



## **Fronius Symo GEN24 6.0 Plus / 8.0 Plus / 10.0 Plus**

EN

Operating instructions

Grid-connected inverter



42,0426,0315,EN 007-06102020



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# Safety rules

## Explanation of safety notices

### **WARNING!**

**Indicates a potentially hazardous situation.**

- ▶ If not avoided, death or serious injury may result.

### **CAUTION!**

**Indicates a situation where damage could occur.**

- ▶ If not avoided, minor injury and/or damage to property may result.

### **NOTE!**

**Indicates a risk of flawed results and possible damage to the equipment.**

If you see any of the symbols depicted in the "Safety rules" chapter, special care is required.

## Safety

### **CAUTION!**

**Danger from crushing due to the incorrect handling of attachments and connection parts.**

Injuries to limbs may result.

- ▶ When lifting up, putting down, and attaching the inverter, use the integrated grips.
- ▶ When fitting attachments, ensure that no limbs are located between the attachment and the inverter.
- ▶ Do not hold onto the terminals when locking and unlocking.

## General

The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:

- Injury or death to the operator or a third party
- Damage to the device and other material assets belonging to the operator

All persons involved in commissioning, maintaining and servicing the device must

- Be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- Read and follow these Operating Instructions carefully.

In addition to the Operating Instructions, attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

All safety and danger notices on the device:

- Must be in a legible state
- Must not be damaged
- Must not be removed
- Must not be covered, pasted or painted over

Only operate the device if all of its protection devices are fully functional. If the protection devices are not fully functional, there is a danger of:

- Injury or death to the operator or a third party
- Damage to the device and other material assets belonging to the operator

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Any safety devices that are not functioning properly must be repaired by a suitably qualified technician before the device is switched on.

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Never bypass or disable protection devices.

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For the location of the safety and danger notices on the device, refer to the section headed "Warning notices on the device" in the Operating Instructions for the device.

---

Before switching on the device, remove any faults that could compromise safety.

---

### **Environmental conditions**

Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer accepts no liability for any damage resulting from improper use.

---

### **Qualified personnel**

The servicing information contained in these operating instructions is intended only for the use of qualified service engineers. An electric shock can be fatal. Do not carry out any actions other than those described in the documentation. This also applies to qualified personnel.

---

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or inadequately dimensioned cables and leads must be immediately repaired by authorised personnel.

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Maintenance and repair work must only be carried out by an authorised specialist.

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It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements. Use only original spare parts (also applies to standard parts).

---

Do not carry out any alterations, installations, or modifications to the device without first obtaining the manufacturer's permission.

---

Components that are not in perfect condition must be changed immediately.

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### **Noise emission values**

The maximum sound power level of the inverter is specified in the [Technical data](#) on page [120](#).

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The device is cooled as quietly as possible with the aid of an electronic temperature control system; this cooling depends on the amount of converted power, the ambient temperature, the level of soiling of the device, etc.

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It is not possible to provide a workplace-related emission value for this device because the actual sound pressure level is heavily influenced by the installation situation, the grid quality, the surrounding walls and the properties of the room in general.

---

### **EMC measures**

In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g. when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers). If this is the case, then the operator is obliged to take appropriate action to rectify the situation.



---

**Backup power**

This system has backup power functions. This enables a replacement power supply to be established automatically, in the event of a failure in the public grid.

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Where an automatic backup power supply is installed, a **backup power warning notice** (<https://www.fronius.com/en/search-page>, item number: 42,0409,0275) must be fitted on the electrical distributor.

---

Maintenance and installation work in the home network requires both disconnection on the utility side and deactivation of the replacement power mode by opening the integrated DC disconnect on the inverter.

---

Depending on the insolation conditions and the battery state of charge, the backup power supply is automatically deactivated and activated. This can cause the backup power supply to unexpectedly return from standby mode. Therefore, installation work can only be performed on the home network when the backup power supply is deactivated.

---

**Influencing factors on the total power in backup power mode:****Reactive power**

Electrical loads with a power factor not equal to 1 also require reactive power in addition to effective power. The reactive power also loads the inverter. Therefore, to correctly calculate the actual total power, it is not the rated power of the load that is relevant, but the current caused by effective and reactive power.

Devices with a high reactive power are mainly electric motors such as:

- Water pumps
- Circular saws
- Blowers and fans

**High starting current**

Electrical loads that need to accelerate a large mass usually require a high starting current. This can be up to 10 times higher than the nominal current. The maximum current of the inverter is available for the starting current. Loads with too high starting currents therefore cannot be started/operated, even though the nominal power of the inverter suggests that they can. When dimensioning of the backup power circuit, the connected load power and any starting current must also be taken into account.

Devices with high starting currents are, for example:

- Devices with electric motors (e.g. lifting platform, circular saws, planing bench)
- Devices with large transmission ratio and flywheel mass
- Devices with compressors (e.g. compressed air compressors, air conditioning systems)

**IMPORTANT!**

Very high starting currents can cause short-term distortion or a drop in output voltage. The simultaneous operation of electronic devices in the same backup power supply system should be avoided.

**Load unbalance**

When dimensioning three-phase backup power networks, the total output power and the power output per phase of the inverter must be taken into account.

**IMPORTANT!**

The inverter may only be operated within the limits of its technical capabilities. Operation outside of its technical capabilities can cause the inverter to shut down.

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**Data protection**

The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

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**Copyright**

Copyright of these operating instructions remains with the manufacturer.

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The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.

# **General information**



# Fronius Symo GEN24

## Device concept

The inverter transforms the direct current generated by the solar modules into alternating current. This alternating current is fed into the public grid and synchronized with the grid voltage in use. Moreover, the solar energy can also be stored in a connected battery for later use.

The inverter is intended for use in grid-connected photovoltaic systems. The inverter has backup power functions and switches to backup power mode if it has been wired accordingly\*.

The inverter automatically monitors the public grid. Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop producing power and interrupt the supply of power into the grid.

The grid is monitored by monitoring the voltage, frequency and islanding conditions.

After installation and commissioning, the inverter's operation is fully automatic; the inverter draws the maximum possible power from the solar modules.

Depending on the operating point, this power is used in the home, stored in a battery\*\*, or fed into the grid.

As soon as the energy provided by the solar modules is no longer sufficient, the power from the battery is fed into your home. Depending on the setting, power may also be obtained from the public grid in order to charge the battery\*\*.

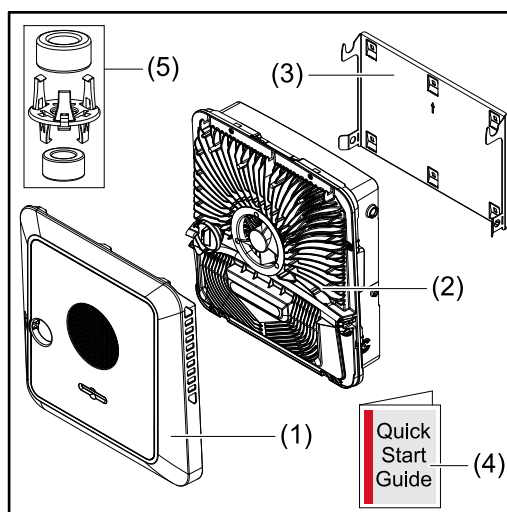
When its temperature gets too high, the inverter automatically reduces the output or charging power, or switches off completely, in order to protect itself.

Reasons for the temperature being too high include a high ambient temperature or insufficient heat dissipation (for example, inadequate heat dissipation when installed in switch cabinets).

\* For inverters of the Fronius GEN24 Plus power category.

\*\* With suitable battery and cabling.

## Scope of supply



- (1) Housing cover
- (2) Inverter
- (3) Mounting bracket (illustration)
- (4) Quick Start guide
- (5) 2x ferrite ring with holder

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## Intended use

The inverter is designed to convert direct current from solar modules into alternating current and feed this power into the public grid. A backup power mode is possible provided that appropriate cabling has been installed.

The following are considered improper use:

- Utilisation for any other purpose, or in any other manner
- Alterations to the inverter are not permitted unless expressly recommended by Fronius
- Installation of components is not permitted unless expressly recommended or sold by Fronius.

The manufacturer is not responsible for any damage resulting from improper use. All warranty claims are considered void in such cases.

Intended use also means:

- Carefully reading and obeying all the instructions, as well as safety and danger notices in the Operating Instructions
- Installation in accordance with chapter "**Installation**" from page **41**.

When configuring the photovoltaic system, make sure that all components of the photovoltaic system are operating exclusively within their permissible operating range.

Observe all measures recommended by the solar module manufacturer to permanently maintain the solar module properties.

Observe the grid operator's regulations for energy fed into the grid and connection methods.

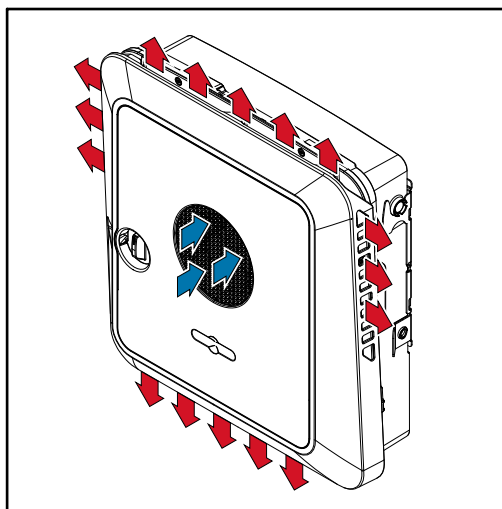
The Fronius GEN24 inverter is a grid-connected inverter with a backup power function – it is not a stand-alone inverter. The following restrictions must therefore be observed in backup power mode:

- Backup power mode may be in operation for at least 2000 hours
- Backup power mode may be in operation for more than 2000 operating hours if 20% of the duration of the inverter's grid power feed operation is not exceeded at the relevant time.

\* For inverters of the Fronius GEN24 Plus power category.

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## Thermal concept



Ambient air is drawn in by the fan on the front side and blown out at the device sides. The even heat dissipation allows several inverters to be installed next to each other.

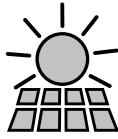
**NOTE!****Risk due to insufficient cooling of the inverter.**

This may result in a loss of power in the inverter.

- ▶ Do not block the fan (for example, with objects that protrude through the touch guard).
  - ▶ Do not cover the ventilation slots, even partially.
  - ▶ Make sure that the ambient air can always flow through the inverter's ventilation slots unimpeded.
-

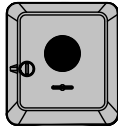
# The various operating modes

## Operating modes – Explanation of symbols



### Solar module

generates direct current



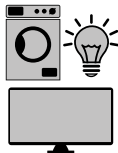
### Fronius GEN24 inverter

converts direct current into alternating current and charges the battery (battery charging is only possible with inverters in the Fronius GEN24 Plus power category). The integrated system monitoring enables the inverter to be integrated into a network by means of WLAN.



### Battery

is coupled to the inverter on the direct current side, and stores electrical energy.



### Loads in the PV system

are the loads connected in the system.



### Additional loads and producers in the system

are connected to the system by means of a Smart Meter.



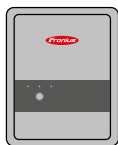
### Meter - Fronius Smart Meter

for optimum energy management. The meter can be mounted in the switch cabinet by the electrician performing the installation. Using several smart meters enables energy profiling. Further loads or producers in the system can be measured and monitored.



### Backup power mode

the inverter is prepared for backup power mode. The backup power mode must be implemented in the switch cabinet by the electrician performing the installation. The PV system operates in a stand-alone manner in backup power mode.



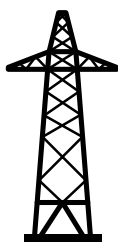
### Fronius Ohmpilot

for using excess energy to heat water.



### Additional inverter in the system

converts the direct current into alternating current. However, it cannot charge a battery, and is not available in backup power mode.



### Grid

supplies the loads in the system if insufficient power is being generated by the solar modules or supplied by the battery.

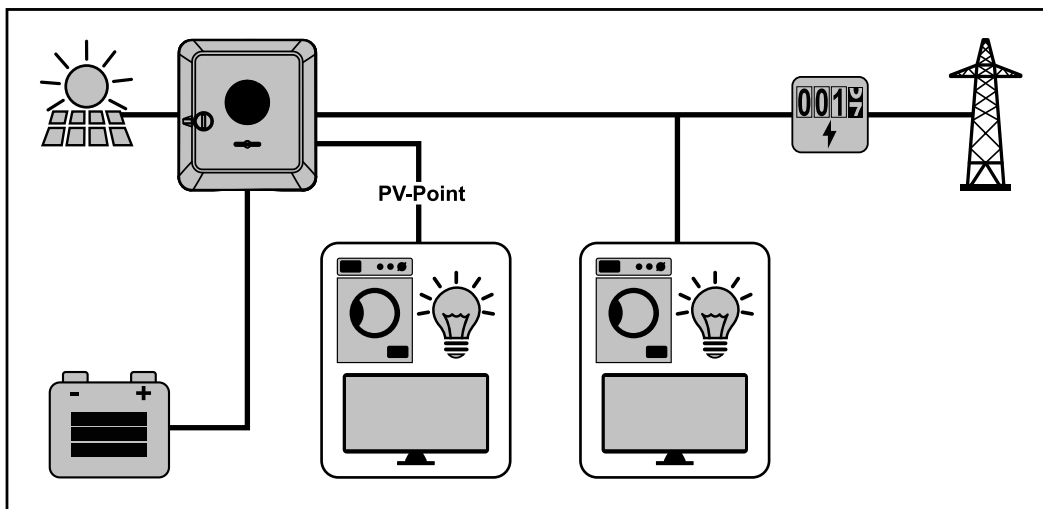
### PV Point

is a non-uninterruptible backup power circuit which supplies electrical devices with up to 3 kW if sufficient power is available from the PV modules or the battery.

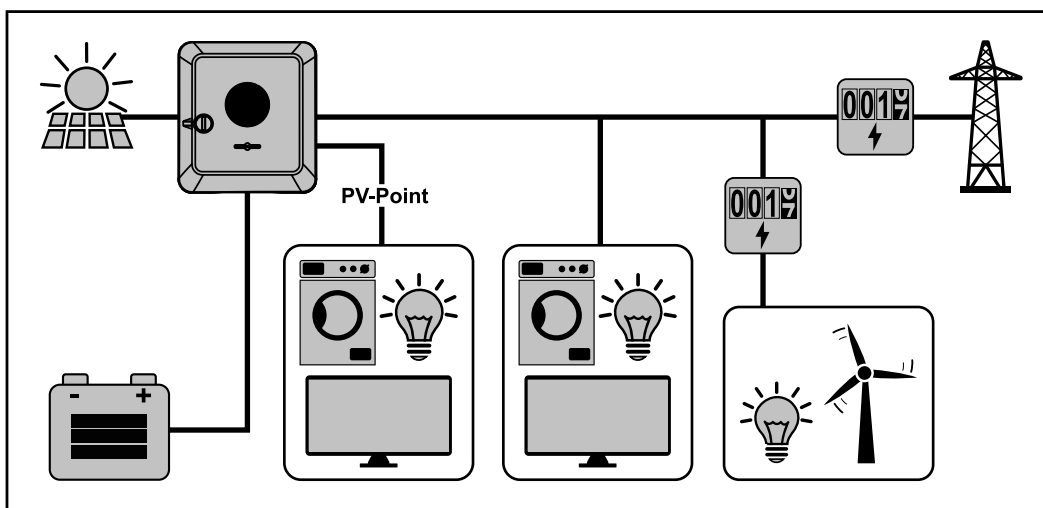


**Operating mode – Inverter with battery**

In order to be able to obtain the highest rate of self-consumption with your PV system, a battery can be used to store excess energy. The battery is coupled to the inverter on the direct current side. Multiple current conversion is therefore not required, and the efficiency is increased.



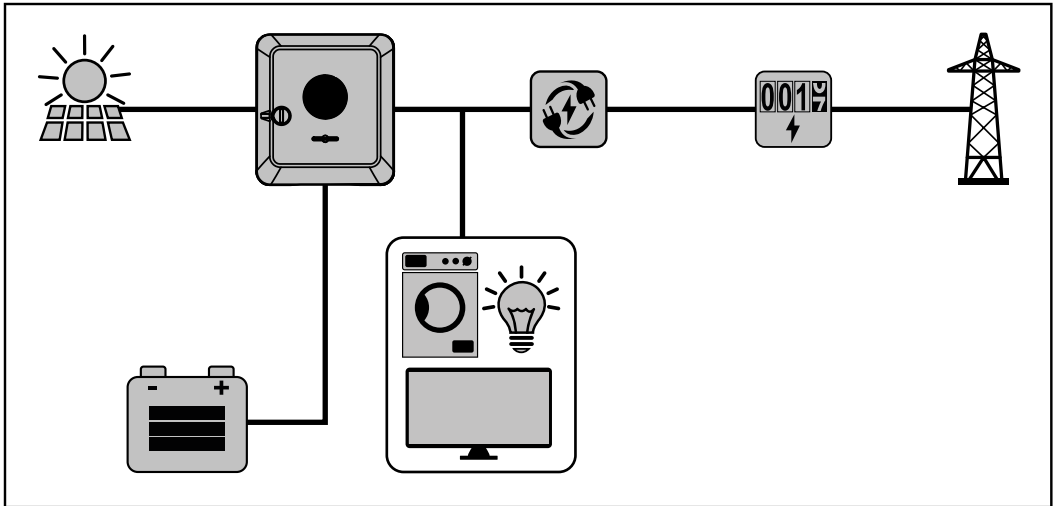
**Operating mode – Inverter with battery and several Smart Meters**



**Operating mode – Inverter with battery and backup power function**

**IMPORTANT!**  
In backup power mode, an increased nominal frequency is used in order to prevent undesired parallel operation with other power generators.

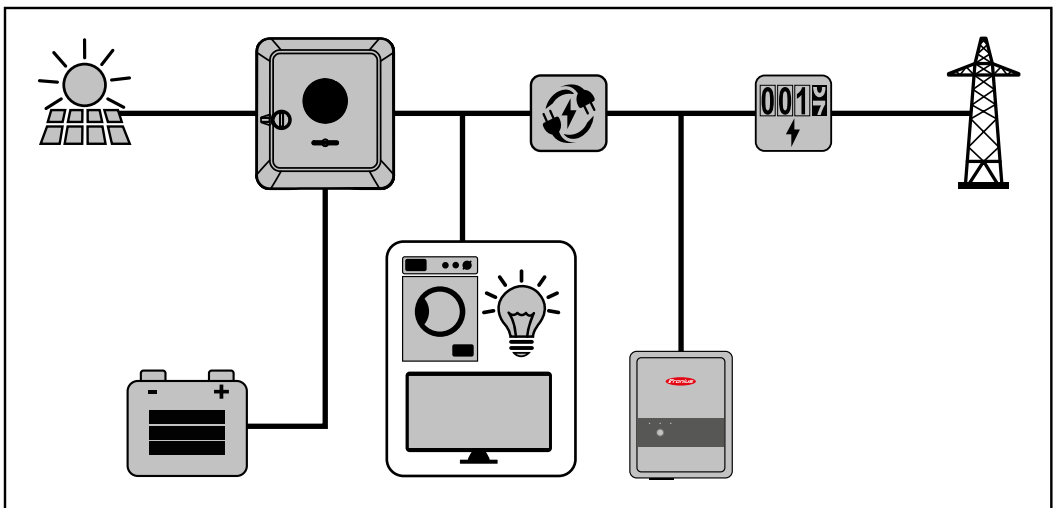
- In the fully equipped hybrid PV system, the inverter can:
- Supply loads in the house
  - Store excess energy in the battery and/or feed it into the grid
  - Supply connected loads in the event of a power failure



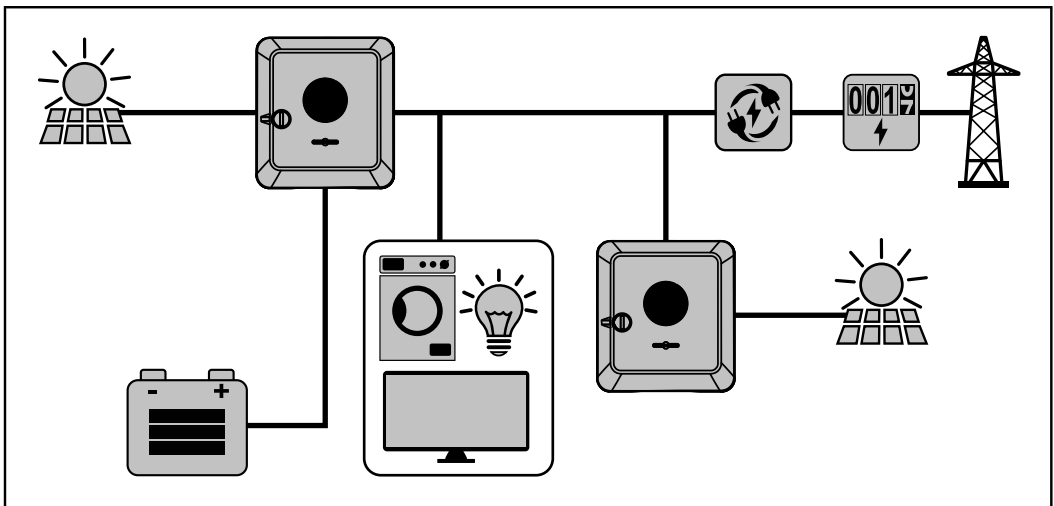
**Operating mode – Inverter with battery, Ohmpilot and backup power function**

**IMPORTANT!**

In the fully equipped hybrid PV system with a Fronius Ohmpilot, the Ohmpilot cannot be operated in the event of a power failure for regulatory reasons. It is therefore sensible to install the Ohmpilot outside of the backup power branch.

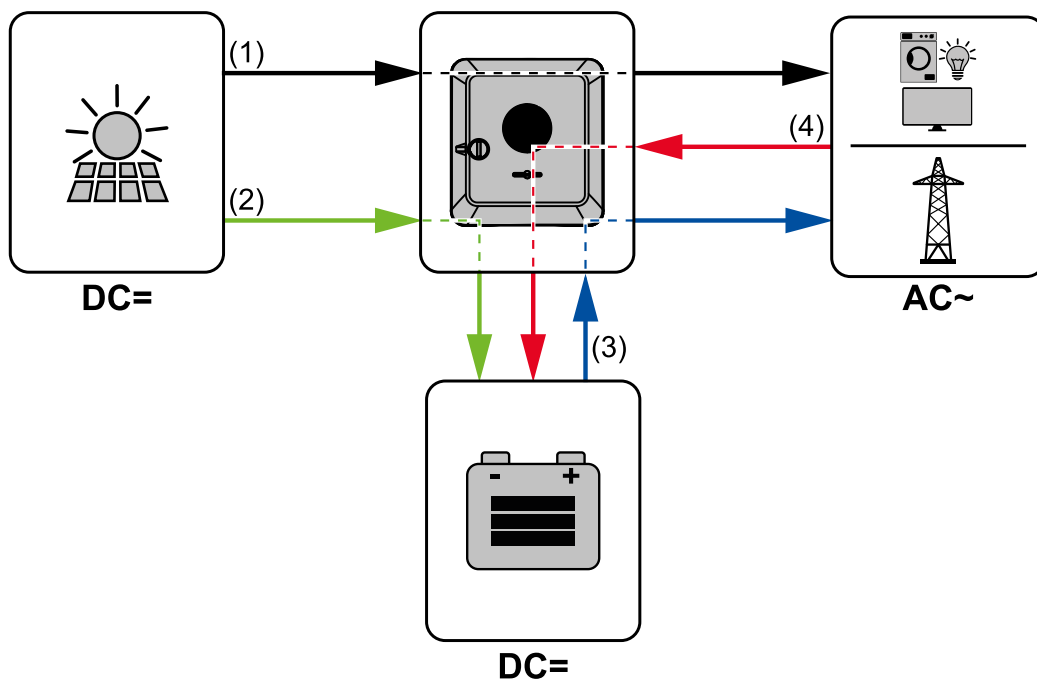


**Operating mode – Inverter with battery, further inverter and backup power function**



**Energy flow direction of the inverter**

In the case of hybrid inverters, there are four different energy flow directions:



- (1) Solar module – inverter – load/grid
- (2) Solar module – inverter – battery\*
- (3) Battery – inverter – load/grid\*
- (4) Grid – inverter – battery\*

\* depending on the settings and local standards and regulations.

**Operating states (only for systems with a battery)**

Battery system distinguishes different operating states. In this case, the relevant current operating state is displayed on the website of the inverter or in Solar.web.

Operating state	Description
Normal operation	Energy is stored or drawn, as required.
Min. state of charge (SOC) achieved	Battery has reached the minimum SOC set or specified by the manufacturer. The battery cannot be discharged further until charging takes place again.
Energy saving mode (standby)	The system has been put into energy saving mode. Energy saving mode is automatically ended as soon as sufficient excess energy is available again.
Start	The storage system starts from energy saving mode (standby).
Forced re-charging	The inverter re-charges the battery, in order to maintain the set minimum SOC (state of charge) or the SOC specified by the manufacturer (protection against deep discharge).
Deactivated	The battery is not active. It has either been deactivated/switched off, or an error means that no communication with the battery is possible.

# Energy saving mode

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## General

Energy saving mode (standby mode) is used to reduce the self-consumption of the system. Both the inverter and the battery automatically switch into energy saving mode under certain conditions.

The inverter switches into energy saving mode if the battery is flat and no PV power is available. Only the inverter's communication with the Fronius Smart Meter and Fronius Solar.web is maintained.

---

## Switch-off conditions

If all the switch-off conditions are met, the battery switches into energy saving mode within six minutes. This time delay ensures that the inverter can at least be restarted.



≤ min. SoC

The battery state of charge is less than or equal to the input minimum state of charge.



< 50 W

The power from the solar modules is less than 50 W.



< 100 W

The current charging or discharging power of the battery is less than 100 W.



< 50 W

Less than 50 W is available for charging the battery. The power of feeding into the public grid is at least 50 W less than the power currently required in the home network.

The inverter automatically switches into energy saving mode, following the battery.

---

## Switch-on conditions

If one of the following conditions is met for at least 30 seconds, energy saving mode is ended:

- Energy saving mode is no longer permissible owing to a changed setting on the website of the inverter.
  - More than 50 W is available for charging the battery. The power of feeding into the public grid is at least 50 W greater than the power currently required in the home network.
  - If dynamic power reduction of 0 is set, or if the system is operating in backup power mode, the power of feeding into the public grid is always less than the required power in the home network.  
There is a separate condition for this case (dynamic power reduction < 300 W or active backup power mode): If the PV power is above a specified threshold (50 W), the energy saving mode is ended.
  - Battery charging from the public grid is requested via the website.
  - The battery is being recharged in order to restore the minimum state of charge or perform calibration.
- 

## Special case

If the inverter does not operate for 8–12 minutes (e.g.: error), or if there is an interruption in the electrical connection between the inverter and battery, the battery switches into energy saving mode in any case. This reduces self discharge of the battery.

### Indication of energy saving mode

During energy saving mode:

- Operating LED for the inverter lights up orange, see [Button functions and LED status indicator](#) on page 81.
- The website of the inverter can be reached.
- All the available data is saved and transmitted to Solar.web.
- The real-time data can be seen on Solar.web.

Energy saving mode is shown on the website of the inverter and in Solar.web by an "i" beside the battery symbol in the system overview.



The battery is in standby mode

# Suitable battery

## BYD Battery-Box Premium

Fronius explicitly points out that the third-party batteries are not Fronius products. Fronius is not the manufacturer, distributor or retailer of these batteries. Fronius accepts no liability and offers no service or guarantees for these batteries.

Obsolete firmware/software states may lead to incompatibilities between the inverter and the battery. In this case, the following steps are to be performed:

- Update battery software - see the battery documentation.
- Update inverter firmware - see [Update](#) on page 95.

Before installation and commissioning, read this document and the Installation Instructions for the external battery.

All the documents relating to the inverter can be found at the following address:

<https://www.fronius.com/en/photovoltaics/expertise/gen24plus>

The documentation for the BYD Battery-Box Premium is enclosed with the third-party battery or can be obtained from the battery manufacturer and its service partners.

BYD Battery-Box Premium HVS / HVM	Symo GEN24 Plus*
HVS 5.1	✓
HVS 7.7	✓
HVS 10.2	✓
HVM 8.3	✗
HVM 11.0	✓
HVM 13.8	✓
HVM 16.6	✓
HVM 19.3	✓
HVM 22.1	✓

# Protection of people and equipment

---

## **WSD (wired shutdown)**

The wired shutdown (WSD) interrupts the inverter's grid power feed if the trigger device (switch) has been activated.

If an inverter (slave) fails, it is bypassed and the other inverters continue operating. If a second inverter (slave) or the inverter (master) fails, the operation of the entire WSD chain is interrupted.

For installation, see [Installing the WSD \(wired shutdown\)](#) on page 78.

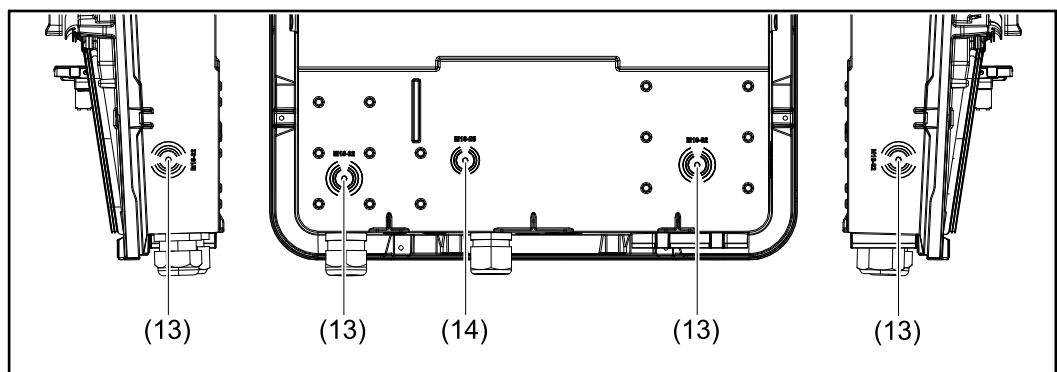
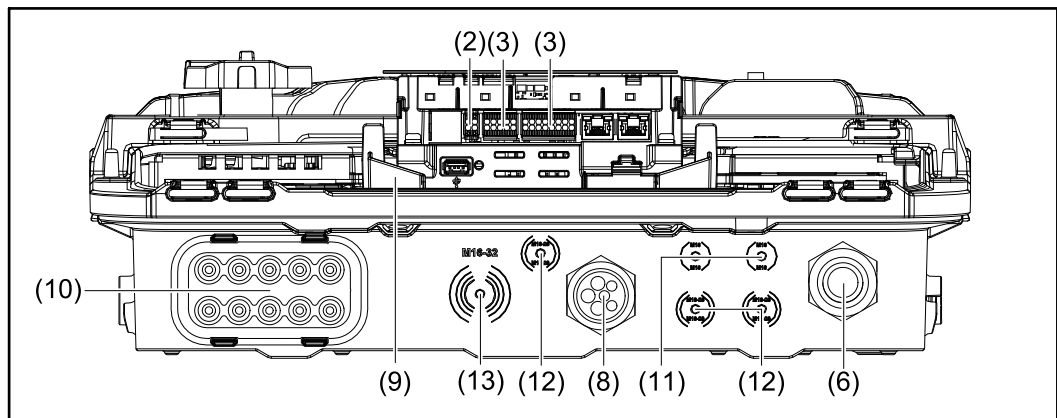
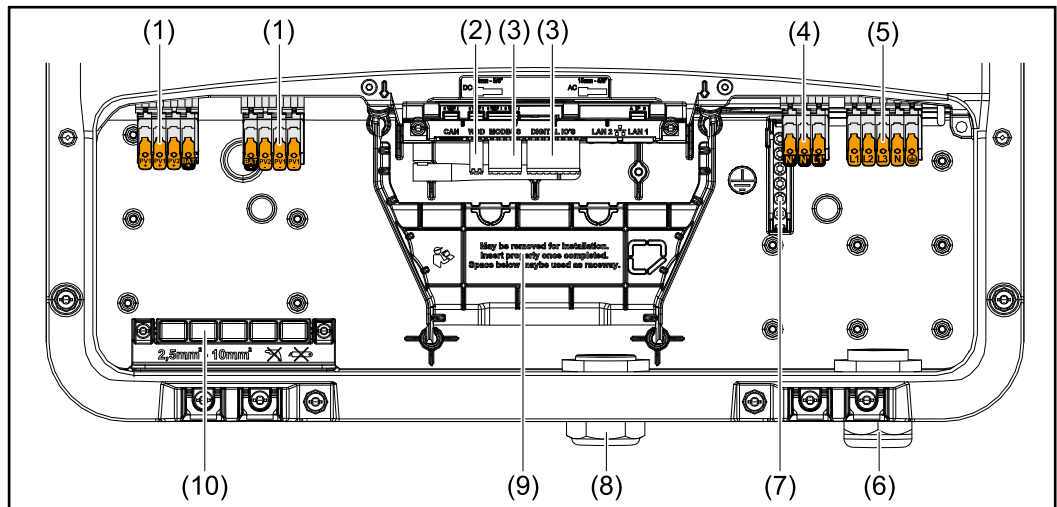
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## **RCMU**

The inverter is equipped with a universal current-sensitive residual current monitoring unit (RCMU = Residual Current Monitoring Unit) in accordance with IEC 62109-2. This device monitors residual currents from the PV module to the grid connection of the inverter and disconnects the inverter from the grid in the event of unauthorised residual current.

