

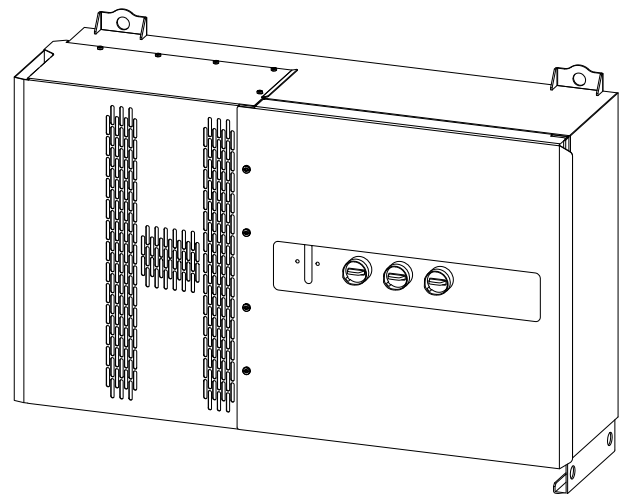
Operating Instructions

Fronius Tauro 50-3

Fronius Tauro ECO 50-3

Fronius Tauro ECO 99-3

Fronius Tauro ECO 100-3



EN | Operating Instructions



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General information

Safety information

Explanation of warnings and safety instructions

Warnings are intended to warn people of possible injuries and to avoid personal injury and damage to the product. They relate to individual actions with and on the product.



DANGER

Indicates an immediately dangerous situation.

Serious injury or death will result if the danger is not avoided.

- Action step to escape the situation.



WARNING

Indicates a potentially dangerous situation.

Serious injury or death may result if the danger is not avoided.

- Action step to escape the situation.



CAUTION

Indicates a potentially dangerous situation.

Minor or moderate injury may result if the danger is not avoided.

- Action step to escape the situation.

NOTE

Indicates a situation that may result in property damage.

If the situation is not avoided, impaired work results, material damage to the product or other property are the possible consequences.

- Action step to avoid the situation.

Safety instructions are designed to ensure safe product use. They are preventive and help to inform users about the fundamental risks involved when dealing with the product. They do not refer specifically to individual actions with and on the product.

Safety instructions and important information

The device has been manufactured in line with the state of the art and according to recognized safety standards.



WARNING

Incorrect operation or misuse

Serious to fatal injuries to the operator or third parties as well as damage to the device and other property of the operator may result.

- All persons involved in the commissioning, maintenance, and servicing of the device must be appropriately qualified and have knowledge of working with electrical installations.
- Read these operating instructions in full and follow them carefully and precisely.
- The operating instructions must always be kept to hand wherever the device is being used.

IMPORTANT!

In addition to the operating instructions, observe the following general and local rules:

- Accident prevention
- Fire protection
- Environmental protection

IMPORTANT!

Labels, warning notices, and safety symbols are located on the device. A description can be found in these operating instructions.

IMPORTANT!

All safety and danger notices on the device:

- Must be kept in a legible state
- Must not be damaged/marked
- Must not be removed
- Must not be covered, have anything stuck on them, or painted over

**WARNING****Tampered-with and non-functioning protection devices**

Serious to fatal injuries as well as damage to the device and other property of the operator may result.

- ▶ Never bypass or disable protection devices.
- ▶ Any protection devices that are not fully functional must be repaired by an authorized specialist before the device is switched on.

**WARNING****Loose, damaged, or under-dimensioned cables**

An electric shock can be fatal.

- ▶ Use undamaged, insulated, and adequately dimensioned cables.
- ▶ Fasten the cables according to the specifications in the operating instructions.
- ▶ Loose, damaged, or under-dimensioned cables must be repaired or replaced immediately by an authorized specialist.

NOTE**Installations or modifications to the device**

The device may be damaged

- ▶ Do not carry out any alterations, installations, or modifications to the device without first obtaining the manufacturer's permission.
- ▶ Damaged components must be replaced.
- ▶ Only use original spare parts.

**Safety measures
at the installation
site**

When installing devices with ventilation slots, ensure that the ambient air can enter and exit unhindered through the vents. When selecting the installation site, observe the protection class (IP).

**Environmental
conditions**

Operation or storage of the machine outside the stipulated area will be deemed as not in accordance with the intended purpose.

For exact information on permitted environmental conditions, please refer to the technical data.

Electromagnetic fields

During operation, due to the high electrical voltages and currents, local electromagnetic fields (EMF) are generated. These occur in the immediate vicinity of the inverter and the Fronius system components. Electromagnetic fields are also present in the area of the PV modules and their supply lines.

As long as the intended use and a minimum distance of 20 cm are observed, all limit values for human exposure are observed.

If the limit values are complied with, according to current scientific knowledge, no negative health effects from EMF exposure are to be expected. For persons with prostheses¹⁾ or active physical aids²⁾, there is a possible health risk in the vicinity of photovoltaic system components. To avoid possible health risks, consult with the responsible doctor.

¹⁾ e.g., implants or metal parts

²⁾ e.g., pacemaker, insulin pump, hearing aid, etc.

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 equipment that is susceptible to interference 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, the operator is obliged to take action to rectify the situation.

Protective earthing (PE)

Connection of a point in the device, system or installation to earth to protect against electric shock in the event of a fault. When installing the Tauro inverter, the PE connection is mandatory as it is a protection class 1 device. When connecting the PE conductor, ensure that it is secured against accidental disconnection. All points listed under "Connecting the inverter to the public grid (AC side)" must be observed, including the use of washers, screw locks, and nuts with the defined torque.

It must be ensured that when using the strain-relief devices, the ground conductor is the last to be disconnected in the event of a possible failure. When connecting the ground conductor, the minimum cross-section requirements specified by the respective national regulations must be observed. In addition, the minimum cross-section of the PE conductor must be at least half of the phase cross-sections according to the product standard IEC 62109-1, as a cross-section of at least 35 mm² (50 kW) or 70 mm² (99.99 / 100 kW) must be used for the phases (L1 / L2 / L3).

Maintenance

In principle, Tauro inverters are maintenance-free. If maintenance work is nevertheless carried out on the inverter, such as cleaning or replacing components, this must be done in consultation with a Fronius-trained service technician. The manufacturer accepts no liability for damage caused by improper use.

Protection of people and equipment

Safety



WARNING

Danger due to incorrect operation and incorrectly performed work.

This can result in serious injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by trained and qualified personnel.
- ▶ Read and understand this document.
- ▶ Read and understand all the Operating Instructions for the system components, especially the safety rules.



WARNING

Danger from electromagnetic fields. Electromagnetic fields are generated during operation.

Effects on the health of persons (e.g., those wearing a pacemaker) can result.

- ▶ Do not remain closer than 20 cm from the inverter for a prolonged period of time.

Central grid and system protection

The inverter offers the option to use the integrated AC relays as section switches in conjunction with a central grid and system protection unit (in accordance with VDE-AR-N 4105:2018:11 §6.4.1). For this purpose, the central trigger device (switch) must be integrated into the WSD chain as described in chapter [WSD \(wired shutdown\)](#) on page 12.

WSD (wired shutdown)

The wired shutdown (WSD) interrupts the inverter's grid power feed if the trigger device (switch, e.g., Emergency Stop or fire alarm contact) 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.

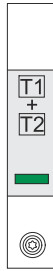
For installation, see [Installing the WSD \(wired shutdown\)](#) on page 69.

RCMU

The inverter is equipped with an RCMU (RCMU = residual current monitoring unit) according to IEC 62109-2 and IEC63112.

It monitors residual currents from the PV module up to the AC output and disconnects the inverter from the grid when an improper residual current is detected.

Surge protection device SPD



The surge protection device (SPD) protects against temporary over-voltages and diverts surge currents (e.g., lightning strike). Based on an overall lightning protection concept, the SPD contributes to the protection of the photovoltaic system components.

If the surge protection device is triggered, the color of the indicator changes from green to red (mechanical display).

A triggered SPD must be replaced with a fully functional SPD immediately by an authorized specialist company in order to maintain the full protective function of the device.

It is possible to enable the option of digitally displaying the triggering of an SPD. If you wish to set this function, refer to the PDF "SPD Triggering / Temporary SPD Triggering" in the Service & Support area at www.fronius.com

IMPORTANT!

