designation	Explanation
AC ~	AC	Alternating current
1/N/PE	1/N/PE	Grid connection terminals

3.7 Type plate

The type plate is fitted in the following position on the device:



3.7: Position of the type plate [1]

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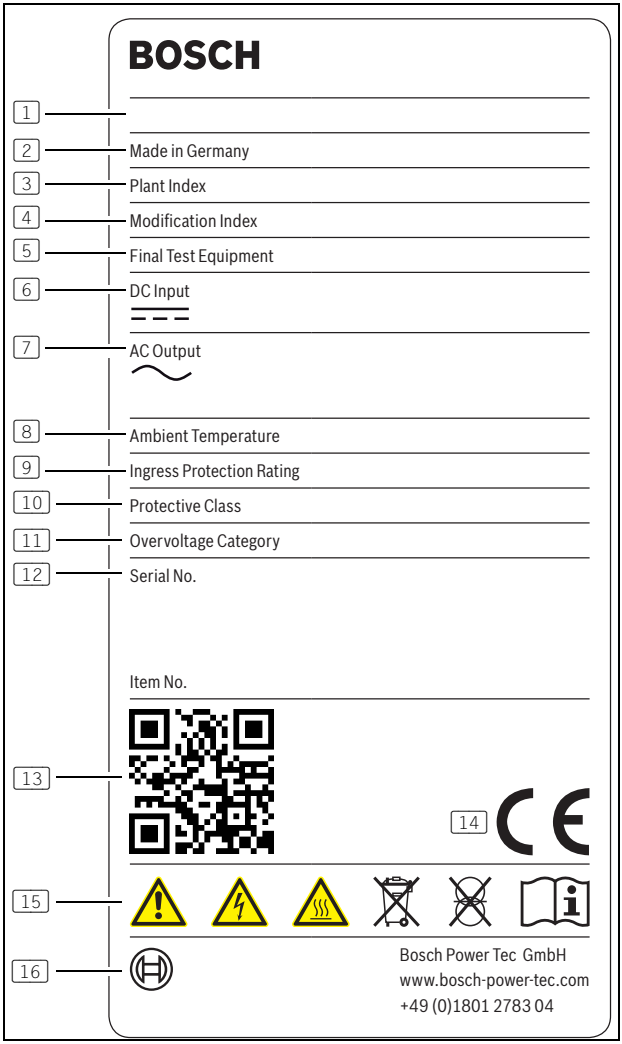

3.8: Type plate

[1] Device description / device type

[2] Place of manufacture / Date of manufacture

[3] Plant code (only relevant for manufacturer)

[4] Version (only relevant for manufacturer)

[5] Final test number (only relevant for manufacturer)

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6	Input data for the solar generator connection: Maximum current, maximum voltage, MPP voltage range
7	Output data for the grid connection: Rated voltage, rated frequency, rated active power, rated apparent power, phase angle cos φ, maximum output current
8	Ambient temperature
9	Protection type
10	Protection class
11	Overvoltage category
12	Serial number, bar code and article number
13	QR code with link to the manufacturer's homepage
14	Conformity marking and test seal
15	Symbols (*Safety signs on the device, p. 13*)
16	Manufacturer

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4 Transportation and installation

4.1 Safety instructions for transport

⚠ CAUTION

Risk of injury due to incorrect transport / incorrect storage / incorrect assembly

If the device falls over during transport, storage or assembly, or is exposed to heavy impacts or persistent rain, this can lead to injury when the damaged device is subsequently used.

- ▶ Avoid damage to the device as a result of it being dropped or banged
- ▶ Do not use a damaged device

NOTICE

Material damage due to improper transport or storage

If the packaged device is dropped, this can damage the device even if it still appears to be fine.

- ▶ Ensure the device is thoroughly checked for damage: Contact Bosch Power Tec Service (see contact details on the back of the manual)
- ▶ Do not use a damaged device

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NOTICE

Material damage caused by condensation

If the device is moved from a warm, damp environment to a cold installation location, condensation may form inside the device.

In the reverse case: If the device is moved from a cold environment to a warm installation location, condensation can form on the housing (especially on the heat sink).

When connecting to a voltage supply, condensation on electronic components can cause a short circuit and damage to the electronics.

- ▶ Before commissioning, the device must be completely de-energised and acclimatised for at least 2 hours.

NOTICE

Material damage due to inadequate ventilation

If, due to an inadequate or blocked air supply, the device is not cooled sufficiently, this can cause the device to age prematurely and, therefore, lead to irreversible damage.

- ▶ Ensure that there is sufficient ventilation
- ▶ Mount the device vertically
- ▶ Observe the minimum clearances
- ▶ Do not install any equipment which generates warm exhaust air above or below the device or which blocks the air supply
- ▶ Do not mount devices on top of each other
- ▶ Do not store any objects on or above the device
- ▶ Do not cover the front panel of the device
- ▶ When mounting the device in a control cabinet, make sure there is sufficient air circulation and the required ambient temperature

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4.2 Safety instructions for assembly/ disassembly

⚠ WARNING

Risk of injury due to incorrect mounting/ disassembly

Incorrect assembly/disassembly can cause the device to fall and be damaged. Commissioning/ recommissioning the damaged device can result in serious injury or death.

- ▶ Do not damage external components (inductors, cooling fins, connection area, plugs, etc.)
- ▶ Use suitable and sufficient materials for anchoring the underside (screws, screw anchors)
- ▶ Only install the device on a wall that has sufficient load-bearing capacity (not plasterboard or anything similar)
- ▶ Do not place the device on dirty ground (mud, puddles)
- ▶ Do not forcibly remove the anti-theft protection (padlock)

⚠ WARNING

Risk of fatal injury due to an unsuitable installation location

An unsuitable installation location (e.g. potentially explosive environments/near highly flammable materials) can result in the risk of explosions/fire and serious injury or death when the device is operated.

- ▶ Do not install the device in areas at risk of explosion (e.g. fine particles such as powder or dust)
- ▶ Do not install the device near highly inflammable substances (e.g. fuels, paints, etc.)

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⚠ CAUTION

Risk of injury due to incorrect mounting/ disassembly

Incorrect mounting/disassembly can cause injury during commissioning/recommissioning.

- ▶ Only install the device with the wall-mounting frame supplied
- ▶ Do not install the device on a damp wall: Do not allow rust to form on screws
- ▶ The device must not be tipped over or subjected to heavy impact
- ▶ Do not over-tighten the screws in the wall-mounting frame, because overtightened screws can become loose
- ▶ Insert the device correctly in the wall-mounting frame. Do not forcefully press down on an incorrectly inserted device
- ▶ The installation location must be easily and safely accessed

⚠ CAUTION

Risk of injury due to an unsuitable installation location

If the installation location is unsuitable, this may cause injury.

- ▶ Use only suitably fireproofed surfaces for installation (made from flame-retardant material), as metal surfaces on the back of the device (e.g. heat sink) may heat up to 100 °C.
- ▶ Only install the device in installation locations where it is not possible for children or unauthorised persons to pull on the cables.

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NOTICE

Material damage due to an unsuitable installation location

If you mount the device in an unsuitable installation location, the ambient conditions may damage the device.

- ▶ Avoid very dirty installation locations (high thermal stresses, derating)
- ▶ Observe minimum clearances, particularly when installing the device in a cabinet (high thermal stresses, derating)
- ▶ Avoid installation locations with strong vibrations (machines/objects) (vibrating components cause electrical failures)
- ▶ Avoid installation locations with biological cultures such as mould/moss (accelerated ageing of plastics and seals leads to leaky, defective parts)

4.3 Transport conditions and storage conditions

- ▶ Ambient temperature: -25 to +60 °C
- ▶ Relative air humidity: 4 to 100% (non-condensing)
- ▶ Pallet can be stacked in two, i.e. the 2nd pallet lies on the cardboard layer of the 1st pallet
- ▶ Only store the packaged device in suitable rooms (device is not packaged to be weather-resistant)
- ▶ If you discover damage that has occurred during transportation: Contact Bosch Power Tec Service (see contact details on the back of the manual).
- ▶ During transportation and handling, bear in mind the weight of the device and its packaging (*Specifications, p. 111*)

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4.4 Requirements for the installation location

NOTICE

Material damage due to an unsuitable installation location (requirements)

If the following requirements for the installation location are not observed, the device may be damaged.

▶ You must observe the listed requirements for the installation location

Bosch BPT-S series devices can be mounted both indoors and outdoors due to their protection type (*Specifications, p. 111*).

Outdoor installation

When installing outdoors, observe the following:

▶ Do not expose the device to intensive, direct sunlight (derating, additional heating, light reflection on the display, poor visibility on the display)

▶ Do not expose the device to heavy contamination

– Cooling fins must not be impaired in their function

– Avoid deposits on cooling fins

▶ Do not expose the device to wet weather

▶ Do not expose the device to heavy winds

▶ Do not expose the device to high levels of dust or sand (do not fit in desert climates)

▶ Do not expose the device to biological activity (moss, fungi, mildew)

▶ Corrosive environments such as spray salt and maritime climates lead to increased corrosion on the device

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- Do not install the device where it is accessible to animals (e.g. rodents)
- Device with IP 65: **Installation beneath a canopy recommended**. The canopy protects the device from unnecessary exposure to heat and moisture (permanent water on the device can cause leaks)

Indoor installation

When installing indoors, observe the following:

- The device can develop noises during operation that are disruptive for people and animals.
- The installation location must be dry.
- The installation locations must be clean and free of foreign objects.
- The installation location must be free of highly flammable (e.g. paper) or explosive materials (e.g. fuel, paint).
- Do not place any objects on the device (insufficient ventilation, excessive loading of the wall bracket)
- Do not expose the device to corrosive gases
- Do not mount the device in areas which are frequently used by people
- Do not mount the device in animal stalls
- The installation location must be sufficiently ventilated.

Clearances

Observe the following minimum clearances when mounting on the wall:

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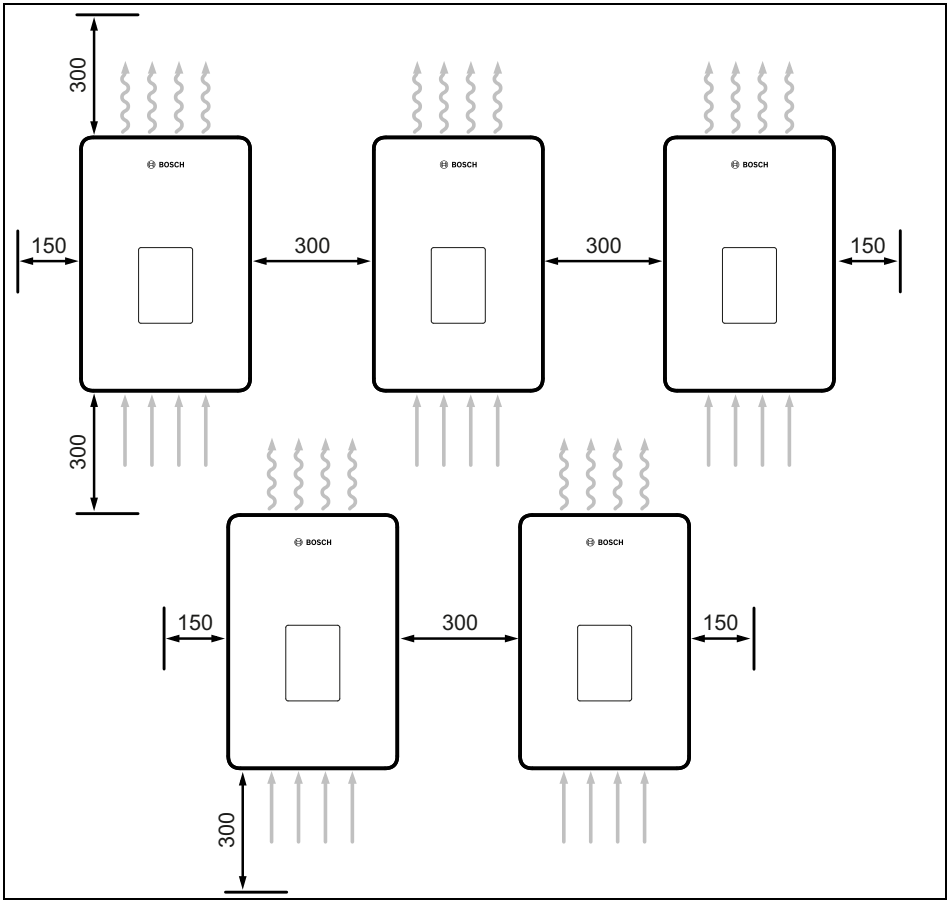

4.1: Necessary clearances (mm) for air circulation

Prerequisites for the ambient air to cool the device:

- ▶ Mount the device vertically
- ▶ Do not mount any devices that produce warm exhaust air above or below the device
- ▶ Do not mount devices on top of each other
- ▶ Do not cover the front panel of the device

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- When mounting the device in a control cabinet, make sure there is sufficient air circulation
- Comply with the following clearances during installation:
  - 300 mm above
  - 300 mm below
  - 150 mm to the side
  - 150 mm in front of the device
  - In the case of outdoor installation: 500 mm clearance from the ground (protection against damage caused by rodents)

Installation surface

The installation surface must meet the following requirements:

- Temperature resistant from -45 °C to +150 °C
- Made of flame-retardant material. Fitting of metal plates is not permitted. If mounting on a wooden wall is unavoidable: Use a 15 mm thick plate (non-combustible) (e.g. building material class A1)
- Fixed
- Flat
- Large enough
- Designed for the weight (*Specifications, p. 111*)
- The mounting background must not transfer vibrations (e.g. from machines) to the device

Installation altitude

- ≤ 3000 m

Ambient temperature

During operation, observe the following ambient temperatures:

- T= –10 to +40°C: Optimum ambient temperature: Device reaches rated power
- T= –25 to –10°C and T= +40 to +60°C: Device output may be reduced (derating). The service life of the device is reduced.