# Control elements and connections

## Connection area



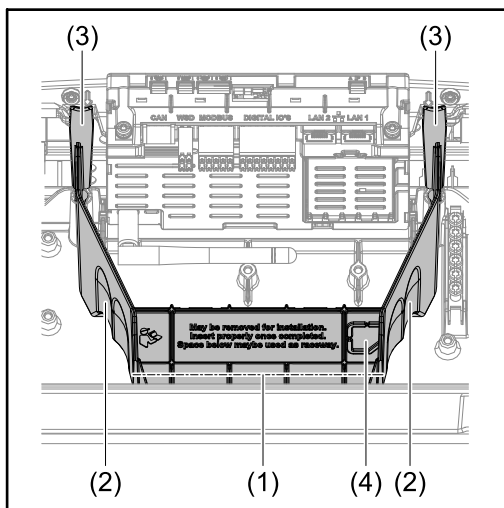
- (1) 2 x 4-pin DC push-in terminal
- (2) Push-in WSD (wired shutdown) terminal
- (3) Push-in terminals in the data communication area (Modbus, digital inputs and outputs)
- (4) 3-pin push-in terminal for PV point (OP)
- (5) 5-pin AC push-in terminal
- (6) Cable gland/strain-relief device AC
- (7) 6-pin ground electrode terminal
- (8) Cable gland/strain-relief device in the data communication area
- (9) Cable gland/strain-relief device in the data communication area
- (10) Cable gland/strain-relief device AC
- (11) Cable gland/strain-relief device AC
- (12) Cable gland/strain-relief device AC
- (13) Cable gland/strain-relief device AC
- (14) Cable gland/strain-relief device in the data communication area



- (9) Connection area divider
- (10) 10 x DC cable glands
- (11) Optional cable gland (M16)
- (12) Optional cable gland (M16 - M20)
- (13) Optional cable gland (M16 - M32)
- (14) Optional cable gland (M16 - M25)

### Connection area divider

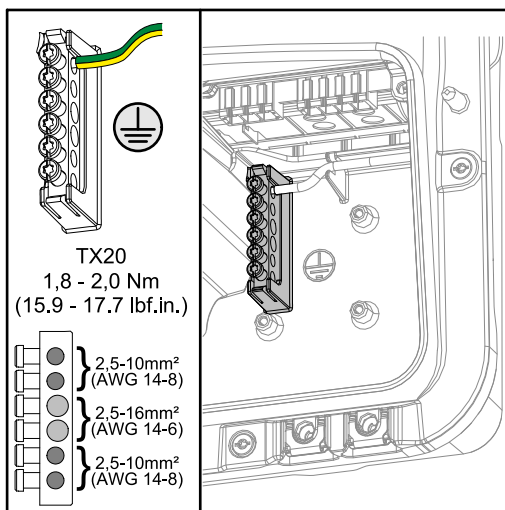
The connection area divider separates the high-voltage conductors (DC and AC) from the signal lines. To make it easier to reach the connection area, the divider can be removed for the connection work, and must be re-inserted.



- (1) Integrated cable duct
- (2) Recesses for removing the connection area divider
- (3) Snap tabs for locking/unlocking
- (4) Defined breaking point for the Dat-com connection

The integrated cable duct (1) allows for the lines to be laid from one area of the inverter to the other. As a result, multiple inverters can be easily installed next to each other.

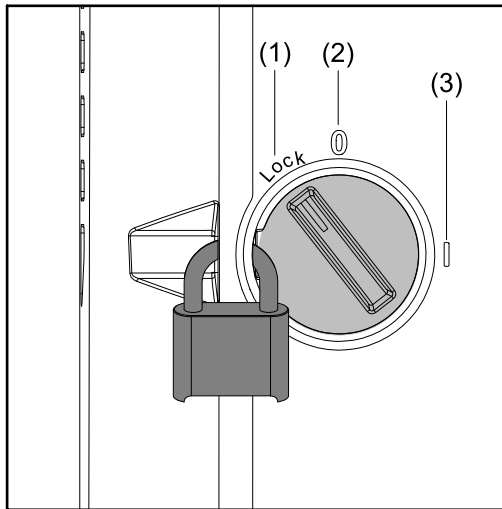
### Ground electrode terminal



The ground electrode terminal  $\oplus$  allows additional components to be earthed, such as:

- AC cable
- Module mounting system
- Ground rod

## DC disconnect



The DC disconnect has three switch settings:

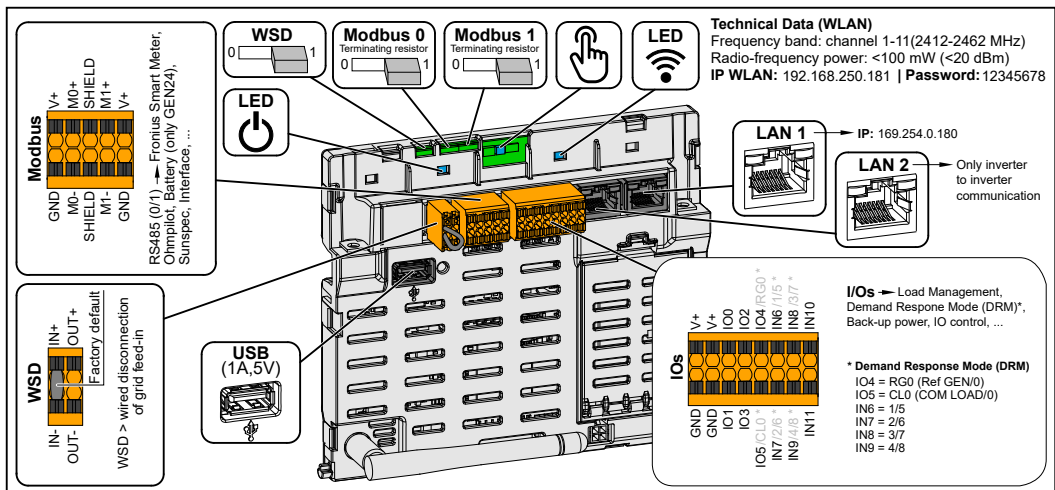
- (1) Locked/off (turned to the left)
- (2) Off
- (3) On

### IMPORTANT!

In switch settings (1) and (3), a conventional padlock can be used to secure the inverter against being switched on/off.

- The national guidelines must be complied with in this respect.

## Data communication area



Push-in terminal for the installation of Modbus 0, Modbus 1, 12 V and GND (Ground).

## Modbus terminal




The data connection to the connected components is established via the Modbus terminal. The inputs M0 and M1 can be selected for this purpose. Max. 4 Modbus participants per input, see chapter **Modbus participants** on page 74.

## WSD (wired shutdown) switch

Defines the inverter as a WSD master or WSD slave.

**Position 1:** WSD master

**Position 0:** WSD slave

<b>Modbus 0 (MB0) switch</b>	Switches the terminating resistor for Modbus 0 (MB0) on/off.  <b>Position 1:</b> Terminating resistor on (factory setting) <b>Position 0:</b> Terminating resistor off
<b>Modbus 1 (MB1) switch</b>	Switches the terminating resistor for Modbus 1 (MB1) on/off.  <b>Position 1:</b> Terminating resistor on (factory setting) <b>Position 0:</b> Terminating resistor off
 <b>Optical sensor</b>	To operate the inverter. See chapter <a href="#">Button functions and LED status indicator</a> on page 81.
 <b>Communication LED</b>	Indicates the inverter connection status.
 <b>Operating status LED</b>	Indicates the inverter operating status.
<b>LAN 1</b>	Ethernet connection for data communication.
<b>LAN 2</b>	Ethernet connection for data communication from inverter to inverter.
<b>WSD terminal</b>	Push-in terminal for the WSD installation. See chapter <a href="#">WSD (wired shut-down)"</a> on page 23.
<b>USB</b>	Power supply max. 1 A at 5 V. Software updates and data recording via USB is not possible.
<b>IOs terminal</b>	Push-in terminal for digital inputs/ outputs. See chapter <a href="#">Permitted cables for the data communication area</a> on page 51. The designations (RG0, CL0, 1/5, 2/6, 3/7, 4/8) on the terminal refer to the Demand Response Mode function, see chapter <a href="#">Functions and IOs</a> on page 88.

### Internal schematic connection diagram of the IOs

On the V+/GND pin, it is possible to feed in a voltage of around 12.5 - 24 V (+ max. 20%) with an external power supply. The outputs IO 0 - 5 can then be operated with the external voltage. A maximum of 1 A can be drawn per output, with a maximum of 3 A allowed in total. The fuse protection must be located externally.

#### CAUTION!

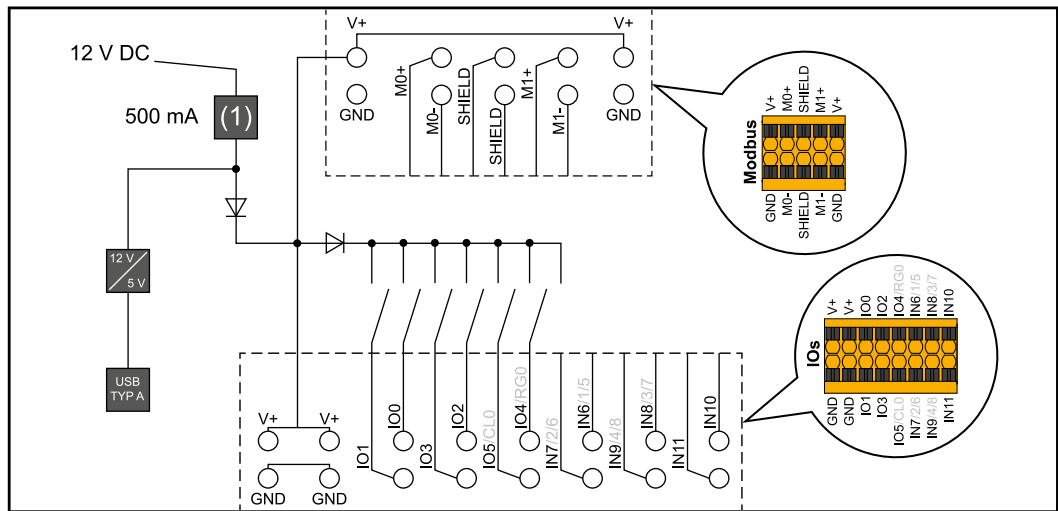
#### Risk of polarity reversal at the terminals due to improper connection of external power supplies.

This may result in severe damage to the inverter.

- ▶ Check the polarity of the external power supply with a suitable measuring device before connecting it.
- ▶ Connect the cables to the V+/GND outputs with the correct polarity.

### IMPORTANT!

If the total output (6 W) is exceeded, the inverter switches off the entire external power supply.

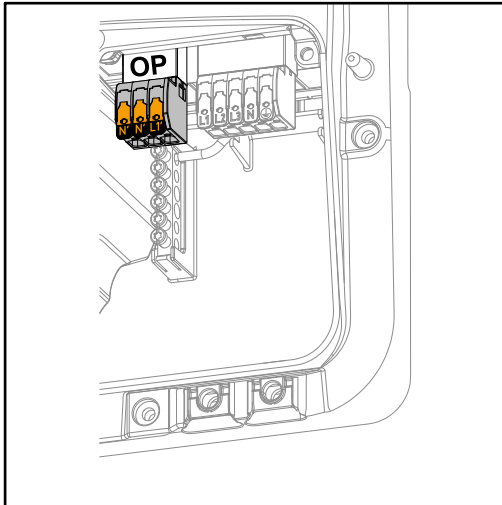


(1) Power limitation

# **Backup power variant - PV Point (OP)**



## PV Point (OP)



With the PV Point, in the event of a failure of the public grid, electrical devices can be connected to the Opportunity Power (OP) terminal and supplied with a maximum power of 3 kW, if enough power is available from the solar modules or an optional battery. In grid-connected operation, the OP terminal is not supplied with voltage, therefore the connected loads will not be supplied with power in this operating mode.

### **IMPORTANT!**

A relay-based network switching setup is not possible.

## **Explanation - PV Point (OP)**

The inverter can provide 120 to 240 V at the PV Point. A corresponding configuration must be set up during commissioning.

At 120 to 240 V output voltage, a maximum of 13 A AC continuous power is available.

### **For example:**

120 V = max. 1.5 kW

230 V = max. 3 kW

In backup power mode, some electrical appliances cannot function properly as starting currents are too high (for example, fridges and freezers). It is recommended to switch off non-essential loads during backup power mode. Overload capacity of 35% is possible for a duration of 5 seconds, depending on the capacity of the solar modules and/or the battery.

There is a brief interruption when switching from grid-connected mode to backup power mode. For this reason, the backup power function cannot be used as an uninterruptible power supply, for example for computers.

If no energy from the battery or the solar modules is available in backup power mode, backup power mode ends automatically. If sufficient energy becomes available from the solar modules once again, backup power mode starts again automatically.

In the event of excessive consumption, backup power mode is stopped and the "backup power overload" status code is displayed on the inverter's LED status indicator. The maximum power in backup power mode according to the technical data must be observed.





# **Backup power variant - Full Backup**



# General

## Prerequisites for backup power mode

In order to use the inverter's backup power function, the following prerequisites must be fulfilled:

- The inverter must be from the Fronius GEN24 6-10 kW Plus device series.
- A battery suitable for backup power use must be installed and configured.
- Correct cabling of the backup power system in the electrical installation or usage of a switch box from Enwitec (see chapter [Description of the backup power components](#) on page 118 or [Circuit diagrams](#) on page 125).
- Mount and configure the Fronius Smart Meter at the feed-in point.
- Attach a [warning notice for the backup power supply](https://www.fronius.com/en/search-page) (https://www.fronius.com/en/search-page, item number: 42,0409,0275) on the electrical distributor.
- Apply the necessary settings in the "Devices and system components" → "Functions and pins" → "Backup power" menu area and activate backup power.
- Follow the [backup power checklist](https://www.fronius.com/en/search-page) (https://www.fronius.com/en/search-page, item number: 42,0426,0365) step by step and confirm.

## Transitioning from feeding energy into the grid to backup power mode

1. The public grid is monitored by the inverter's internal grid and system protection unit and by the Fronius Smart Meter connected to it.
2. **The public grid fails or specific grid parameters are dropped below or exceeded.**
3. The inverter carries out the measures necessary according to the country standard and then switches off.
4. The inverter starts backup power mode after a checking period.
5. All loads in the household that are in the backup power circuit are supplied by the battery and the PV modules. The remaining loads are not supplied with power and are safely isolated.

## Transitioning from backup power mode to feeding energy into the grid

1. The inverter is operating in backup power mode.
2. **The public grid is functioning correctly again.**
3. The Fronius Smart Meter monitors the grid parameters on the public grid and passes this information to the inverter.
4. The stability of the returned public grid is determined by checking the measured values of the Fronius Smart Meter.
5. The inverter ends backup power mode.
6. All circuits are reconnected to the public grid and are supplied by the grid.
7. The inverter can start feeding energy into the grid again after performing the grid checks required by the relevant standard.

## Backup power and energy saving mode

Under the following conditions, the battery and the inverter are switched to energy saving mode after a waiting time of 8 - 12 minutes and backup power mode is ended:

- The battery is discharged to the minimum state of charge and no energy is coming from the PV modules.
- The inverter is set to energy saving mode (standby mode).

If the battery and inverter are in energy saving mode, the system is reactivated by the following:

- Enough energy is available from the solar PV modules.
- The public grid is functioning again.
- The battery is switched off and on.

# Cabling variants including emergency power circuits and 3-pin separation e.g. Austria or Australia

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## Functions

- Measuring and transferring the required parameters for energy management and Solar.web by the Fronius Smart Meter.
  - Disconnecting from the public grid to enable operation in backup power mode if the grid parameters are outside the country-specific standards.
  - Reconnecting to the public grid when the grid parameters are within the limits specified by the country-specific standards.
  - Option of having a separate backup power circuit or several backup power circuits that are supplied even during failure of the public grid. The total load of the backup power circuits must not exceed the nominal output of the inverter. Furthermore, the performance of the connected battery must also be considered.
- 

## Transitioning from feeding energy into the grid to backup power mode

1. The public grid is monitored by the inverter's internal grid and system protection unit and by the Fronius Smart Meter connected to it.
  2. **Failure of the public grid.**
  3. The inverter carries out the necessary measures according to the country standard and then switches off.  
Contactors K1 and K2 drop out. This disconnects the backup power circuits and the inverter from the rest of the home network and from the public grid, as the main contacts of the contactors K1 and K2 3-pin open. The inverter activates relay K3, which interrupts the supply to contactors K1 and K2. This prevents unintentional activation of contactors K1 and K2 and thus a grid connection when voltage is restored in the grid. The NC auxiliary contacts of contactors K1 and K2 send feedback to the inverter that the contactors are open (a condition for starting backup power mode).
  4. The NO contact of relay K3 gives additional feedback to the inverter on whether the locking was successfully performed by relay K3.
  5. The inverter decides based on the contactors' feedback as well as the measurements on the inverter terminals and the Smart Meter that backup power mode can be started.
  6. After all the required activation tests have been carried out, the inverter starts backup power mode.
  7. All loads in the backup power circuits are supplied with power. The remaining loads are not supplied with power and are safely isolated.
- 

## Transitioning from backup power mode to feeding energy into the grid

1. The inverter is operating in backup power mode. The contactors K1 and K2 to the public grid are open.
2. **Public grid available again.**
3. The Fronius Smart Meter monitors the grid parameters on the public grid and passes this information to the inverter.
4. The stability of the returned public grid is determined by checking the measured values of the Fronius Smart Meter.
5. The inverter ends backup power mode and disconnects the outputs.
6. The inverter deactivates K3. The contactors K1 and K2 are reactivated.
7. All circuits are reconnected to the public grid and are supplied by the grid. The inverter does not feed anything into the grid at this time.
8. The inverter can start feeding energy into the grid again after performing the grid checks required by the relevant standard.

# All-pin separation cabling variant, e.g. Germany, France

## Functions

- Measuring and transferring the required parameters for energy management and Solar.web by the Fronius Smart Meter.
- Disconnecting from the public grid to enable operation in backup power mode if the grid parameters are outside the country-specific standards.
- Reconnecting to the public grid when the grid parameters are within the limits specified by the country-specific standards.
- Establishing a proper ground connection for backup power mode to ensure the protection devices function correctly.
- Option of having a separate backup power circuit or several backup power circuits that are supplied even during failure of the public grid. The total load of the backup power circuits must not exceed the nominal output of the inverter. Furthermore, the performance of the connected battery must also be considered.

## Transitioning from feeding energy into the grid to backup power mode

1. The public grid is monitored by the inverter's internal grid and system protection unit and by the Fronius Smart Meter connected to it.
2. **Failure of the public grid.**
3. The inverter carries out the necessary measures according to the country standard and then switches off.  
Contactors K1, K2, K4 and K5 drop out. This disconnects the backup power circuits and the inverter from the rest of the home network and from the public grid, as the main contacts of the contactors K1 and K2 open at all pins. The NC auxiliary contacts of contactors K1 and K2 send feedback to the inverter that the contactors are open (a condition for starting backup power mode).
4. The NC main contacts of contactors K4 and K5 are closed, establishing a connection between the neutral conductor and the ground conductor. The two other NC main contacts of contactors K4 and K5 give feedback to the inverter that the ground connection has been established correctly (a condition for starting backup power mode).
5. The inverter activates relay K3, which interrupts the supply to contactors K1, K2, K4 and K5. This prevents unintentional activation of contactors K1, K2, K4 and K5 and thus a grid connection when voltage is restored in the grid.
6. The NO contact of relay K3 gives additional feedback to the inverter on whether the locking was successfully performed by relay K3.
7. The inverter decides based on the contactor's feedback as well as the measurements on the inverter terminals and the Smart Meter that the emergency power mode can be activated.
8. After all the required activation tests have been carried out, the inverter starts backup power mode.
9. All loads in the backup power circuits are supplied with power. The remaining loads are not supplied with power and are safely isolated.

---

**Transitioning  
from backup  
power mode to  
feeding energy  
into the grid**

1. The inverter is operating in backup power mode. The contactors K1 and K2 to the public grid are open.
2. **Public grid available again.**
3. The Fronius Smart Meter monitors the grid parameters on the public grid and passes this information to the inverter.
4. The stability of the returned public grid is determined by checking the measured values of the Fronius Smart Meter.
5. The inverter ends backup power mode and disconnects the outputs.
6. The inverter deactivates K3. Power is restored to contactors K1, K2, K4 and K5.
7. All circuits are reconnected to the public grid and are supplied by the grid. The inverter does not feed anything into the grid at this time.
8. The inverter can start feeding energy into the grid again after performing the grid checks required by the relevant standard.

# All-pin split separation cabling variant (Italy)

## Functions

- Measuring and transferring the required parameters for energy management and Solar.web by the Fronius Smart Meter.
- Monitoring of the voltage and frequency grid parameters by the inverter.
- Disconnecting from the public grid to enable operation in backup power mode if the grid parameters are outside the country-specific standards.
- Reconnecting to the public grid when the grid parameters are within the limits specified by the country-specific standards.
- Establishing a correct ground connection for backup power mode.
- Option of having a separate backup power circuit or several backup power circuits that are supplied even during failure of the public grid. The total load of the backup power circuits must not exceed the nominal output of the inverter. Furthermore, the performance of the connected battery must also be considered.

## Transitioning from feeding energy into the grid to backup power mode

1. The public grid is monitored by the inverter's internal grid and system protection unit and by an external grid and system protection unit.
2. **Failure of the public grid**
3. The inverter carries out the measures necessary according to the country standard and then switches off.
4. The external grid and system protection unit opens contactors K1 and K2 for grid monitoring. This disconnects the backup power circuits and the inverter from the rest of the home network and from the public grid, as the main contacts of the contactors K1 and K2 open at all pins. To ensure that the public grid has definitely been disconnected, the NC auxiliary contacts of contactor K1 give feedback to the external grid and system protection unit.
5. The NC main contact of contactors K4 and K5 is closed, establishing a connection between the neutral conductor and the ground conductor. The two other NC main contacts of contactors K4 and K5 give feedback to the inverter that the ground connection has been established correctly.
6. The inverter activates relay K3, which activates the remote input of the external grid and system protection unit via an NC contact. This prevents a connection to the public grid when voltage is restored in the grid.
7. The NO contact of relay K3 gives additional feedback to the inverter on whether the locking was successfully performed by relay K3.
8. The inverter decides based on the contactors' feedback as well as the measurement on the inverter terminals and the Smart Meter that backup power mode can be started.
9. The inverter starts backup power mode after a defined checking period.
10. All loads in the backup power circuits are supplied with power. The remaining loads are not supplied with power and are safely isolated.

---

**Transitioning  
from backup  
power mode to  
feeding energy  
into the grid**

1. The inverter is operating in backup power mode. The contactors K1 and K2 to the public grid are open.
2. **Public grid available again.**
3. The Fronius Smart Meter monitors the grid parameters on the public grid and passes this information to the inverter.
4. The stability of the returned public grid is determined by checking the measured values of the Fronius Smart Meter.
5. On the basis of adjustments that have been carried out, the inverter ends backup power mode and disconnects the outputs.
6. The inverter deactivates K3 and K6. Power is restored to contactors K1, K2, K4 and K5.
7. All circuits are reconnected to the public grid and are supplied by the grid. The inverter does not feed anything into the grid at this time.
8. The inverter can start feeding energy into the grid again after performing the grid checks required by the relevant standard.

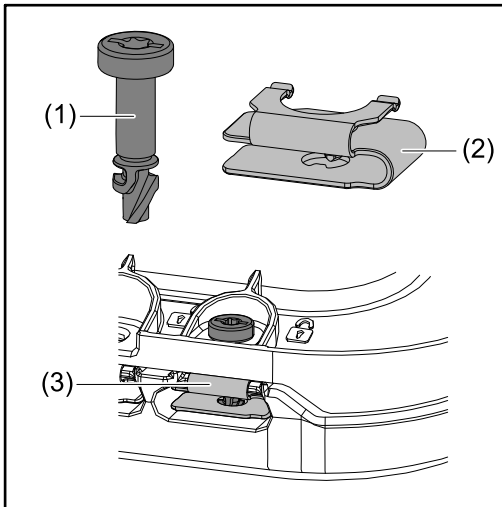


# Installation



# General

## Quick-lock system



A quick-lock system (3) is used to mount the connection area cover and front cover. The system is opened and closed with a half-rotation (180°) of the captive screw (1) into the quick-lock spring (2).

The system is independent of torque.

### NOTE!

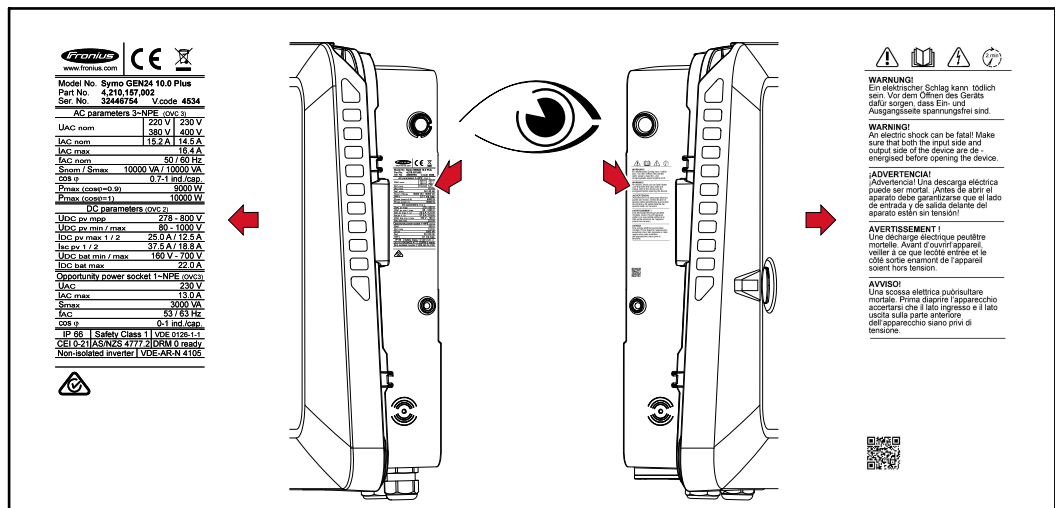
#### Danger when using a drill driver.

This may result in the destruction of the quick-lock system due to overtorque.

- ▶ Use a screwdriver (TX20).
- ▶ Do not turn the screws more than 180°.

## Warning notices on the device

Technical data, warning notices and safety symbols are affixed to the inverter. These warning notices and safety symbols must not be removed or painted over. They warn against incorrect operation which can lead to serious injury and damage.



### Symbols on the rating plate:



The devices comply with all the requisite and relevant standards and guidelines that form part of the relevant EU Directive, and are therefore permitted to display the CE mark.



To comply with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must be returned to your distributor or disposed of at an approved collection and recycling facility in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!



RCM symbol – the product complies with Australian legislative requirements.

**Safety symbols:**



Risk of serious injury and property damage due to incorrect operation.



Do not use the functions described here until you have fully read and understood the following documents:

- These Operating Instructions.
- All Operating Instructions for the system components of the photovoltaic system, especially the safety rules.



Dangerous electrical voltage.



Allow the capacitors of the inverter to discharge (2 minutes).

**Warning notice text:**

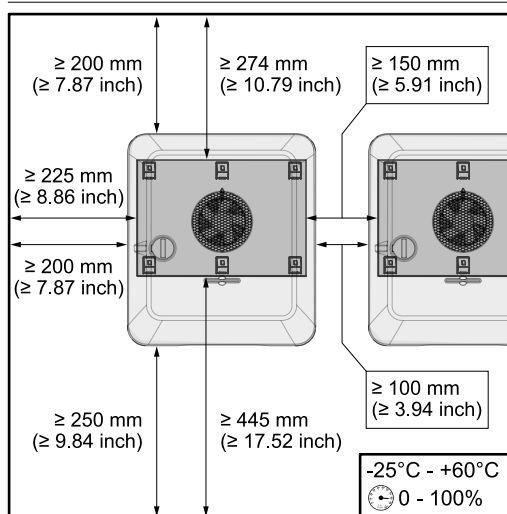
**WARNING!**

An electric shock can be fatal. Before opening the device, it must be disconnected at the input and output.

# Installation location and position

## Choosing the location of the inverter

Please note the following criteria when choosing a location for the inverter:



Only install on a solid, non-flammable surface.

Max. ambient temperatures:  
 $-25^{\circ}\text{C} - +60^{\circ}\text{C}$

Relative humidity:  
0-100%

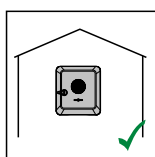
If the inverter is installed in a switch cabinet or similar enclosed space, ensure sufficient heat dissipation with forced-air ventilation.

For detailed information on the dimensions of the inverter, see chapter **Dimensions of the inverter** on page 135.

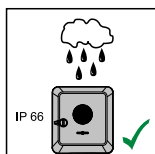
When installing the inverter on the outer walls of cattle sheds, it is important to keep a minimum clearance of 2 m between all sides of the inverter and air vents and building openings.

The following substrates are permissible for installation:

- Walls (corrugated metal walls [mounting rails], brick walls, concrete walls, or other non-flammable surfaces sufficiently capable of bearing loads)
- Poles (installed using mounting rails, behind the solar modules directly on the PV mounting system)
- Flat roofs (if this is for a film roof, make sure that the films comply with the fire protection requirements and are not highly flammable. Ensure compliance with the national provisions.)
- Covered car park roofs (no overhead installation)

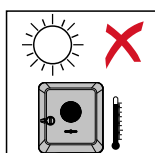


The inverter is suitable for indoor installation.