After setting the function described above, the inverter also responds if the 2-pole signal cable of the surge protection device is damaged or is subject to an interruption.

The following components can be used to replace existing AC SPDs with type 1+2 products:

- CITEL - DAC1-13S-31-275 (for mains voltages of 380–400 V)
- CITEL - DAC1-13S-31-320 (for mains voltages of 440–480 V)

Note: Replacing a device does not automatically result in replacement of the existing SPDs.

AFCI – Arc Fault Circuit Interrupter (Arc-Guard)

Available ex works.

AFCI (Arc Fault Circuit Interrupter) protects against arcing faults and in the narrower sense is a protection device against contact faults. The AFCI evaluates any faults that occur in the current and voltage curve with an electronic circuit and switches off the circuit when a contact fault is detected. This prevents overheating on poor contacts and possible fires.

IMPORTANT!

Active solar module electronics can interfere with the function of the ArcGuard. Fronius does not guarantee the correct functioning when using Fronius ArcGuard in combination with active solar module electronics.



CAUTION

Danger due to incorrect or unprofessional DC installation.

This can result in risk of damage and, in turn, risk of fire to the PV system due to inadmissible thermal loads that arise with an arc.

- ▶ Check that plug connections are in good condition.
- ▶ Repair incorrect insulation as appropriate.
- ▶ Complete connections as per the specifications.

IMPORTANT!

Fronius will not accept any costs associated with production downtimes, installer costs, etc., that may arise as the result of a detected arc and its consequences. Fronius accepts no liability for damage that can occur despite the

presence of the integrated Arc Fault Circuit Interrupter/extinguishing system (e.g., caused by a parallel arc).

Automatic reconnection

To restart the AFCI, no manual procedure is required if a minimum interruption time of 5 minutes is ensured before continuing operation.

When interrupting for the fifth time within a 24 h period, the AFCI is only allowed to be reset manually before the AFCI does reconnect. Afterwards, the AFCI may return to automatic reconnection mode.

Safe state

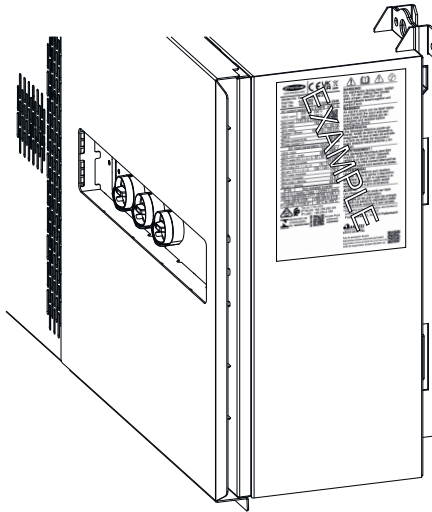
If one of the following safety devices trips, the inverter will change to a safe state:

- WSD
- isolation measurement
- RCMU and
- AFCI

In the safe state, the inverter no longer feeds into the grid and is disconnected from the grid by opening the AC relays.

General

Information on the device



Technical data, warning notices, labels, and safety symbols are located on and in the inverter. This information must be kept in a legible condition and must not be removed, covered, pasted over, or painted over. The notices and symbols warn against incorrect operation that may result in serious injury and damage.

Symbols on the rating plate:



CE label – confirms compliance with applicable EU directives and regulations.



UKCA marking – confirms compliance with applicable UK directives and regulations.



WEEE marking – waste electrical and electronic equipment must be collected separately and recycled in an environmentally sound manner in accordance with the European Directive and national law.



RCM marking – tested according to the requirements of Australia and New Zealand.



ICASA marking – tested according to the requirements of the Independent Communications Authority of South Africa.



CMIM marking – tested according to IMANOR requirements for import regulations and compliance with Moroccan standards.

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.



Wait until the capacitors have discharged before opening the device.

Warning notice text:

WARNING!

An electric shock can be fatal. Before opening the device, ensure that the input and output sides are de-energized and isolated.

How information is presented in the document

The conventions regarding how information is presented in the document, which are set out below, have been defined in order to increase the readability and comprehensibility of the document.

Application notes

IMPORTANT! Indicates application notes and other useful information. It does not indicate a harmful or dangerous situation.

Software

Software functions and elements of a graphical user interface (e.g., buttons, menu items) are highlighted in the text with this **mark up**.

Example: Click **Save**.

Instructions for action

1 Action steps are displayed with consecutive numbering.

- ✓ *This symbol indicates the result of the action step or the entire instruction.*

Target group

This document provides detailed information and instructions to ensure that people can use the machine safely and efficiently.

The information is intended for the following groups of people:

- **Technical specialists:** People with appropriate qualifications and fundamental knowledge of electronics and mechanics. The activities of a technical specialist include installation, operation, maintenance, and service work.
- **User:** People that use the machine in daily operation and want to understand its basic functions.

Regardless of any qualifications, only perform the activities listed in this document.

The definition of professional qualifications and their applicability are subject to national law.

Data security

With regard to data security, the user is responsible for:

- Backing up any changes made to the factory settings
- Saving and storing personal settings

NOTE

Data security for network and Internet connection

Unsecured networks and a lack of safeguards can result in data loss and unauthorized access. Observe the following points for safe operation:

- ▶ Operate inverters and system components on a private, secure network. A WiFi network is considered secure if security standard WPA 2 is satisfied as a minimum.
- ▶ Keep the network devices (e.g., WiFi routers) up to date with the latest technology.
- ▶ Keep the software and/or firmware updated.
- ▶ Use a wired network to ensure a stable data connection.
- ▶ For security reasons, do not make inverters and system components accessible from the Internet via port forwarding or Port Address Translation (PAT).
- ▶ Use the solutions provided by Fronius for monitoring and remote configuration.
- ▶ The optional communication protocol Modbus TCP/IP¹⁾ is an unsecured interface. Only use Modbus TCP/IP if no other secured data communication protocol (MQTT²⁾) is possible (e.g., compatibility with older Smart Meters).

¹⁾ TCP/IP - Transmission Control Protocol/Internet Protocol

²⁾ MQTT - Message Queuing Telemetry Protocol

Privacy policy

When you connect your device (and any associated devices) to the internet, the following device and operating data (device ID/identifier, device IP address, device time, configuration settings, hardware and software information, device status log files, serial number) is sent automatically to

Fronius International GmbH, Froniusstraße 1, 4643 Pettenbach, Austria, telephone +43(0) 7242241-0, email: contact@fronius.com (controller)

and stored.

The processing of this device and operating data is carried out for the purpose of ensuring the operational safety of the device (time synchronization, provision of updates). This processing is therefore necessary for the functionality of the device and thus for the fulfillment of the contract (Art. 6 (1) (b) GDPR).

If you do not wish to have such data processed, you must manually disable the device's internet connection.

In addition, the device and operating data is also processed for the purpose of providing services as part of a supplementary digital service for your device (such as solar.web or similar) as soon as you have registered your device with such a digital service (identification). This data is processed to provide the requested digital services and is therefore necessary for the fulfillment of the contract (Art. 6 (1) (b) GDPR).

Furthermore, this data processing is also carried out for maintenance and support purposes and for handling customer concerns as well as in warranty and guarantee cases (only in individual cases and given connection between device and internet). In this context, the device and operating data may also be passed on to our cooperation partners (third-party providers and suppliers). The processing of this data is necessary for maintenance and support purposes or for processing warranty and guarantee cases and thus for the fulfillment of the contract (Art. 6 (1) (b) GDPR).

Device and operating data are also processed for analysis and diagnostic purposes in order to gain insights into the functionality of the devices and improve them accordingly. This data processing is based on our legitimate interest (Art. 6 (1) (f) GDPR).

We store this data for as long as it is necessary to fulfill the existing contract with you. Any storage beyond this is carried out for legal reasons or if we have a legitimate interest in doing so. For more information on data processing for the solar.web-digital service, as well as our general privacy policy and your rights as a data subject, please visit <https://www.fronius.com>.

Copyright

Fronius International GmbH retains the copyrights of these operating instructions.