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4.5 Wall mounting or pole mounting

Materials required

- ▶ String inverter (included in delivery)
- ▶ Wall bracket (included in delivery)
- ▶ Suitable drill and drill bit
- ▶ Screws and wall plugs for securing on the wall
- ▶ Suitable tool for screw mounting

The device can be mounted on a wall or on a pole. Pole in this instance refers to a pillar (e.g. made of steel or aluminium), i.e. a vertical, load-carrying component of a photovoltaic system.

Prerequisites

- ▶ Installation instructions have been followed
- ▶ Make sure that no devices that generate warm exhaust air are installed above or below the device.
- ▶ As the device is not supplied with screws:
  - – Select screws and wall plugs that are suitable for the wall material
  - – Use screws made of steel or stainless steel
  - – Observe the dimensions of the screw/washer (see drawing)

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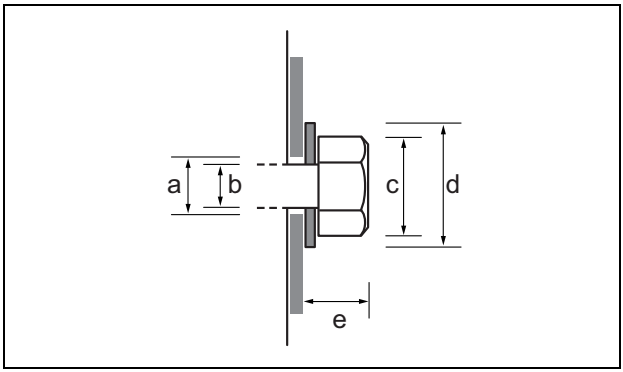
4.5.1 Selecting screws



4.2: Screws: Required dimensions

- a = 9 mm (hole diameter for wall bracket)
- b = 6 to 8 mm (screw diameter)
- c = 15 to 20 mm (screw head outer diameter)
- d = max. 20 mm (washer outer diameter)
- e = max. 10 mm (total height of screw head and washer)

4.5.2 Mounting the wall bracket and device

Procedure

1. Remove the wall bracket and accessories from the packaging. Please note the following here: Wall bracket is packaged separately.

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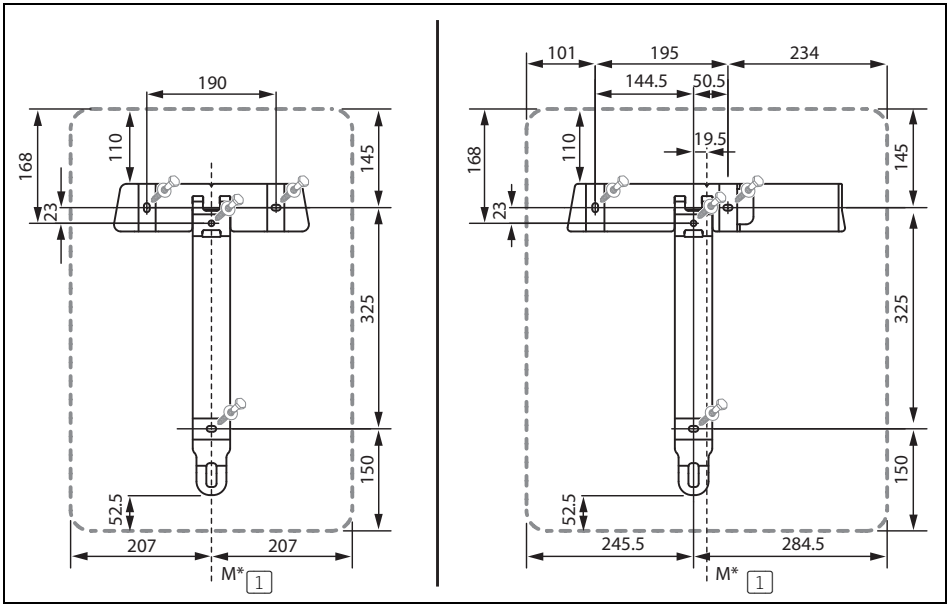

4.3: Wall bracket as a drill template (specifications in mm), left: BPT-S 3/3.68, right: BPT-S 4/4.6

1 M*: Middle axis of the device

2. Using a wall bracket as a drill template: Mark the position of the drill holes (first: top left/centre/ right, then: bottom). Note the following here: Mark the drill holes in such a way that the device display will be at eye level.
3. Drill 4 drill holes (if mounting on a pole, only drill the two vertical drill holes.)
4. Screw the wall bracket on tight
5. Pick up the device using the grip and lift into place

NOTICE

Material damage due to setting down the device

If the device is set down on its front or outer edges, the housing can be scratched or damaged.

▶ Only set the device down on the rear side

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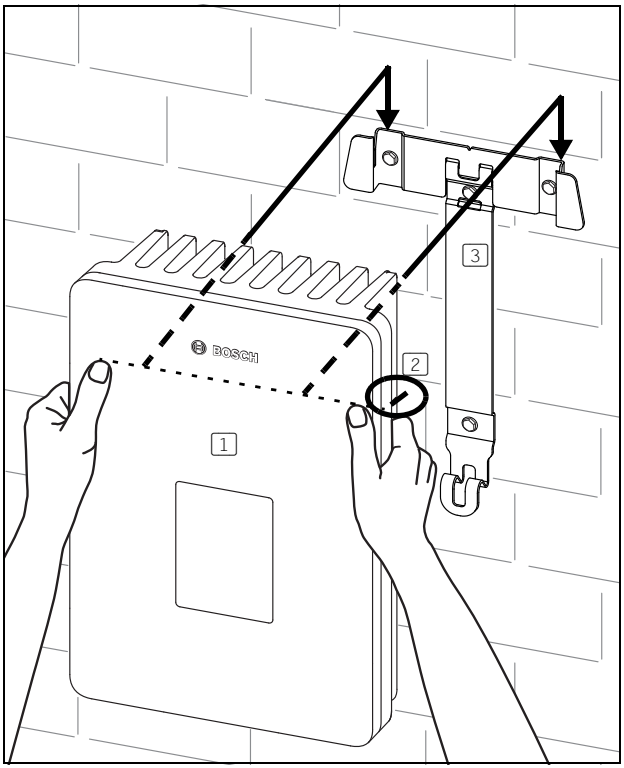
6. Hook the device onto the wall bracket. Please note the following here: Markings on the side of the device show the position for hooking in place.



4.4: Device [1], side marking [2], wall bracket [3]

7. Check to make sure that the device has slotted into place on both sides of the wall bracket.
8. Recommendation: Secure the device with a padlock to protect against theft.

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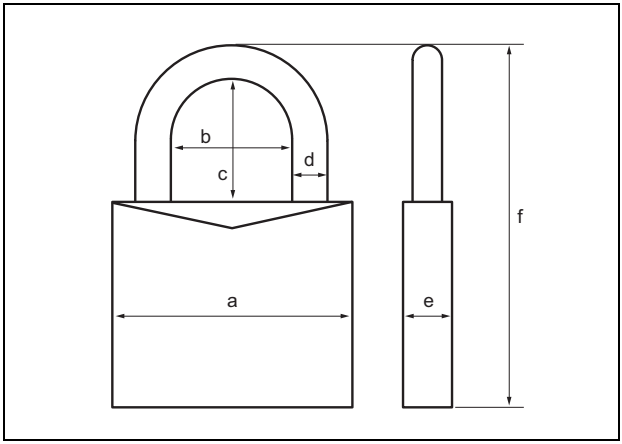

4.5: Dimensions for padlock

The padlock must meet the following requirements:

- Dimensions
  - a = 37 to 50 mm
  - b = 18 to 27 mm
  - c = 18 to 26 mm
  - d = 6 to 8 mm
  - e = 12 to 20 mm
  - f = 58 to 70 mm
- Hardened clamp
- Secured lock cylinder
- Rustproof

Please note the following here:

- Store the key in a safe place for use during servicing
- Recommendation: ABUS 45/40 padlock

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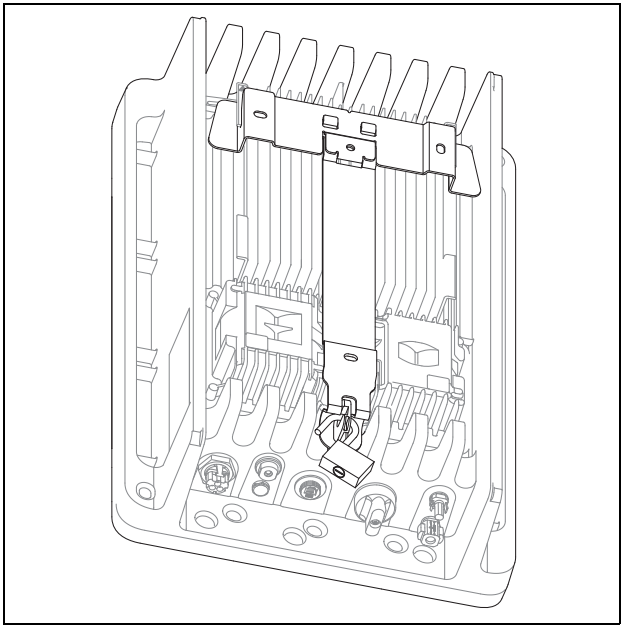

4.6: Position of padlock

- The device is now installed.

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5 Installation

DANGER

Risk of fatal injury due to high voltages

High voltages occur in photovoltaic systems (up to 265 V AC and 1000 V DC) as well as high currents (13 A to 20 A AC and 11.6 A to 16 A DC). Failure to observe standards, directives and local regulations when working on the photovoltaic system leads to risk of fatal injury. Please note the following here: The solar generator is live during daylight.

Before starting any work on electrical systems:

- ▶ Disconnect the system
- ▶ Ensure that it is secured against being switched back on
- ▶ Verify that the system is fully de-energised
- ▶ Earth and short-circuit the AC system
- ▶ Cover or shield any adjacent live components

DANGER

Risk of fatal injury due to incorrect DC connection (max. voltage/current)

If the maximum input voltage/maximum input current is exceeded, there is a risk of potentially fatal electric shocks.

- ▶ Observe the maximum input voltage and maximum input current of the device

DANGER

Risk of fatal injury due to incorrect DC connection (polarity reversal)

Reversing the polarity of the string connections can result in potentially fatal electric shocks.