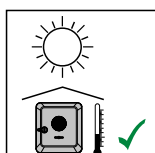


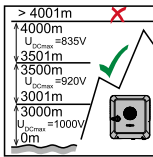
The inverter is suitable for outdoor installation.

Because of its IP 66 protection class, the inverter is resistant to water jets from any direction and can also be used in damp environments.



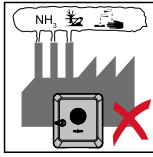
In order to minimise the heating up of the inverter, do not expose it to direct insolation. The inverter should be installed in a protected location, for example, near the solar modules or under an overhanging roof.





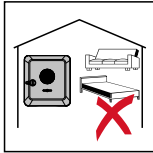
**IMPORTANT!**

The inverter must not be installed or used at altitudes above 4000 m.

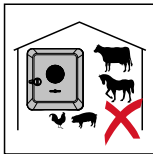


Do not install the inverter in:

- Areas where it may be exposed to ammonia, corrosive gases, acids or salts (e.g. fertiliser storage areas, vent openings for live-stock stables, chemical plants, tanneries, etc.)



During certain operating phases the inverter may produce a slight noise. For this reason it should not be installed in an occupied living area.

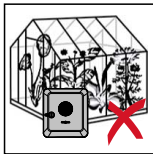


Do not install the inverter in:

- Areas where there is an increased risk of accidents from farm animals (horses, cattle, sheep, pigs, etc.)
- Stables or adjoining areas
- Storage areas for hay, straw, chaff, animal feed, fertilizers, etc.



The inverter is essentially designed to be dustproof (IP 66). In areas of high dust accumulation, dust deposits may collect on the cooling surfaces, and thus impair the thermal performance. Regular cleaning is required in this case, see chapter **Operation in dusty environments** on page 115. We therefore recommend not installing the inverter in areas and environments with high dust accumulation.



Do not install the inverter in:

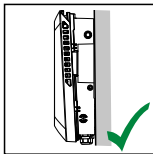
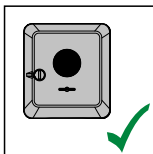
- Greenhouses
- Storage or processing areas for fruit, vegetables or viticulture products
- Areas used in the preparation of grain, green fodder or animal feeds

**Choosing the location of third-party batteries**

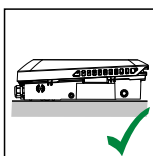
**IMPORTANT!**

Refer to the manufacturer's documents for the suitable location for third-party batteries.

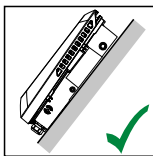
**Explanation of symbols for the installation position**



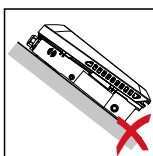
The inverter is suitable for vertical installation on a vertical wall or column.



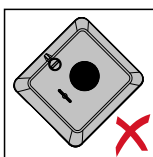
The inverter is suitable for a horizontal installation position.



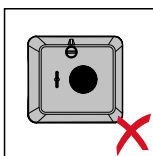
The inverter is suitable for installation on a sloping surface.



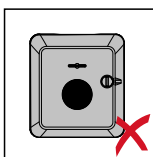
Do not install the inverter on a sloping surface with its connection sockets at the top.



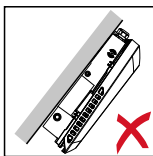
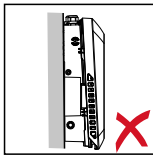
Do not install the inverter at an angle on a vertical wall or column.



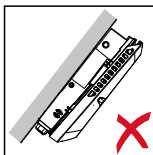
Do not install the inverter horizontally on a vertical wall or pillar.



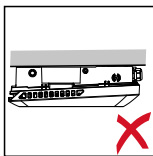
Do not install the inverter on a vertical wall or pillar with its connection sockets facing upwards.



Do not install the inverter overhanging with the connection sockets at the top.



Do not install the inverter overhanging with the connection sockets at the bottom.



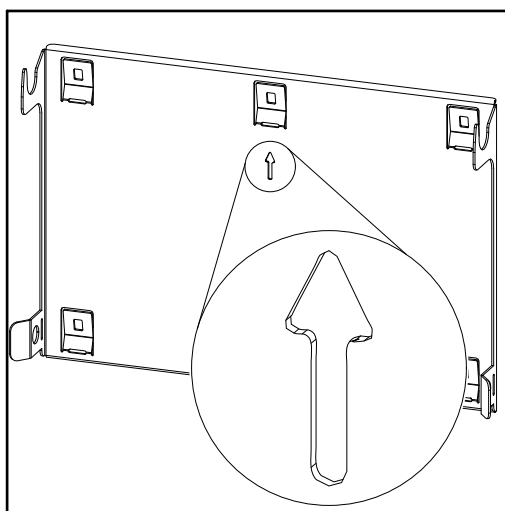
Do not install the inverter on the ceiling.

# Install the mounting bracket and hang up the inverter

## Selecting the fixing material

Use the corresponding fixing materials depending on the subsurface and observe the screw dimension recommendations for the mounting bracket. The installer is responsible for selecting the right type of fixing.

## Properties of the mounting bracket



The separate mounting bracket (illustration) is also used as the gauge.

The pre-drilled holes on the mounting bracket are intended for screws with a thread diameter of 6 - 8 mm (0.24 - 0.32 inches).

Unevenness on the installation surface (for example, coarse-grained plaster) is largely counterbalanced by the mounting bracket.

## Do not deform the mounting bracket

### NOTE!

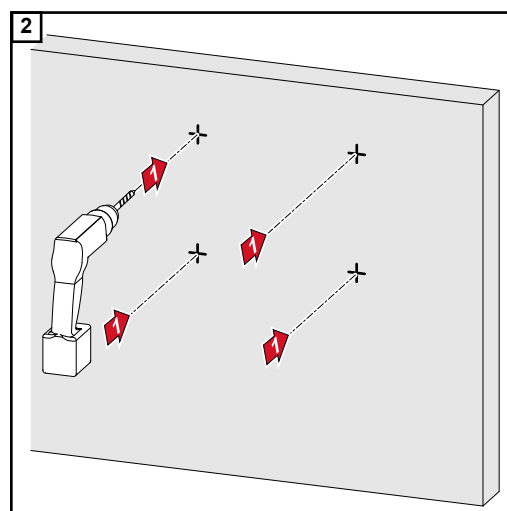
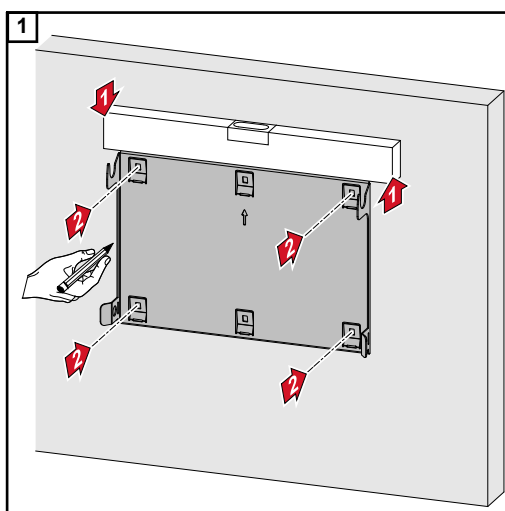
When fitting the mounting bracket to the wall or column, ensure that the mounting bracket does not become deformed.

A deformed mounting bracket may make it difficult to clip/swivel the inverter into position.

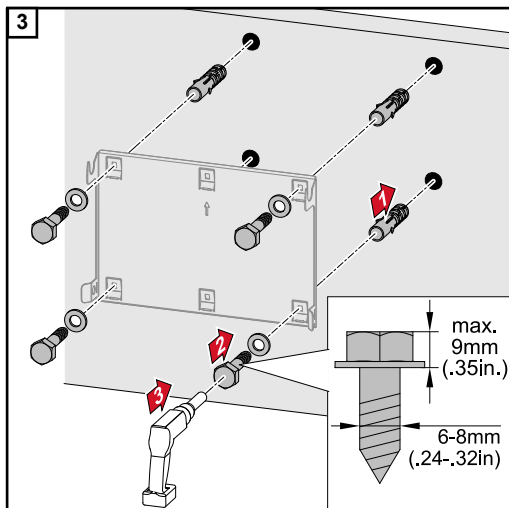
## Fitting the mounting bracket to a wall

### IMPORTANT!

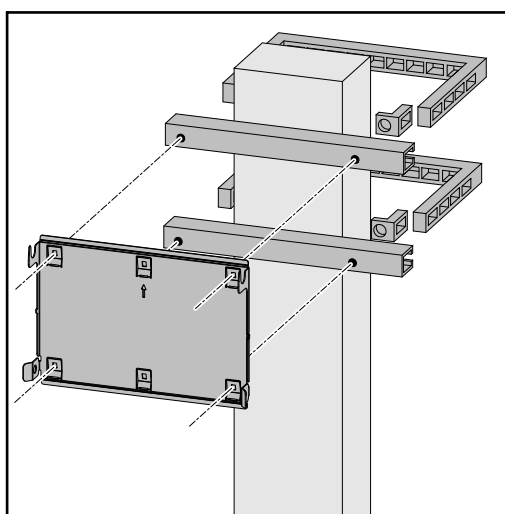
When installing the mounting bracket, make sure that it is installed with the arrow pointing upwards.







### Installing the mounting bracket on a mast or beam

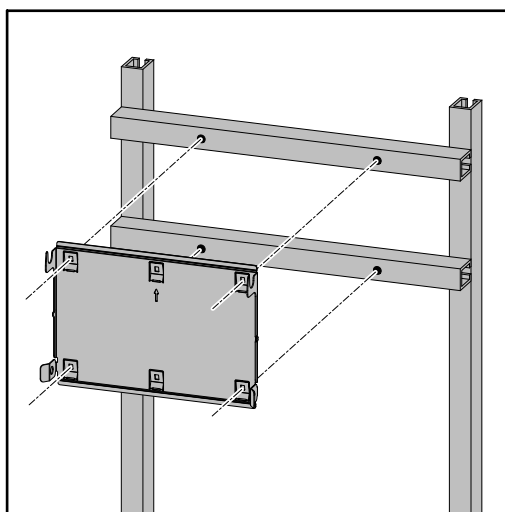


When installing the inverter on a mast or beam, Fronius recommends using the "Pole clamp" (order no. SZ 2584.000) mounting kit from Rittal GmbH.

The "Pole clamp" kit covers the following dimensions:

- Rectangular mast or beam with a side length of 50-150 mm (1.97-5.91 inches)
- Round mast or beam with a diameter of 40-190 mm (1.57-7.48 inches)

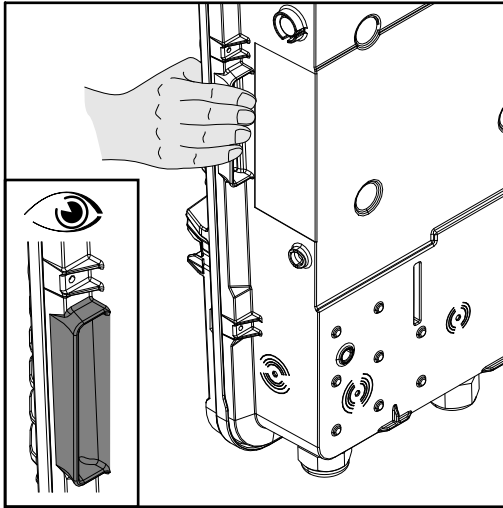
### Attaching the mounting bracket to mounting rails



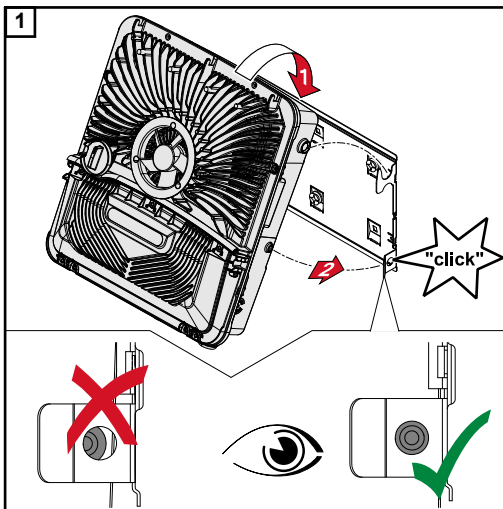
### IMPORTANT!

The mounting bracket must be affixed at a minimum of four points.

**Attaching the inverter to the mounting bracket**



There are integrated grips on the side of the inverter which facilitate lifting/attaching.



Clip the inverter into the mounting bracket from above. The connections must point downwards.

The lower area of the inverter is pushed into the snap-in tabs until the inverter audibly clicks into place on both sides.

Check that the inverter is correctly positioned on both sides.

# Prerequisites for connecting the inverter

**Permitted cables** Cables with the following design can be connected to the terminals of the inverter:



- Copper: round, solid



- Copper: round, fine-stranded, up to conductor class 4

<b>Grid connections with push-in terminal</b> Select a sufficiently large cable cross section based on the actual device output.				
Power-categories	Solid	Multi-stranded	Fine-stranded	Fine-stranded with ferrules-with/without collar
6 - 10 kW (5-pin)	2.5–10 mm <sup>2</sup>	2.5–10 mm <sup>2</sup>	2.5–10 mm <sup>2</sup>	2.5 - 6 mm <sup>2</sup>

<b>Grid connections backup power with push-in terminal</b> Select a sufficiently large cable cross section based on the actual device output.				
Power-categories	Solid	Multi-stranded	Fine-stranded	Fine-stranded with ferrules-with/without collar
3 – 10 kW (3-pin)	1.5 – 10 mm <sup>2</sup>	1.5 – 10 mm <sup>2</sup>	1.5 – 10 mm <sup>2</sup>	1.5 – 6 mm <sup>2</sup>

<b>PV/BAT connections with push-in terminal</b> Select a sufficiently large cable cross section based on the actual device output.				
Power-categories	Solid	Multi-stranded	Fine-stranded	Fine-stranded with ferrules-with/without collar
3 - 10 kW (2 x 4-pin)	4 - *10 mm <sup>2</sup>	4 - *10 mm <sup>2</sup>	4 - *10 mm <sup>2</sup>	4 - 6 mm <sup>2</sup>

\* if an SPD (surge protective device) is installed, a max. cable cross section of 6 mm<sup>2</sup> is permitted.

<b>Ground electrode terminal (6-pin)</b> Select a sufficiently large cable cross section based on the actual device output.				
Number of pins	Solid	Multi-stranded	Fine-stranded	Fine-stranded with ferrules-with/without collar
2	2.5 - 16 mm <sup>2</sup>	2.5 - 16 mm <sup>2</sup>	2.5 - 16 mm <sup>2</sup>	2.5 - 16 mm <sup>2</sup>
4	2.5–10 mm <sup>2</sup>	2.5–10 mm <sup>2</sup>	2.5–10 mm <sup>2</sup>	2.5–10 mm <sup>2</sup>

**Permitted cables for the data communication area** Cables with the following design can be connected to the terminals of the inverter:



- Copper: round, solid



- Copper: round, fine-stranded

**IMPORTANT!**

Connect the individual conductors to an appropriate ferrule if several individual conductors are connected to one input of the push-in terminals.

<b>WSD connections with push-in terminal</b>						
<b>Distance max.</b>	<b>Stripping length</b>	<b>Solid</b>	<b>Fine-stranded</b>	<b>Fine-stranded with ferrules with collar</b>	<b>Fine-stranded with ferrules without collar</b>	<b>Cable recommendation</b>
100 m 109 yd	10 mm 0.39 inch	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1 mm <sup>2</sup> AWG 26-18	0.14-1.5 mm <sup>2</sup> AWG 26-16	min. CAT 5 UTP (unshielded twisted pair)

<b>Modbus connections with push-in terminal</b>						
<b>Distance max.</b>	<b>Stripping length</b>	<b>Solid</b>	<b>Fine-stranded</b>	<b>Fine-stranded with ferrules with collar</b>	<b>Fine-stranded with ferrules without collar</b>	<b>Cable recommendation</b>
300 m 328 yd	10 mm 0.39 inch	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1 mm <sup>2</sup> AWG 26-18	0.14-1.5 mm <sup>2</sup> AWG 26-16	min. CAT 5 STP (shielded twisted pair)

<b>IO connections with push-in terminal</b>						
<b>Distance max.</b>	<b>Stripping length</b>	<b>Solid</b>	<b>Fine-stranded</b>	<b>Fine-stranded with ferrules with collar</b>	<b>Fine-stranded with ferrules without collar</b>	<b>Cable recommendation</b>
30 m 32 yd	10 mm 0.39 inch	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1.5 mm <sup>2</sup> AWG 26-16	0.14-1 mm <sup>2</sup> AWG 26-18	0.14-1.5 mm <sup>2</sup> AWG 26-16	Single conductor possible

<b>LAN connections</b>
Fronius recommends using at least CAT 5 STP (shielded twisted pair) cables and a maximum distance of 100 m (109 yd).

**Cross section of the AC cable**

For a standard M32 metric screw joint with a reducer:  
Cable diameter from 7-15 mm

When using an M32 metric screw joint (reducer removed):  
cable diameter from 11-21 mm  
(with a cable diameter of less than 11 mm, the strain-relief force is reduced from 100 N to a maximum of 80 N)

With cable diameters greater than 21 mm, the M32 screw joint must be replaced by an M32 screw joint with a larger clamping area – item number: 42,0407,0780 – strain-relief device M32 x 1.5 KB 18–25.

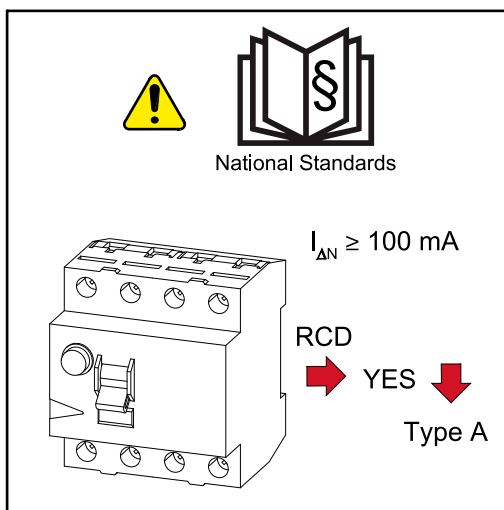
**Cross section of the DC cable**

Cable diameter for the strain-relief device: max. 9 mm.  
Cable diameter for the connection to the push-in terminal: max. 6 mm

**IMPORTANT!**

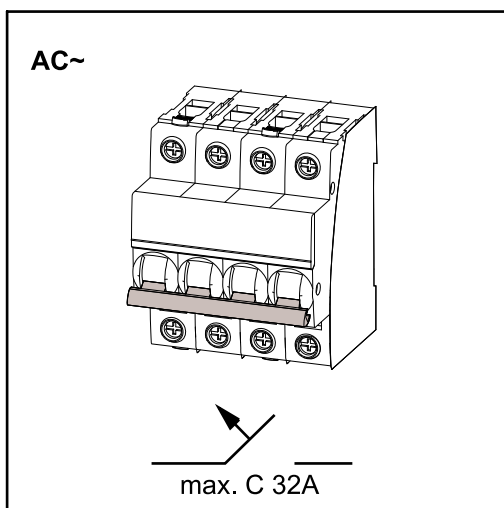
For double-insulated cables with a cable diameter over 6 mm, the external insulation layer must be removed to connect to the push-in terminal.

**Maximum alternating current fuse protection**

**NOTE!**

**National regulations, the grid operator's specifications or other factors may require a residual current circuit breaker in the AC connection lead.**

For this situation, a type A residual-current circuit breaker is generally adequate. Nevertheless, false alarms can be triggered for the type A residual current circuit breaker in individual cases and depending on local conditions. For this reason, in accordance with national legislation, Fronius recommends that a residual current protection device with a tripping current of at least 100mA suitable for frequency converters be used.

**NOTE!**

**The inverter can be used with max. an automatic circuit breaker C 32 A.**

Inverter	Phases	AC output	Maximum fuse rating	Recommended fuse rating
Fronius Symo GEN24 6 kW	3	6000 W	C 32 A	C 16 A
Fronius Symo GEN24 8 kW	3	8000 W	C 32 A	C 25 A
Fronius Symo GEN24 10 kW	3	10,000 W	C 32 A	C 32 A

# Connecting the inverter to the public grid (AC side)

## Safety

### **WARNING!**

#### **Danger due to incorrect operation and incorrectly performed work.**

This can result in serious injury and damage to property.

- ▶ Read the Installation and Operating Instructions before installing and commissioning the equipment.
- ▶ Only qualified personnel are authorised to commission your inverter and only within the scope of the respective technical regulations.

### **WARNING!**

#### **Danger due to grid voltage and DC voltage from solar modules that are exposed to light.**

An electric shock can be fatal.

- ▶ Prior to any connection work, disconnect the inverter on the AC side and the DC side.
- ▶ Only an authorised electrical engineer is permitted to connect this equipment to the public grid.

## Connecting the inverter to the public grid (AC side)

### **NOTE!**

#### **The neutral conductor must be connected in order to operate the inverter.**

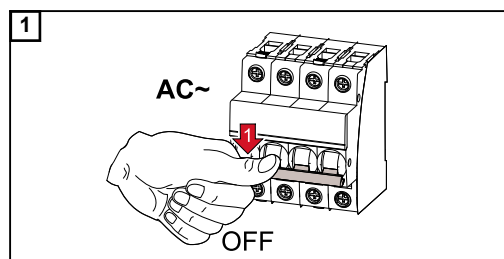
It is not possible to operate the inverter in unearthed grids, such as IT grids (insulated grids without earthing).

- ▶ Make sure that the grid's neutral conductor is earthed.

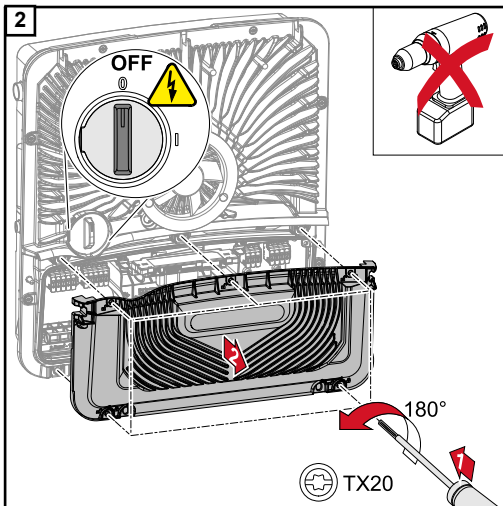
### **IMPORTANT!**

The PE ground conductor of the AC cable must be laid in such a way that it is the last to be disconnected in the event that the strain-relief device should fail.

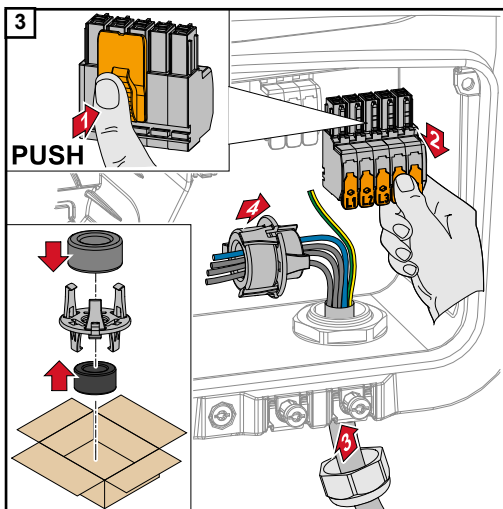
This can be ensured by making it somewhat longer and by laying it in a loop.



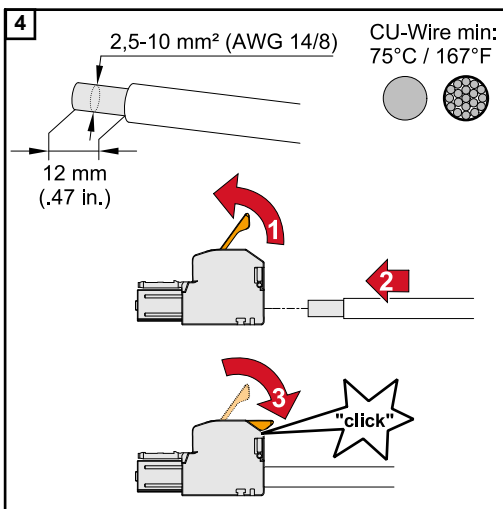
Turn off the automatic circuit breaker.



Make sure that the DC disconnect is in the "Off" switch setting.  
 Loosen the five screws of the connection area cover by rotating them 180° to the left using a screwdriver (TX20).  
 Remove the connection area cover from the device.



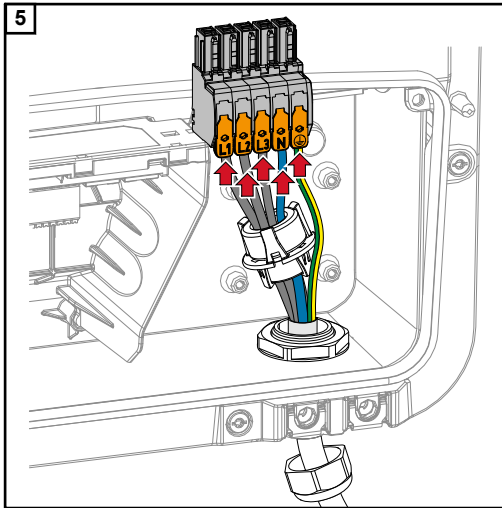
Press the lock on the back of the terminal and remove the AC terminal.  
 Route the mains cable from below through the strain-relief device located on the right side and the ferrite core.  
**IMPORTANT!**  
 Do not route the ground conductor/earthing through the ferrite core.



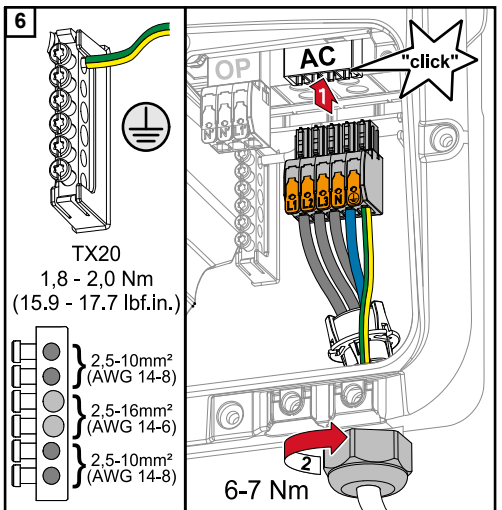
Strip the insulation of the single conductors by 12 mm.  
 The cable cross section must be selected in accordance with the instructions in **Permitted cables** from page 51.  
 Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided as far as it will go.  
 Then close the operating lever until it engages.

**NOTE!**

**Only one conductor may be connected to each pin.**  
 The AC cables can be connected to the AC terminals without ferrules.



- L1 Phase conductor
- L2 Phase conductor
- L3 Phase conductor
- N Neutral conductor
- PE Ground conductor / earthing



Insert the AC terminal into the AC slot until it engages. Fasten the cap nut of the strain-relief device with a torque of 6-7 Nm.



# Connecting solar module strings to the inverter

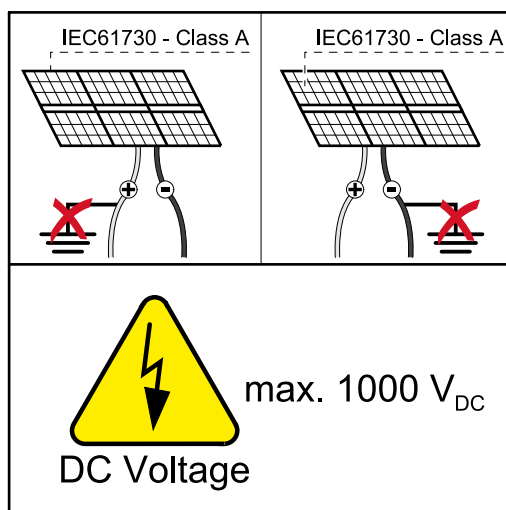
## General comments regarding solar modules

To enable suitable solar modules to be chosen and to use the inverter as efficiently as possible, it is important to bear the following points in mind:

- If insolation is constant and the temperature is falling, the open circuit voltage of the solar modules will increase. The open circuit voltage must not exceed the maximum permissible system voltage. If the open circuit voltage exceeds the specified values, the inverter will be destroyed and no warranty claims will be entertained.
- The temperature coefficients on the data sheet of the solar modules must be observed.
- Exact values for sizing the solar modules can be obtained using suitable calculation tools, such as the [Fronius Solar.configurator](#).

### IMPORTANT!

Before connecting up the solar modules, check that the voltage for the solar modules specified by the manufacturer corresponds to the actual measured voltage.



### IMPORTANT!

The solar modules connected to the inverter must comply with the IEC 61730 Class A standard.

### IMPORTANT!

Solar module strings must not be earthed.

## Safety



### WARNING!

**If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result.**

Commissioning as well as maintenance and service work in the power module of the inverter must only be carried out by service personnel trained by Fronius and only within the scope of the respective technical regulations. Read the Installation and Operating Instructions before installing and commissioning the equipment.



### WARNING!

**An electric shock can be fatal.**

Danger due to grid voltage and DC voltage from solar modules that are exposed to light.

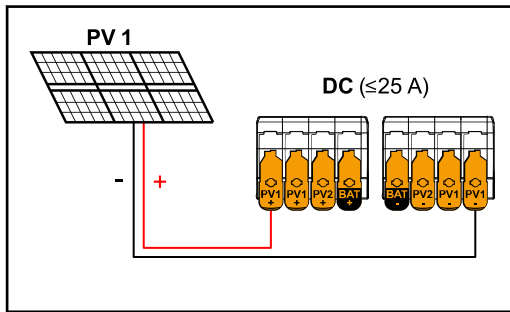
- ▶ Ensure that the AC and DC side of the inverter are de-energised before carrying out any connection/maintenance or service tasks.
- ▶ Only an authorised electrical engineer is permitted to connect this equipment to the public grid.

**General comments regarding multiple MPP trackers**

In the case of inverters with multiple MPP trackers, there are two independent PV inputs (MPP trackers) available. These can be connected to a different number of modules.

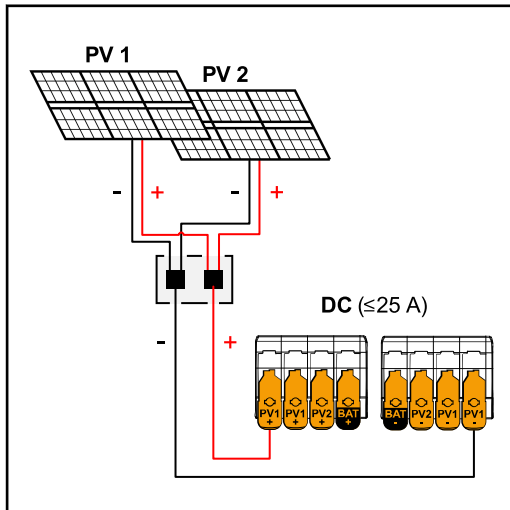
When using for the first time, set up MPP TRACKER according to the respective configuration (also possible later in the "System configuration" menu area under the "Components" menu item).