Text, illustrations, and other media correspond to the technical state of the art at the time of publication. Fronius reserves the right to make changes. If you have any suggestions for improvement or have found a mistake in this document, we would be most grateful for your comments.

Product description

Description of the device

The inverter transforms the direct current generated by the PV modules into alternating current. This alternating current is fed into the public grid and synchronized with the mains voltage in use.

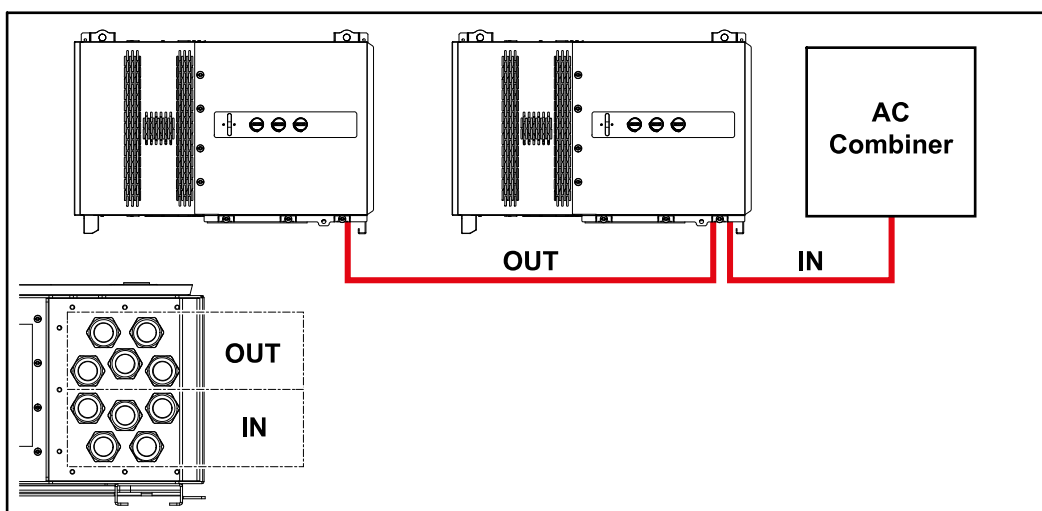
The inverter has been designed exclusively for use in grid-connected photovoltaic systems. It cannot generate electric power independently of the grid.

The inverter also has a design and functions that ensure it can offer maximum safety during installation and during operation.

AC Daisy Chain

With the "AC Daisy Chain" inverter version, the AC lead can be fed directly from the inverter to another inverter. Several Tauro inverters, up to an output power of max. 200 kW, can be thereby be quickly connected to one another.

The minimum cable cross-section is defined by the fuse at the mains connection point. A larger cable cross-section can be selected at any time. The applicable national standards must be taken into account and applied.



String fuses

Only applies to device types Fronius Tauro 50-3-D / Eco 50-3-D / Eco 99-3-D / Eco 100-3-D (direct):

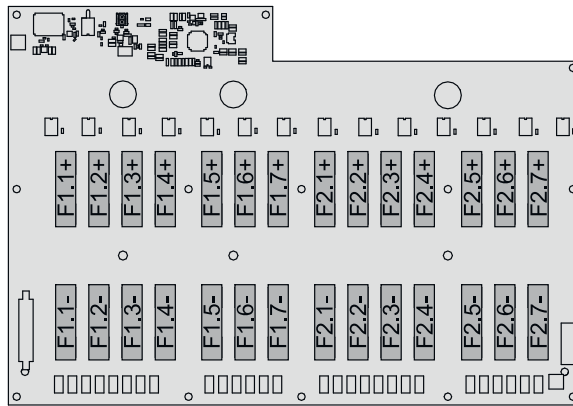
String fuses are used in the Fronius Tauro to provide additional protection for the solar modules.

The maximum short circuit current I_{SC} , the maximum module return current I_R or the maximum string fuse rating specified in the module data sheet of the respective solar module is crucial in affording the solar modules the correct fuse protection.

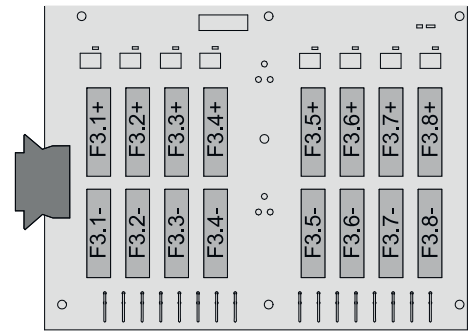
The national regulations regarding fuse protection must be observed. The electrical engineer carrying out the installation is responsible for the correct choice of string fuses.

To replace the string fuses, see chapter [Replacing the string fuses](#) on page 62.

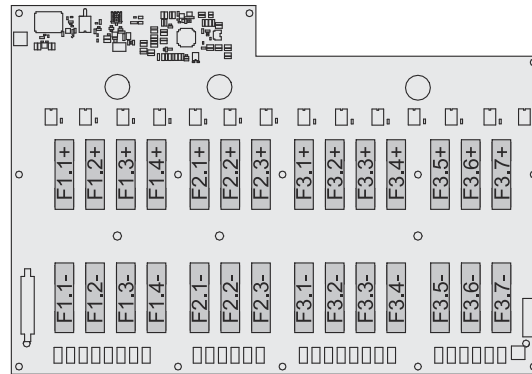
Eco 50-3-D
Eco 99-3-D / Eco 100-3-D Standard
 F1.1 - F2.7



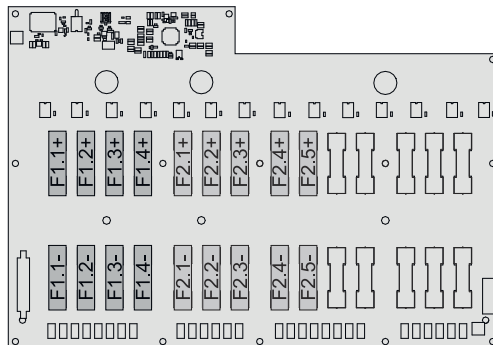
Eco 99-3-D / Eco 100-3-D
Standard
 F3.1 - F3.8



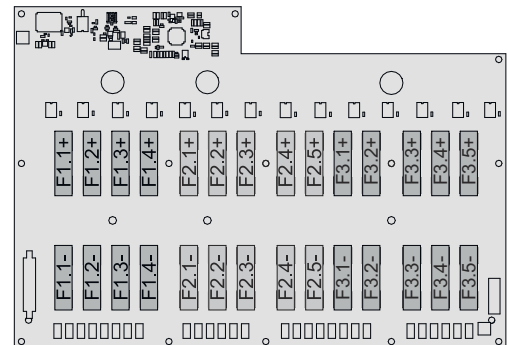
50-3-D
 F1.1 - F3.7



Eco 50-3-D
30A fuses F1.1 - F2.5



50-3-D / Eco 99-3-D / Eco 100-3-D
30A fuses F1.1 - F3.5



Fronius Solar.web

System owners and installers can easily monitor and analyze the PV system using Fronius Solar.web or Fronius Solar.web Premium. With the appropriate configuration, the inverter transmits data such as power, yield, load, and energy balance to Fronius Solar.web. More detailed information can be found at [Solar.web - Monitoring & analysis](#).

Configuration is carried out via the Setup wizard, see chapter [Installation with the app](#) or [Installation with the browser](#).

Requirements for configuration:

- Internet connection (download: min. 512 kbit/s, upload: min. 256 kbit/s)*.
 - User account at solarweb.com.
 - Completed configuration using the Setup wizard.
- * These specifications do not provide an absolute guarantee of flawless operation. High error rates in the transmission, fluctuating receptions or misfires can have an adverse effect on data transfer. Fronius recommends on-site testing to ensure that the connections meet the minimum requirements.
-

Local communication

The inverter can be found via the Multicast DNS (mDNS) protocol. We recommend searching for the inverter using the assigned host name.

The following data can be called up via mDNS:

- NominalPower
- Systemname
- DeviceSerialNumber
- SoftwareBundleVersion

Utilization in accordance with "intended purpose"

Intended use The inverter is designed exclusively to convert direct current from PV modules into alternating current and feed this power into the public grid.

Intended use also includes following all information from the operating instructions.