- ▶ Do not reverse the polarity of the string connections

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DANGER

Risk of fatal injury due to incorrect DC connection (incorrect plug/socket, incorrect cable terminations)

Using unauthorised plugs/sockets or incorrect cable terminations for the SUNCLIX plugs/sockets may result in potentially fatal electric shocks, overheating and fire.

- ▶ Only use the SUNCLIX plugs/sockets that are supplied. In case of loss or if replacement parts are required: Only order original parts. Contact Bosch Power Tec Service (see contact details on the back of the manual).
- ▶ Correctly assemble the SUNCLIX plugs/sockets: do not reverse the polarity, insert the strands far enough, and audibly lock the spring contact into place

DANGER

Risk of fatal injury due to unplugging the DC plugs/sockets under load

Removing the DC plugs/sockets under load can result in potentially fatal arcing. These lead to potentially fatal electric shocks and burns.

- ▶ Never remove the DC plugs/sockets under load

WARNING

Risk of injury due to modifications to the device

Modifications to the device can cause serious injury or death.

- ▶ Only use the device in its original condition
- ▶ Do not open the device
- ▶ Do not carry out any mechanical changes on the device (do not drill the device)
- ▶ Do not modify or paint the device
- ▶ Avoid contact with paints, thinners, etc.
- ▶ Do not over-stress the service switch

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⚠ WARNING

Risk of injury due to incorrect AC connection (1)

Incorrect AC connections can cause overheating and fire, which can lead to serious injury or death.

- ▶ Only allow an authorised electrician to carry out AC connections
- ▶ Correctly connect and check the protective earth (PE) and measure the protective earth resistance
- ▶ Connect an external circuit breaker
- ▶ Install the circuit breaker (automatic circuit breaker) according to the maximum permitted fuse rating of the string inverter.
- ▶ Only connect a suitable circuit breaker
- ▶ Only connect the device to specified grids: see data on the type plate

⚠ WARNING

Risk of injury due to incorrect AC connection (2)

Incorrect AC connections can cause overheating and fire, which can lead to serious injury or death.

- ▶ Only use AC cables with sufficient current-carrying capacity. Observe specified cable cross-section.
- ▶ Correctly assemble the original AC plug: do not reverse the polarity, insert the strands far enough and use a suitable tool to tighten the screw terminals.
- ▶ If there is no guarantee that the device will be switched off in the event of a fault (no low-resistance PE connection for TT grids), suitable safety measures must be put in place (e.g. install earth leakage circuit breaker).

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⚠ **WARNING**

Risk of injury due to failure to follow the correct sequence

Failure to connect the protective earth first before assembling and installing the device can result in serious injury or death.

- ▶ First connect the protective earth (if necessary through mains cable), then connect the solar generator cable
- ▶ Observe the order specified
- ▶ Observe the safety instructions

⚠ **WARNING**

Risk of injury due to incorrect earthing of the solar generator

If the solar generator is not earthed when the string inverter is feeding in power, there is a risk of an electric shock from touching the frame of the solar generator. This is caused by accidental energization resulting from capacitive leakage currents.

- ▶ We therefore recommend: Earth the frame of the solar generator: 10 mm^2 copper cable or 16 mm^2 aluminium cable

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NOTICE

Material damage due to incorrect DC connection (1)

An incorrect DC connection can cause damage to the string inverter.

- ▶ Only allow an authorised electrician to carry out DC connections
- ▶ BPT-S 4/4.6 only Do not connect to two of the same poles (e.g. two positive poles)
- ▶ Do not connect modules to the incorrect inputs of negative or positive poles
- ▶ Do not install an earth connection in the generator: Do not earth the positive (+) or negative (-) string cable and only use insulated cables. It is possible to earth the PV installation system and this is required in some countries. Observe the applicable national standards and directives.
- ▶ Only connect permitted modules: Modules based on crystalline silicon technology and modules based on CIS technology
- ▶ Only connect solar modules as DC sources: do not connect fuel cells or batteries
- ▶ Only use PV cables with sufficient current-carrying capacity.
- ▶ Only use double-insulated PV cables with sufficient voltage resistance

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NOTICE

Material damage due to incorrect DC connection (2)

An incorrect DC connection can cause damage to the string inverter.

- ▶ Only use permitted plugs/sockets (SUNCLIX). Only allow an authorised electrician to terminate the cables.
- ▶ If additional external charge disconnectors are required: Only use switch disconnectors or circuit breakers as charge disconnectors.
- ▶ When connecting and selecting PV modules: observe the module and string inverter specifications
- ▶ Always use the same alignment/incline for the modules (within a string)
- ▶ Observe the chronological connection sequence for the strings
- ▶ Only connect PV modules which satisfy the electrically permitted input data of the inverter.

NOTICE

Material damage due to incorrect AC connection (earthing)

Incorrect AC connection (incorrect material pairing for PE bolts) can cause electrical corrosion and, therefore, damage the device.

- ▶ Use the earthing set supplied

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NOTICE

Material damage due to incorrect AC connection

An incorrect AC connection can result in overvoltage or an overloaded cable and consequently the risk of fire.

- ▶ Use a strain relief for cables in the connection area
- ▶ Connect the device and electric loads to separate circuit breakers (automatic circuit breakers)
- ▶ Only connect one conductor (stripped cable) per terminal
- ▶ Observe the correct wire stripping length

NOTICE

Material damage due to incorrect DC connection and AC connection

If the DC cables and AC cables are bent beyond the minimum permitted bending radii, the cables may break and both the plug/socket and the seal may be damaged.

- ▶ Observe the minimum bending radii of the DC cable and AC cable
- ▶ Absorb mechanical loads before they reach the plug/socket (e.g. using cable ties)

NOTICE

Material damage due to modifications to the device

The device can be damaged by modifications to the device.

- ▶ Do not modify or paint the device
- ▶ Avoid contact with paints, thinners, etc.
- ▶ Do not over-stress the service switch
- ▶ Do not open the device

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5.1 Electrical installation

⚠ WARNING

Risk of injury due to failure to follow the correct sequence

Failure to connect the protective earth first before assembling and installing the device can result in serious injury or death.

- ▶ First connect the protective earth (if necessary through mains cable), then connect the solar generator cable
- ▶ Observe the order specified
- ▶ Observe the safety instructions

5.1.1 Connecting the earthing set

Materials required

- ▶ Rigid cable (copper cable 10 mm^2 or aluminium cable 16 mm^2) not included in scope of delivery
- ▶ Earthing set comprising:
  - Terminal plate
  - Detent edged washer
  - Flat-head screw M6

An additional earth connection (irrespective of the national regulations) is absolutely necessary: See the earthing set in the scope of supply

▶ **Procedure**

1. Take the terminal plate, detent edged washer, M6 flat-head screw from the accessories bag
2. Strip the rigid cable to 38 mm
3. Insert the screw and detent edged washer through the U-plate (toothing of the detent edged washer must be facing the terminal plate)

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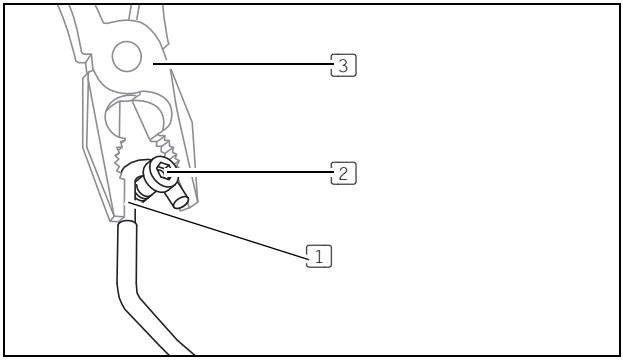
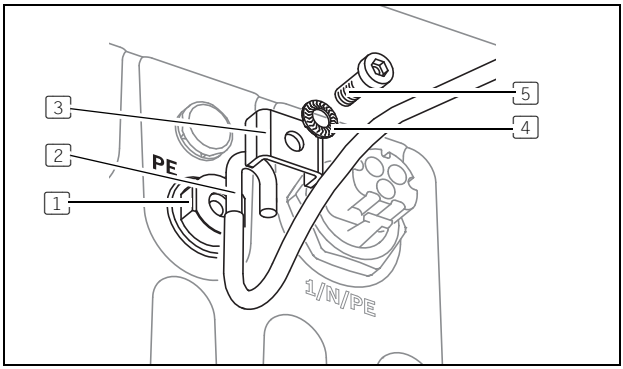
4. Bend the stripped rigid cable around the screw (180° curve) using pliers



5.1: Stripped rigid cable [1], flat-head screw M6 [2], pliers [3]

5. Screw together into the PE connection on the device, thus fixing the cable in place



5.2: Connecting the earthing set

[1] PE connection

[2] Rigid cable

[3] Terminal plate

[4] Detent edged washer

[5] Flat-head screw M6

6. Tighten the screw in place and clamp the rigid cable between the plate and PE connection

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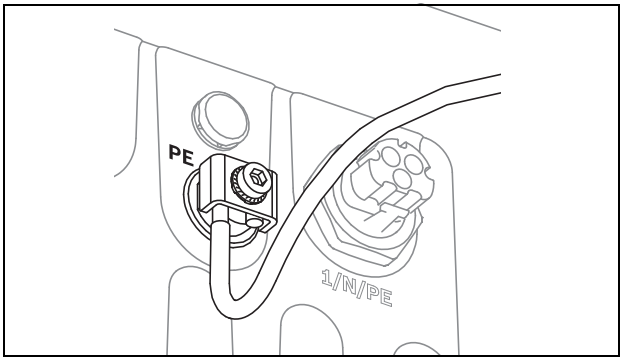

5.3: Connected earthing set

- PE earthing set is connected

5.1.2 Preparing the AC connection

The single-phase Bosch BPT-S series string inverters are designed to be connected to a single-phase or three-phase power grid.

Each Bosch BPT-S series string inverter is therefore equipped with a three-pin AC plug for connection to the grid.

When installing several string inverters on a 3-phase grid, they can be distributed to different phases in order to load the feed-in phases evenly.

See figure *Connection of three string inverters to different phases of a grid connection, p. 63*

NOTICE

Material damage due to incorrect connection to a 3-phase grid

If the phases are incorrectly connected to a 3-phase grid, this can cause material damage due to overvoltage: e.g. damage to the device electronics.

- ▶ Do not inadvertently connect the string inverter between 2 phases
- ▶ Do not mix up phase and N

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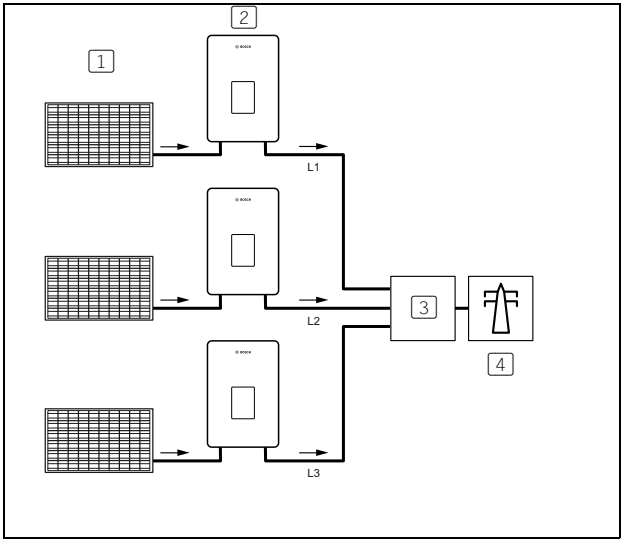

5.4: Connection of three string inverters to different phases of a grid connection

[1] PV system

[2] String inverter

[3] Control cabinet

[4] Public power grid

Please note the following here:

- ▶ Observe the applicable standards as well as the local connection conditions from your grid operator (permitted phase imbalance)
- ▶ Fuse each string inverter separately: Using a dedicated circuit breaker (automatic circuit breaker) for each one

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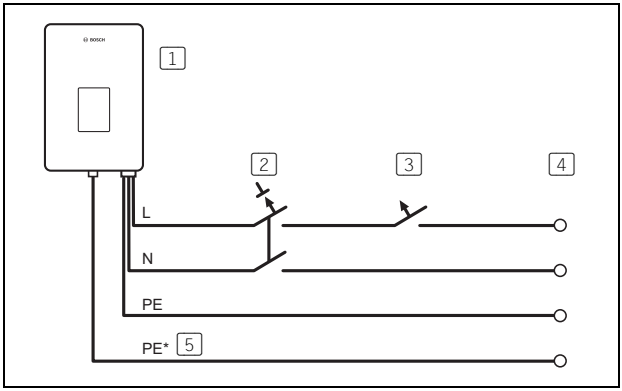

5.5: Fuse each string inverter separately (1-phase connection)

[1] String inverter

[2] If necessary: RCD, type A, at least 100 mA (if standards specify that an additional RCD is required to protect the AC cable)

[3] Circuit breaker (automatic circuit breaker), type B (see table)

[4] Transfer rail

[5] PE*: Separate PE

The string inverter already contains an RCD type B to protect the solar generator side.