**Multiple MPP tracker configuration 6-10 KW**



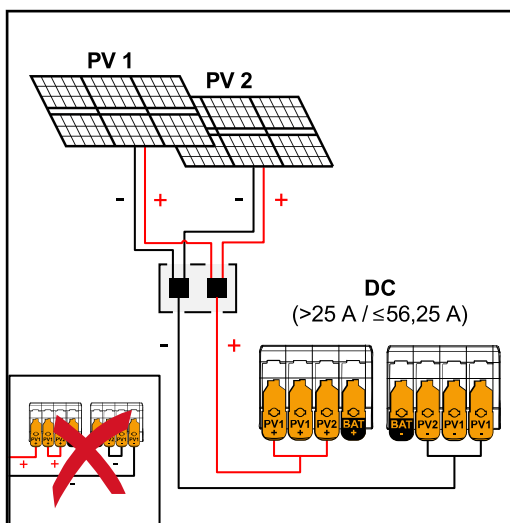
**PV generator settings:**  
 PV1: **ON**  
 PV2: **OFF**

Total current less than or equal to 25 A.



**PV generator settings:**  
 PV1: **ON**  
 PV2: **OFF**

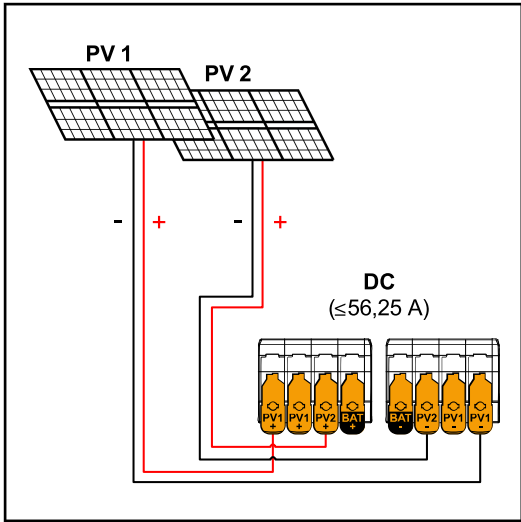
Combined solar module strings with total current less than or equal to 25 A.



**PV generator settings:**  
 PV1: **ON**  
 PV2: **OFF**  
 PV1 + PV2 (connected in parallel): **ON**

**IMPORTANT!**  
 The maximum current load of a single terminal is 25 A. PV connection strings with a total current of more than 25 A must be split between both PV inputs upstream of the terminals ( $\leq 56.25$  A). The plug connection for splitting the total current must be sufficiently dimensioned, suitable and correctly installed. Splitting the current by bridging from PV 1 to PV 2 at the terminal is not permitted.

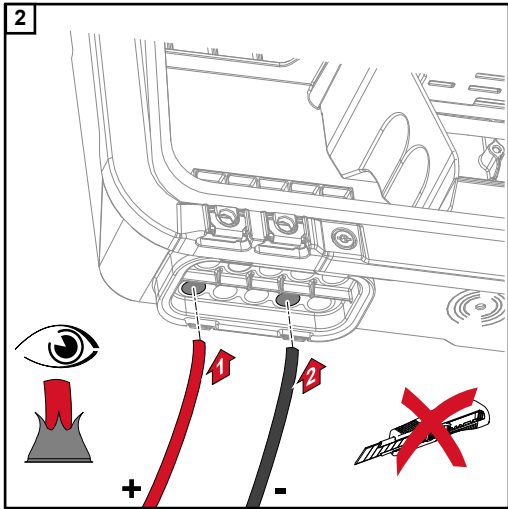
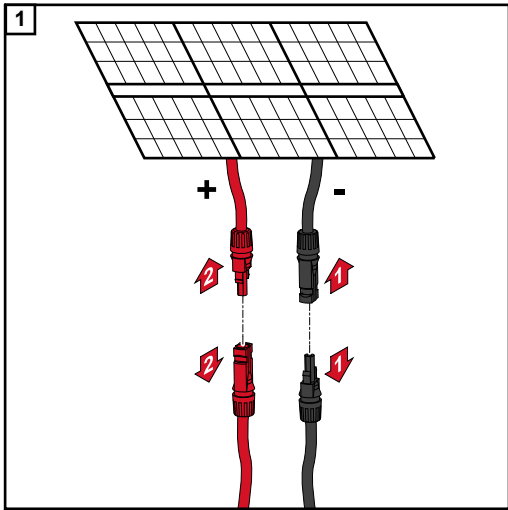
Combined solar module strings with total current greater than 25 A.



**PV generator settings:**  
PV1: ON  
PV2: ON

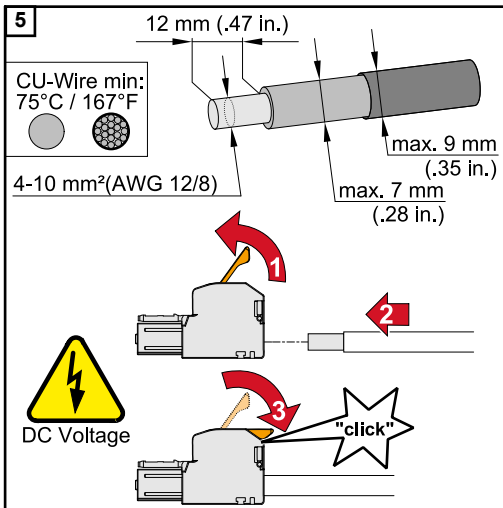
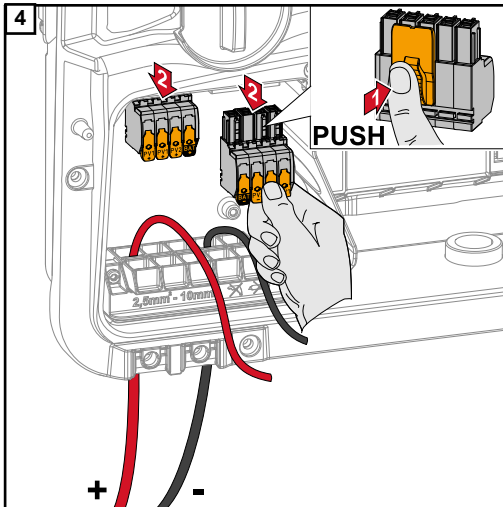
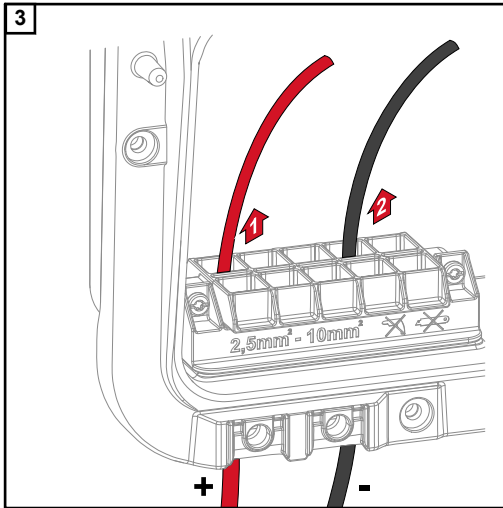
$PV1 (I_{dcmax}) = 37.5 \text{ A} / PV2 (I_{dcmax}) = 18.75 \text{ A}$

**Connecting the solar module strings to the inverter**



Push the DC cables through the DC bushings by hand.

**IMPORTANT!**  
Before stripping the insulation, push the cables through the DC bushings to prevent individual wires being bent or broken.



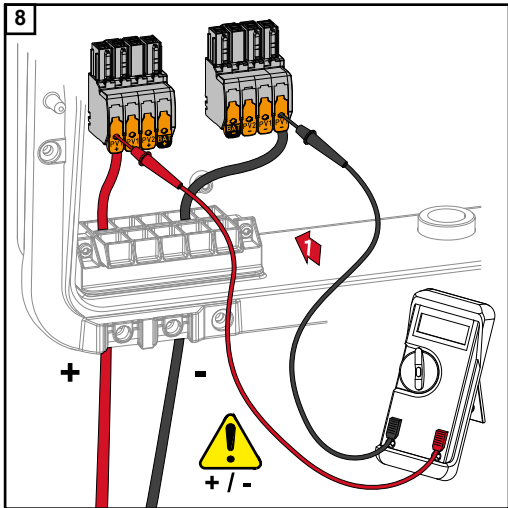
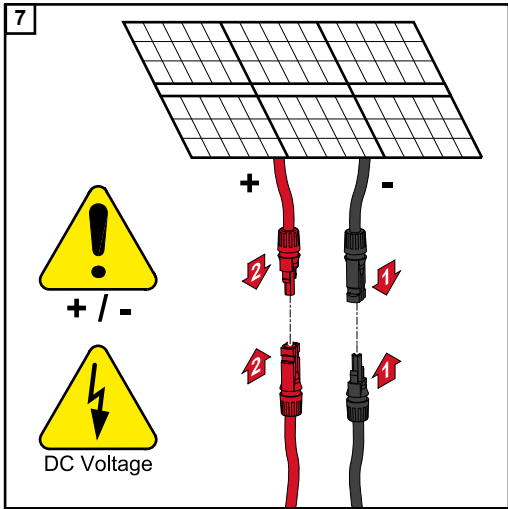
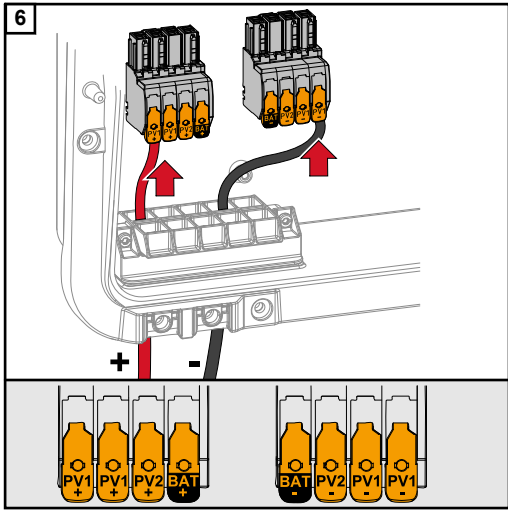
Select the cable cross section in accordance with the instructions in **Permitted cables** from page 51.

Strip the insulation of the single conductors by 12 mm. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided, in each case as far as it will go. Then close the operating lever until it engages.

**NOTE!**

**No multi-wire connections are possible with this terminal type.**

Only one conductor may be connected to each pin. The DC cables can be connected to the DC terminals without ferrules.



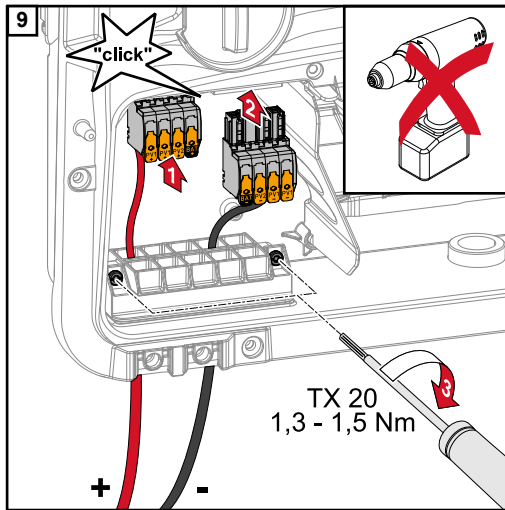
Use a suitable measuring instrument to check the voltage and polarity of the DC cabling. Remove both DC terminals from the slots.

**⚠ CAUTION!**

**Danger due to polarity reversal at the terminals.**

This may result in severe damage to the inverter.

- ▶ Use a suitable measuring instrument to check the polarity of the DC cabling.
- ▶ Use a suitable measuring instrument to check the voltage (**max. 1000 V<sub>DC</sub>**)



Insert the DC terminals into the respective slot until they engage. Fasten the screws of the cable guides to the housing using a screwdriver (TX20) and a torque of 1.3-1.5 Nm.

**NOTE!**

**Do not use a drill driver as this could cause overturning.**

A possible consequence of overturning is, for example, damaging the strain-relief device.

# Connecting the battery to the inverter

## Connecting the battery on the DC side

### CAUTION!

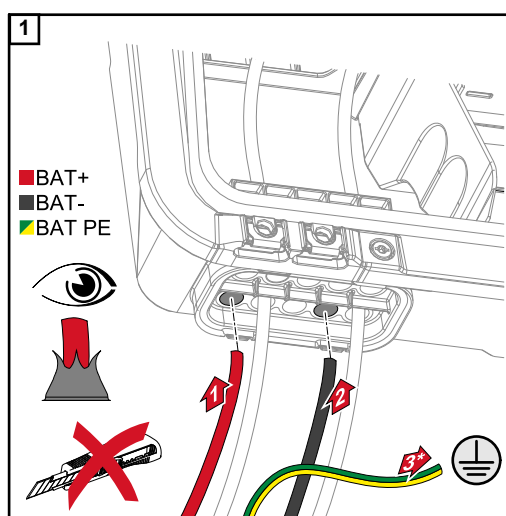
**Risk due to operation of the battery above the permissible altitude as specified by the manufacturer.**

Operating the battery above the permissible altitude can result in restricted operation, failure of the operation, and unsafe states of the battery.

- ▶ Adhere to the manufacturer's instructions regarding the permissible altitude.
- ▶ Operate the battery only at the altitude specified by the manufacturer.

### IMPORTANT!

Prior to installing a battery, ensure that the battery is switched off.

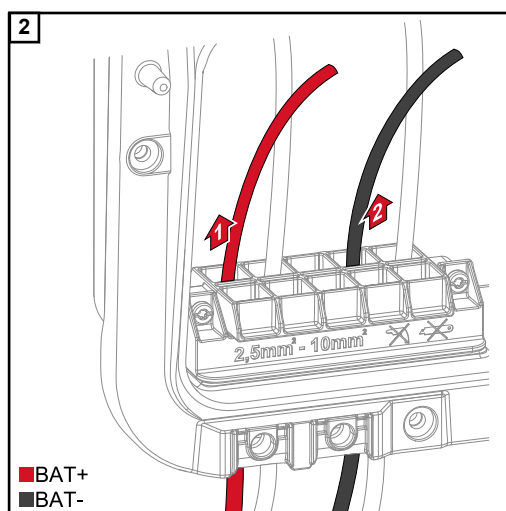


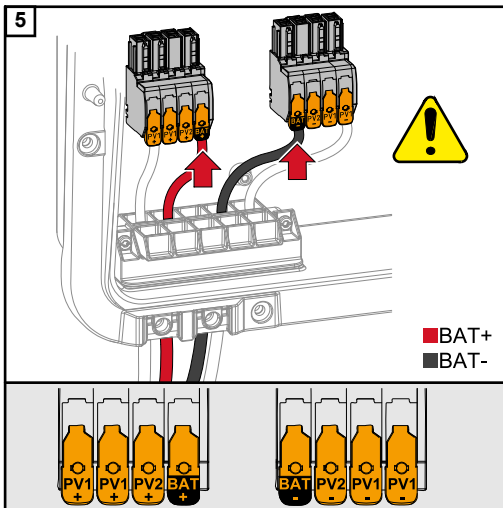
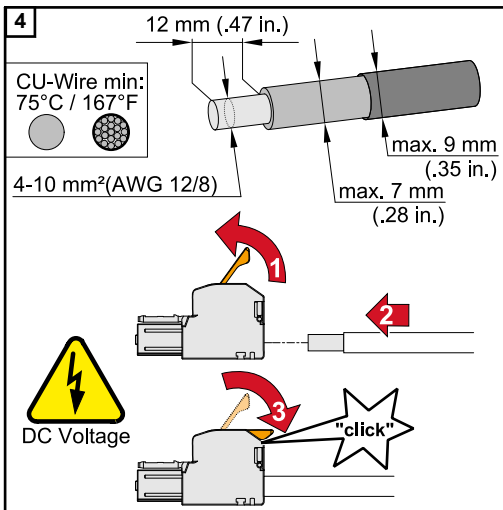
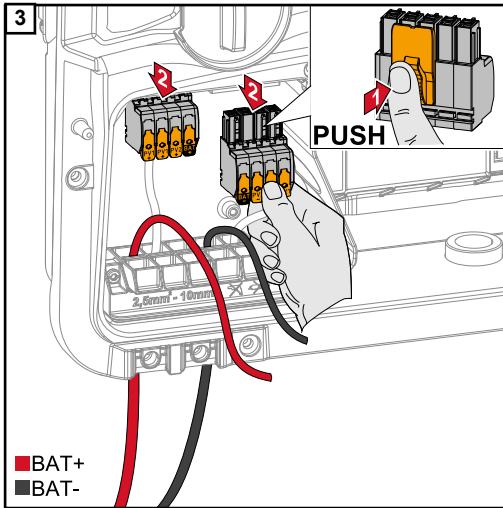
Manually guide the BAT cables through the DC bushings.

\* Connect the ground conductor of the external battery (e.g. switch cabinet).

### IMPORTANT!

Before stripping the insulation, push the cables through the DC bushings to prevent individual wires being bent or broken.





Select the cable cross section in accordance with the instructions in **Permitted cables** from page 51. Strip the insulation of the single conductors by 12 mm. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided, in each case as far as it will go. Then close the operating lever until it engages.

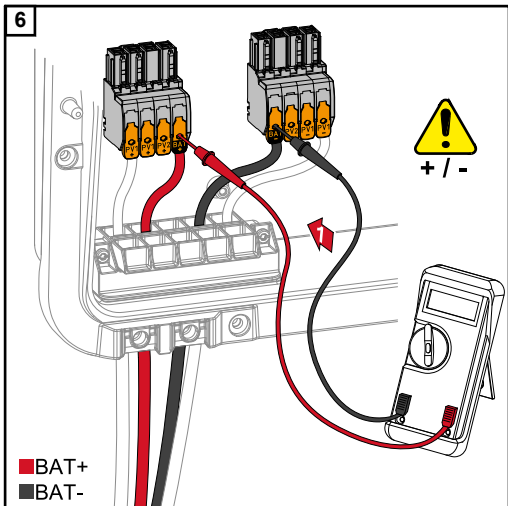
**NOTE!**

**No multi-wire connections are possible with this terminal type.** Only one conductor may be connected to each pin. The DC cables can be connected to the DC terminals without ferrules.

**CAUTION!**

**Risk due to overvoltage when using other slots on the terminal.** This may result in damage to the battery and/or the solar module due to discharge. Only use the designated slots for battery connection.

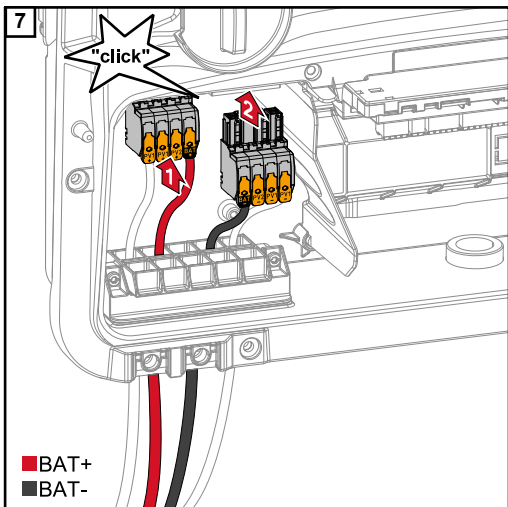




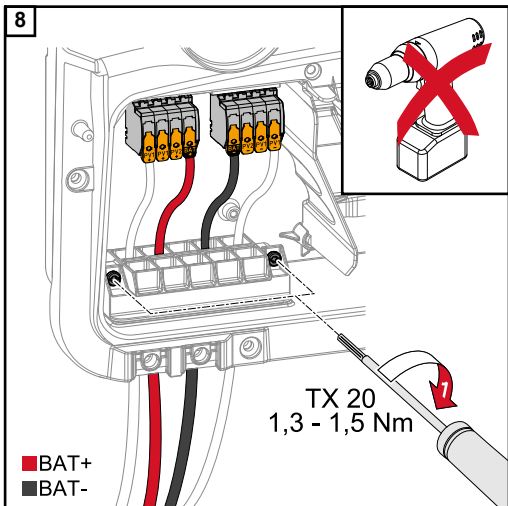
**CAUTION!**

**Danger due to polarity reversal at the terminals.**  
 Serious substantive damage to the PV system may result.

- ▶ Use a suitable measuring instrument to check the polarity of the DC cabling when the battery is switched on.
- ▶ The maximum voltage for the battery input must not be exceeded (see [Technical data](#) on page 120).



Insert the DC terminals into the respective slot until they engage.



Fasten the screws of the cable guides to the housing using a screwdriver (TX20) and a torque of 1.3-1.5 Nm.

**NOTE!**

**Do not use a drill driver as this could cause overturning.**  
 A possible consequence of overturning is, for example, damaging the strain-relief device.

**IMPORTANT!**  
 Information for connection on the battery side can be found in the Installation Instructions from the relevant manufacturer.

# Connecting backup power - PV Point (OP)

## Safety

### IMPORTANT!

The valid national laws, standards and provisions, as well as the specifications of the relevant grid operator are to be taken into account and applied.

It is highly recommended that the specific installation be agreed with the grid operator and explicitly approved by this operator. This obligation applies to system constructors in particular (e.g. installers).

### WARNING!

#### **Danger from incorrect installation, commissioning, operation or incorrect use.**

This can result in severe personal injury/damage to property.

- ▶ Only trained and qualified personnel are authorised to install and commission the system, and only within the scope of the technical regulations.
- ▶ The Installation and Operating Instructions must be read carefully prior to use.
- ▶ If anything is unclear, contact your vendor immediately.

### NOTE!

#### **The supply via the PV Point is not interruption-free.**

If the solar modules are not supplying enough power, interruptions may occur.

- ▶ Do not connect any loads that require an interruption-free supply.

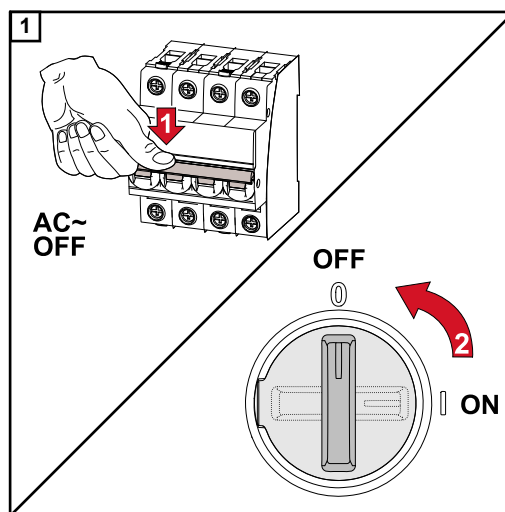
## Installation

### NOTE!

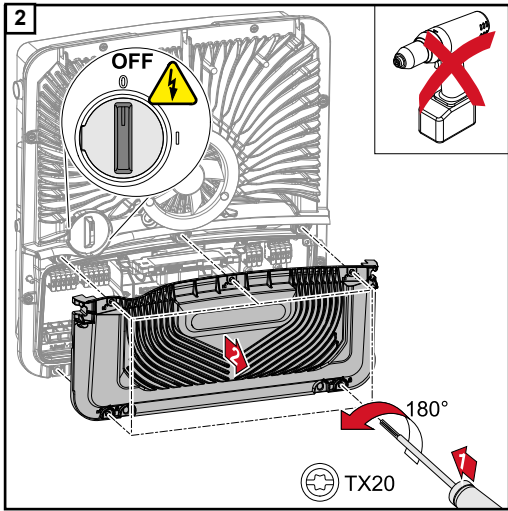
#### **All loads that have to be supplied via the OP terminal must be protected by means of a residual current circuit breaker.**

In order to ensure the residual current circuit breaker operates properly, a connection must be established between the neutral conductor N' (OP) and ground (PE).

Circuit Diagram recommended by Fronius, see [Circuit Diagram - PV Point \(OP\)](#) on page 127.



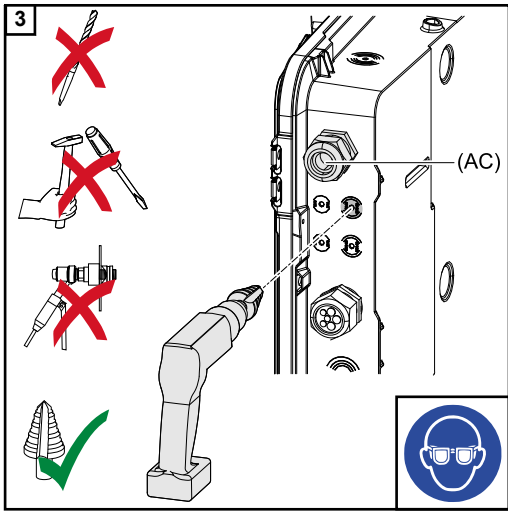
Switch off the automatic circuit breaker and DC disconnecter.



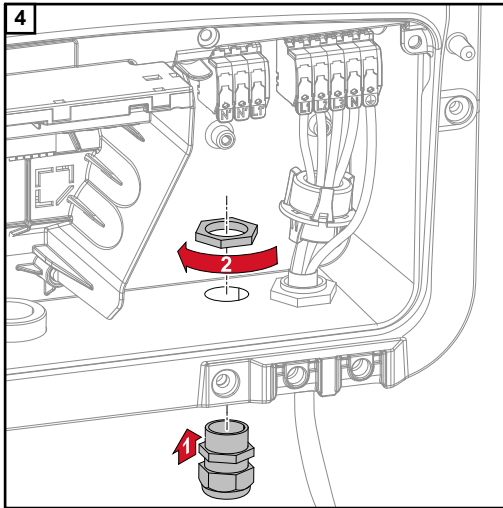
Make sure that the DC disconnect is in the "Off" switch setting.  
 Loosen the five screws of the connection area cover by rotating them 180° to the left using a screwdriver (TX20).  
 Remove the connection area cover from the device.

**⚠ CAUTION!**

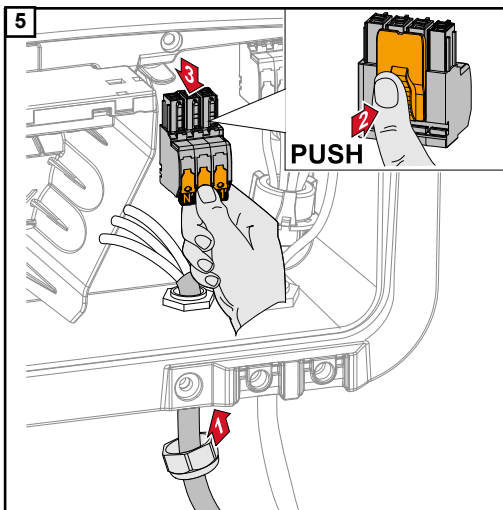
- Danger from faulty or incorrect holes.**  
 This may lead to injuries to the eyes and hands as a result of flying debris and sharp edges, as well as damage to the inverter.
- ▶ When drilling, wear suitable protective goggles.
  - ▶ Only use a step drill when drilling.
  - ▶ Ensure that nothing is damaged inside the device (for example connection block).
  - ▶ Adapt the diameter of the hole to match the corresponding connection.
  - ▶ Deburr the holes using a suitable tool.
  - ▶ Remove the drilling residues from the inverter.



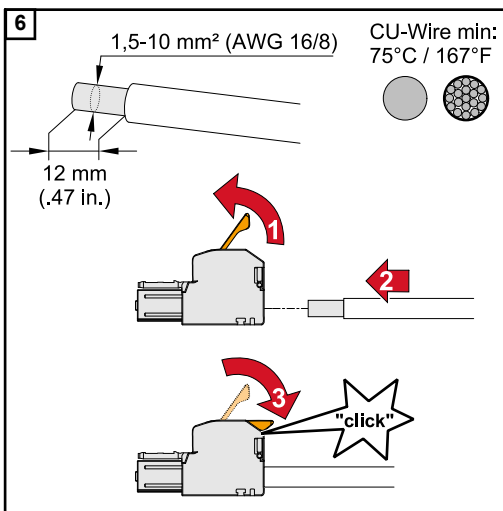
Drill out the optional cable gland.



Insert the strain-relief device into the hole and secure to the torque specified by the manufacturer.



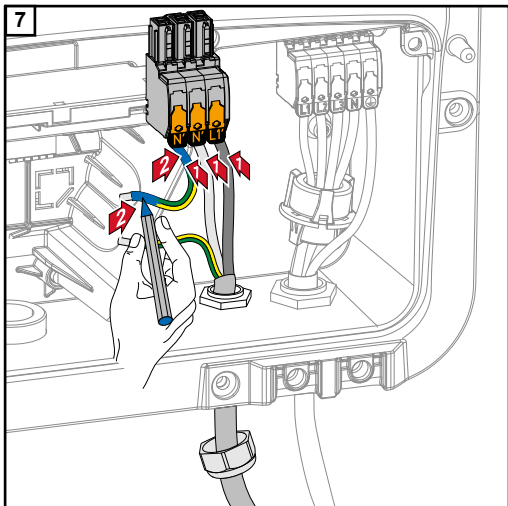
Guide the mains cable through the strain-relief device from below. Remove the OP terminal.



Strip the insulation of the single conductors by 12 mm. The cable cross section must be between 1.5 mm<sup>2</sup> and 10 mm<sup>2</sup>. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided, all the way up to the stop. Then close the operating lever until it engages.

**NOTE!**

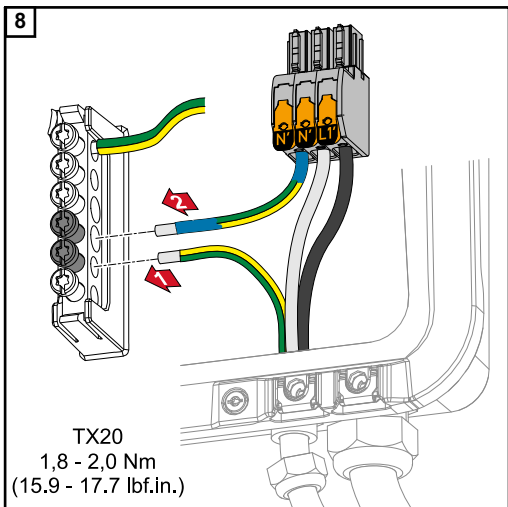
Only one conductor may be connected to each pin. The conductors can be connected without ferrules.



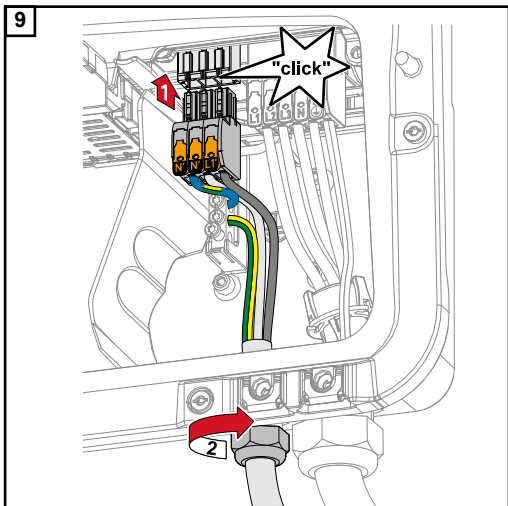
- L1' Phase conductor
- N' Neutral conductor
- N' PEN conductor

**NOTE!**

The PEN conductor must be produced with ends that are permanently marked blue, according to the national provisions, and have a cross section of 10 mm<sup>2</sup>.



Fasten the ground conductor (PE) and PEN conductor to the ground electrode terminal using a screwdriver (TX20) and a torque of 1.8-2 Nm.



Insert the OP terminal into the OP slot until it engages. Tighten the cap nut of the strain-relief device to the torque specified by the manufacturer.

# Connecting backup power - Full Backup

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## General

The examples given in this document (in particular cabling variants and Circuit Diagrams) are suggestions only. These examples have been carefully developed and tested. They can therefore be used as a basis for real-life installation. Anyone following or using these examples does so at their own risk.

### **IMPORTANT!**

The applicable national laws, standards and regulations as well as the specifications of the respective grid operator must be taken into account and applied.

It is strongly recommended to coordinate the concrete examples implemented and in particular the specific installation with the grid operator to obtain their explicit approval. This obligation applies to system constructors in particular (e.g. installers).