Foreseeable mis-use The following circumstances are considered to be reasonably foreseeable mis-use:

- Any use that is not the intended use or goes beyond the intended use.
- Alterations to the inverter that are not expressly recommended by Fronius.
- Installation of components that are not expressly recommended or sold by Fronius.

Provisions for the photovoltaic system The inverter is designed exclusively to be connected and used with PV modules. Use with other DC generators (e.g., wind generators) is not permitted.

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

All measures recommended by the PV module manufacturer for maintaining the PV module properties must be followed.

Functional principle

Operating principle

The inverter is fully automatic. Starting at sunrise, as soon as the PV modules are generating enough energy, the inverter starts checking the PV system (insulation measurement) and the grid (mains voltage and mains frequency). If all values are within the normative framework, the system is automatically connected to the grid and grid power feed operation begins.

The control system of the inverter ensures that the maximum possible power output is drawn from the PV modules at all times. This function is called MPPT (Maximum Power Point Tracking). In the event of shady conditions affecting the PV modules, a large part of the local maximum power point (LMPP) of the PV system can still be obtained via the "Dynamic Peak Manager" function.

As dusk starts and there is no longer sufficient energy available to feed energy into the grid, the inverter shuts down the connection of the power electronics to the grid completely and stops operating. All settings and recorded data are saved.

Cooling of the inverter through forced-air ventilation

Cooling of the inverter is performed by a forced-air ventilation system via temperature-controlled fans. Air is sucked in from the front and fed, via a sealed duct, through the AC and DC heat sink, before passing directly over the inductors and dissipating.

The sealed air duct prevents the electronics compartment from coming into contact with the ambient air. This approach largely prevents any contamination of the electronics compartment.

The fan speed and temperature of the inverter are monitored.

The variable-speed, ball-bearing mounted fans in the inverter permit the following:

- Optimum cooling of the inverter
- Cooler components, therefore a longer service life
- Lowest-possible energy consumption
- High output power including in top temperature range of the inverter

Overload performance

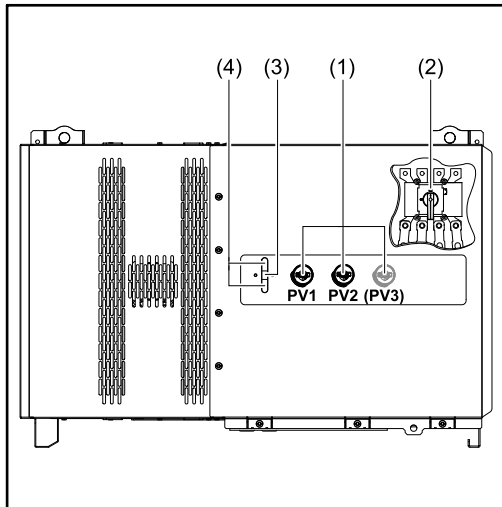
When the device temperature gets too high, the inverter automatically reduces the current output power in order to protect itself. Reasons for an excessively high device temperature can be a high ambient temperature or insufficient heat dissipation (for example, when installed in containers without sufficient heat dissipation).

The output of the inverter is reduced such that the temperature will not exceed the permissible limit.

If a maximum temperature is exceeded, the inverter switches off in a safe state and resumes grid power feed operation only after the device has cooled down.

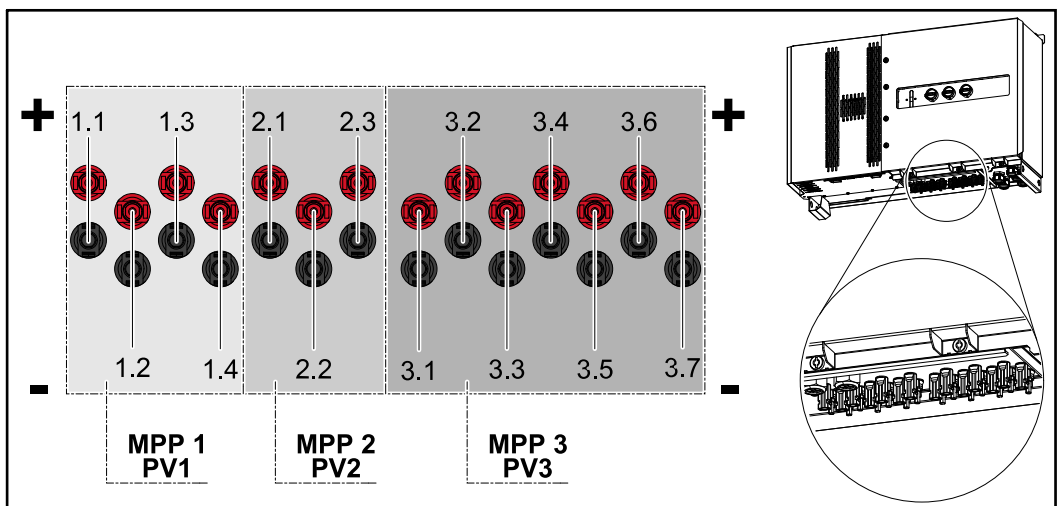
Operating controls and connections

Controls and displays

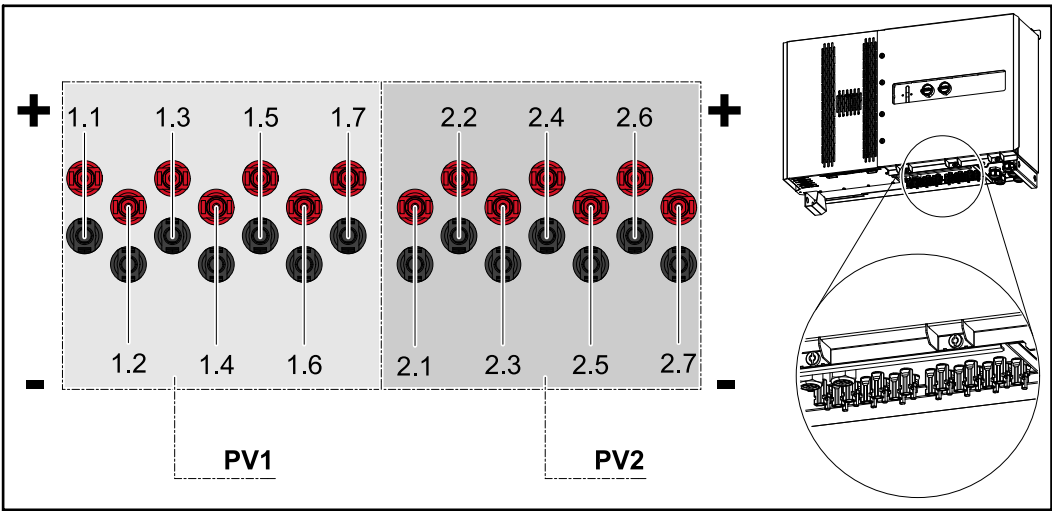


- (1) **DC disconnect**
Disconnects the electrical connection from the solar modules to the inverter. Depending on the device type, 2 or 3 DC disconnects are installed. The DC disconnects can be secured against switching on with a padlock.
- (2) **AC disconnect option**
The optional AC disconnect breaks the connection from the inverter to the grid
- (3) **Button function**
For further information about the button function, see [Button functions and LED status indicator](#)
- (4) **LED status indicator**
For further information about the LED status indicator, see [Button functions and LED status indicator](#)