	Circuit breaker with characteristic B: Rated currents		
String inverter	16 A	20 A	25 A
BPT-S 3	x	x	
BPT-S 3.68		x	
BPT-S 4		x	x
BPT-S 4.6			x

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5.1.3 Connecting the network cable (AC cable)

Materials required

- ▶ Cable stripper
- ▶ Suitable 4 mm slotted screwdriver
- ▶ 30 mm spanner
- ▶ Mains plug (included in delivery)
  - – For wire cross-section 2.5 to 6 mm^2, rigid or flexible (with wire end ferrule without plastic collar)
  - – 3 different cable thicknesses for external cable diameters 8 to 12 mm, 12 to 16 mm, 16 to 21 mm

Permitted connectors: Only connect the integrated AC connection of the string inverter with the AC plug included in the delivery. If you lose the original AC plug: Contact Bosch Power Tec Service (see contact details on the back of the manual).

Minimum permitted bending radii: At least 4 x cable diameter

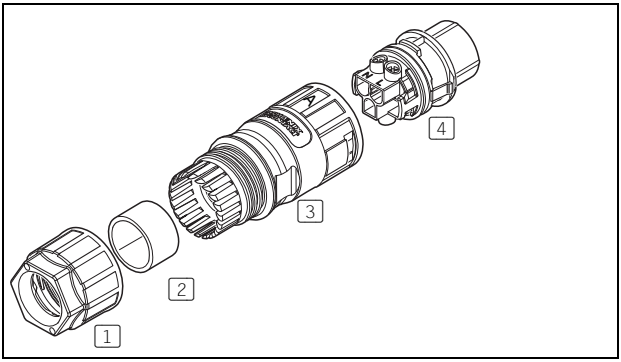
NOTICE

Material damage due to incorrect DC connection and AC connection

If the DC cables and AC cables are bent beyond the minimum permitted bending radii, the cables may break and both the plug/socket and the seal may be damaged.

- ▶ Observe the minimum bending radii of the DC cable and AC cable
- ▶ Absorb mechanical loads before they reach the plug/socket (e.g. using cable ties)

Assembling the mains plug: Preparing the cables and connecting the wires



5.6: Individual components of the mains plug

[1] Cable screw connection

[2] Seal (3 different versions)

[3] Housing

[4] Contact carrier

▶ **Procedure**

1. Strip the cable to 35 mm

NOTICE

Material damage due to damaged wire strands

Damaged wire strands can break and heat up to more than 100 °C. This results in a risk of fire.

▶ Do not damage the wire strands

2. Push the cable through the cable screw connection
3. Select the correct seal for the cable diameter
4. Push the housing with the seal over the cable
5. Strip the wires to 12 mm (in the case of flexible cables: Add and crimp an additional cable end sleeve.)

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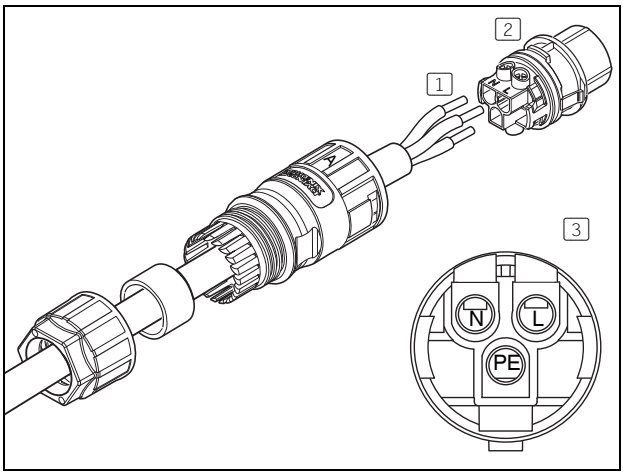
6. Connect the wires to the contact carrier. For the terminal assignment (PE, L, N), see the drawing. Tighten the screws on the contact carrier using a slotted screwdriver (blade width 4 mm) (tightening torque: 0.8 to 1 Nm).



5.7: Wires [1], contact carrier [2]: Terminal assignment [3]

NOTICE

Material damage due to failure to observe the specified tightening torques

Insufficient tightening torque can cause the cable to be pulled out of the plug. Excessive tightening torque can break the cable at the contact or the plug. In both cases (too low, too high), this can result in a short circuit, fire or device failure.

- ▶ Tighten the cable to the specified tightening torque.
- ▶ Tighten the screw connection to the specified tightening torque.

7. Check that the wires are completely inserted and connected.
8. Insert the contact carrier into the housing until the contact carrier audibly clicks into place on both sides.

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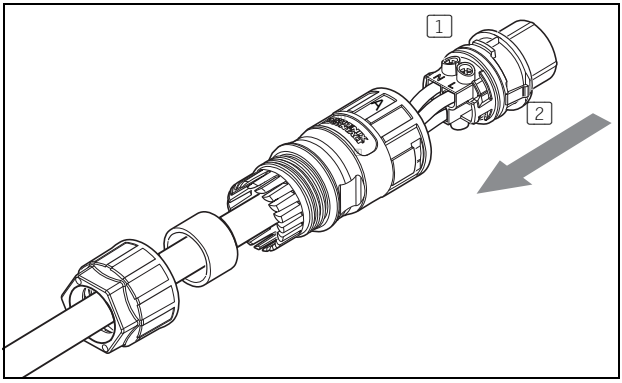

5.8: Contact carrier [1] and lock [2]

9. Push the seal into the housing. Make sure that the catches are in the correct position and facing in the right direction. If it is difficult to insert the seal: Open out the housing collar, then insert the seal.
10. Tighten the cable screw connection with a 30 mm torque wrench (specifications in mm) (tightening torque 3.5 Nm)

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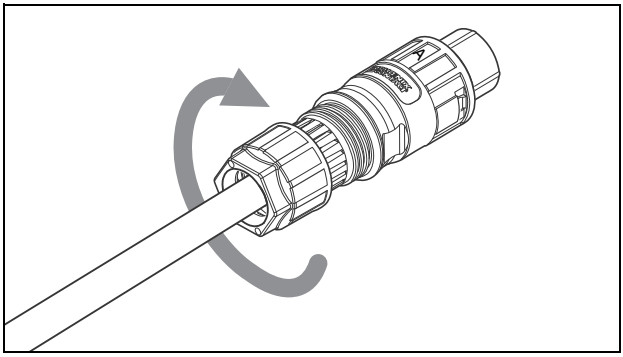

5.9: Cable screw connection

⚠ CAUTION

Risk of injury due to damaged wire strands and incorrect screw connections (AC)

Damaged wire strands may break. Cables that are not properly screwed into place can be pulled out or damaged.

This may result in electric shock or heat build-up.

- ▶ Do not damage the wire strands
- ▶ Carry out the screw connection according to instructions
- ▶ Observe the tightening torques

NOTICE

Material damage due to failure to observe the specified tightening torques

Insufficient tightening torque can cause the cable to be pulled out of the plug. Excessive tightening torque can break the cable at the contact or the plug. In both cases (too low, too high), this can result in a short circuit, fire or device failure.

- ▶ Tighten the cable to the specified tightening torque.
- ▶ Tighten the screw connection to the specified tightening torque.

■ Plug is terminated.

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Insert the terminated mains plug into the AC socket

▶ **Procedure**

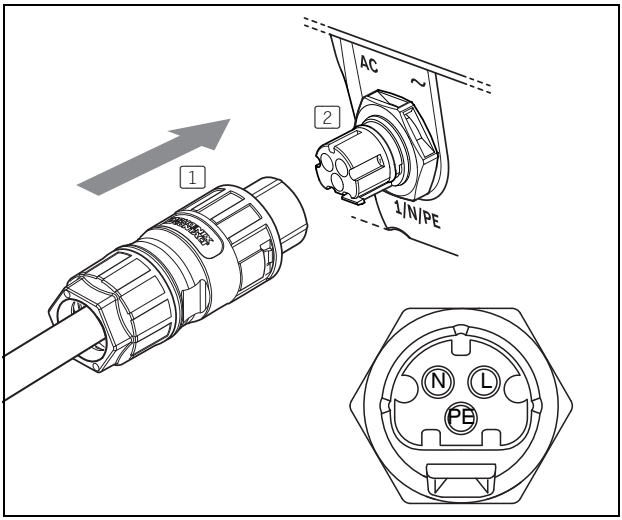
NOTICE

Material damage due to incorrect AC connection

Incorrect AC connections (connecting or disconnecting under load) can damage the AC plug. The AC plug is not suitable for interrupting current.

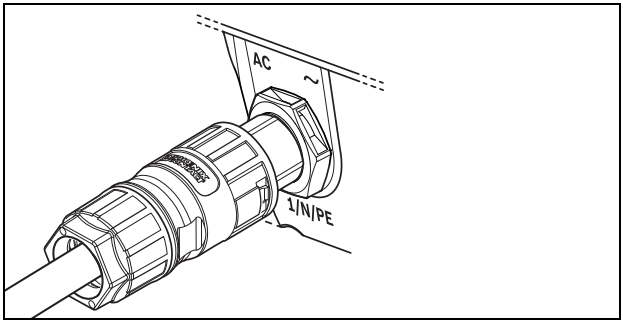
▶ Do not connect or disconnect the AC plug under load

1. Insert the terminated mains plug into the AC socket of the string inverter. A clicking noise confirms a correct connection.



5.10: Terminated AC mains plug [1] and AC socket [2] (string inverter)

■ The AC mains plug is connected to the AC connection of the string inverter.



5.11: AC mains plug and AC connection connected

5.1.4 Connecting the solar generator cable (DC cable)

Materials required

- ▶ Slotted screwdriver (blade width 3 mm)
- ▶ 15 mm spanner (specification in mm)
- ▶ Sockets/plugs for DC+ and DC– (included in the delivery)

DANGER

Risk of fatal injury when working on a live system

When working on a live system there is a risk of electric shock, which can result in death or serious injury.

- ▶ Do not work on a live system
- ▶ If there is no alternative: Only work on live components if you have the appropriate additional qualification, and use protective equipment. Please note the applicable standards and regulations.

By measuring the voltage on the solar generator, you can determine possible causes of faults (cabling, part shadowing or defective solar modules) and rectify these before installing the device.

Solar generator cables must not be earthed. The device measures the insulation resistance during commissioning.

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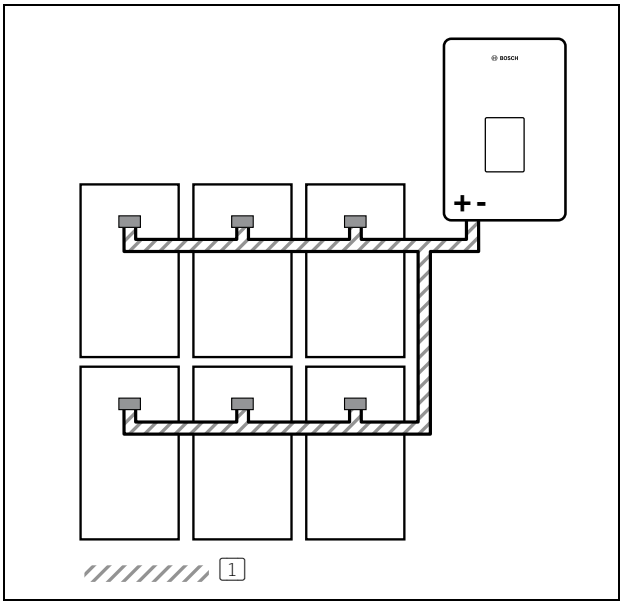
Cables with a cross-section between 2.5 mm² and 6 mm² are compatible with the SUNCLIX plugs/ sockets.