The examples suggested here show a backup power supply with or without an external protection relay (external grid and system protection unit). Whether an external protection relay must be used or not is the decision of the respective grid operator.

### **IMPORTANT!**

No uninterruptible power supply (UPS) must be operated in the backup power circuit. The Installation and Operating Instructions must be read carefully prior to use. If anything is unclear, contact your vendor immediately.



### **WARNING!**

**Any incorrect installation, commissioning, operation or usage can cause serious personal injury and/or property damage.**

Only trained and qualified personnel are authorised to install and commission the system, and only within the scope of the technical regulations.

---

## Cabling variants including backup power circuits with 3-pin separation e.g. Austria or Australia

### **Circuit Diagram**

The Circuit Diagram for the 3-pin double separation - e.g. Austria, can be found on page [129](#) in the appendix of this document.

The Circuit Diagram for the 3-pin single separation - e.g. Australia, can be found in the appendix of this document on page [130](#).

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### **Cabling of backup power circuit and non-backup power circuits**

If not all the loads in the home need to be supplied in a backup power situation, the circuits need to be divided into backup power circuits and non-backup power circuits. The total load of the backup power circuits must not exceed the nominal output of the inverter.

The backup power circuits and non-backup power circuits must be fused separately according to the required safety measures (residual-current circuit breaker, automatic circuit breaker, etc.).

In backup power mode, only the backup power circuits are disconnected from the grid by contactors K1 and K2, 3-pin. The rest of the home network is not supplied with power in this case.

**The following points regarding cabling must be considered:**

- The main contacts of contactors K1 and K2 must be installed between the Fronius Smart Meter and the inverter and the residual-current circuit breaker of the backup power circuits.
- The supply voltage for contactors K1 and K2 is provided by the public grid and must be connected to phase 1 (L1) after the Fronius Smart Meter and fused accordingly.
- An NC contact for the relay K3 interrupts the supply voltage to contactors K1 and K2. This prevents the backup power network of the inverter from being switched to the public grid.
- The NO contact of relay K3 gives feedback to the inverter on whether the locking was successfully performed by relay K3.
- Additional inverters or other AC sources can be installed in the backup power circuit after the main contacts of K1 and K2. The sources are not synchronised to the network of the inverter because this backup power network has a frequency of 53 Hz.
- The use of contactor K2 is optional in Australia.

**AI-pin separation  
cabling variant  
e.g. Germany,  
France, Spain**

**Circuit Diagram**

The Circuit Diagram for the 4-pin double separation - e.g. Germany, can be found in the appendix of this document on page [132](#)

The Circuit Diagram for the 4-pin single separation - e.g. France and Spain, can be found in the appendix of this document on page [133](#).

**Cabling of backup power circuit and non-backup power circuits**

If not all the loads in the home need to be supplied in a backup power situation, the circuits need to be divided into backup power circuits and non-backup power circuits. The total load of the backup power circuits must not exceed the nominal output of the inverter.

The backup power circuits and non-backup power circuits must be fused separately according to the required safety measures (residual-current circuit breaker, automatic circuit breaker, etc.).

In backup power mode, only the backup power circuits are disconnected at all pins from the grid by contactors K1 and K2; an earth connection is only established for these circuits. The rest of the home network is not supplied with power in this case.

**The following points regarding cabling must be considered:**

- The main contacts of contactors K1 and K2 must be installed between the Fronius Smart Meter and the residual-current circuit breaker of the inverter and the residual-current circuit breaker of the backup power circuits.
- The supply voltage for contactors K1 and K2 is provided by the public grid and must be connected to phase 1 (L1) after the Fronius Smart Meter and fused accordingly.
- To ensure residual-current circuit breakers function in backup power mode, the connection between the neutral conductor and the ground conductor must be established as close as possible to the inverter, but in any case before the first residual-current circuit breaker. An NC contact is used for this purpose for each of the main contacts of contactors K4 and K5. This ensures that the ground connection is established as soon as the public grid connection is no longer available.
- As with contactor K1, the supply voltage for contactors K4 and K5 is provided via phase 1 (L1) of the public grid.
- An NC contact for the relay K3 interrupts the supply voltage to contactors K1, K2, K4 and K5. This prevents the ground connection from being immediately disconnected again when power returns to the public grid and the backup power network of the inverter from being switched to the public grid.
- The NO contact of relay K3 gives feedback to the inverter on whether the locking was successfully performed by relay K3.
- The use of contactor K2 is optional in France.
- Additional inverters or other AC sources can be installed in the backup power circuit after the main contacts of K1 and K2. The sources are not synchronised to the network of the inverter because this backup power network has a frequency of 53 Hz.

---

**All-pin separation  
cabling variant,  
e.g. Italy**

**Circuit Diagram**

The Circuit Diagram for the 4-pin double separation with ext. grid and system protection - e.g. Italy, can be found on page [134](#) in the appendix of this document.

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**Backup power circuit and non-backup power circuits**

**IMPORTANT!**

Fronius Smart Meter US-480 must be used for these circuit variants.

The backup power circuits and non-backup power circuits must be fused separately according to the required safety measures (residual-current circuit breaker, automatic circuit breaker, etc.).

In backup power mode, only the backup power circuits are disconnected from the grid by contactors K1 and K2; an earth connection is only established for these circuits. The rest of the home network is not supplied with power in this case.



**The following points regarding cabling must be considered:**

- The main contacts of contactors K1 and K2 must be installed between the Fronius Smart Meter and the residual-current circuit breaker of the inverter and the residual-current circuit breaker of the backup power circuits.
- The supply voltage for contactors K1 and K2 is provided by the public grid and must be connected to phase 1 (L1) after the Fronius Smart Meter and fused accordingly.
- Actuation of contactors K1 and K2 is carried out by the external grid and system protection unit.
- The external grid and system protection unit must be installed after the Fronius Smart Meter. Precise installation and wiring instructions for the external grid and system protection unit can be found in its separate Operating Instructions.
- The remote trip input of the external grid and system protection unit must be set to NC according to the manufacturer's Operating Instructions.
- To ensure residual-current circuit breakers function in backup power mode, the connection between the neutral conductor and the ground conductor must be established as close as possible to the inverter, but in any case before the first residual-current circuit breaker. An NC contact is used for this purpose for the main contacts of contactors K4 and K5. This ensures that the ground connection is established as soon as the public grid connection is no longer available.
- As with contactor K1, the supply voltage for contactor K4 is provided via phase 1 (L1) of the public grid and is switched via the external grid and system protection unit.
- An NC contact for relay K3, which activates the remote input of the external grid and system protection unit, interrupts the supply voltage to contactors K1, K2 and K4. This prevents the ground connection from being immediately disconnected again when power returns to the public grid and the backup power network of the inverter from being switched to the public grid.
- The NO contact of relay K3 gives additional feedback to the inverter on whether the locking was successfully performed by relay K3.
- Additional inverters or other AC sources can be installed in the backup power circuit after the main contacts of K1 and K2. The sources are not synchronised to the network of the inverter because this backup power network has a frequency of 53 Hz.

---

**Testing backup power mode**

Backup power mode should be tested once it has been installed and set up for the first time. A battery state of charge of over 30% is recommended when in test mode.

A description on how to run test mode can be found in the [backup power checklist](https://www.fronius.com/en/search-page) (https://www.fronius.com/en/search-page, item number: 42,0426,0365).

# Connecting the data communication cable

## Modbus participants

A maximum of 4 Modbus participants can be connected to the Modbus terminal on inputs M0 and M1.

### IMPORTANT!

Only one primary meter, one battery and one Ohmpilot can be connected per inverter. Due to the high data transfer of the battery, the battery occupies 2 participants. If the "Inverter control via Modbus" function is activated in the "Communication" "Modbus" menu, no Modbus participants are possible. It is not possible to send and receive data at the same time.

### Example:

Input	Battery	Fronius Ohmpilot	Quantity Primary meter	Quantity Secondary meter
Modbus 0 (M0)	✗	✗	1	3
	✓	✗	1	1
	✓	✓	1	0
Modbus 1 (M1)	✗	✗	0	4

## Routing data communication cables

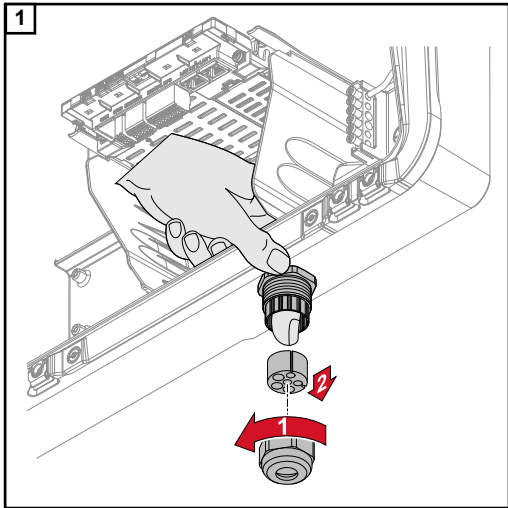
### IMPORTANT!

If data communication cables are wired into the inverter, observe the following points:

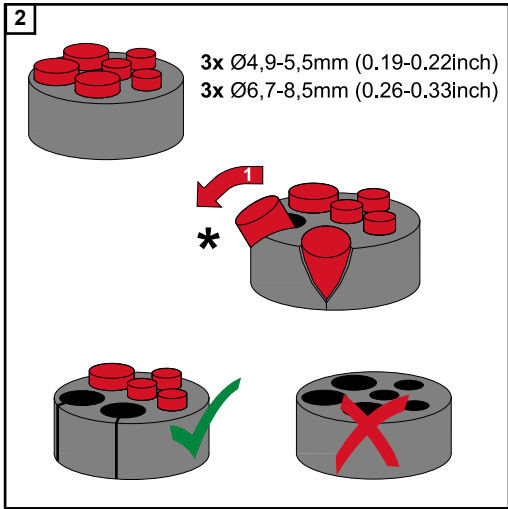
- Depending on the number and cross section of the wired data communication cables, remove the corresponding blanking plugs from the sealing insert and insert the data communication cables.
- Make sure that you insert the corresponding blanking plugs into any free openings on the sealing insert.

### IMPORTANT!

Should the blanking plugs be missing or improperly fitted, then protection class IP66 cannot be guaranteed.



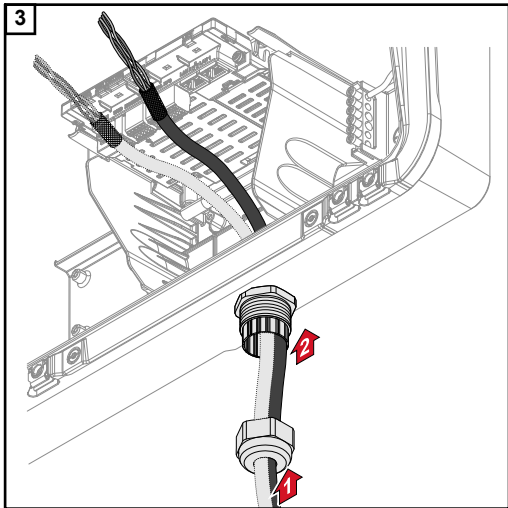
Undo the strain-relief device cap nut and push out the sealing ring and the blanking plug from the inside of the device.



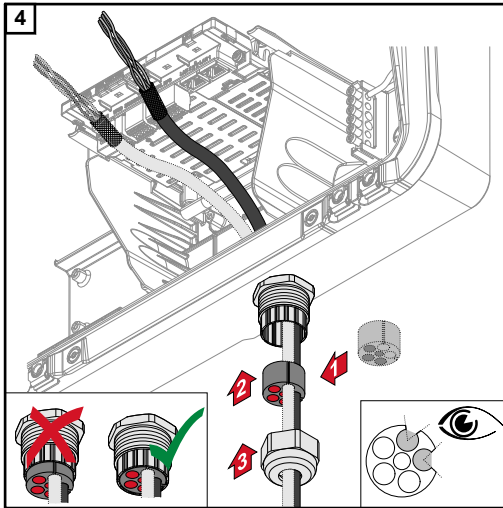
3x Ø4,9-5,5mm (0.19-0.22inch)  
3x Ø6,7-8,5mm (0.26-0.33inch)

Open up the sealing ring at the location where the blanking plug is to be removed.

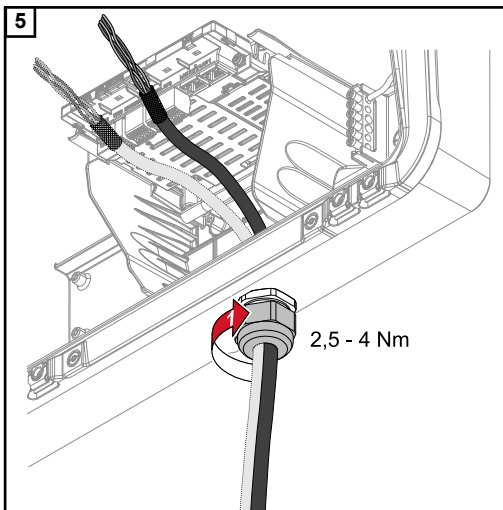
\* Liberate the blanking plug by moving it sideways.



Guide the data cables first through the strain-relief device cap nut and then through the housing opening.

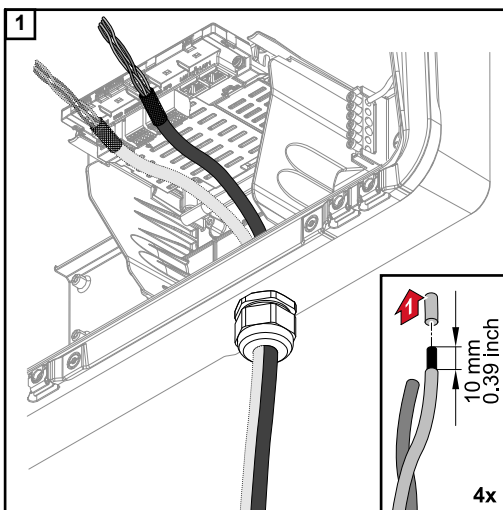


Insert the sealing ring between the cap nut and the housing opening. Press the data cables into the seal's cable guide. Then press in the seal until it reaches the underside of the strain-relief device.



Fasten the cap nut of the strain-relief device with a torque of min. 2.5 - max. 4 Nm.

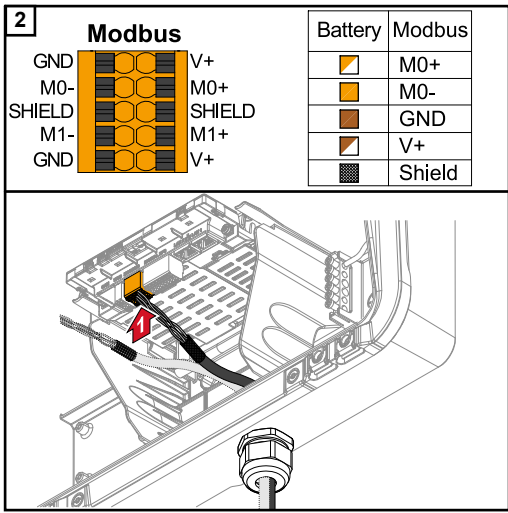
### Connecting the battery communication cables



Strip 10 mm from the single conductors and mount the ferrules if necessary.

#### **IMPORTANT!**

Connect the individual conductors to an appropriate ferrule if several individual conductors are connected to one input of the push-in terminals.



Insert the cable into the respective slot and check the cable is securely retained.

**IMPORTANT!**  
Use only twisted pairs for connecting "Data +/-" and "Enable +/-", see chapter **Permitted cables for the data communication area** on page 51.

Twist the cable shield and insert into the "SHIELD" slot.

**IMPORTANT!**  
Improperly fitted shielding can cause data communication problems.

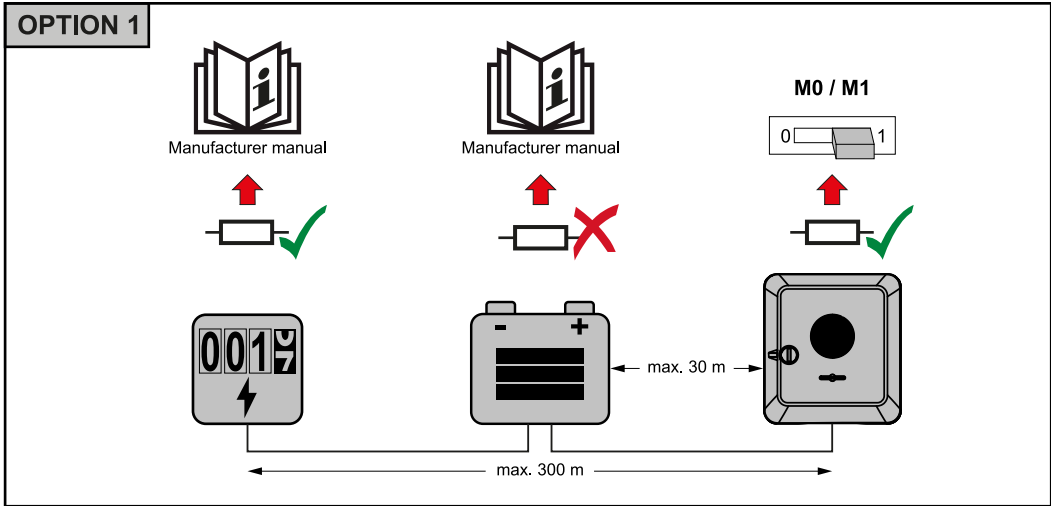
Wiring proposal recommended by Fronius, see page 128.

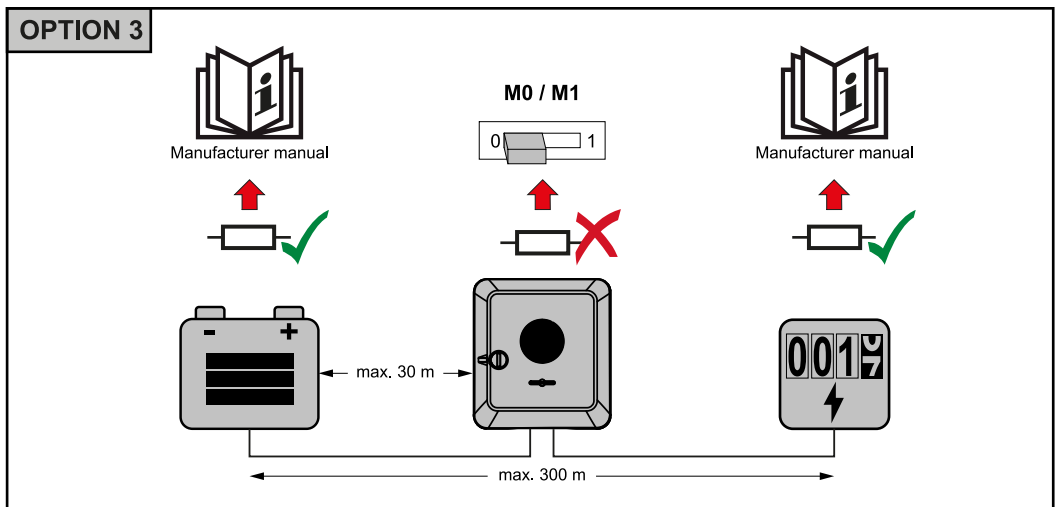
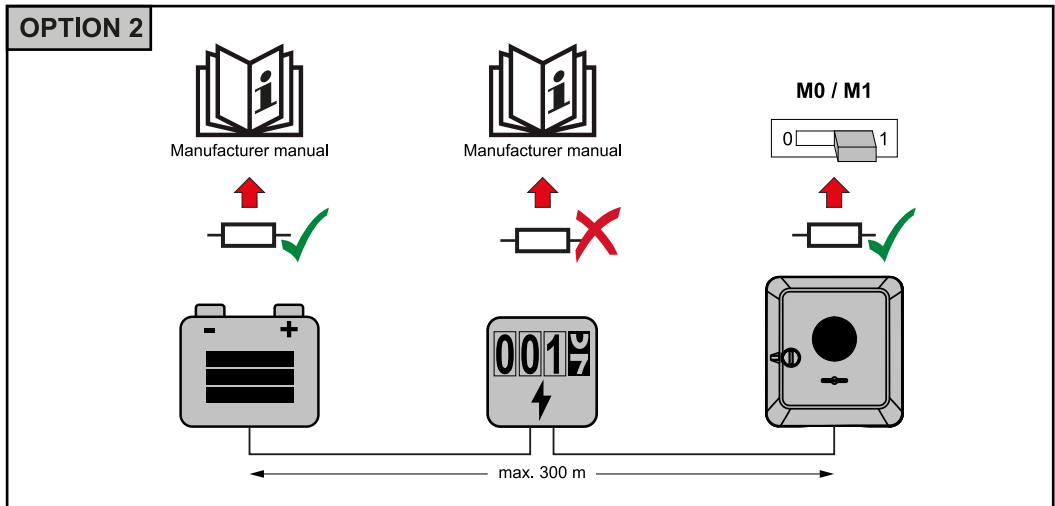
**Terminating resistors**

It may be possible for the system to function without terminating resistors. However, owing to interference, the use of terminating resistors according to the following overview is recommended for trouble-free functioning.

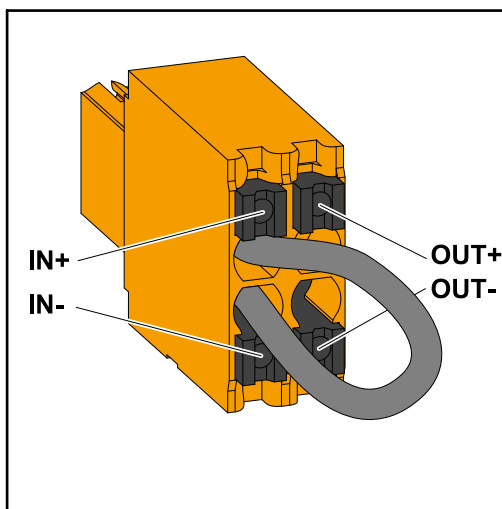
For permissible cable and max. distances see chapter **Permitted cables for the data communication area** on page 51.

**IMPORTANT!**  
Terminating resistors that are not positioned as illustrated can result in interference in the data communication. If the terminating resistor on the battery cannot be deactivated, the battery is to be set up at the bus end (see option 2, 3).





### Installing the WSD (wired shut-down)



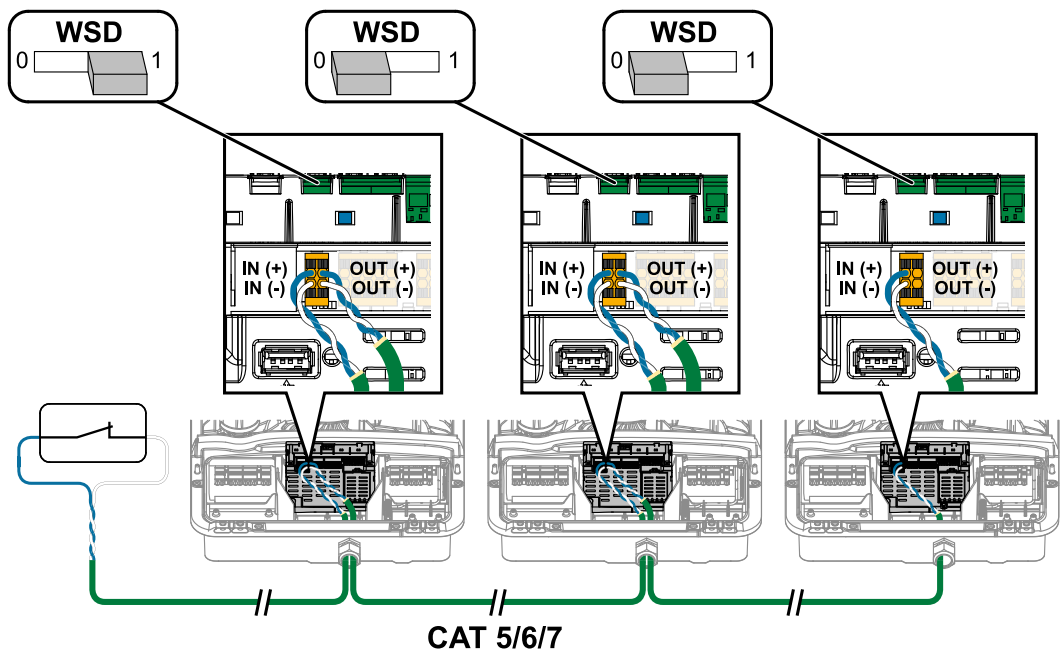
### IMPORTANT!

The push-in WSD terminal in the inverter's connection area is delivered with a bypass ex works as standard. The bypass must be removed when installing a trigger device or a WSD chain.

The WSD switch of the first inverter with connected trigger device in the WSD chain must be in position 1 (master). The WSD switch of all other inverters should be in the 0 (slave) position.

Max. distance between two devices: 100 m

Max. number of devices: 28



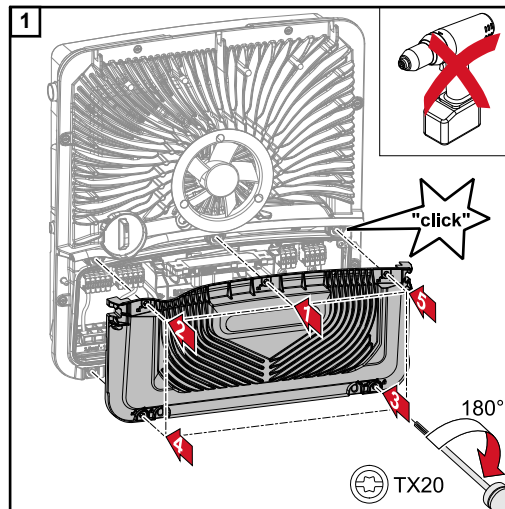
# Closing and commissioning the inverter

## Closing the inverter's connection area/ housing cover, and commissioning

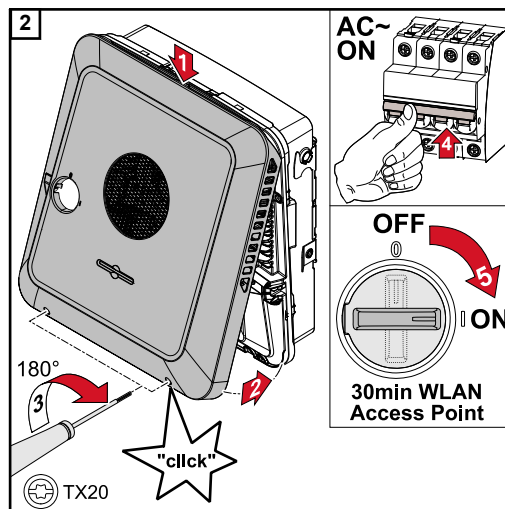
### NOTE!

The housing cover is fitted with a lock for safety reasons, which allows the housing cover on the inverter to be pivoted only when the DC disconnect is switched off.

- ▶ Only clip and pivot the housing cover onto the inverter when the **DC disconnect is switched off**.
- ▶ Do not use excessive force to clip in and pivot the housing cover.



Place the cover on the connection area. Tighten the five screws by rotating them 180° to the right in the indicated order using a screwdriver (TX20).



Clip the housing cover onto the inverter from above. Press on the lower part of the housing cover and tighten the two screws 180° to the right using a Torx screwdriver (TX20). Turn on the automatic circuit breaker. Turn the DC disconnect to the "On" switch position.

### IMPORTANT!

The DC disconnect in the "On" switch position automatically opens the WLAN access point (AP) during initial commissioning.

Alternatively, the WLAN access point can be opened with the optical sensor, see chapter [Button functions and LED status indicator](#) on page 81

## Starting the inverter for the first time

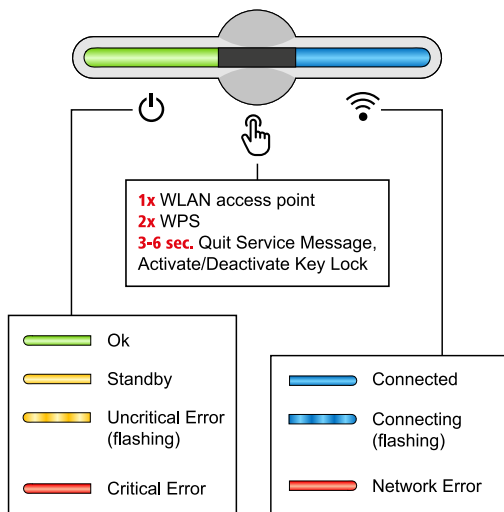
When using the inverter for the first time, various setup settings must be configured.

If the setup process is cancelled before the process is complete, any data that has been input up to this point is lost and the start screen with the installation wizard is shown again. If the process is interrupted, such as in the event of a power outage, the data is saved. Commissioning may be continued from the point at which the process was interrupted once the power supply has been restored. If the setup was interrupted, the inverter feeds energy into the grid at maximum 500 W and the operating status LED flashes yellow.



The country setup can only be set when using the inverter for the first time. If the country setup needs to be changed at a later date, please contact your installer / Technical Support team.

**Button functions and LED status indicator**



The status of the inverter is shown via the operating status LED. In the event of faults, carry out the individual steps in the Fronius Solar.web live app.

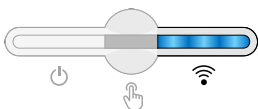


The optical sensor is actuated by touching with a finger.



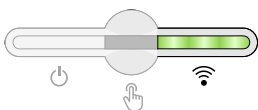
The status of the connection is shown via the communication LED. To establish the connection, carry out the individual steps in the Fronius Solar.web live app.

**Sensor functions**



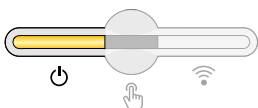
1x = WLAN Accesspoint (AP) is opened.

Flashing blue



2x = WLAN Protected Setup (WPS) is activated.

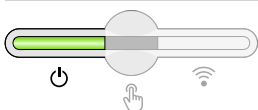
Flashing green



3 seconds (max. 6 seconds) = the service notification is terminated and the key lock is deactivated.

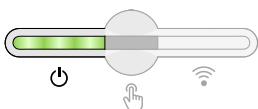
Lights up yellow

**LED status indicator**



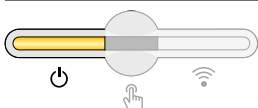
The inverter is operating correctly.

Lights up green



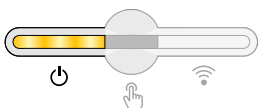
The inverter starts.

Flashing green



The inverter is in standby, is not operational (e.g. no feed-in at night) or is not configured.

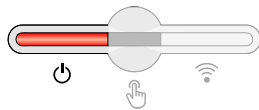
Lights up yellow



The inverter indicates a non-critical status.

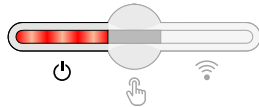
Flashing yellow

## LED status indicator

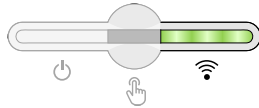


The inverter indicates a critical status and there is no grid power feed process.

⏻ Lights up red

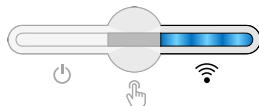


⏻ Flashing red



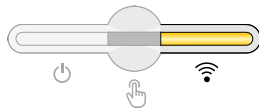
The network connection is being established via WPS.  
2x 🖱️ = WPS search mode.

📶 Flashing green



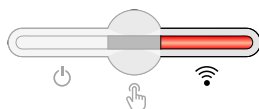
The network connection is being established via WLAN AP.  
1x 🖱️ = WLAN AP search mode (active for 30 minutes).