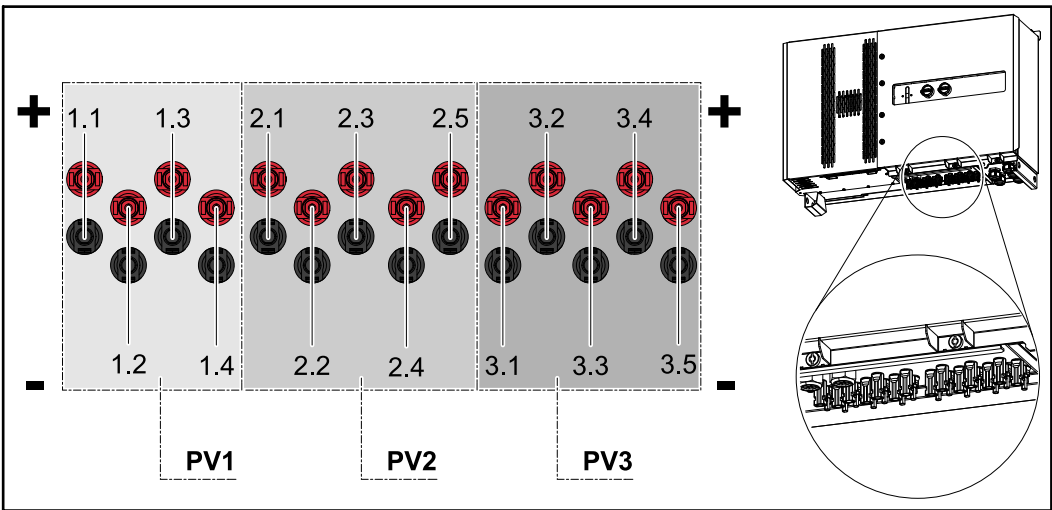
PV connections - Tauro 50-3-D (direct)



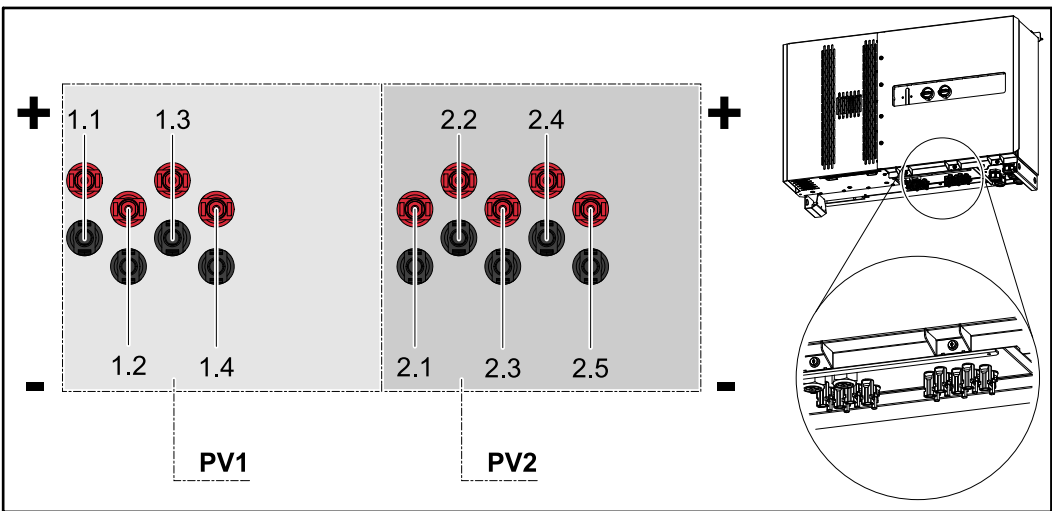
**PV connections -
Tauro Eco 50-3-D (direct)**



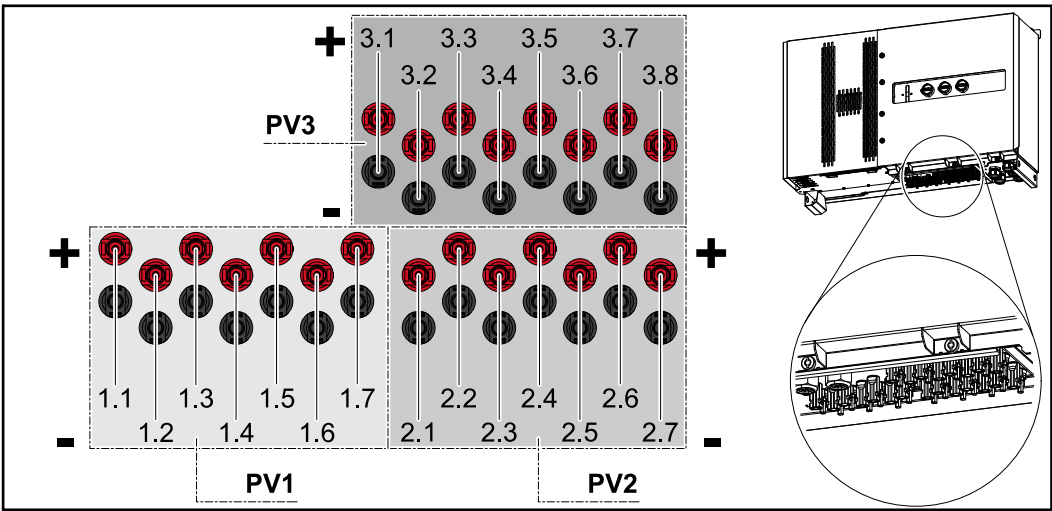
**PV connections -
Tauro 50-3-D (30 A fuses)**



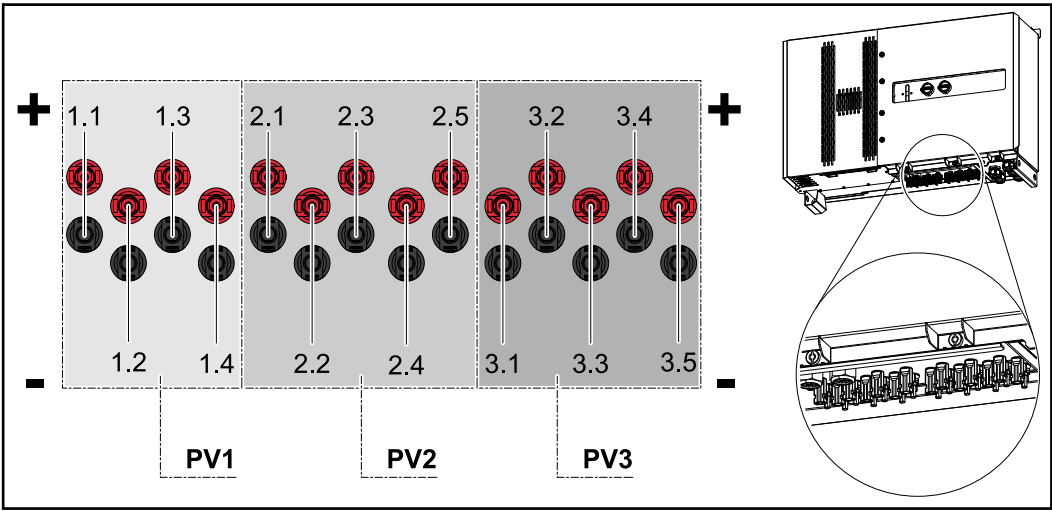
**PV connections -
Tauro Eco 50-3-D (30 A fuses)**



PV connections -
Tauro Eco 99-3-
D / 100-3-D (dir-
ect, 20 A option)



PV connections -
Tauro Eco 99-3-
D / 100-3-D (dir-
ect, 30 A option)



String arrange-
ment in Sol-
ar.web

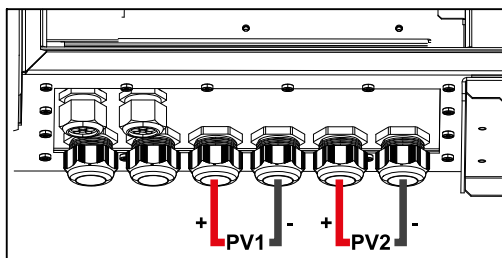
The currents of the individual strings are visible in Solar.web under **History** - **Devices** - **Channels**.