The Bosch BPT-S series string inverters are equipped with varistors on the DC side. These provide overvoltage protection.

To minimise faults caused by overvoltages through electric fields (e.g. in the event of storms): Avoid looping (keep the enclosed area between the feed and return line as small as possible).



5.12: Example: Avoid looping (keep the enclosed area between the feed and return line as small as possible)

1 Area enclosed by cables

Prerequisites

- ▶ Protective earth connected
- ▶ Polarity of the solar generator cable checked: DC+ cable for socket (+) and DC– cable for plug (–)
- ▶ Voltage of the solar generator cable checked

- ▶ Solar generator cable
  - – Increased insulation
  - – Cable cross-section 2.5 to 6 mm^2
  - – Cable diameter 5 to 8 mm
  - – Tin-plated cable
- ▶ Switch position of optionally external DC switch disconnector at **0**. Optional (unless required by local law)
- ▶ Service switch position to **0**: The power unit for the string inverter is de-energised.

▶ **Procedure**

The following steps refer to the DC plug (-) and the DC socket (+). First carry out the steps for the DC plug and then for the DC socket. In the following drawings, the DC plug can be seen on the left and the DC socket on the right.

DANGER

Risk of fatal injury when working on a live system

When working on a live system there is a risk of electric shock, which can result in death or serious injury.

- ▶ Do not work on a live system
- ▶ If there is no alternative: Only work on live components if you have the appropriate additional qualification, and use protective equipment. Please note the applicable standards and regulations.

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DANGER

Risk of fatal injury due to high voltages

High voltages occur in photovoltaic systems (up to 265 V AC and 1000 V DC) as well as high currents (13 A to 20 A AC and 11.6 A to 16 A DC). Failure to observe standards, directives and local regulations when working on the photovoltaic system leads to risk of fatal injury. Please note the following here: The solar generator is live during daylight.

Before starting any work on electrical systems:

- ▶ Disconnect the system
- ▶ Ensure that it is secured against being switched back on
- ▶ Verify that the system is fully de-energised
- ▶ Earth and short-circuit the AC system
- ▶ Cover or shield any adjacent live components

DANGER

Risk of fatal injury due to careless work

Careless working practices (live power/uninsulated tools) leads to the risk of electric shock, which can result in death or serious injury.

- ▶ Do not work on a live system
- ▶ Only use insulated tools.
- ▶ Terminate the DC plug/socket in sequence and take measures to prevent them being touched.

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⚠ CAUTION

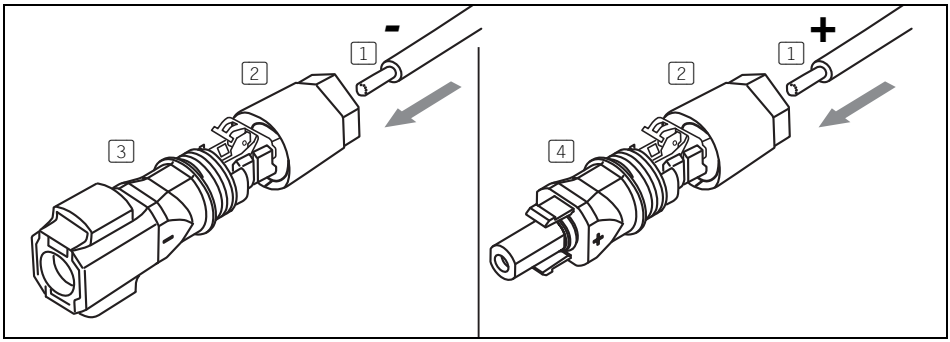
Risk of injury due to damaged wire strands and incorrect screw connections

Damaged wire strands may break. Cables that are not properly screwed into place can be pulled out or damaged.

This may result in electric shock or heat build-up.

- ▶ Do not damage wire strands when inserting them into the spring contact
- ▶ Carry out the screw connection according to instructions
- ▶ Observe the specified tightening torque

1. Strip the cable to 15 mm.
2. Insert the stripped cable up to the stop (negative cable for DC plug (-) and positive cable for DC socket (+) are live). Hold the housing on the screw connection.



5.13: Stripped cable [1], screw connection [2], DC plug housing (–) [3], DC socket housing (+) [4]

3. Press down spring until it clicks audibly into place (it must be possible to see the fine wire strands in the chamber)

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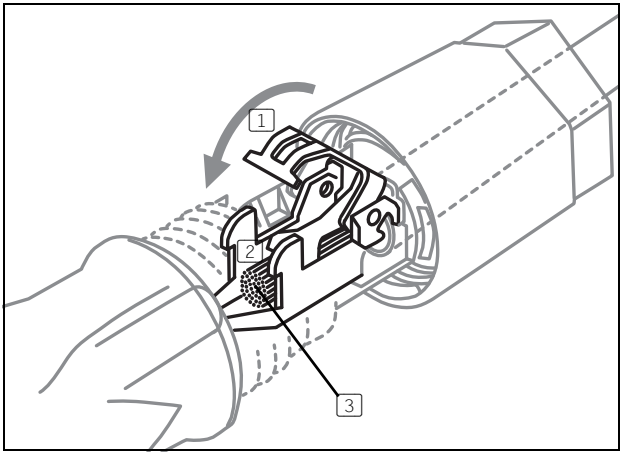

5.14: Spring [1], chamber [2], wire strands [3]

NOTICE

Material damage due to incorrect DC cable terminations

Incorrect cable terminations can result in damage to the DC plug/DC socket. If the wire strand can no longer be seen once the spring has been pressed down in the terminal area, the cable is not positioned correctly.

▶ Dismantle the plug/socket and re-terminate the cable

4. Tighten the screw connection (tightening torque: 2.0 Nm)

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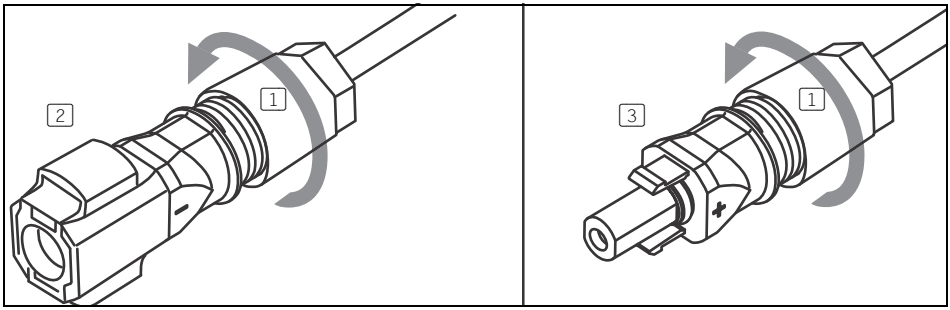
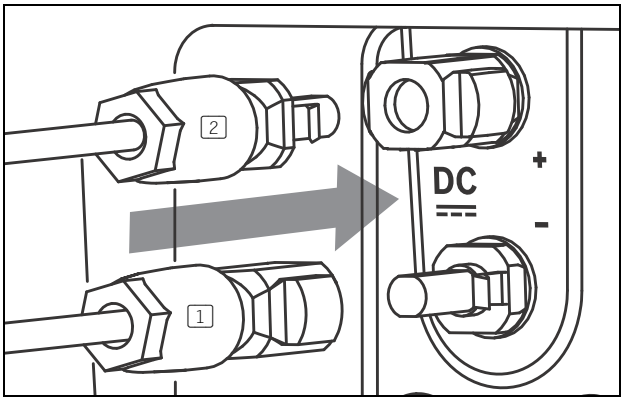


5.15: Screw connection [1], DC plug housing (-) [2], DC socket housing (+) [3]

5. Repeat the corresponding steps 1-4 for the socket.
6. Insert the DC (-) plug into the DC- socket of the string inverter. Insert the DC (+) socket into the DC+ plug of the string inverter. Please note the following here: A clicking sound indicates a secure lock.



5.16: DC (-) plug [1] and DC (+) socket [2] including connection area DC- and DC+

7. Lay the AC cable and DC cable in the cable channel

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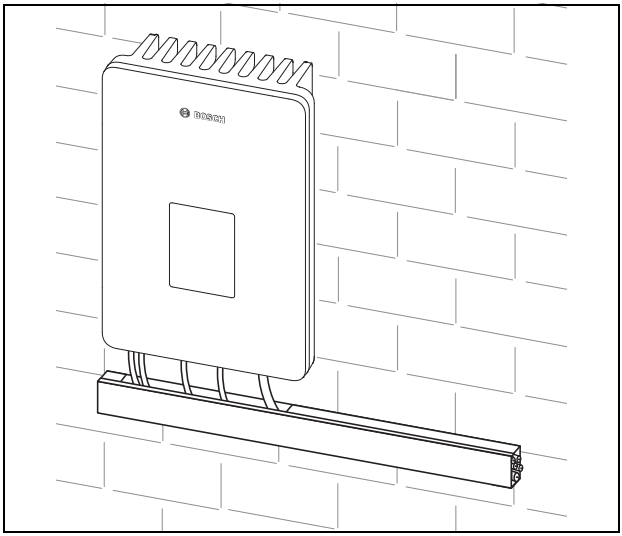

■ Solar generator cable is connected.

5.1.5 Dismantling the plug

Materials required

▶ Slotted screwdriver

Prerequisites

▶ Service switch to position **0**

▶ If an external DC circuit breaker is included in the installation: DC circuit breaker to position **0**

If the wire strand can no longer be seen once the spring has been pressed down in the terminal area, the cable is not positioned correctly. In this case dismantle the plug and re-terminate the cable.

▶ **Procedure**

1. Loosen the plug/socket with the slotted screwdriver (do not open plug/socket)

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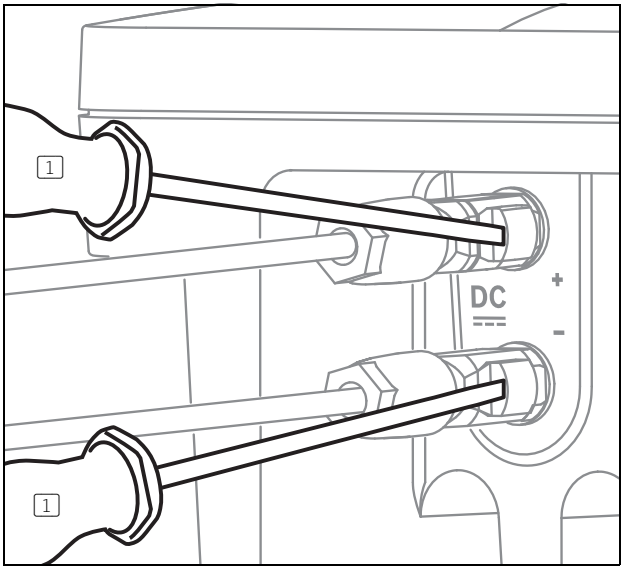

5.17: Slotted screwdriver [1] for opening

2. Remove all DC cables from the string inverter to de-energise the device.
3. Verify that the system is fully de-energised

DANGER

Risk of fatal injury due to high voltages

High voltages occur in photovoltaic systems (up to 265 V AC and 1000 V DC) as well as high currents (13 A to 20 A AC and 11.6 A to 16 A DC). Failure to observe standards, directives and local regulations when working on the photovoltaic system leads to risk of fatal injury. Please note the following here: The solar generator is live during daylight.