📶 Flashing blue



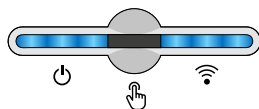
The network connection is not configured.

📶 Lights up yellow



The inverter is operating correctly, a network fault is indicated.

📶 Lights up red



The inverter is performing an update.

⏻ / 📶 Flashing blue

## Installation with the app

The "Fronius Solar.start" app is needed for this installation method. Depending on the end device with which the installation will be carried out, download the app for the respective platform.



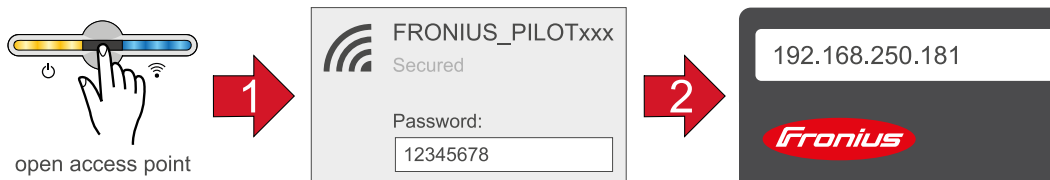
- 1 Start the installation in the app.
- 2 Select the product to which the connection should be established.
- 3 Open the access point by touching the sensor once 🖱️ → Communication LED: flashes blue.
- 4 Follow and complete the installation wizard in the individual sections.

- 5 Add system components in Solar.web and start up the PV system.

The network wizard and the product setup can be carried out independently of each other. A network connection is required for the Solar.web installation wizard.

### Installation using the web browser

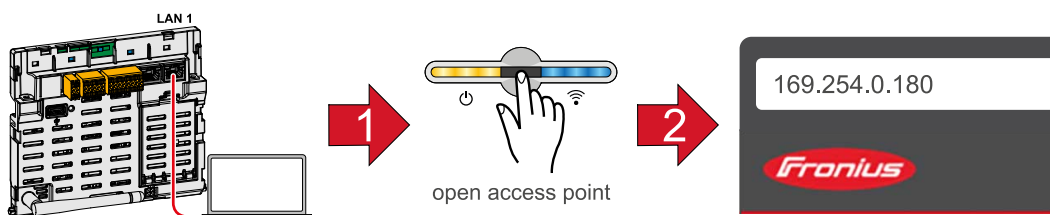
#### WLAN:



- 1 Open the access point by touching the sensor once → Communication LED: flashes blue.
- 2 Establish the connection to the inverter in the network settings (the inverter is displayed with the name "FRONIUS\_PILOT" and the serial number of the device).
- 3 Password: enter 12345678 and confirm.  
**IMPORTANT!**  
To enter the password on a Windows 10 operating system, the link "Connect using a security key instead" must first be activated to establish a connection with the password: 12345678.
- 4 In the browser address bar, enter and confirm the IP address 192.168.250.181. The installation wizard is opened.
- 5 Follow the installation wizard in the individual sections and complete the installation.
- 6 Add system components in Solar.web and start up the PV system.

The network wizard and the product setup can be carried out independently of each other. A network connection is required for the Solar.web installation wizard.

#### Ethernet:



- 1 Establish a connection to the inverter (LAN1) with a network cable (CAT5 STP or higher).
- 2 Open the access point by touching the sensor once → Communication LED: flashes blue.
- 3 In the browser address bar, enter and confirm IP address 169.254.0.180. The installation wizard is opened.
- 4 Follow the installation wizard in the individual sections and complete the installation.
- 5 Add system components in Solar.web and start up the PV system.

The network wizard and the product setup can be carried out independently of each other. A network connection is required for the Solar.web installation wizard.



# **Settings - website of the inverter**



# User settings

---

## User login

- 1 Open the website of the inverter in your browser.
- 2 In the “Login” menu, log in using your user name and password, or go to the “User” menu and click on the “User login” button and then log in with your user name and password.

### **IMPORTANT!**

Depending on the user's authorization, settings can be executed in the individual menus.

---

## Selecting the language

- 1 In the “User” menu, click on the “Language” button and select the desired language.

# System configuration

---

## Components

Select "Add component+" to add all available components to the system.

---

### PV generator

Activate the MPP tracker and enter the connected PV power in the associated field. For combined solar module strings, "PV1 + PV2 connected in parallel" must be activated.

---

### Battery

If the SoC mode is set to "Automatic", the values "Minimum SoC" and "Maximum Soc" are preset according to the battery manufacturer's specifications.

If the SoC mode is set to "Manual", the "Minimum SoC" and "Maximum SoC" may be changed in consultation with the battery manufacturer.

Using the "Allow battery charging from additional producers in home network" setting, charging of the battery from other external producers is enabled/disabled.

Using the "Allow battery charging from public grid" setting, charging of the battery from the public grid is enabled/disabled.

The normative or feed-in tariff rules must be taken into account with this setting. The setting does not affect the charging of the battery by other producers within the home. It merely relates to the process of drawing charging energy from the public grid. Regardless of this setting, any charging from the public grid that is required for service reasons (e.g. necessary re-charging to protect against deep discharge) is still performed.

### IMPORTANT!

Fronius accepts no liability for damage to third-party batteries.

---

### Primary meter

To ensure smooth operation in conjunction with other energy producers and in back-up power mode, it is important to install the Fronius Smart Meter at the feed-in point. The inverter and other producers must be connected to the public grid via the Fronius Smart Meter.

This setting also affects the behaviour of the inverter at night. If the function is deactivated, the inverter switches to Standby mode as soon as there is no more PV power available, provided that no energy management command is sent to the battery (e.g. minimum state of charge reached). The message "Power low" is displayed. The inverter restarts as soon as an energy management command is sent or sufficient PV power is available.

If the function is activated, the inverter remains permanently connected to the grid so that energy can be drawn from other producers at any time.

After connecting the meter, the position must be configured. A different Modbus address needs to be set for each Smart Meter.

The Watt value on the generator meter is the sum of all generator meters. The Watt value on the consumption meter is the value of all consumption meters.

---

### Ohmpilot

All Ohmpilots available in the system are displayed. Select the desired Ohmpilot and add it to the system via "Add".

---

## Functions and I/Os

### Backup power

"Off" or "PV Point" can be selected for backup power mode.

The backup power functionality can only be activated once the required I/O assignments have been configured for backup power. The meter must be installed at the feed-in point and configured.



**Backup power nominal voltage**

When backup power mode is activated, the nominal voltage of the public grid must be selected.

**SOC warning level**

A warning is output when the residual capacity of the battery specified here is reached in backup power mode.

**Residual battery capacity**

If backup power mode is set to "Auto", during grid-connected operation energy is drawn from the battery until the battery capacity specified here is reached when the backup power mode has been set to "PV Point".

**Load management**

Up to four pins can be selected for load management here. Additional load management settings are available in the "Load management" menu item.

Default: Pin 1

**OFF - Demand Response Mode (DRM)**

The pins for control via DRM can be set here:

Mode	Description	Information	Default pin
DRM0	Inverter disconnects itself from the grid	Open grid relay	
	REF GEN		RG0
	COM LOAD		CL0
		DRM0 occurs if there is an interruption or short circuit on the REF GEN or COM LOAD leads. Or if the combinations DRM1 - DRM8 are invalid.	
DRM1	Import $P_{nom} \leq 0\%$ without disconnection from the grid	currently not supported	1/5
DRM2	Import $P_{nom} \leq 50\%$	currently not supported	2/6
DRM3	Import $P_{nom} \leq 75\%$ & $+Q_{rel}^* \geq 0\%$	currently not supported	3/7
DRM4	Import $P_{nom} \leq 100\%$	currently not supported	4/8
DRM5	Export $P_{nom} \leq 0\%$ without disconnection from the grid	currently not supported	1/5
DRM6	Export $P_{nom} \leq 50\%$	currently not supported	2/6
DRM7	Export $P_{nom} \leq 75\%$ & $-Q_{rel}^* \geq 0\%$	currently not supported	3/7
DRM8	Export $P_{nom} \leq 100\%$	currently not supported	4/8

The percentages always refer to the nominal device output.

**IMPORTANT!**

If the Demand Response Mode (DRM) function is enabled and no DRM control is connected, the inverter switches to Standby mode.

---

**Demand  
Response Modes  
(DRM)**

A value for the apparent power consumption and apparent power output can be entered here for the Australia country setup.

## Energy management

### Self-consumption optimisation

The inverter always adjusts to the set target value on the Smart Meter. In the "automatic" operating mode (factory setting), an adjustment is made to 0 W at the feed-in point (maximum self-consumption).

The target value also applies if a further source feeds into this Smart Meter. However, in this case:

- The Fronius Smart Meter must be installed at the feed-in point
- Battery charging must be activated by another producer

The self-consumption optimisation has lower priority than the battery control specifications.

### Self-consumption optimisation

Switch to self-consumption optimisation automatically or manually.

### Target value on Smart Meter

If a manual selection is made under self-consumption optimisation, the target value on the Smart Meter and the reference/feed-in can be selected here.

---

### External producers

If further decentralised producers are installed in the house, and these are incorporated into the self-consumption regulation of the Fronius Hybrid inverter, this setting must be activated. This means that energy can be drawn from the household network and fed into the battery via the Fronius GEN24 Plus inverter. You can restrict how much power is consumed by the Fronius GEN24 Plus inverter by specifying the maximum AC power (AC max.). A maximum power consumption of the AC nominal capacity of the Fronius GEN24 Plus inverter is possible.

---

### Battery control specification:

Using the time-dependent battery control, it is possible to prevent or restrict the charging/discharging and to specify a defined value for charging/discharging.

The battery is influenced by external factors, e.g. calibration charging, charging from AC permitted, power limit of the inverter, control specifications via Modbus, or self-consumption optimisation. The battery control specifications have the second lowest priority, following the self-consumption optimization, and it may be the case that these are not fulfilled due to other specifications.

Without any battery control specifications, optimization is performed to the best possible self-consumption. Self-consumption decreases when battery control specifications are defined.

The following values can be selected in the column "regulation":

- **max charging power**  
The battery is charged with the power set in the field "power" at most
- **min charging power**  
The battery is charged with the power set in the field "power" at least
- **max discharging power**  
The battery is discharged with the power set in the field "power" at most
- **min discharging power**  
The battery is discharged with the power set in the field "power" at least

The day and time window in which this regulation applies is defined in the columns "Day of the week" and "Time window". It is not possible to define a time window over midnight. Example: Two entries are needed to set a parameter of 22:00 to 06:00: '22:00 - 24:00' and '00:00 - 06:00'.

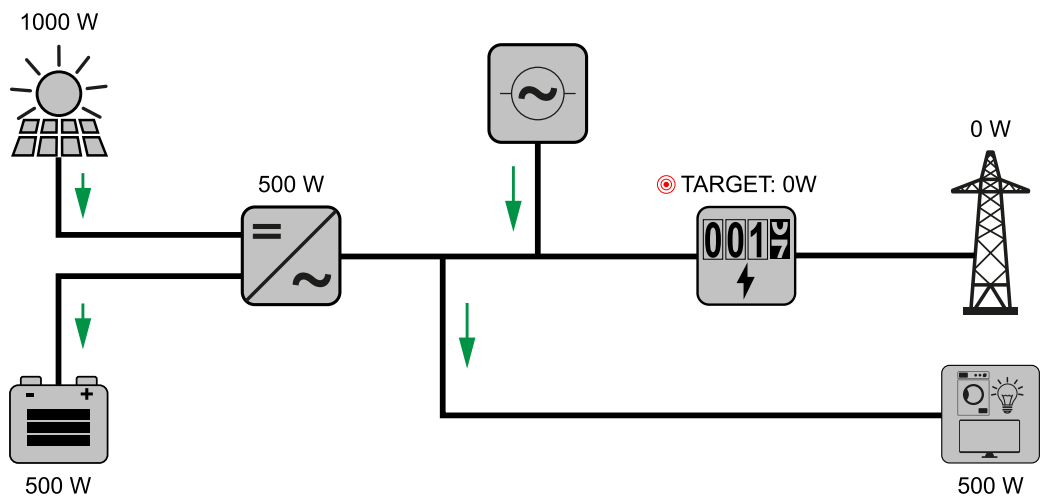
Examples for the battery control specifications can be found in the following chapter.

### Examples of battery control specifications

These examples illustrate the energy flows. Efficiency levels are not taken into account.

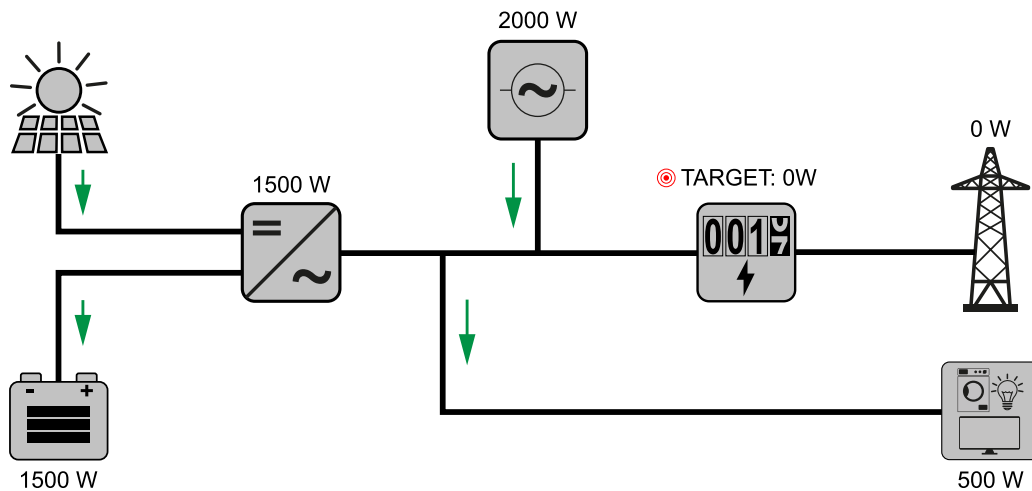
#### Battery system example

PV system on inverter:	1000 W
Power into the battery:	500 W
Power output (AC) of the inverter:	500 W
Target value set at feed-in point:	0 W
Infeed into the public grid:	0 W
Consumption in home:	500 W



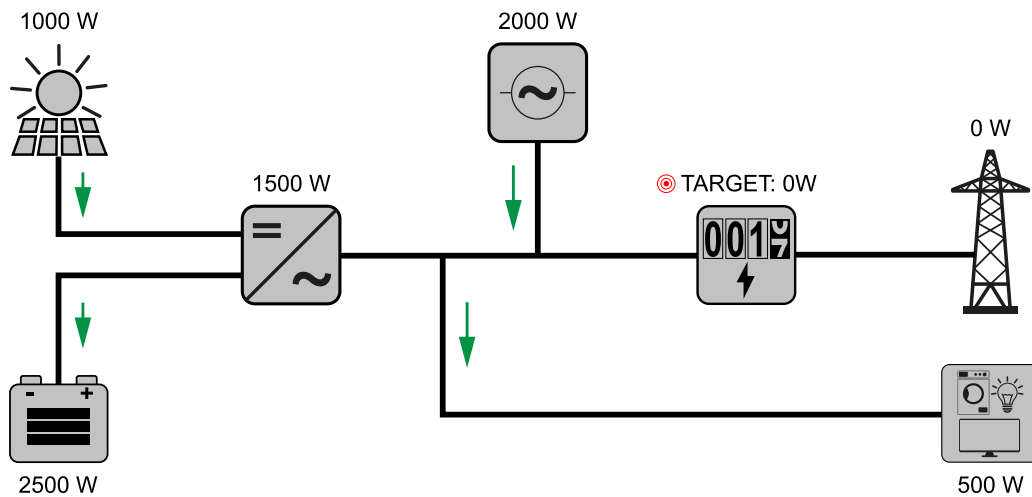
#### Example: battery system without photovoltaics, including second producer in the house

Power into the battery:	1500 W
Power consumption (AC) of the inverter:	1500 W
Second producer in home network:	2000 W
Target value set at feed-in point:	0 W
Infeed into the public grid:	0 W
Consumption in home:	500 W



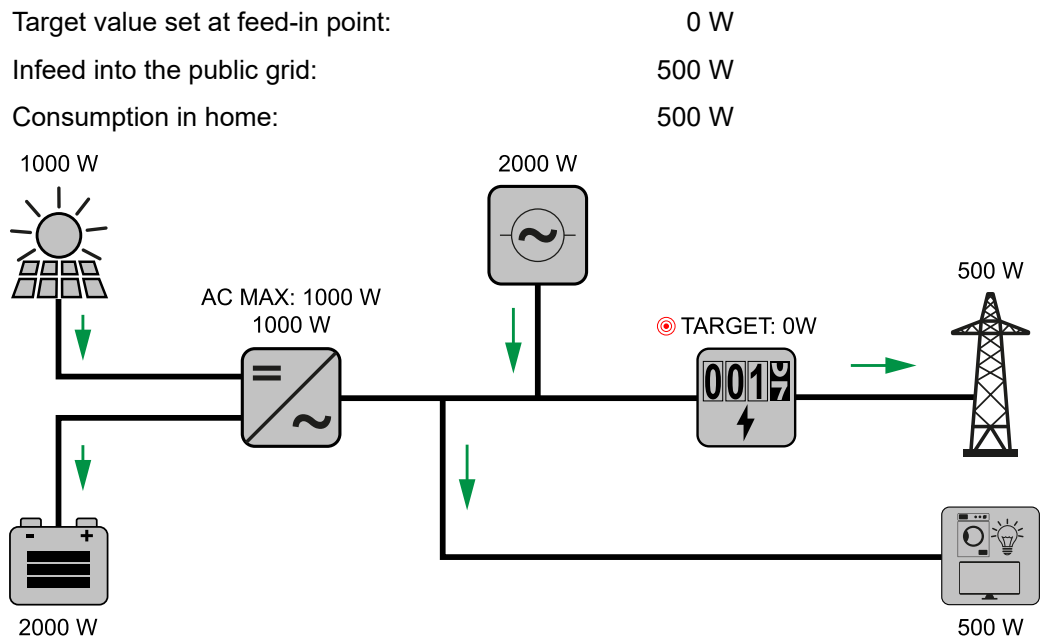
**Example: battery system including second producer in the house**

PV system on inverter:	1000 W
Power into the battery:	2500 W
Power consumption (AC) of the inverter:	1500 W
Second producer in home network:	2000 W
Target value set at feed-in point:	0 W
Infeed into the public grid:	0 W
Consumption in home:	500 W



**Example: battery system including second producer in the house (with AC max. limitation)**

PV system on inverter:	1000 W
Power into the battery:	2000 W
Power consumption AC max. limited to:	1000 W
Power consumption (AC) of the inverter:	1000 W
Second producer in home network:	2000 W



## Load management

### Priorities

If additional components (e.g. battery, Ohmpilot) are present in the system, the priorities can be set here. Devices having higher priority are actuated first, and subsequently, if there is still excess energy available, the other devices.

### Load management

It is possible for up to four different load management rules to be defined. At the same threshold values, the rules are activated in succession. For deactivation, this is done in reverse; the I/O last switched on is the first to be switched off. In the case of different thresholds, the I/O with the lowest threshold is switched on first, followed by the second lowest, and so on.

I/Os controlled by the produced power are always prioritised over a battery and Ohmpilot. That is to say that an I/O can switch on and result in the battery no longer being charged or the Ohmpilot no longer being activated.

An I/O is activated or deactivated only after 60 seconds.

### Control

- Control is deactivated.
- Control is effected by the power generated.
- Control is effected by excess power (given feed limits). This option can only be selected if a meter has been connected. Control via Energy Manager is effected using the actual power of feeding in with respect to the grid.

### Thresholds

- On: For entering an effective power limit, at which the output is activated.
- Off: For entering an effective power limit, at which the output is deactivated.

### Runtimes

- Field for enabling a minimum duration for which the output is to be activated for each switch-on process.
- Field for enabling the maximum runtime per day.
- Field for enabling a target duration for which the output is to be activated in total per day (total of several switch-on processes).

---

## General

### General settings

- 1 In the "System name" input field, enter the name of the system (max. 30 characters).
- 2 "Synchronize time automatically" enabled → select "Area time zone" and "Location time zone". The date and time are applied from the time zone entered.
- 2 "Synchronize time automatically" disabled → enter or select "Date", "Time", "Area time zone" and "Location time zone".
- 3 Click on the "Save" button.

---

## Update

All available updates are made available on the product page and in the "Download search" area under [www.fronius.com](http://www.fronius.com) .

### Firmware update

- 1 Drag the firmware file into the "Drag&Drop file here" field or select it using "Select file".

The update will start.

---

## Setup wizard

The guided setup wizard can be accessed here.

---

## Restoring the factory settings

### All settings

All configuration data is reset with the exception of the country setup. Changes to the country setup may only be carried out by authorized personnel.

---

### All settings with no network

All configuration data is reset with the exception of the country setup and the network settings. Changes to the country setup may only be carried out by authorized personnel.

---

## Event Log

### Current events

All current events of the connected system components are shown here.

### IMPORTANT!

Depending on the type of event, these must be confirmed via the "tick" button in order to be processed further.

---

### Archived

All events of the connected system components that no longer exist are shown here.

---

## Information

This menu displays all system information and the current settings.

---

### Save as PDF

- 1 Click on the "Save as PDF" button.
- 2 Individually select information with the "tick" next to the information or with the tick "Select all".

- 3 Enter the file name in the input field and click on the "Print" button.

The PDF is created and displayed.

---

### Create support info

- 1 Click on the "Create support info" button.
- 2 The sdp.cry file is downloaded automatically. To download manually, click on the "Download Support-Info" button.

The sdp.cry file is saved in the downloads.

---

### Enable remote maintenance

- 1 Click on the "Enable remote maintenance" button.

Remote maintenance access for the Fronius Support team is enabled.

### IMPORTANT!

Remote maintenance access gives Fronius Technical Support exclusive access to the inverter via a secure connection. Diagnostic data is transmitted here that can be used for troubleshooting purposes. Only enable remote maintenance access following a request from the Fronius Support team.

---

## Licence manager

The license file contains the performance data and the scope of functions of the inverter. When replacing the inverter, power stage set or data communication area, the license file must also be replaced.

### Licensing - online (recommended):

An Internet connection and completed configuration on Solar.web is required.

- 1 Complete the installation work (see chapter [Closing the inverter's connection area/housing cover, and commissioning](#) on page 80).
- 2 Connect to the website of the inverter.
- 3 Enter the serial number and verification code (VCode) of the defective and replacement unit. The serial number and the VCode can be found on the rating plate of the inverter (see chapter [Warning notices on the device](#) on page 43).
- 4 Click on the "Start online licensing" button.
- 5 Skip the Terms of use and Network settings menu items by clicking on "Next".

The license activation starts.

### Licensing - offline:

- 1 Complete the installation work (see chapter [Closing the inverter's connection area/housing cover, and commissioning](#) on page 80).
- 2 Connect to the website of the inverter.
- 3 Enter the serial number and verification code (VCode) of the defective and replacement unit. The serial number and the VCode can be found on the rating plate of the inverter (see chapter [Warning notices on the device](#) on page 43).
- 4 Click on the "Start offline licensing" button.
- 5 Download the service file onto the end device by clicking on the "Download service file" button.
- 6 Open the website [licensemanager.solarweb.com](http://licensemanager.solarweb.com) and log in with your user name and password.
- 7 Drag or upload the service file into the "Drop service file here or click to upload" field.



- 8] Download the newly generated license file onto the end device using the "Download license file" button.
- 9] Go to the inverter website and drag the license file into the "Drag&Drop licence file here" field, or select it via "Select license file".

The license activation starts.

# Communication

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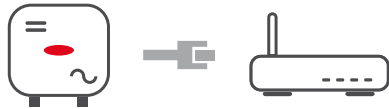
## Network

### Server addresses for data transfer

If a firewall is used for outgoing connections, the following protocols, server addresses and ports must be allowed for successful data transfer:

- Tcp froniussseiot.azure-devices.net:8883
  - Tcp froniussseiot-telemetry.azure-devices.net:8883
  - Tcp froniussseiot-telemetry.azure-devices.net:443
  - Udp sera-gen24.fronius.com:1194 (213.33.117.120:1194)
  - Tcp froniussseiot.blob.core.windows.net:443
- 

### LAN:



- 1 Enter host name.
- 2 Select connection type "automatic" or "static".
- 3 For connection type "static" - enter IP address, subnet mask, DNS and gateway.
- 4 Click on the "Connect" button.

The connection is established.

---

### WLAN:




### Establishing a connection via WPS:

- 1 Click the "Enable" button.
- 2 Activate WPS on the WLAN router (see documentation provided with the WLAN router).

The connection is established automatically.

### Select and connect WLAN network:

The networks found are shown in the list. Clicking on the refresh button  will carry out a second search of the available WLAN networks. The "Find network" input field is used to find hidden networks.

- 1 Select network from the list.
- 2 Select connection type "automatic" or "static".
- 3 For connection type "automatic" - enter WLAN password and host name.
- 4 For connection type "static" - enter IP address, subnet mask, DNS and gateway.
- 5 Click on the "Connect" button.

The connection is established.

---

**Access point:**

The inverter acts as the access point. A PC or smart device connects directly with the inverter. It is not possible to connect to the internet. The "Network name (SSID)" and "Network key (PSK)" can be assigned in this menu.

**Modbus****“Baud rate”**

The baud rate influences the transmission speed between the individual components connected in the system. When selecting the baud rate, ensure that it is the same at both the sending and receiving end.

**“Parity”**

The parity bit can be used to check the parity. It detects transmission errors. A parity bit can safeguard a specific number of bits. The value (0 or 1) of the parity bit must be calculated by the sender and is checked by the recipient using the same calculation. The parity bit can be calculated for even and odd parity.

**“SunSpec Model Type”**

Depending on the SunSpec model, there are two different settings.

**float:** SunSpec Inverter Model 111, 112, 113 or 211, 212, 213.

**int + SF:** SunSpec Inverter Model 101, 102, 103 or 201, 202, 203.

**“SC address”**

Depending on the SunSpec model, there are two different settings.

**float:** SunSpec Inverter Model 111, 112, 113 or 211, 212, 213.

**int + SF:** SunSpec Inverter Model 101, 102, 103 or 201, 202, 203.

# Safety and grid requirements

---

**Feed-in limitation** DNO or grid operators may stipulate feed-in limitations for an inverter (e.g. max. 70% of kWp or max. 5 kW).  
The feed-in limitation takes account of self-consumption by the household before the power of an inverter is reduced:

- A custom limit can be set.
- A Fronius Smart Meter can be connected to the Modbus push-in terminal of the data communication area at the connections M0/M1- / M0/M1+ for Modbus data.

With the inverter, any PV power that is not allowed to be fed into the grid is used to charge the battery instead and/or used by the Fronius Ohmpilot so that it does not go to waste. The feed-in limitation is only active if the power fed in is higher than the set power reduction. The battery is charged first or the energy is consumed on the Fronius Ohmpilot.

### "Limit for entire system"

The entire PV system is limited in accordance with a set power limit. If this setting is disabled, the entire available PV-power is converted and fed into the grid.

### "Total DC system power"

Input field for the total DC system power in Wp.  
This value is used if the "Maximum permitted feed-in power of the entire system" is specified in %.

### "Maximum permitted feed-in power of the entire system"

Input field for the "Maximum permitted feed-in power of the entire system" in W or % (setting range: -10 to 100%).

If there is no meter in the system or if a meter has failed, the inverter limits the feed-in power to the set value.

### Example: Feed-in limitation

(without consideration of the efficiency)

PV system on Fronius inverter:	5000 W
Consumption in home:	1000 W
Maximum permitted feed-in power of the entire system:	60% = 3000 W

### Case 1: The battery can be charged

Power at grid feed-in point:	0 W
Power at inverter output:	1000 W
Power into the battery:	3000 W

### Case 2: The battery cannot be charged

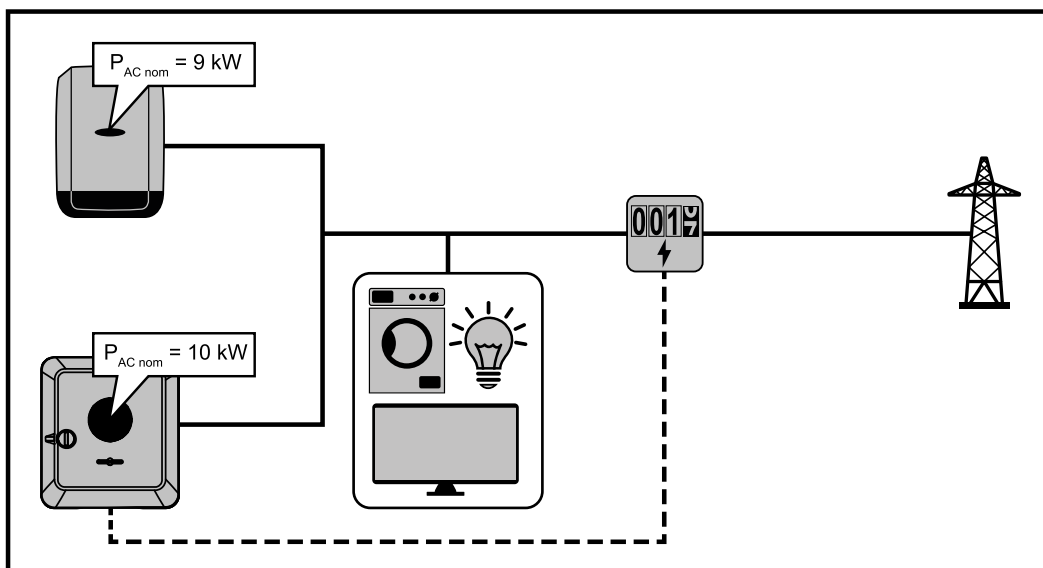
Power at grid feed-in point:	3000 W
Power at inverter output:	4000 W
Power into the battery:	0 W

In this example, no more than 3000 W may be fed into the grid at the grid feed-in point. However, any loads that are located between the inverter and the grid feed-in point can be supplied by additional power from the inverter. These loads are also compensated as required.

### Dynamic power regulation with several inverters

**Example: 9 kW ( $P_{AC\ nom}$  SnapInverter)  $\leq$  10 kW ( $P_{AC\ nom}$  Symo GEN24)**

Only one Smart Meter is required for the Symo GEN24 inverter.



#### Settings on the Symo GEN24 inverter website:

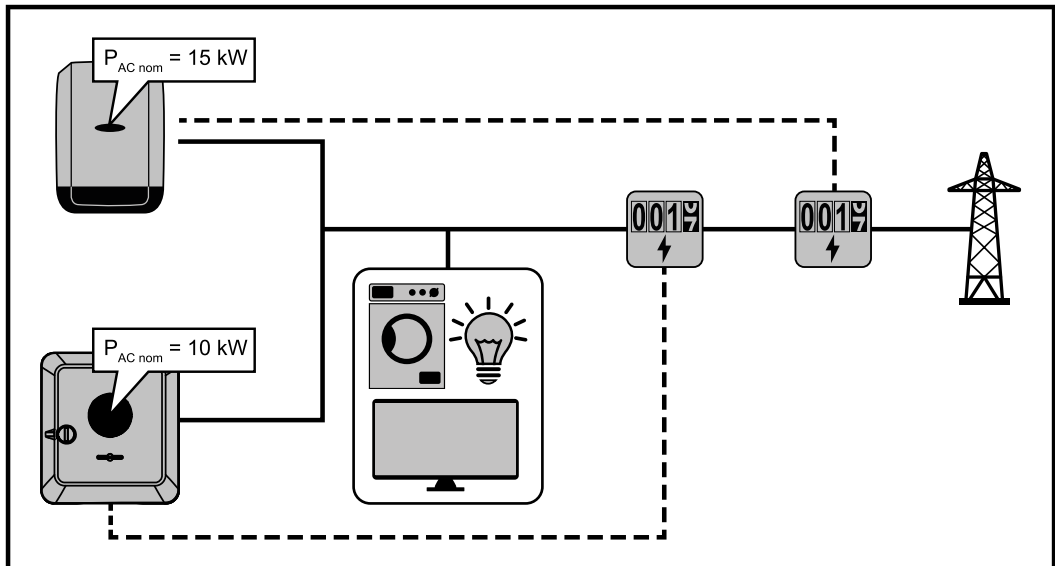
- 1 Configure the meter at the feed-in point in the "System configuration" → "Components" menu.
- 2 Activate the limit for the entire system in the "Safety and grid regulations" → "Export limitation" menu. Enter the value 19,000 Wp in the "Total DC system power" input field. Enter the value 60% in the "Max. grid feed-in power" input field.