Solar.web Current DC string #	20 A option			30 A option		
	50-3-D	ECO 50-3-D	ECO 99-3-D / 100-3-D	50-3-D	ECO 50-3-D	ECO 99-3-D / 100-3-D
1	PV1.1	PV1.1	PV1.1	PV1.1	PV1.1	PV1.1
2	PV1.2	PV1.2	PV1.2	PV1.2	PV1.2	PV1.2
3	PV1.3	PV1.3	PV1.3	PV1.3	PV1.3	PV1.3
4	PV1.4	PV1.4	PV1.4	PV1.4	PV1.4	PV1.4
5	PV2.1	PV1.5	PV1.5	PV2.1	PV2.1	PV2.1
6	PV2.2	PV1.6	PV1.6	PV2.2	PV2.2	PV2.2

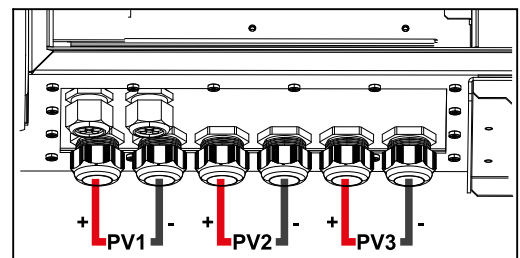
Solar.web Current DC string #	20 A option			30 A option		
	50-3-D	ECO 50-3-D	ECO 99-3-D / 100-3-D	50-3-D	ECO 50-3-D	ECO 99-3-D / 100-3-D
7	PV2.3	PV1.7	PV1.7	PV2.3	PV2.3	PV2.3
8	PV3.1	PV2.1	PV2.1	PV2.4	PV2.4	PV2.4
9	PV3.2	PV2.2	PV2.2	PV2.5	PV2.5	PV2.5
10	PV3.3	PV2.3	PV2.3	PV3.1		PV3.1
11	PV3.4	PV2.4	PV2.4	PV3.2		PV3.2
12	PV3.5	PV2.5	PV2.5	PV3.3		PV3.3
13	PV3.6	PV2.6	PV2.6	PV3.4		PV3.4
14	PV3.7	PV2.7	PV2.7	PV3.5		PV3.5
15			PV3.1			
16			PV3.2			
17			PV3.3			
18			PV3.4			
19			PV3.5			
20			PV3.6			
21			PV3.7			
22			PV3.8			

PV connections - pre-combined

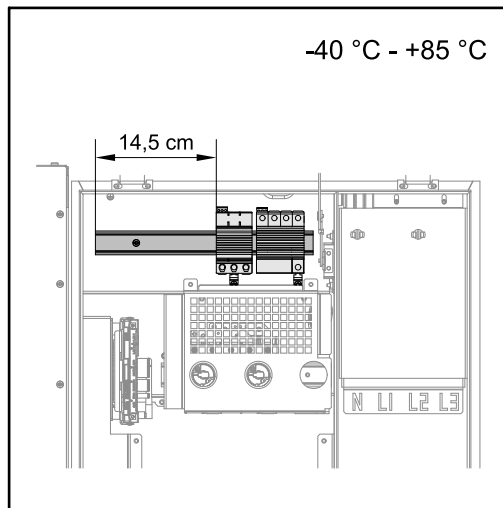
Tauro Eco 50-3-P / 99-3-P / 100-3-P



Tauro 50-3-P



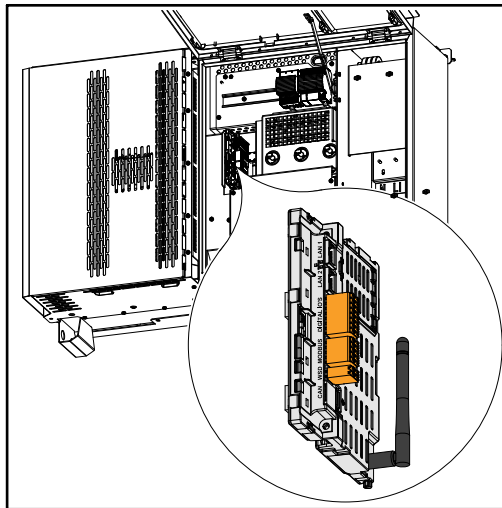
Mounting option for third-party components



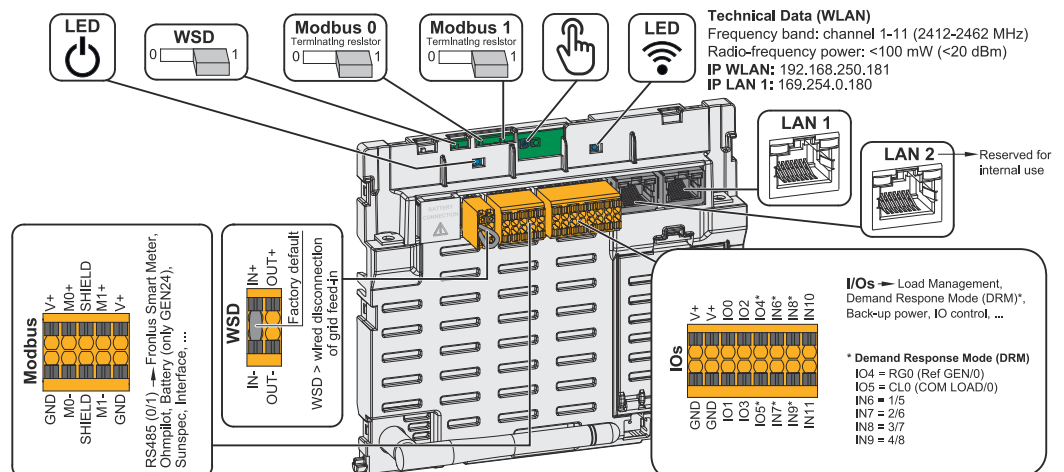
Above the DC connection area there is space for mounting third-party components. Components up to a maximum width of 14.5 cm (8 DU) can be mounted on the DIN rail. The components must have a temperature resistance of -40 °C to +85 °C.

Data communication area in the inverter

The data communication area (Pilot PC board) is located above the DC connections in the inverter.



Data communication area



 Operating LED	Indicates the inverter operating status.
WSD (wired shutdown) switch	Defines the inverter as the WSD master or WSD slave. Position 1: WSD master Position 0: WSD slave
Modbus 0 (MB0) switch	Switches the terminating resistor for Modbus 0 (MB0) on/off. Position 1: Terminating resistor on (factory setting) Position 0: Terminating resistor off
Modbus 1 (MB1) switch	Switches the terminating resistor for Modbus 1 (MB1) on/off. Position 1: Terminating resistor on (factory setting) Position 0: Terminating resistor off
 Optical sensor	For operating the inverter. See chapter Button functions and LED status indicator on page 30.
 Communications LED	Indicates the inverter connection status.
LAN 1	Ethernet connection for data communication (e.g., WiFi router, home network or, for commissioning with a laptop, see chapter Installation with the browser on page 72).
LAN 2	Reserved for future functions. To avoid malfunctions, only use LAN 1.
I/O terminal	Push-in terminal for digital inputs/outputs. See chapter Permitted cables for the data communication area on page 66. The designations (RG0, CLO, 1/5, 2/6, 3/7, 4/8) relate to the Demand Response Mode function, see chapter UC Editor—AUS—Demand Response Modes (DRM) on page 79.
WSD terminal	Push-in terminal for the WSD installation. See chapter WSD (wired shutdown) on page 12.
Modbus terminal	Push-in terminal for the installation of Modbus 0, Modbus 1, 12 V, and GND (ground). The data connection to the connected components is established via the Modbus terminal. The inputs M0 and M1 can be freely selected. Max. 4 Modbus participants per input; see chapter Modbus participants on page 66.

Schematic internal wiring of IOs

The V+/ GND pin provides the possibility of feeding in a voltage in the range of 12.5 to 24 V (+ max. 20%) using an external power supply unit. Outputs IO 0 - 5 can then be operated using the external voltage that has been fed in. A maximum of 1 A may be drawn per output, whereby a total of max. 3 A is permitted. The fuse protection must take place externally.

⚠ CAUTION

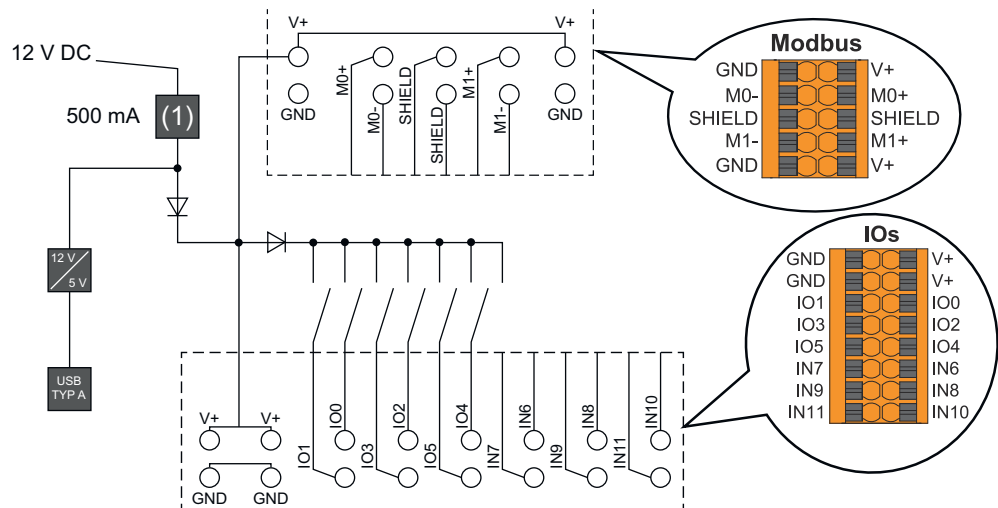
Danger from polarity reversal at the terminals due to improper connection of external power supply units.