Before starting any work on electrical systems:

- ▶ Disconnect the system
- ▶ Ensure that it is secured against being switched back on
- ▶ Verify that the system is fully de-energised
- ▶ Earth and short-circuit the AC system
- ▶ Cover or shield any adjacent live components

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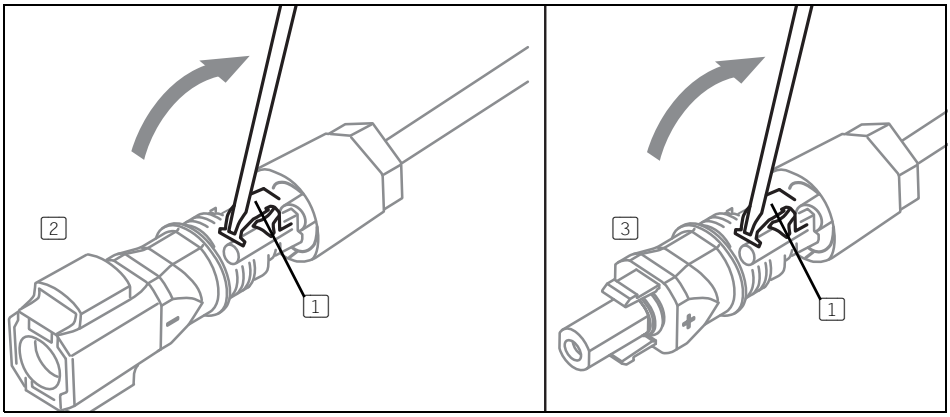
4. Press the spring down to open



5.18: Spring [1], DC plug housing (-) [2], DC socket (+)housing [3]

- DC plug/DC socket is opened and dismantled.

5.1.6 Connecting the string inverter to the Ethernet

Materials required

- ▶ Ethernet cable with the following characteristics
  - – Cable category CAT.5e or better
  - – Shielded FTP cable (Foiled Twisted Pair)
  - – UV-resistant
  - – Temperature-resistant: -20°C to +60°C
  - – Shielding up to the tip of the plug

Prerequisites

- ▶ Mounted and connected string inverter
- ▶ Ethernet socket with internet access (e.g. router or PC). For smooth operation, ports 80, 123 and 5222 must be activated in any existing firewall.

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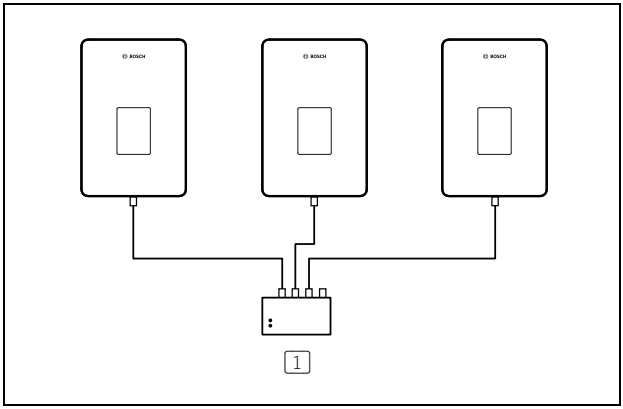
Procedure

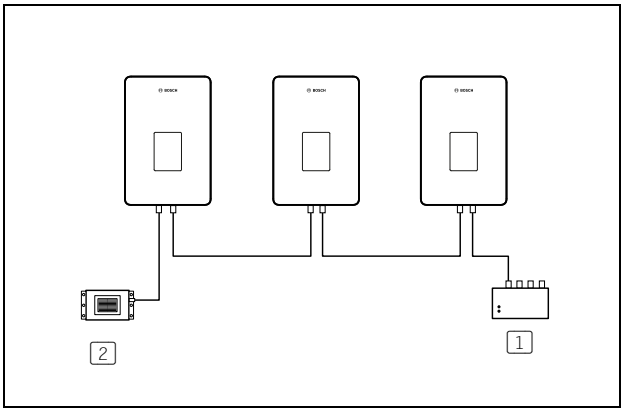
1. Connect the string inverter to the network using a standard Ethernet cable or directly to the network connection of a computer. Crossed cables are not necessary.



5.19: LAN connection string inverter (1 Ethernet socket)

[1] Router or switch

2. Optional: Connect several string inverters together either using a router or a switch or, if the string inverter has two Ethernet sockets (see data sheet), also from string inverter to string inverter.



5.20: LAN connection: Several string inverters (two Ethernet sockets)

1 Router or switch

2 Accessories

- One or more string inverters are connected with the Ethernet network or a PC.

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6 Commissioning

NOTICE

Material damage due to incorrectly set values during commissioning/recommissioning

During commissioning/recommissioning, parameters can be changed (e.g. country standard, grid standard). Incorrect settings can lead to parameters that exceed the values permitted for the country in question and which can damage the device. In addition, the device may no longer be compliant with the grid or the law.

▶ Settings or changes to parameters may only be carried out by an authorised electrician

NOTICE

Material damage due to mechanical damage to the display screen

Knocking or banging the black display screen can damage the printed circuit board behind it.

▶ Only operate the device contact-free as described (e.Key, e.Data, manually via gesture control)

Prerequisites

▶ Corresponding regulations and warnings observed

▶ Device mounted (*Wall mounting or pole mounting, p. 46*)

▶ Network cable (AC) connected (*Connecting the network cable (AC cable), p. 65*)

▶ Solar generator cable (DC) connected (*Connecting the solar generator cable (DC cable), p. 71*)

6.1 Switching on the AC and DC network

▶ **Procedure**

1. Switch on the mains power supply by switching the external circuit breaker

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2. If necessary, switch on the solar generator via the external optional DC disconnect switch.

■ The power unit for the string inverter is switched on. The AC and DC networks are switched on.

The string inverter only requires the AC grid for commissioning and communication. Therefore, commissioning and communication with the device are also possible without solar generator power, e.g. at night.

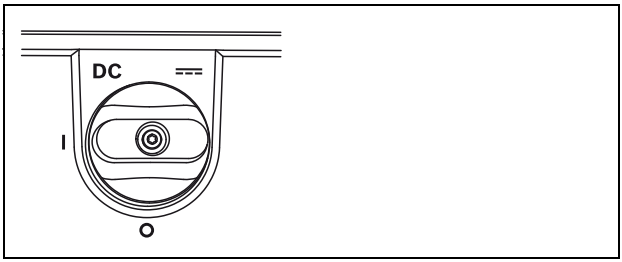
The following 3 options are available for commissioning:

- ▶ With the e.Key: See chapter *Starting up the string inverter using the e.Key, p. 85*
- ▶ Manually (gesture control): See chapter *Starting up the string inverter by hand (gesture control), p. 86*
- ▶ With e.Data: See chapter *Starting up the string inverter using e.Data, p. 89*

6.2 Switching on the device

▶ **Procedure**

1. Move the service switch on the string inverter from **0** to **1**.



6.1: Service switch

■ The string inverter is switched on.

The start screen appears:

Solar key or hand operated

6.3 Starting up the string inverter using the e.Key

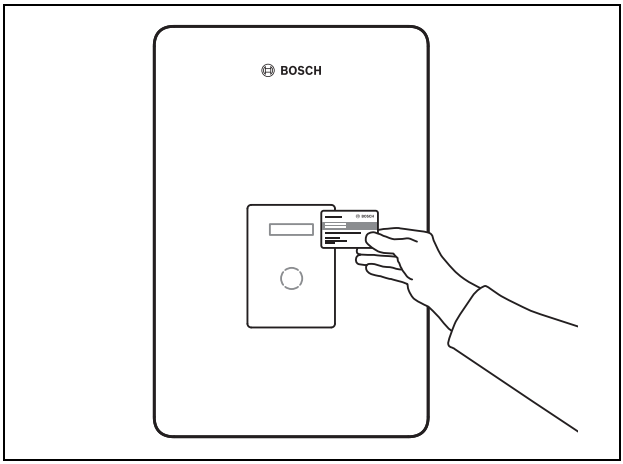
Prerequisites

- Obtain an e.Key from the manufacturer: Pre-programmed RFID card, which contains the language, country and standard settings for the respective location
- Service switch is in position 1 and AC cabling is in place

The e.Keys can be obtained in the *Standard* and *Premium* variants. Both the standard card and the premium card enable simplified commissioning.

Procedure

1. Hold the e.Key next to the specified point on the inverter, depending on the device category (approx. 3 seconds).



6.2: Position of the e.Key on the device (single-phase: BPT-S 3-4.6)

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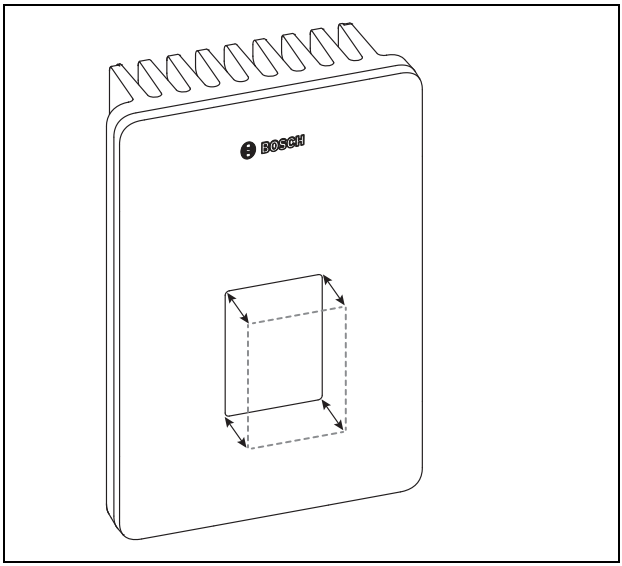
- The e.Key is detected (display: *e.Key detected*). The data (language, country, grid standard) is transferred to the device:
  - ▶ When the data is being transferred, white LEDs light up permanently.
  - ▶ Once the data has been transferred, the LEDs light up in a blue circular pattern for three seconds.

The configuration is now complete.

6.4 Starting up the string inverter by hand (gesture control)

As an alternative to the e.Key or e.Data, once the start screen has appeared, the string inverter can be activated using gesture control.



6.3: Area for gesture control

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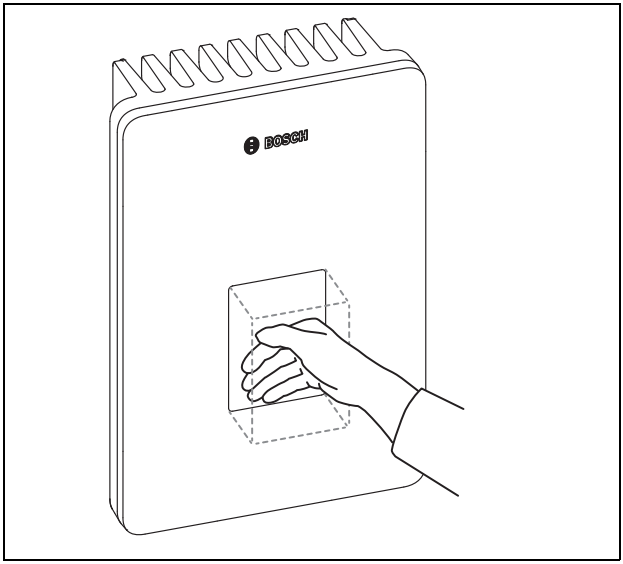

6.4: Area for gesture control (approach with hand)

Prerequisites

- ▶ Service switch is in position 1 and AC cabling is in place
- ▶ The string inverter is switched on
- ▶ You have understood the way that the gesture control works:
  - **Short** gesture: Position your hand approx. 15 cm in front of the device and then pull your hand back again immediately
  - **Long** gesture: Place your hand approx. 15 cm in front of the device and hold your hand in this position for approx. 5 seconds
- ▶ The start screen appears:

  e.Key or hand operated

With the long gesture, a progress bar is immediately displayed on the screen.

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If the display screen is dirty or old, the distance for the gesture control may be less.

6.4.1 Switching from the start screen into the language menu

Prerequisites

- ▶ Find out the required standard that must be set from your local energy supply company.
- ▶ Service switch on the string inverter is set to **1**
- ▶ Start screen is displayed

  e.Key or hand operated

▶ **Procedure**

1. To switch to the language menu: Carry out a long gesture

■ The language menu is displayed.

6.4.2 Setting the language

▶ **Procedure**

1. Carry out short gestures until the desired language appears (e.g. English) and the angled brackets flash:

   Language

   <English>
2. To confirm: Carry out a long gesture

■ Entry is confirmed: Flashing stops and the next menu is displayed.