**Example: 15 kW ( $P_{AC\ nom}$  SnapInverter)  $>$  10 kW ( $P_{AC\ nom}$  Symo GEN24)**

Two Smart Meters are required for the inverter.

#### IMPORTANT!

If there are two Smart Meters at the feed-in point, the SnapInverter and Symo GEN24 cannot be shown combined in one PV system. Two individual PV systems must be created in Solar.web.



### Settings on the Symo GEN24 inverter website:

- 1 Configure the meter at the feed-in point in the "System configuration" → "Components" menu.

### Settings in the system monitoring of the SnapInverter:

- 1 Configure the meter at the feed-in point in the "Settings" → "Meter" menu.
- 2 Activate the limit for the entire system in the "DNO Editor" → "Dynamic power reduction" menu. Enter the value 25,000 Wp in the "Total DC system power" input field. Enter the value 60% in the "Max. grid feed-in power" input field.

## I/O power management

### General

In this menu item, settings relevant for an electricity company (DNO) are made. An effective power limitation in % and/or a power factor limitation can be set.

### IMPORTANT!

The service password must be entered in order to adjust settings in this menu item. Settings in this menu area must only be made by trained and qualified personnel.

#### "Input pattern" (assignment of individual I/Os)

- 1 click = white (contact open)
- 2 clicks = blue (contact closed)
- 3 x clicks = grey (not used)

#### "Power factor (cos φ)"

- "ind" = inductive
- "cap" = capacitive

#### "DNO feedback"

when the rule is enabled, output I/O 0 is activated (e.g. for operating a signalling device).

For "Import" or "Export", the data format \*.fpc is supported.

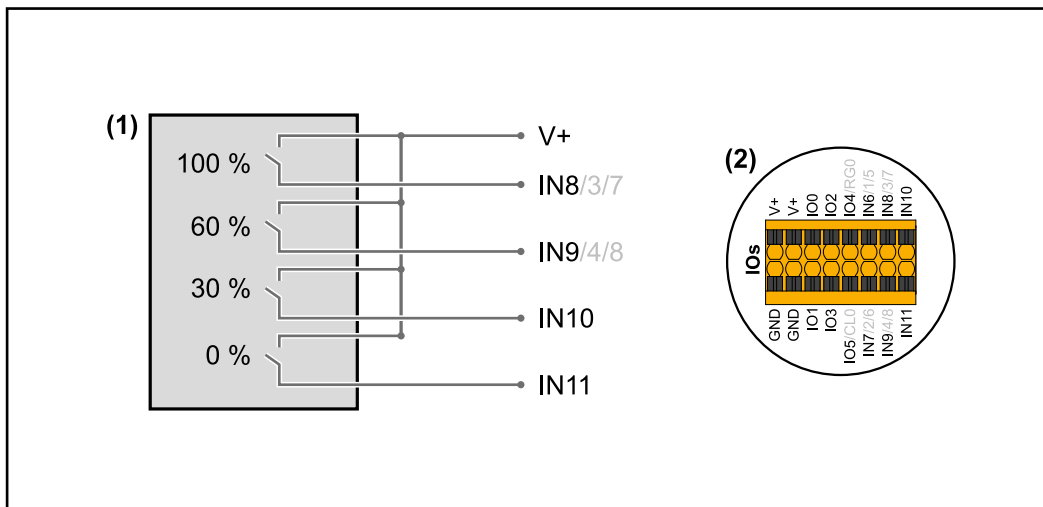
### Control priorities

For setting the control priorities for the ripple control signal receiver, the feed-in limitation and control via Modbus.

1 = highest priority, 3 = lowest priority

**Connection diagram - 4 relay**

The ripple control signal receiver and the I/Os terminal of the inverter can be connected to one another in accordance with the connection diagram.  
 If the distance between the inverter and the ripple control signal receiver exceeds 10 m, at least a CAT 5 cable is recommended and the shield must be connected at one end to the push-in terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 4 relays, for effective power limiting.
- (2) I/Os of the data communication area.

**Use the preconfigured file for 4-relay mode:**

- 1 Download the file (.fpc) **under 4-relay mode** onto the end device.
- 2 Upload the file (.fpc) in the "I/O Power Management" menu using the "Import" button.
- 3 Click on the "Save" button.

The settings for 4-relay mode are stored.

**I/O power management settings  
- 4 relays**

**I/O Power Management**



DNO Feedback  
not used

**DNO Rules**

**Rule 1**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 100

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 2**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 60

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 3**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 30

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 4**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 0

Power Factor (cos φ): 1 cap

DNO Feedback:

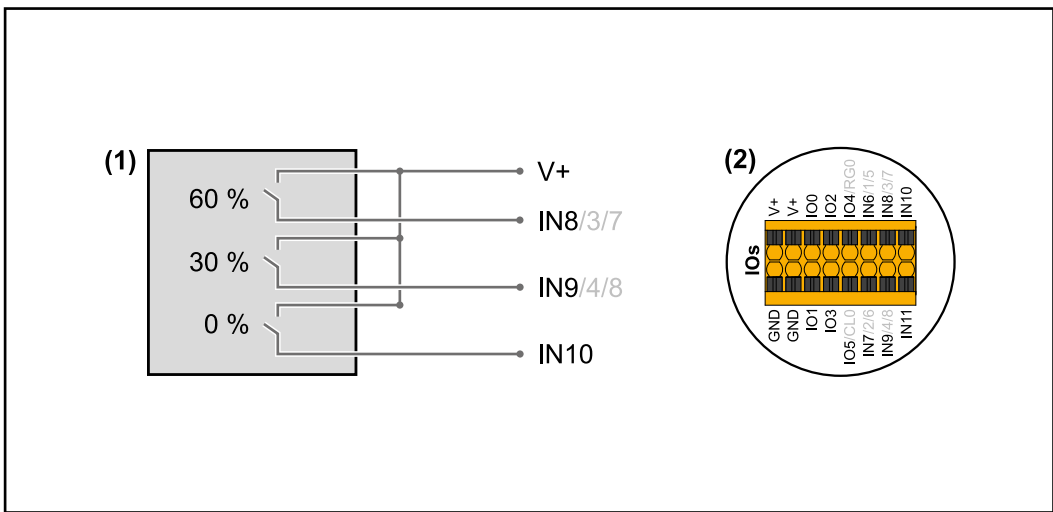
IMPORT EXPORT

- 0 None
- 1 None
- 2 None
- 3 None
- 4 None
- 5 None
- 6 None
- 7 None
- 8 **IO control**
- 9 **IO control**
- 10 **IO control**
- 11 **IO control**



**Connection diagram - 3 relay**

The ripple control signal receiver and the I/Os terminal of the inverter can be connected to one another in accordance with the connection diagram.  
 If the distance between the inverter and the ripple control signal receiver exceeds 10 m, at least a CAT 5 cable is recommended and the shield must be connected at one end to the push-in terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 3 relays, for effective power limiting.
- (2) I/Os of the data communication area.

**Use the preconfigured file for 3-relay mode:**

- 1 Download the file (.fpc) **under 3-relay mode** onto the end device.
- 2 Upload the file (.fpc) in the "I/O Power Management" menu using the "Import" button.
- 3 Click on the "Save" button.

The settings for 3-relay mode are stored.

**I/O power management settings  
- 3 relays**

**I/O Power Management**



DNO Feedback  
not used

**DNO Rules**

**Rule 1**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 100

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 2**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 60

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 3**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 30

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 4**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 0

Power Factor (cos φ): 1 cap

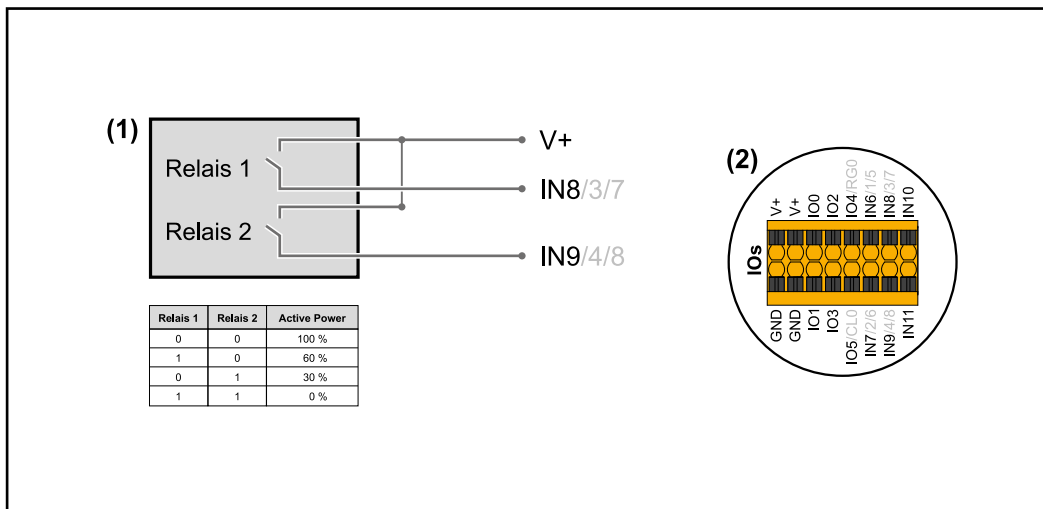
DNO Feedback:

- 0 None
- 1 None
- 2 None
- 3 None
- 4 None
- 5 None
- 6 None
- 7 None
- 8 **IO control**
- 9 **IO control**
- 10 **IO control**
- 11 None

IMPORT EXPORT

**Connection diagram - 2 relay**

The ripple control signal receiver and the I/Os terminal of the inverter can be connected to one another in accordance with the connection diagram.  
 If the distance between the inverter and the ripple control signal receiver exceeds 10 m, at least a CAT 5 cable is recommended and the shield must be connected at one end to the push-in terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 2 relays, for effective power limiting.
- (2) I/Os of the data communication area.

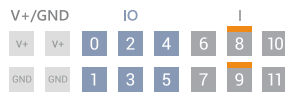
**Use the preconfigured file for 2-relay mode:**

- 1 Download the file (.fpc) **under 2-relay mode** onto the end device.
- 2 Upload the file (.fpc) in the "I/O Power Management" menu using the "Import" button.
- 3 Click on the "Save" button.

The settings for 2-relay mode are stored.

**I/O power management settings  
- 2 relays**

## I/O Power Management



DNO Feedback  
not used

### DNO Rules

**Rule 1**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 100

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 2**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 60

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 3**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 30

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 4**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 0

Power Factor (cos φ): 1 cap

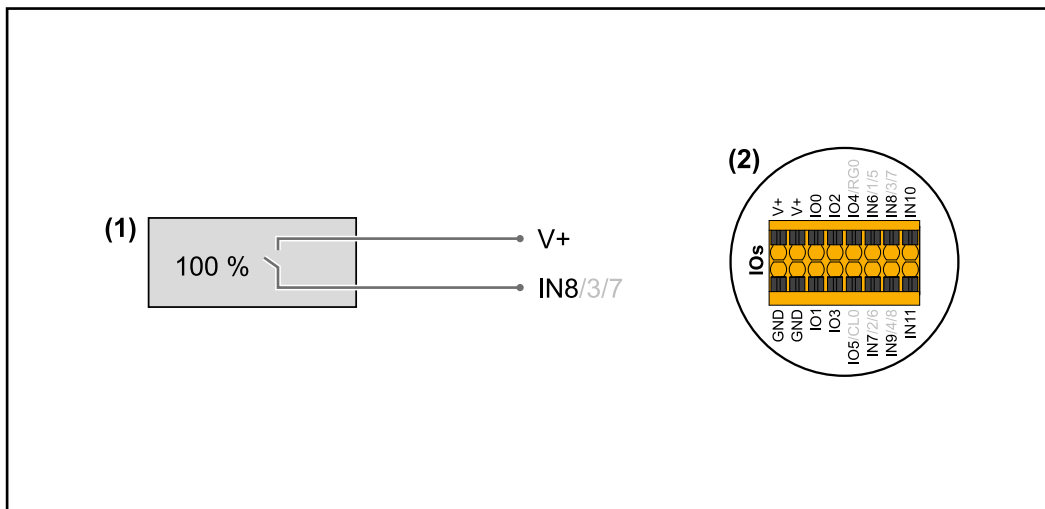
DNO Feedback:

IMPORT EXPORT

- 0 None
- 1 None
- 2 None
- 3 None
- 4 None
- 5 None
- 6 None
- 7 None
- 8 **IO control**
- 9 **IO control**
- 10 None
- 11 None

**Connection diagram - 1 relay**

The ripple control signal receiver and the I/Os terminal of the inverter can be connected to one another in accordance with the connection diagram.  
 If the distance between the inverter and the ripple control signal receiver exceeds 10 m, at least a CAT 5 cable is recommended and the shield must be connected at one end to the push-in terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 1 relay, for effective power limiting.
- (2) I/Os of the data communication area.

**Use the preconfigured file for 1-relay mode:**

- 1 Download the file (.fpc) **under 1-relay mode** onto the end device.
- 2 Upload the file (.fpc) in the "I/O Power Management" menu using the "Import" button.
- 3 Click on the "Save" button.

The settings for 1-relay mode are stored.

**I/O power management settings  
- 1 relay**

**I/O Power Management**

The interface shows terminal pin configurations for V+ /GND, IO, and I. A legend on the right lists pins 0-11 with 'None' or 'IO control' assignments. Below, two DNO Rules are defined. Rule 1 is active with 100% power and 'cap' power factor. Rule 2 is inactive with 0% power and 'cap' power factor. 'DNO Feedback' is disabled for both. 'IMPORT' and 'EXPORT' buttons are at the bottom.

**V+ /GND**  
V+ V+ 0 2 4 6 8 10  
GND GND 1 3 5 7 9 11

**IO**  
0 2 4 6 8 10  
1 3 5 7 9 11

**I**  
0 2 4 6 8 10  
1 3 5 7 9 11

DNO Feedback: not used

**DNO Rules**

**Rule 1**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 100

Power Factor (cos φ): 1 cap

DNO Feedback:

**Rule 2**

0 2 4 6 8 10  
1 3 5 7 9 11

Active Power: 0

Power Factor (cos φ): 1 cap

DNO Feedback:

IMPORT EXPORT

**Legend:**  
0 None  
1 None  
2 None  
3 None  
4 None  
5 None  
6 None  
7 None  
8 **IO control**  
9 None  
10 None  
11 None

**Autotest  
(CEI 0-21)**

**Description**

The 'Autotest' can be used to check the protective function required by the Italian standard for monitoring the voltage and frequency limits as well as the trip limits of the inverter during commissioning. During normal operation, the inverter constantly checks the current voltage and frequency actual value of the grid.

After the start of the autotest, various individual tests run automatically one after the other. Depending on grid conditions, the duration of the test is approx. 15 minutes.

**IMPORTANT!**

The inverter may only be commissioned in Italy after a successful autotest (CEI 0-21). If the autotest is not passed, no feed-in operation may take place. If the autotest is started once, it must be completed successfully. The autotest cannot be started during emergency power mode.

VAC inner limit max	Test to check the maximum voltage in the phases
VAC inner limit min	Test to check the minimum voltage in the phases
FAC inner limit max	Test to check the maximum frequency

FAC inner limit min	Test to check the minimum frequency
FAC altern- ativ inner limit max	Test to check the maximum alternative frequency
FAC altern- ativ inner limit min	Test to check the minimum alternative frequency
VAC outer limit min	Test to check the minimum voltage in the phases
VAC long time limit	Test to check the 10 min average voltage in the phases

### Save as PDF

- 1 Click the 'Save as PDF' button.
- 2 Enter the file name in the input field and click on the 'Print' button.

The PDF is created and displayed.

### Note on autotest

The limit values are set in the menu area 'Grid Code'.

The access code for the 'Grid Code' menu area corresponds to the installer code (PROFI menu) and is only made available to Fronius following a written request. An appropriate application form is available from national technical support.





# Appendix



# Care and maintenance

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**General** The inverter is designed in such a way that no additional maintenance work builds up. Nevertheless, a few points must be considered during operation to ensure that the inverter works perfectly.

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**Maintenance** Maintenance and servicing may only be carried out by Fronius-trained service technicians.

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**Cleaning** Clean the inverter as required with a damp cloth.  
Do not use cleaning agents, abrasives solvents or similar to clean the inverter.

---

**Safety** The DC disconnect is used only to switch off power to the power stage set. When the DC disconnect is turned off, the connection area is still energized.

 **WARNING!**

**Danger from grid voltage and DC voltage from solar modules.**

An electric shock can be fatal.

- ▶ The connection area must only be opened by an authorised electrician.
  - ▶ The separate power stage set area must only be opened by Fronius-trained service technicians.
  - ▶ Prior to any connection work, disconnect the inverter on the AC side and the DC side.
- 

 **WARNING!**

**Danger of residual voltage from capacitors.**

An electric shock can be fatal.

- ▶ Allow the capacitors of the inverter to discharge (2 minutes).
- 

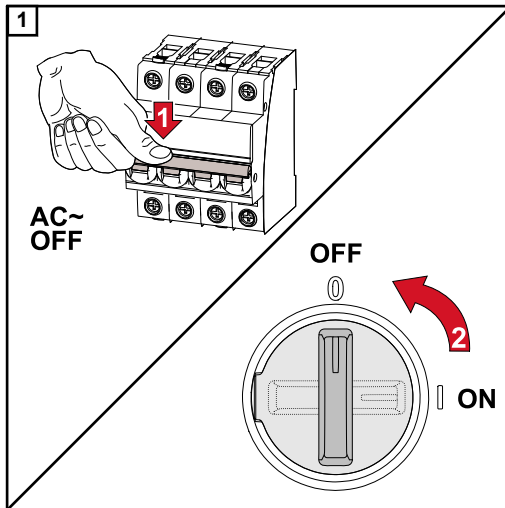
**Operation in dusty environments**

If the inverter is operated in dusty environments, dirt may build up on the heat sink and fan.

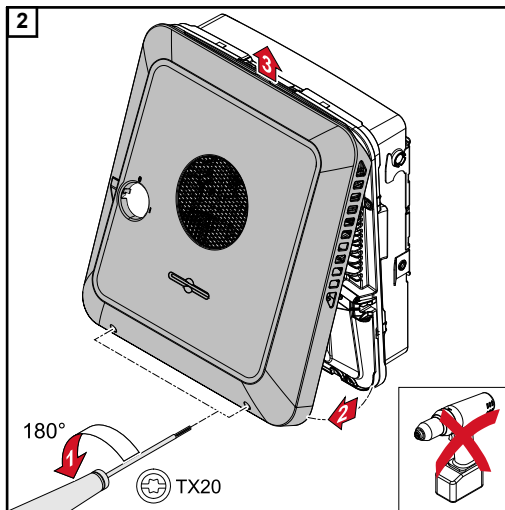
**NOTE!**

**Power loss due to insufficient cooling of the inverter.**

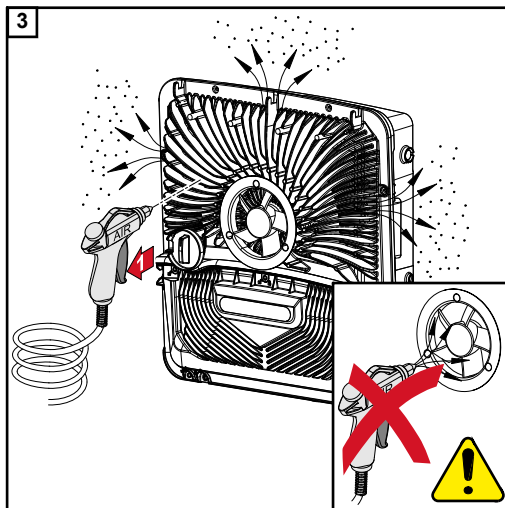
- ▶ Make sure that the ambient air can always flow through the inverter's ventilation slots unimpeded.
  - ▶ Remove any build-ups of dirt from the heat sink and the fan.
-



Switch off power to the inverter and wait for the specified time (2 minutes) until the capacitors have discharged and the fan has shut down.  
Turn the DC disconnect to the "Off" switch position.



Loosen the screws on the underside of the housing cover by rotating them 180° to the left using a screwdriver (TX20). Then lift the housing cover away from the inverter at the bottom and detach from above.



Remove any build-up of dirt on the heat sink and fan using compressed air, a cloth, or a brush.

**NOTE!**

**Danger due to driving the fan with compressed air.**

Excessive speeds may be achieved. Damage to the bearings may result.

- ▶ Clean the fan with a cloth or a brush.

To start up the inverter again, follow the steps listed above in reverse order.

# Guarantee provisions

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## **Fronius manufacturer's warranty**

Detailed, country-specific warranty terms are available on the internet:  
[www.fronius.com/solar/warranty](http://www.fronius.com/solar/warranty)

To obtain the full warranty period for your newly installed Fronius inverter or storage system, please register at: [www.solarweb.com](http://www.solarweb.com).

# Description of the backup power components

## Description of the backup power components

Fronius Smart Meter	63A-3	50kA-3	480 V-3 UL
Min. voltage	230 (400) V	230 (400) V	384 V
Max. voltage	240 (415) V	240 (415) V	552 V
Nominal frequency	50/60 Hz		
Communication	Modbus RTU		
Application area	International (not USA)	International (not USA)	International (not USA)
Nominal current	10 A	50,000 A	1-3000 A
Maximum current	63 A	6 A	Suitable only for use with transformers with an output voltage of 333 mV.
Item number	43,0001,1473	43,0001,1478	43,0001,3530

### Grid and system protection unit

Other manufacturers and types are permissible if they are technically and functionally identical to type VMD460-NA-D-2 from Bendner, for example.

Fuse protection	Grid and system protection	Coupling contactors
Number of pins	3-pin or 1-pin	
Rated current	6 A	

K1 and K2 - installation contactor with auxiliary contact	
Number of pins	3-pin or 4-pin (depending on the cabling variant)
Rated current	25 A or 63 A (depending on house connection)
Coil voltage	230 V AC
Nominal frequency	50/60 Hz
Min. short circuit current	3 kA (make contacts)
Test standard	IEC 60947-4-1
Auxiliary contact	
Number of NC contacts	1
Switching voltage	12-230 V @ 50/60 Hz
Min. nominal current	1 A
Min. short circuit current	1 kA

<b>K3, K6 and K7 - modular relay</b>	
Number of changeover contacts	2
Coil voltage	12 V DC

<b>K4 and K5 - installation contactor</b>	
Number of NC contacts	2 (20 A)
Coil voltage	230 V AC (2P)
Nominal frequency	50/60 Hz
Min. short circuit current	3 kA (make contacts)
Test standard	IEC 60947-4-1

#### **Examples of contactors and relays to IEC 60947-4-1:**

- **K1 and K2**
  - Iskra IK63-40
  - Schrack BZ326461
- **K3**
  - Finder 22.23.9.012.4000
  - Schrack relay RT424012 (bracket RT17017, relay base RT78725)
- **K4 and K5**
  - Iskra IK20-02
  - Schrack BZ626439

# Technical data

Fronius Symo GEN24	6.0 Plus	8.0 Plus	10.0 Plus
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## DC input data

MPP voltage range (at nominal output)	174 - 800 V	224 - 800 V	278 - 800 V
Max. input voltage at 1000 W/m <sup>2</sup> /-10 °C in an open circuit	1000 V		
Min. input voltage	80 V		
Feed-in start voltage in grid operation	80 V		
Max. input current (PV1 / PV2)	25.0 / 12.5 A		
Max. short circuit current of solar modules (I <sub>SC PV</sub> )	37.5 / 18.75 A		
Max. feedback current <sup>4)</sup>	37.5 A		
Number of inputs - PV1	2		
Number of inputs - PV2	1		

## DC input data battery

Max. voltage	500 / 700 V *		
	* only with suitable protection against overvoltage in the event of a fault, on the battery or between the inverter and the battery.		
Min. voltage	160 V		
Max. current	22 A		
Max. output	6000 W	8000 W	10,000 W
DC inputs	1		
DC overvoltage category (in accordance with IEC 62109-1)	2		

## AC input/output data

Nominal output power (P <sub>nom</sub> )	6000 W	8000 W	10,000 W
Max. output power	6000 W	8000 W	10,000 W
Nominal grid voltage	3 ~ EN 220V / 380V		
	3 ~ EN 230V / 400V		
Min. grid voltage	154 V <sup>1)</sup>		
Max. grid voltage	280 V <sup>1)</sup>		
Max. output current	16.4 A		
Nominal frequency	50 / 60 Hz <sup>1)</sup>		
Nominal frequency for Full Backup	53 / 63 Hz <sup>1)</sup>		
Total harmonic distortion	< 3%		



Fronius Symo GEN24	6.0 Plus	8.0 Plus	10.0 Plus
Power factor (cos phi)	0-1 (adjustable)		
	0.7 - 1 (recommended)		
Max. permitted mains impedance $Z_{max}$ at PCC <sup>3)</sup>	None		
Max. output residual current per duration	80.7 A / 10 ms		

### AC output data PV Point

Max. output power	3000 W (for 5 s max. 4133 W)
Max. output current	13 A
Nominal grid voltage	1 ~ EN 220 V / 230 V / 240 V
Nominal frequency	53 / 63 Hz <sup>1)</sup>
Switchover time	> 90 s
Power factor (cos phi)	0 - 1

### General data

Maximum efficiency	98.2%	98.2%	98.2%
European efficiency ( $U_{mpp\ nom}$ )	97.7%	97.8%	97.9%
European efficiency ( $U_{mpp\ max}$ )	97.3%	97.5%	97.7%
European efficiency ( $U_{mpp\ min}$ )	96.5%	96.9%	97.1%
Self-consumption at night	≤ 10 W		
Cooling	Controlled forced-air ventilation		
Degree of protection	IP 66		
Dimensions H x W x D	594 × 527 × 180 mm		
Weight	25 kg		
Permissible ambient temperature	-25 °C – +60 °C		
Permissible humidity	0–100% (incl. condensation)		
EMC device class	B		
DC / AC overvoltage category	2/3		
Degree of pollution	2		
Sound pressure	47 dB(A)		
Safety class (according to IEC62103)	1		

### Protection devices

DC insulation measurement	Warning / shutdown <sup>7)</sup> at $R_{ISO} < 100\ k\Omega$
Manifestation of DC overload	Operating point shift, power limiter
DC disconnecter	Integrated
RCMU	Integrated

### Data communication

WLAN SMA-RP connection (FCC ID: QKWPILOT01 / IC ID: 12270A-PILOT01)	802.11b/g/n
--	-------------

<b>Fronius Symo GEN24</b>	<b>6.0 Plus</b>	<b>8.0 Plus</b>	<b>10.0 Plus</b>
Ethernet (LAN)	RJ 45, 10/100 MBit		
USB (type A socket)	max. 1 A at 5 V (IO connection not connected)		
Wired shutdown (WSD)	max. 28 devices/WSD chain		
	Max. distance Master → Slave = 100 m Slave → Slave = 100 m		
Modbus RTU SunSpec (2x)	RS485 2-wire		
Voltage level of digital inputs	low: min. 0 V–max. 1.8 V		
	high: min. 4.5 V–max. 28.8 V		
Input currents of digital inputs	depending on the input voltage; input resistance = 70 kOhm		
Total power for digital output (for internal supply)	6 W at 12 V (USB not connected)		
Power per digital output (for external supply)	1 A at >12.5 V–24 V (max. 3 A in total)		
Datalogger/web server	Integrated		

<b>Optional surge protective device (SPD)</b>	<b>DC SPD Type 1+2 GEN24</b>
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#### General data

Continuous operating current ( $I_{cpv}$ )	< 0.1 mA
Rated discharge current ( $I_n$ ) - 15 x 8/20 $\mu$ s pulses	20 kA
Lightning surge current ( $I_{imp}$ ) Max. discharge capacity @ 10/350 $\mu$ s	6.25 kA
Protection level ( $U_p$ ) (star-shaped mounting)	4 kV
Short-circuit strength PV ( $I_{scpv}$ )	15,000 A

#### Disconnecter

Thermal disconnecter	Integrated
External fuse	None

#### Mechanical properties

Disconnection indicator	Mechanical indicator (red)
Remote communication of the connection interruption	Output on the changeover contact
Housing material	Thermoplastic UL-94-V0
Test standards	IEC 61643-31 / DIN EN 50539-11 UL1449 ed.4 / VDE 0185-305-3 Bbl. 5

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**Explanation of footnotes**

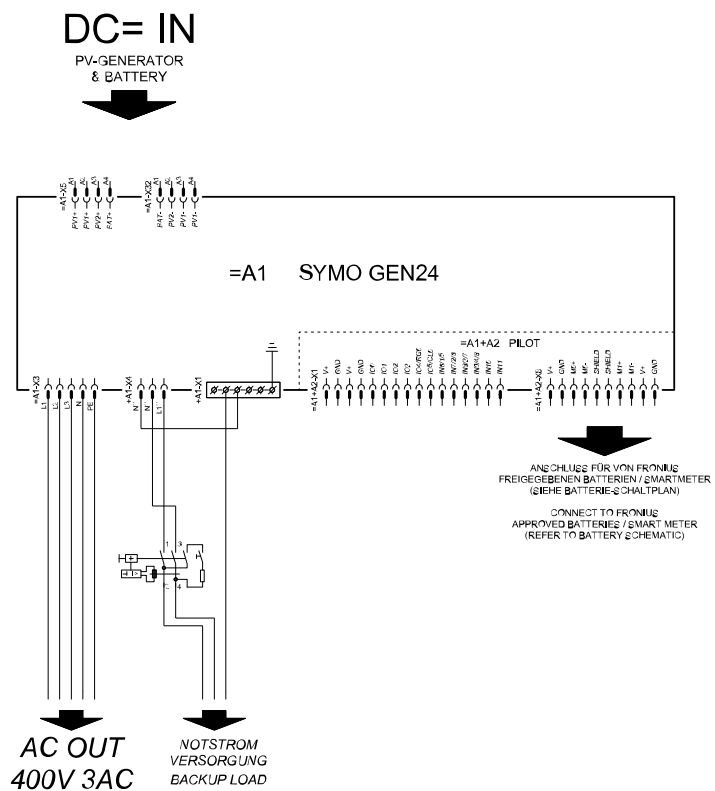
- 1) The values quoted are default values; the inverter is configured specifically to meet the needs of the country in question.
- 2) Depending on the country setup or device-specific settings  
(ind. = inductive; cap. = capacitive)
- 3) Maximum current from a defective solar module to all other solar modules
- 4) Guaranteed by the electrical configuration of the inverter
- 5) Current peak when switching on the inverter