This may result in severe damage to the inverter.

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

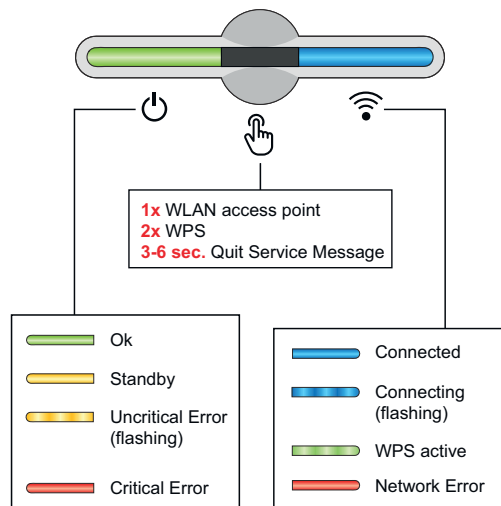
IMPORTANT!

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



(1) Current limitation

Button functions and LED status indicator



The operating status LED displays the status of the inverter. In case of faults, follow the individual steps in the Fronius Solar.web live app.

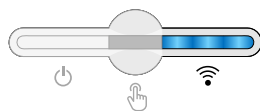


The optical sensor is actuated by touching it with a finger.



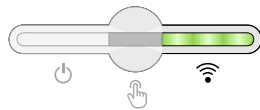
The communications LED displays the connection status. To establish a connection, follow the individual steps in the Fronius Solar.web live app.

Sensor functions



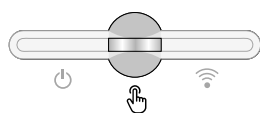
1x = WLAN access point (AP) is opened.

Flashes blue



2x = WLAN protected setup (WPS) is activated.

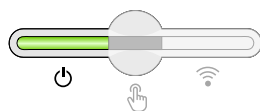
Flashes green



3 seconds (max. 6 seconds) = The service message disappears.

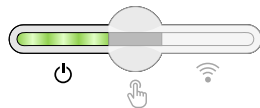
Flashes white (quickly)

LED status indicator



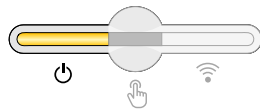
The inverter is operating correctly.

Lights up green



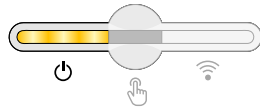
The inverter is starting.

Flashes green



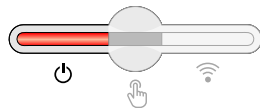
The inverter is on standby, is not operating (e.g., no energy fed into the grid at night), or is not configured.

Lights up yellow



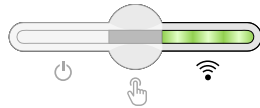
The inverter displays a non-critical status.

Flashes yellow



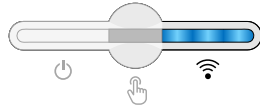
The inverter displays a critical status and no energy is fed into the grid.

Lights up red



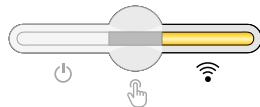
The network connection is being established via WPS.
2x = WPS search mode.

Flashes green



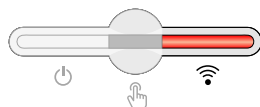
The network connection is being established via WLAN AP.
1x = WLAN AP search mode (active for 30 minutes).

Flashes blue



The network connection is not configured.

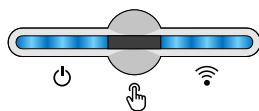
Lights up yellow



A network error is displayed, the inverter is operating correctly.

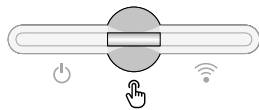
Lights up red

LED status indicator



The inverter is performing an update.

⏻ / 📶 Flash blue



There is a service message.

👆 Lights up white

Installation and Startup

General

System component compatibility

All installed components in the PV system must be compatible with each other and have the necessary configuration options. The installed components must not restrict or negatively affect the functioning of the PV system.

NOTE

Risk due to components in the PV system that are not and/or only partially compatible.

Incompatible components can restrict and/or negatively affect the operation and/or functioning of the PV system.

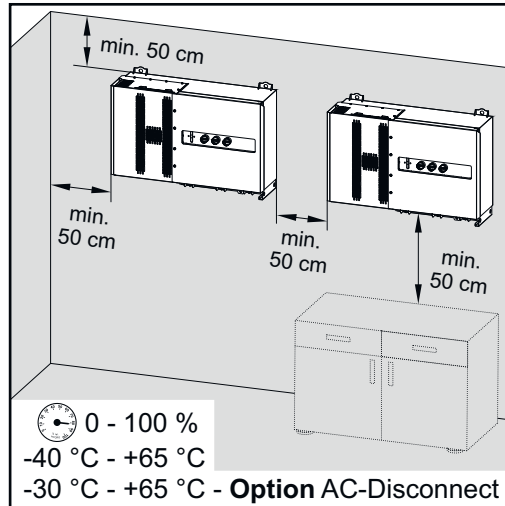
- ▶ Only install components recommended by the manufacturer in the PV system.
- ▶ Before installation, check the compatibility of components that have not been expressly recommended with the manufacturer.

Installation location and position

Choosing the location of the inverter

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

Only install on a solid, non-flammable surface



Max. ambient temperatures: -40 °C / +65 °C

* with built-in optional AC disconnect: -30 °C / +65 °C

Relative humidity: 0 - 100%

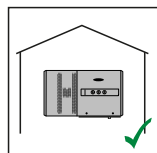
When installing the inverter in a switch cabinet or similar closed environment, ensure adequate heat dissipation by forced-air ventilation.

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

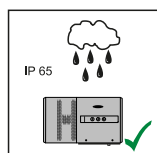
The following surfaces are permitted for installation:

- 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 PV modules directly on the PV mounting system)
- Flat roofs (if this is for a foil roof, make sure that the foils comply with the fire protection requirements and are not highly flammable. Ensure compliance with the national provisions.)
- Covered parking lot roofs (no overhead installation)

The DC disconnects must always be freely accessible after installation of the inverter.

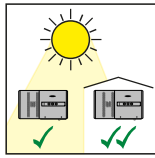


The inverter is suitable for indoor installation.



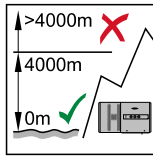
The inverter is suitable for outdoor installation.

Because of its IP 65 protection class, the inverter is not susceptible to hose water on any side and can also be operated in moist environments.

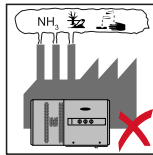


The inverter is suitable for outdoor installation.

In order to keep inverter heating as low as possible, it is recommended that the inverter is not exposed to direct sunlight. The inverter should be installed in a protected location, for example, near the solar modules or under an overhanging roof.

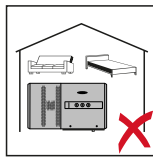


IMPORTANT! The inverter must not be installed or operated at more than 4000 m above sea level.

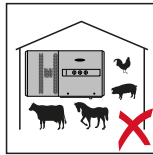


Do not install the inverter:

- Where it may be exposed to ammonia, corrosive gases, acids, or salts (for example, fertilizer storage areas, vent openings for livestock stables, chemical plants, tanneries, etc.)

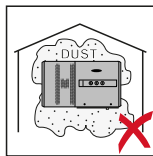


During certain operating phases the inverter may produce a noise. For this reason it should not be installed in an occupied living area.