6.4.3 Set the country

▶ **Procedure**

1. Carry out short gestures until the desired country appears (e.g. United Kingdom) and the angled brackets flash:

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Country

<United Kingdom>

2. To confirm: Carry out a long gesture

■ Entry is confirmed: Flashing stops and the next menu is displayed.

6.4.4 Setting the standard

If various standards apply in the selected country, the *Standard* menu is displayed.

▶ **Procedure**

1. Carry out short gestures until the desired standard appears (e.g. AR4105<13.8) and the angled brackets flash:

   Standard

   <AR4105 <13.8>

2. Carry out a long gesture

■ The data (language, country, grid standard) is transferred to the device:

▶ When the data is being transferred, white LEDs light up permanently.

▶ Once the data has been transferred, the LEDs light up in a blue circular pattern for three seconds.

The configuration is now complete.

6.5 Starting up the string inverter using e.Data

Materials required

▶ Ethernet cable with the following characteristics:

- Cable category CAT.5e or better
- Shielded FTP cable (Foiled Twisted Pair)
- UV-resistant
- Temperature-resistant: -20°C to +60°C
- Shielding up to the tip of the plug

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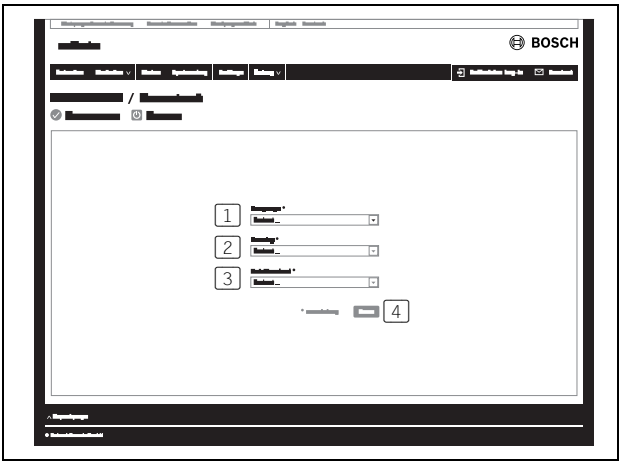
Prerequisites

- ▶ Service switch is in position 1 and AC cabling is in place
- ▶ The string inverter is switched on
- ▶ The one end of the Ethernet cable is inserted in the string inverter and the other end of the Ethernet cable is inserted in the laptop/PC.

▶ **Procedure**

1. Move the service switch on the string inverter from **0** to **1**
2. Enter the serial number of the device or *edata* directly in the address line of the web browser in place of an Internet address (serial number is on the type plate)

The home page appears initially in English. After selecting the language, the home page appears in the selected language.



6.5: Example: Indicated web page in the web browser

1 Setting the language

2 Set the country

3 Set the grid standard

4 Confirm the settings

3. Select the language
4. Select the country
5. Select the grid standard
6. Confirm the settings: Click on *Finish*, then on *Send settings*

■ The data (language, country, grid standard) is transferred to the device:

▶ When the data is being transferred, white LEDs light up permanently.

▶ Once the data has been transferred, the LEDs light up in a blue circular pattern for three seconds.

The configuration is now complete.

6.6 Information on selection of country

Selecting the country sets a country-specific set of parameters. The manufacturer has defined country-specific parameter sets in line with country-specific standards.

On the day of commissioning, you have the option to select another country with the corresponding parameter set. Start the string inverter using the service switch by briefly switching it off and on again.

If you have set the incorrect country during initial start-up: Switch the service switch off and back on again. Then enter the correct country.

The string inverter only works if a set of parameters is set. If you want to use the device in a country that is not listed in the display: Contact Bosch Power Tec Service (see contact details on the back of the manual).

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If you need to switch the parameter set at a later time: Contact Bosch Power Tec Service (see contact details on the back of the manual). You will then be provided with a password which is needed. This ensures that the string inverter can only be parametrised by authorised personnel.

Check whether the string inverter meets the requirements of your energy supply company. Some specifications, such as voltage limit values, may vary for each energy supply company. If you find discrepancies: Contact Bosch Power Tec Service (see contact details on the back of the manual).

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7 Maintenance and disassembly

DANGER

Risk of fatal injury due to high voltages

High voltages occur in photovoltaic systems (up to 265 V AC and 1000 V DC) as well as high currents (13 A to 20 A AC and 11.6 A to 16 A DC). Failure to observe standards, directives and local regulations when working on the photovoltaic system leads to risk of fatal injury. Please note the following here: The solar generator is live during daylight.

Before starting any work on electrical systems:

- ▶ Disconnect the system
- ▶ Ensure that it is secured against being switched back on
- ▶ Verify that the system is fully de-energised
- ▶ Earth and short-circuit the AC system
- ▶ Cover or shield any adjacent live components

WARNING

Risk of injury due to lack of earthing

Without an earth connection, the housing of the inverter could become live in the event of a fault, which could lead to serious injury or death. Therefore, always observe the following sequence when disconnecting the DC and AC cables:

- ▶ Move the service switch from **1** to **0**
- ▶ Disconnect the DC cable
- ▶ Then disconnect the AC cable
- ▶ Finally, disconnect the earth connection

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⚠ CAUTION

Risk of burns due to high temperatures

Metal surfaces on the back of the device (e.g. heat sink) can heat up to 100 °C and can cause burns.

- ▶ Do not touch metal surfaces
- ▶ After switching off the device, always wait for a period of 30 minutes before touching any components

7.1 Preventive maintenance

⚠ WARNING

Risk of injury due to incorrect maintenance

Incorrect maintenance can cause serious injury or death.

- ▶ Do not open the device
- ▶ Do not make any changes to the device
- ▶ Do not use compressed air
- ▶ Do not use a pressure washer to clean the device
- ▶ Do not use hose water to clean the device

NOTICE

Material damage due to unsuitable cleaning agents/ cleaning methods

The use of unsuitable cleaning agents and/or cleaning methods can cause damage to the string inverter.

- ▶ Be careful not to damage the device before and during cleaning
- ▶ Only use water and cleaning agents that are suitable for plastic, rubber and aluminium
- ▶ Do not use any abrasive or sharp agents
- ▶ Do not use wire brushes
- ▶ Do not use a pressure washer to clean the device

The Bosch BPT-S series string inverters are designed to be maintenance-free.

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We recommend that a photovoltaic system be checked at regular intervals (e.g. 1x per year) and that any necessary maintenance is then carried out.

For installation locations with high levels of dust and contamination, the solar generator and the string inverter can become heavily contaminated, requiring that the heat sink be cleaned.

Please observe the following recommendations for cleaning:

- Suction clean the device
- Suitable cleaning materials for plastic, rubber and aluminium are, for example, a damp cloth and neutral cleaner
- The display screen is very sensitive and easy to scratch: Do not use brushes or sponges
- Do not use a high-pressure cleaner, as this can destroy seals and can damage the display screen.

7.2 Disconnecting the cables from the string inverter

7.2.1 Isolating the string inverter

Procedure

1. Set the service switch to **0**
2. Wait until the system has shut down (i.e. until the display and LED status indicator have gone out)
3. Disconnect the grid via the external safety disconnector
4. If an external DC switch is included in the installation, set the external DC switch to **0** (= switched off).

The string inverter is isolated.

7.3 Disconnecting the cables

⚠ WARNING

Risk of injury due to lack of earthing

Without an earth connection, the housing of the inverter could become live in the event of a fault, which could lead to serious injury or death. Therefore, always observe the following sequence when disconnecting the DC and AC cables:

- ▶ Move the service switch from **1** to **0**
- ▶ Disconnect the DC cable
- ▶ Then disconnect the AC cable
- ▶ Finally, disconnect the earth connection

▶ **Procedure**

1. Disconnect the solar generator cable (DC):

   Open a clip of the plug/socket with the screwdriver

   Remove the plug/socket from the connection area of the inverter (DC)

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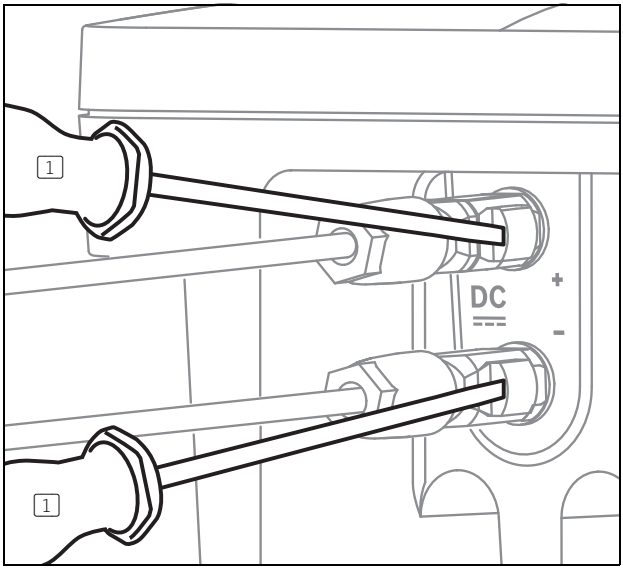

7.1: Slotted screwdriver [1] for opening

2. Disconnect the AC plug:
   Insert the screwdriver in the clip of the AC plug
   Remove the AC plug from the connection area of the inverter (AC)
3. If necessary, dismantle the additional PE connection.

■ DC cable and AC cable are disconnected. PE connection (if fitted) is dismantled.

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7.4 Taking down the string inverter

⚠ CAUTION

Risk of burns due to high temperatures

Metal surfaces on the back of the device (e.g. heat sink) can heat up to 100 °C and can cause burns.

- ▶ Do not touch metal surfaces
- ▶ After switching off the device, always wait for a period of 30 minutes before touching any components

⚠ WARNING

Risk of injury due to incorrect disassembly

If you do not have a firm and secure footing when disassembling the equipment (ladders, dismantling above head height), serious injury or death can result.

- ▶ Do not drop/allow the device to fall
- ▶ Ensure a safe and stable position
- ▶ Work in a way that will protect your back

NOTICE

Material damage due to setting down the device

If the device is set down on its front or outer edges, the housing can be scratched or damaged.

- ▶ Only set the device down on the rear side

Prerequisites

- ▶ Cables are disconnected

▶ **Procedure**

1. If necessary, remove the anti-theft padlock
2. Take the string inverter off the wall
3. Only set string inverters down on the rear side

■ String inverter is removed.

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7.5 Disposal instructions

The device must not be disposed of with domestic waste. The device should be taken to your local recycling depot for electrical waste. Observe the national regulations.

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8 Help in the event of faults

DANGER

Risk of fatal injury in the event of a fault with 4 red flashing LEDs

If, in the event of a fault, all 4 LEDs are flashing red, the housing may be live. Touching the housing can result in a potentially fatal electric shock.

- ▶ Do not touch the device
- ▶ Immediately switch off the AC circuit breaker
- ▶ Contact Bosch Power Tec Service (see contact details on the back of the manual).

Bosch BPT-S series string inverters are fully automatic and maintenance-free.

If a fault occurs in the inverter, the current fault message is shown using one or more of the following elements:

- ▶ LED status indicators
- ▶ Display
- ▶ Optional monitoring accessory for monitoring the system (not included in delivery)

8.1 The LED concept for fault identification

The colours of the LEDs have the following meaning:

- ▶ White LEDs are shown for operator input
- ▶ Blue LEDs are shown for operation of the string inverter
- ▶ Red LEDs are shown for faults

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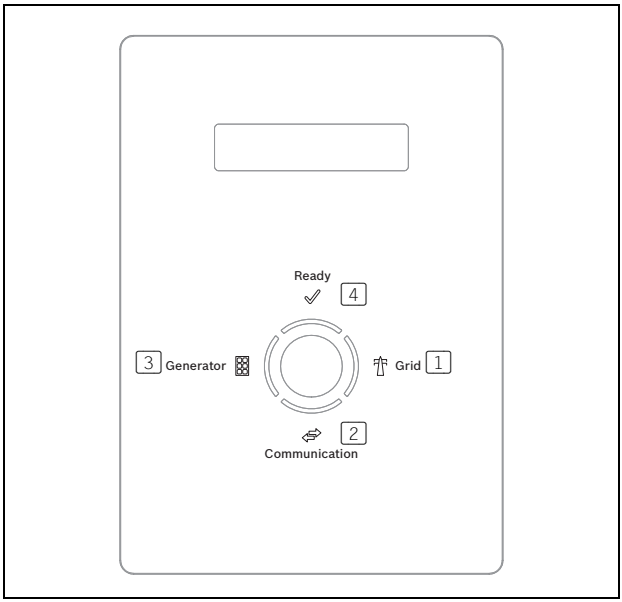
8.1.1 Faults that cannot be remedied



8.1: Display of faults by 4 LEDs

1 Grid LED: Red flashing/permanently red

2 Communication LED: Red flashing/permanently red

3 Generator LED: Red flashing/permanently red

4 Ready LED: Red flashing/permanently red

All four LEDs are flashing red: Safety-relevant fault in the string inverter

▶ Do not touch the device

▶ Immediately switch off the AC circuit breaker

The string inverter has an internal fault that cannot be remedied on site: Contact Bosch Power Tec Service (see contact details on the back of the manual).