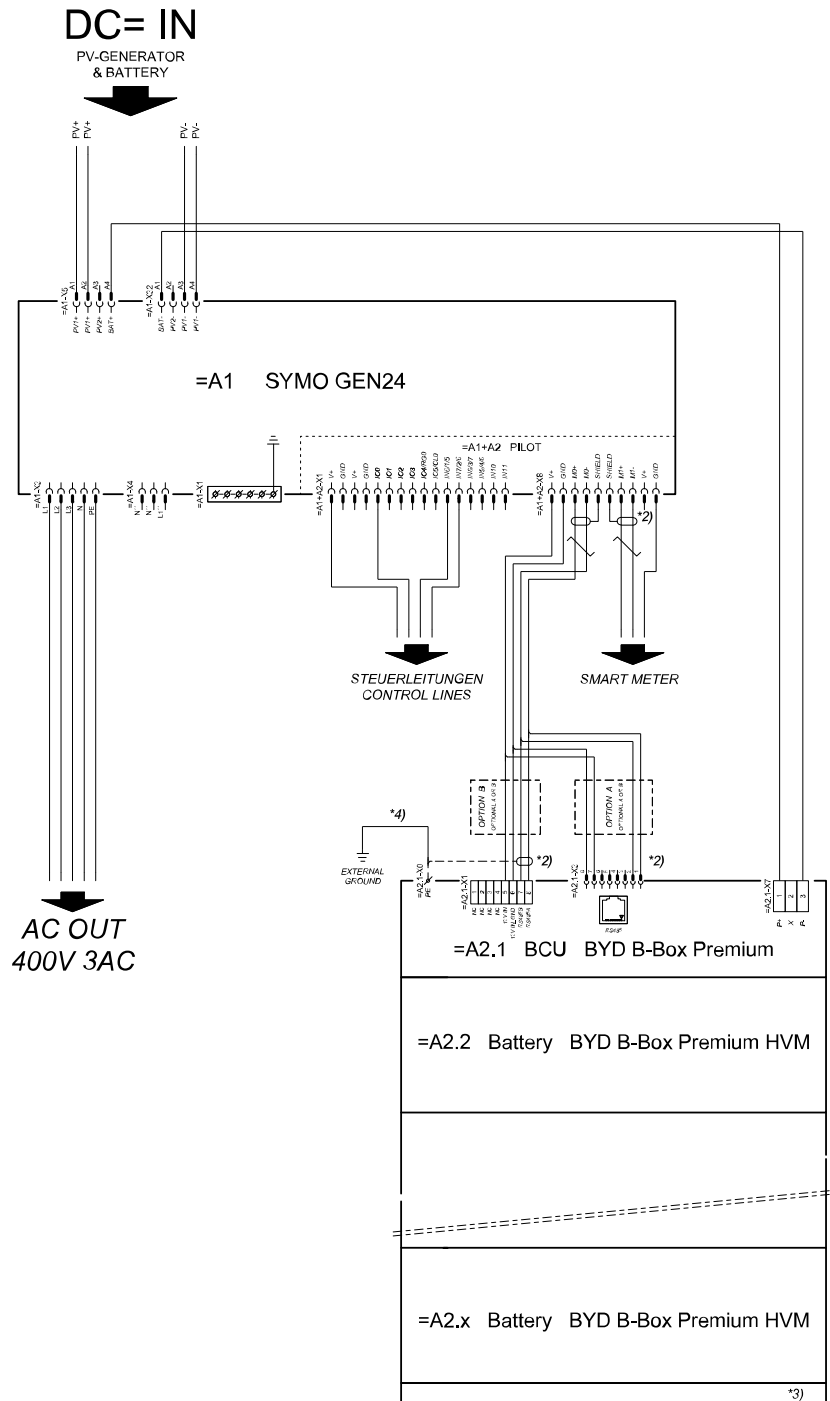
# Circuit diagrams



# Circuit Diagram - PV Point (OP)



# Fronius Symo GEN24 and BYD Battery-Box Premium HV



**SYMBOL DEFINITION:**



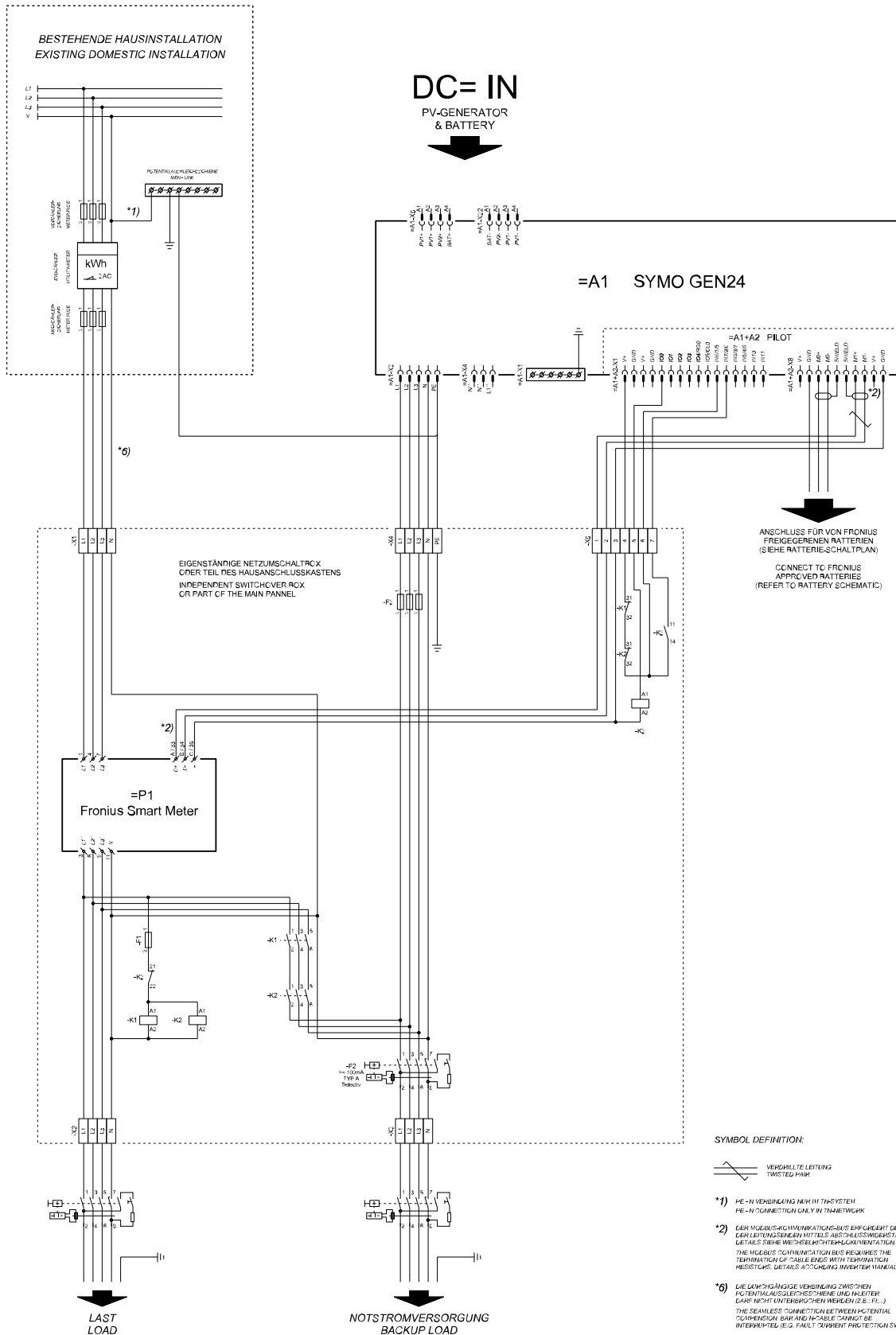
**\*2)** DEN MCGLEBSKOMMUNIKATIONSBUS ERFOLGRIEHT DEN ABSCHLUSS GEGENLEITUNGSSEITIG MITTELS ABSCHLUSSWIDERSTÄNDE. DETAILS SIEHE WECHSELSPERFORMANZLEITUNG.  
THE MCGLEBS COMMUNICATION BUS REQUIRES THE TERMINATION OF CABLE ENDS WITH TERMINATION RESISTORS. DETAILS ACCORDING INVERTER MANUAL.

**\*3)** MINIMALE ZULÄSSIGE MCGLEBSANZAHL.  
MINIMUM POSSIBLE NUMBER OF MCGLES.  
ACCORDING INVERTER MANUAL.

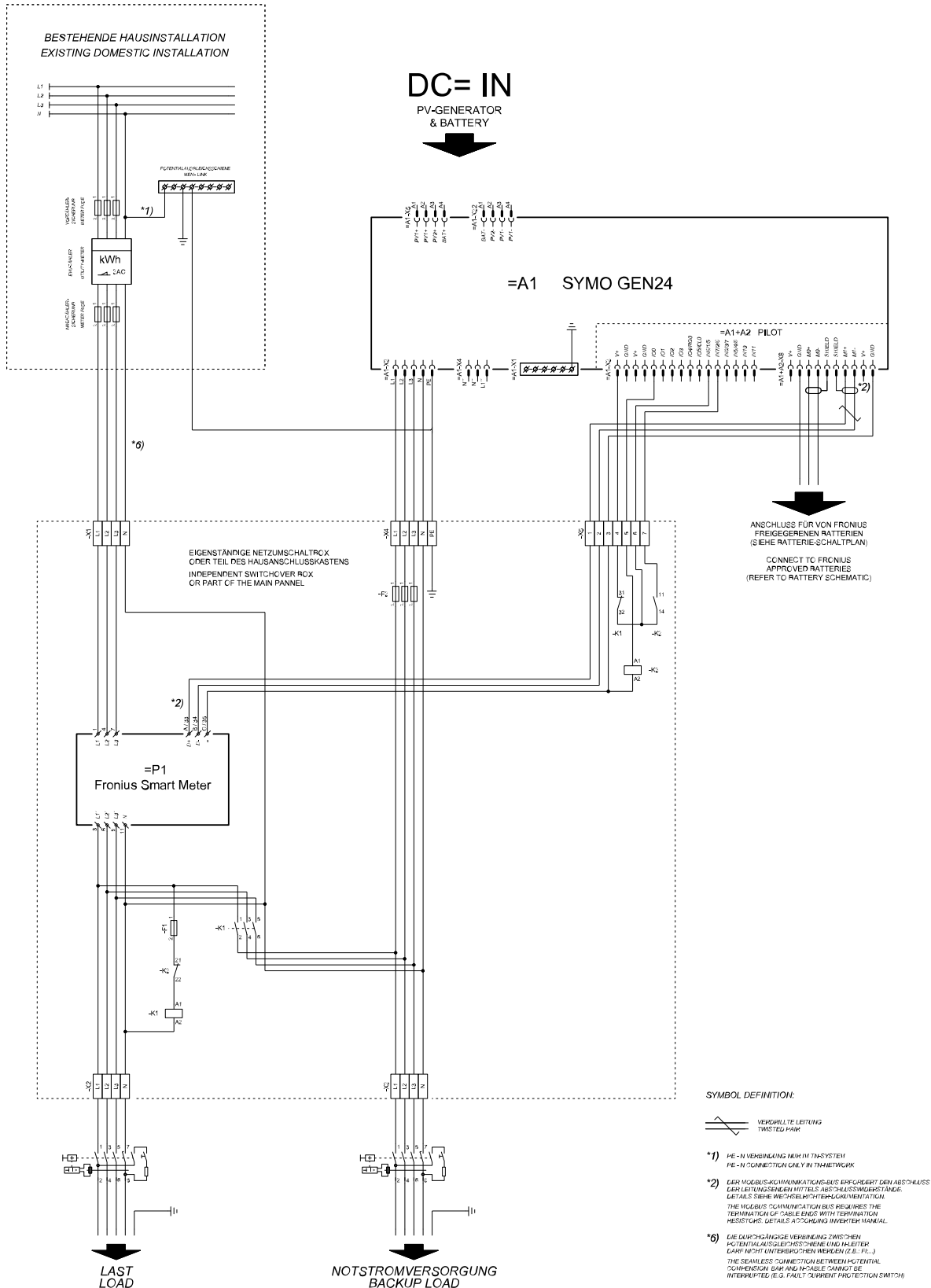
**\*4)** DEN ÜBERSCHNITT DER ERDGANGSLEITUNG ALS DER DOKUMENTATION DER BYD BATTERY-BOX PREMIUM ENTNEHMEN (> 10MM²)  
REFER TO THE TABLE CROSSSECTION ACCORDING TO BYD BATTERY-BOX PREMIUM MANUAL (> 10MM²)



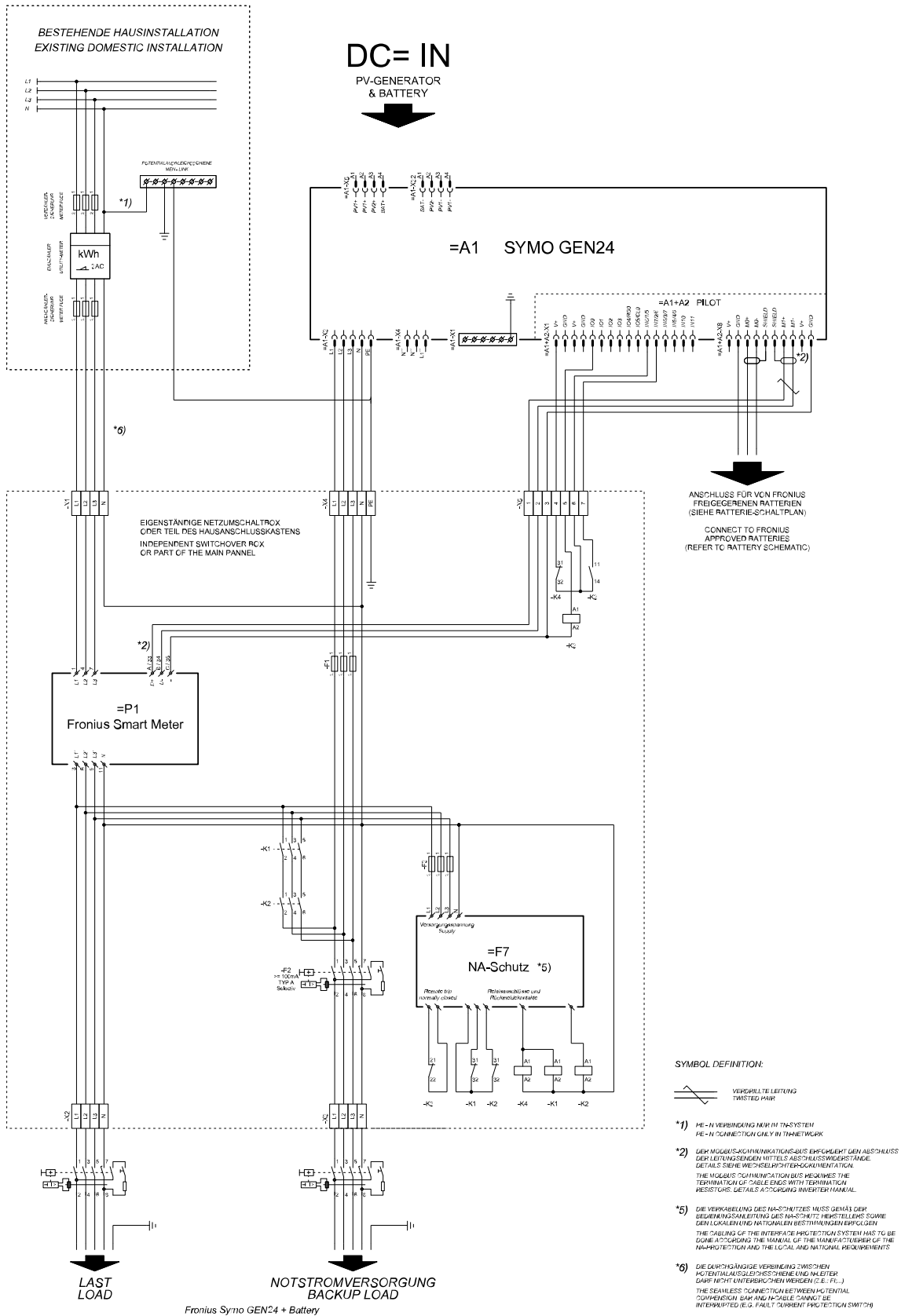
# Automatic switch to backup power 3-pin double separation - e.g. Austria



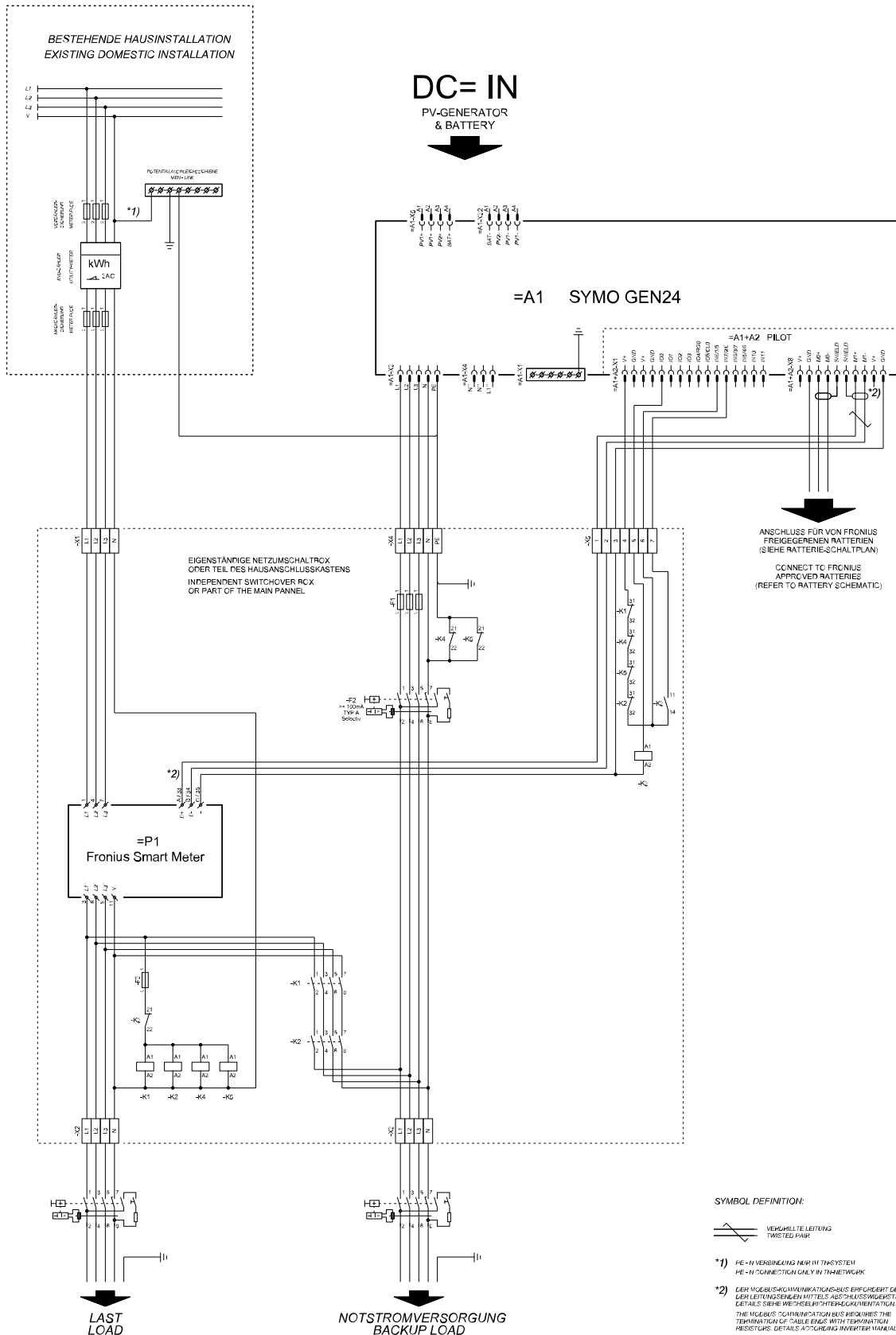
# Automatic switch to backup power 3-pin single separation- e.g. Australia



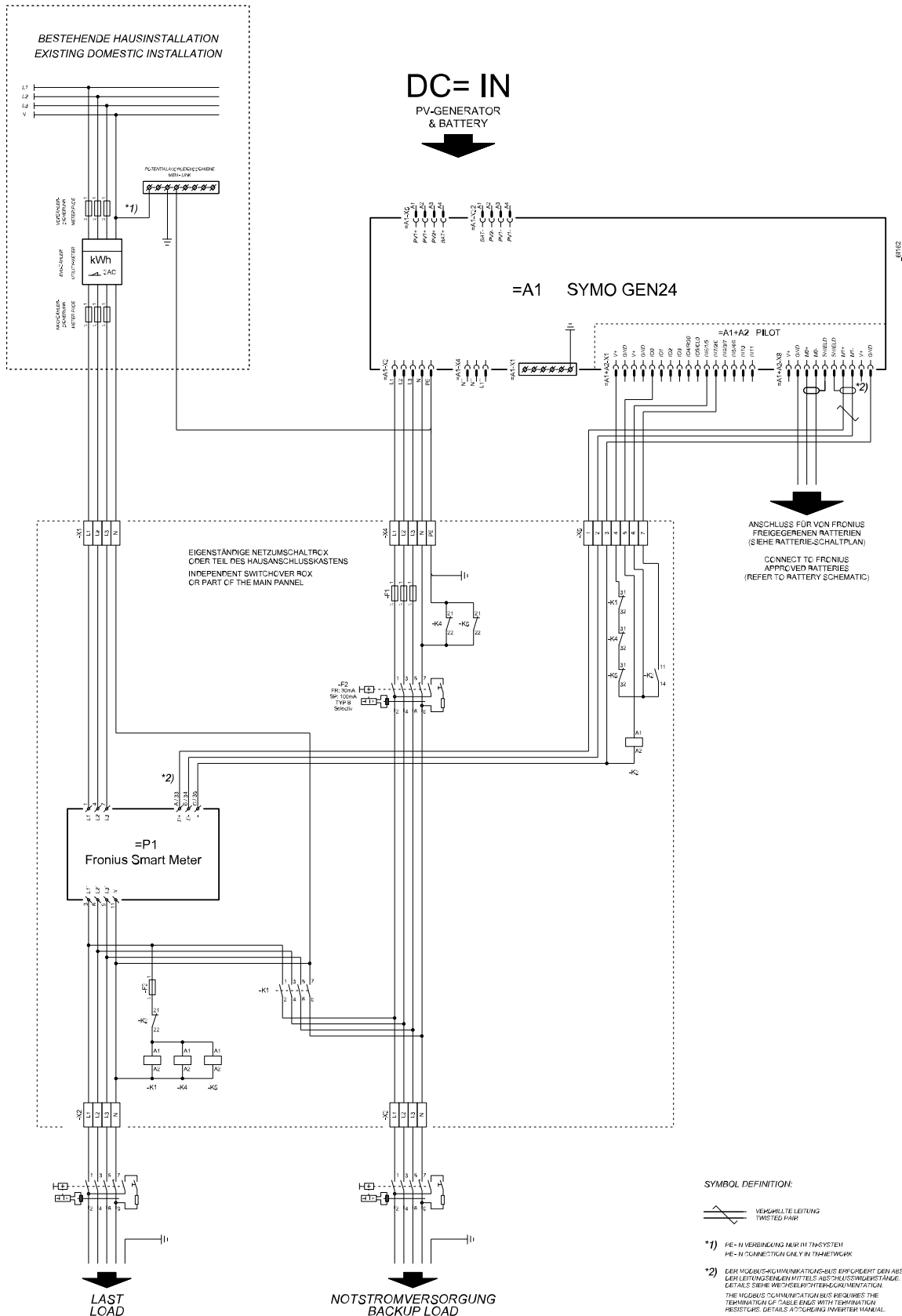
# Automatic switch to backup power 3-pin double separation with ext. Grid and system protection



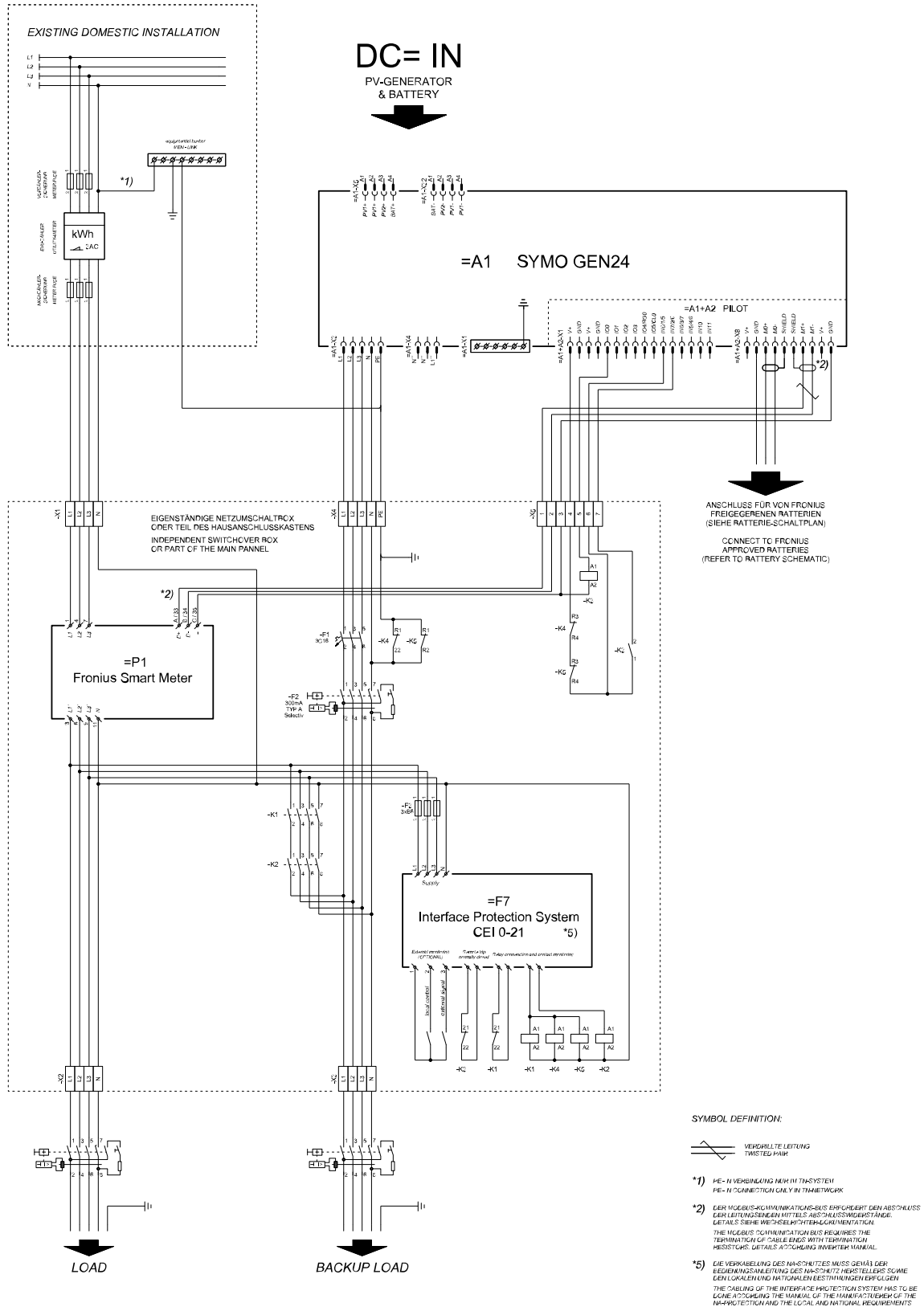
# Automatic switch to backup power 4-pin double separation - e.g. Germany



# Automatic switch to backup power 4-pin single separation- e.g. France, Spain



# Automatic switch to backup power 4-pin double separation with ext. grid and system protection - e.g. Italy

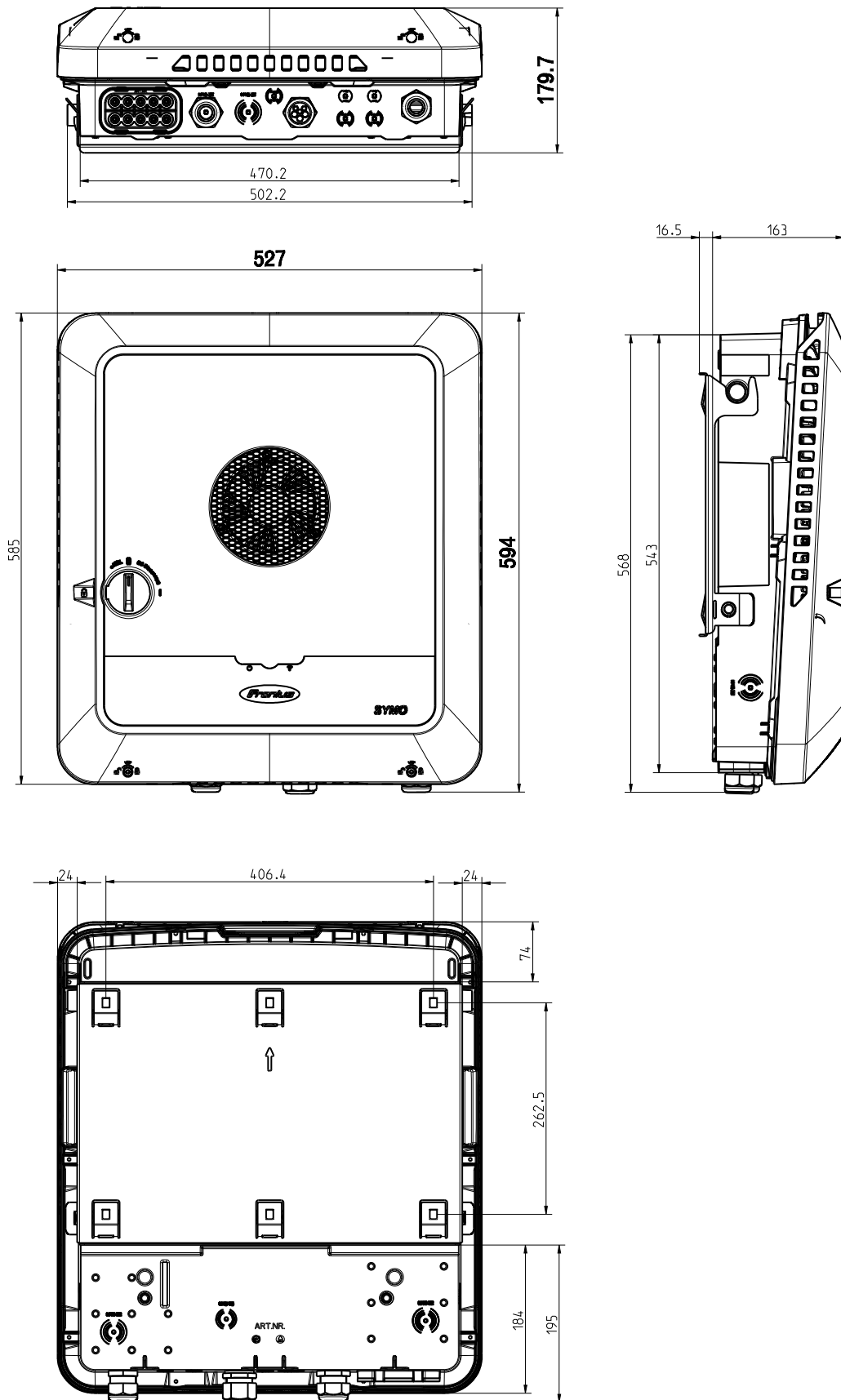


# **Dimensions of the inverter**





# Fronius Symo GEN24 6 -10 kW







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