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All four LEDs are permanently red: Fault in the string inverter

The string inverter has an internal fault that cannot be remedied on site: Contact Bosch Power Tec Service (see contact details on the back of the manual).

8.1.2 Faults that can be remedied

Just one LED permanently red: Fault in the string inverter that can be remedied

The string inverter is indicating a fault in the LED area (Ready, Generator, Grid or Communication), which can possibly be remedied: See table *Messages on the display screen and LED status indicator, p. 105*.

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Just the Ready LED is permanently red: Temporary inverter fault

The string inverter interrupts the feed to the grid if there is an internal fault on the string inverter. In addition, this fault can occur if the ambient conditions are not maintained and the device cannot function properly, for example, as a result of excess temperature.

▶ Once the fault has been remedied (e.g. by cooling down the device), the string inverter automatically continues to work normally.

Just the Generator LED is permanently red: Faults on the DC side

The string inverter interrupts the feed to the grid if there is a fault on the PV generator on the DC side.

▶ Have the PV generator checked for faults by a qualified electrician. At the same time, pay attention to any error messages that appear on the display.

Just the Grid LED is permanently red: Faults in the AC grid

The string inverter interrupts the feed to the grid if there is a fault on the grid on the AC side.

▶ If there is a fault in the public power grid, the device detects this fault due to the grid voltage or grid frequency. The string inverter then switches itself off.

Just the Communication LED is permanently red: Faults in the communication with the string inverter

The string inverter does **not** interrupt the feed to the grid if there is a communication fault, as this only affects optional accessories and does not impair the core functions of the device.

▶ Check the connected accessories to ensure that they are functioning correctly

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A complete overview of all possible faults in the string inverter can be found in the table *Messages on the display screen and LED status indicator, p. 105*.

8.2 Messages on the display screen and LED status indicator

If there is a fault on the string inverter, the current fault message is shown on the display:

- ▶ Top line: Fault message as per the following table
- ▶ Bottom line: Numeric code of the fault

The faults listed cause the string inverter to shut down automatically. The string inverter normally switches back on automatically once the fault has been cleared.

If the string inverter does not switch back on and/or you cannot remedy the fault: Contact Bosch Power Tec Service (see contact details on the back of the manual)

Fault message ENGLISH	LED status indicator	Possible cause	Possible fault rectification
TEMP LIMITS	Top LED red	Ambient temperature is outside the temperature limits	Check the installation conditions *(Requirements for the installation location, p. 42)*
DC VOLTAGE	Left LED red	Solar power system field designed or connected incorrectly	Check the voltage of the solar power system field

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Fault message ENGLISH	LED status indicator	Possible cause	Possible fault rectification
AC CONNECTION	Right LED red	Faulty grid connection	Check installation and connector pin assignment *(Connecting the network cable (AC cable), p. 65)*
		Mains plug installed incorrectly, (L and N interchanged)	
		Wrong grid type	Check grid type *(Preparing the AC connection, p. 62)*
		Protective earth (PE) not connected correctly	
		Mains plug installed incorrectly (L, N or PE interchanged)	Check installation and connector pin assignment
AC CONNECTION PE	Right LED red	Faulty grid connection	Check installation and connector pin assignment *(Connecting the network cable (AC cable), p. 65)*
		Faulty PE connection	
		Wrong grid type	Check grid type *(Preparing the AC connection, p. 62)*
		Protective earth (PE) not connected correctly	
GRID FREQUENCY	Right LED red	Grid frequency is outside tolerance	Check grid frequency, if necessary contact the grid operator

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Fault message ENGLISH	LED status indicator	Possible cause	Possible fault rectification
AC VOLTAGE	Right LED red	AC surge voltage	Check voltage, if necessary contact the grid operator
		AC voltage is too low	Check voltage, if necessary contact the grid operator
		Mains plug installed incorrectly	Check installation and connector pin assignment *(Connecting the network cable (AC cable), p. 65)*
		Grid impedance is too high	Reduce the length of the AC cable or increase the AC cable cross-section
FIRMWARE	Top LED red	Incorrect firmware due to wrong firmware updates	Perform firmware update again. During the firmware update, do not disconnect the string inverter from the grid or the Internet/ computer.
INT ELECTRONICS	All LEDs permanently red	Faulty electronics	Contact Bosch Power Tec Service (see contact details on the back of the manual)
COM FAULT	Bottom LED red	Communication fault	Check connected accessories and internet connection

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Fault message ENGLISH	LED status indicator	Possible cause	Possible fault rectification
DC OVERVOLTAGE	All LEDs are flashing red	Overvoltage	– Do not touch the device – Switch off the AC fuse – If DC circuit breaker is available within the installation, set the DC circuit breaker to 0 (=off). – Contact Bosch Power Tec Service (see contact details on the back of the manual)

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Fault message ENGLISH	LED status indicator	Possible cause	Possible fault rectification
SERVICE SWITCH	All LEDs are flashing red	Internal defect	– Do not touch the device – Switch off the AC fuse – If DC circuit breaker is available within the installation, set the DC circuit breaker to 0 (=off). – Contact Bosch Power Tec Service (see contact details on the back of the manual)
DC ISOLATION	All LEDs are flashing red	– Short circuit – Earth fault	– Do not touch the device – Switch off the AC fuse – If DC circuit breaker is available within the installation, set the DC circuit breaker to 0 (=off). – Contact Bosch Power Tec Service (see contact details on the back of the manual)

8.3 Manufacturer's service centre

In case of faults, contact Bosch Power Tec Service (see contact details on the back of the manual). To allow the manufacturer to respond quickly and appropriately, please provide the following details:

▶ Serial number of the string inverter (Serial no.)

▶ Type of string inverter

▶ Date of invoice

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- Details of warranty extension, if applicable
- Brief description of the fault
- What does the LED fault message reveal?
- What is the numeric code and which fault message is shown in the display?
- Is the fault permanent or temporary?
- Was the string inverter working correctly before the current fault?
- Information about the PV system such as solar module type, circuitry, solar generator voltage
- In the event of a grid fault (AC): How long is the grid connection cable? What is the grid voltage? And what is the cross-section of the grid connection cable?

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9 Specifications

Electrical data entry (DC)	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
PV power with 1.15 design ratio	3.4 kWp	4.2 kWp	4.6 kWp	5.3 kWp
Max. DC input power	3.2 kW	3.9 kW	4.2 kW	4.8 kW
Maximum allowable input voltage	750 V	750 V	750 V	750 V
Max. MPP voltage	600 V	600 V	600 V	600 V
MPP voltage range	170 to 600 V	170 to 600 V	170 to 600 V	170 to 600 V
Min. input voltage/ start voltage	125 V / 170 V	125 V / 170 V	125 V / 170 V	125 V / 170 V
Min. MPP voltage (in accordance with DIN EN 50524)	270 V	330 V	2 x 180 V	2 x 210 V
Max. MPP input current per input	11.6 A	11.6 A	11.6 A	11.6 A
Max. allowable input current	16.3 A	16.3 A	16.3 A	16.3 A
Number of independent MPP trackers	1	1	2	2
DC connections	1 x 1	1 x 1	2 x 1	2 x 1
Design of DC connection	SUNCLIX, incl. DC mating plug			
Maximum feedback current of the inverter in the photovoltaic system	0 A	0 A	0 A	0 A
Compatibility with PV modules	c-Si, CIS (unearthed PV generator), see also module manufacturer's specifications			

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Electrical data output (grid)	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Voltage range	184 to 265 V	184 to 265 V	184 to 265 V	184 to 265 V
Rated grid voltage	230 V	230 V	230 V	230 V
Maximum output current (Iacmax)	13.0 A	16.0 A	17.4 A	20.0 A
Maximum AC output error current	100 A for 1 s	100 A for 1 s	100 A for 1 s	100 A for 1 s
Measured power	3.0 kW	3.68 kW	4.0 kW	4.6 kW
Max. apparent power	3.0 kVA	3.68 kVA	4.0 kVA	4.6 kVA
Frequency area	45 to 55 Hz	45 to 55 Hz	45 to 55 Hz	45 to 55 Hz
Power factor (cos φ)	0.9 inductive to 0.9 capacitive			
Compatible grid types	TN Network / TT Network	TN Network / TT Network	TN Network / TT Network	TN Network / TT Network
Design of AC connection	AC plug	AC plug	AC plug	AC plug
Maximum excess current protection at the AC output	20 A	20 A	25 A	25 A
AC output alternating current (switch-on current)	0 A	0 A	0 A	0 A
Supply type	Single phase	Single phase	Single phase	Single phase
Stand-by/night power consumption	approx. 1 W	approx. 1 W	approx. 1 W	approx. 1 W
Topology	transformerless			

Conversion efficiency	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Max. efficiency factor	97 %	97 %	97 %	97 %
EU efficiency factor	96.2 %	96.3 %	96.5 %	96.5 %

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Protective equipment	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Earth fault and residual current monitoring	Integrated (insulation measurement and universal RCDs in accordance with EN 62109-2)			
DC circuit breaker	Integrated (electro-mechanical)			
DC polarity protection	Integrated (automatic measurement of the DC voltage prevents connection in case of polarity reversal)			
Overvoltage arrester DC input	Varistores class 3			
Overvoltage category (in accordance with IEC 60664-1)	III (AC-side) / II (DC-side)			
Protection class (according to IEC 62103)	Class I	Class I	Class I	Class I

Conformity	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Satisfied requirements/available safety declarations	VDE-AR-N 4105:2011, VDE-0126-1-1:2013			
Interference emission / resistance (EMV)	DIN EN 61000-6-2:2006 + A1:2011, DIN EN 61000-6-3:2011			
Equipment reliability	DIN EN 62109-1:2011, DIN EN 62109-2:2012, EN 60950-1:2011			
Conformity and approval	CE	CE	CE	CE
Radio regulations	ETSI EN 301489-1:2011, ETSI EN 301489-3:2002, ETSI EN 300330-2:2010, ETSI EN 302291-2:2005			
Connection options for ripple control receiver	combined with optional accessories			

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Mechanical data	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Dimensions in mm (L x W x H)	620 x 414 x 170	620 x 414 x 170	620 x 530 x 180	620 x 530 x 180
Weight (without accessories and packaging)	17 kg	17 kg	24 kg	24 kg
Housing material	High-quality special plastic			
Type of installation	Wall installation with wall-mounting			
Protection type (as per EN 60529)	IP65	IP65	IP65	IP65
Climate class (IEC 60721-3-4)	4k6	4k6	4k6	4k6
Cooling	free conversion			

Environmental/ ambient conditions	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Permissible operation area	-25 to +60 °C	-25 to +60 °C	-25 to +60 °C	-25 to +60 °C
Over temperature behaviour	Infinitely variable power reduction (derating)			
Relative air humidity	4 to 100 % (climate class 4K6), non-condensing			
Installation altitude	up to 3000 m over NN			
Place of installation	Indoors and outdoors			

Communication	BPT-S 3	BPT-S 3.68	BPT-S 4	BPT-S 4.6
Display	LCD (2x 16 characters), back-lit, status LEDs			
Operation	Touchless gesture control			
Interfaces	1x Ethernet, RFID		2x Ethernet, RFID	
Connection to online portal	via Ethernet (encoded)			
Monitoring equipment	integrated data logger			

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