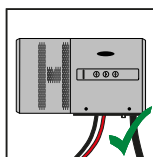
Do not install the inverter in:

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

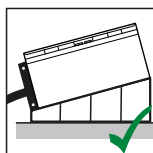
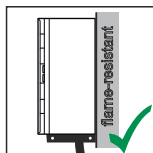


The inverter is designed to be dust-proof (IP 65). However, in areas of high dust accumulation, the cooling surfaces can become dusty, which can impair the thermal performance. In this case, the dust must be removed regularly. We therefore recommend not installing the inverter in areas and environments with high dust accumulation.

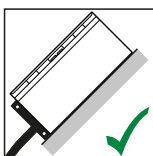
Installation position



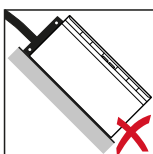
The inverter is designed to be installed vertically on a vertical wall. The optional floor racks must not be used for vertical mounting.



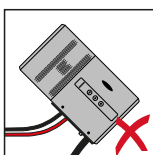
The inverter should have a minimum inclination of 3° in a horizontal installation position so that water can run off. Mounting of the optional floor racks is recommended. The floor racks may only be used on an installation position of 0 - 45°.



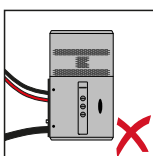
The inverter is suitable for installation on a sloping surface.



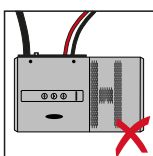
Do not install the inverter on a sloping surface with its connection sockets at the top.



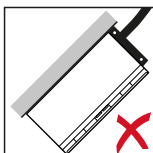
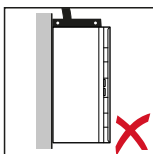
Do not install the inverter at an angle on a vertical wall or column.



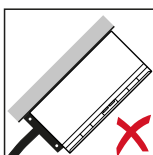
Do not install the inverter horizontally on a vertical wall or pillar.



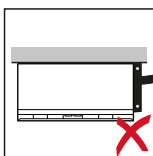
Do not install the inverter on a vertical wall or pillar with its connection sockets facing upwards.



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



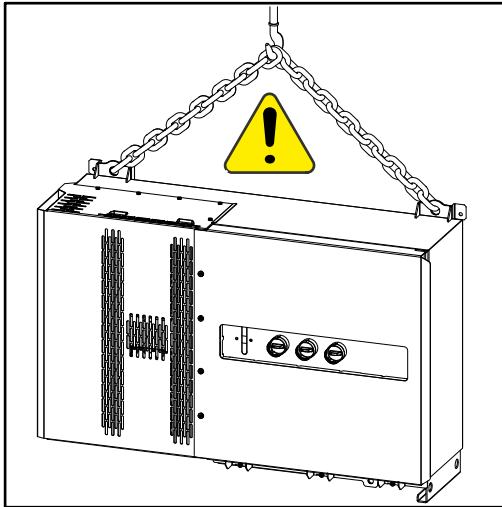
Do not install the inverter overhanging with the connection sockets at the bottom.



Do not install the inverter on the ceiling.

Transport

Crane transport



WARNING

Danger of serious injury and damage from articles being dropped or falling over.

When transporting by crane:

- ▶ Hook chains and ropes onto the suspension points only
- ▶ Always hook chains and ropes onto both suspension points

Transport using a forklift or lift truck



WARNING

Falling or toppling devices can be deadly.

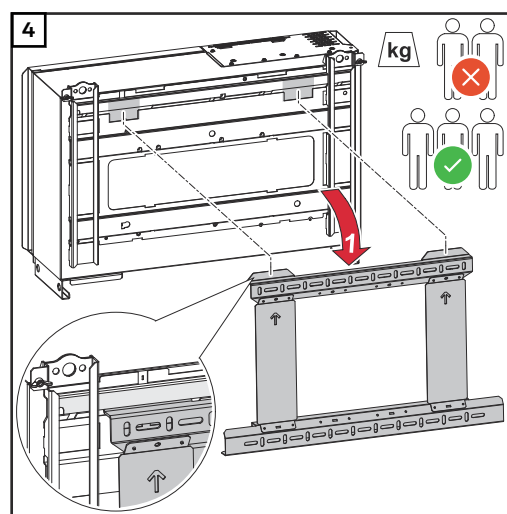
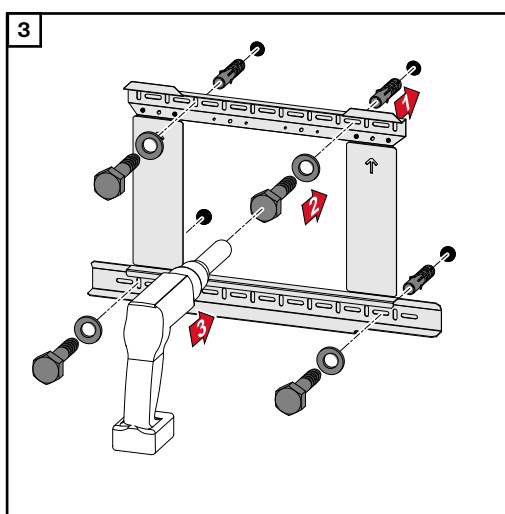
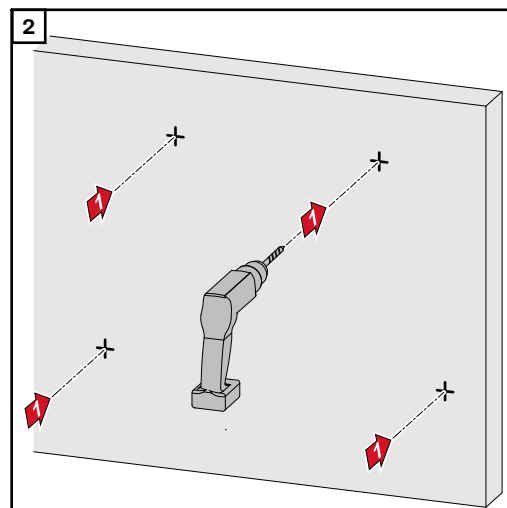
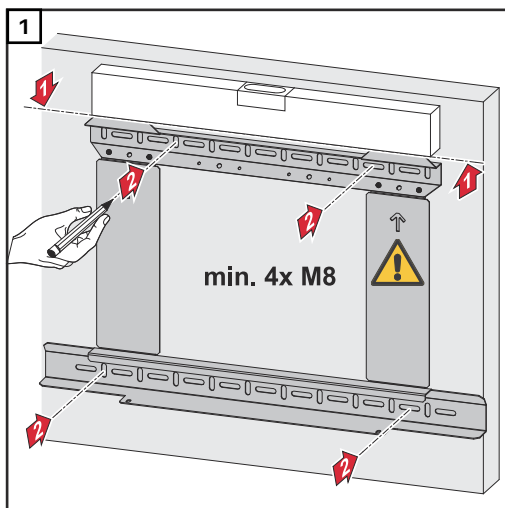
- ▶ When transporting the inverter by forklift or lift truck secure the inverter from falling.
- ▶ Do not turn, brake, or accelerate in a sudden, jerking manner

Selecting the mounting material

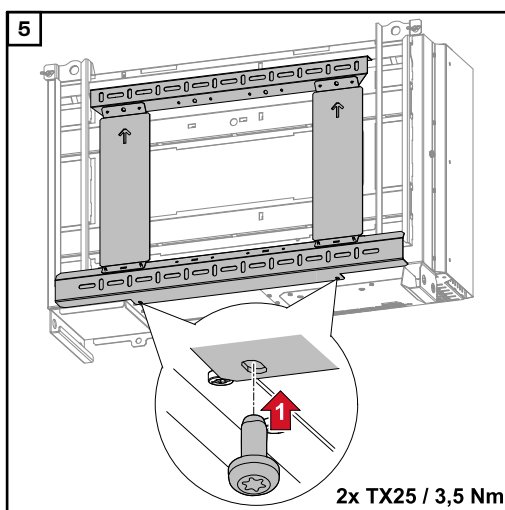
Mounting bracket dimensions

[illegible]

Mounting the in- verter on the wall

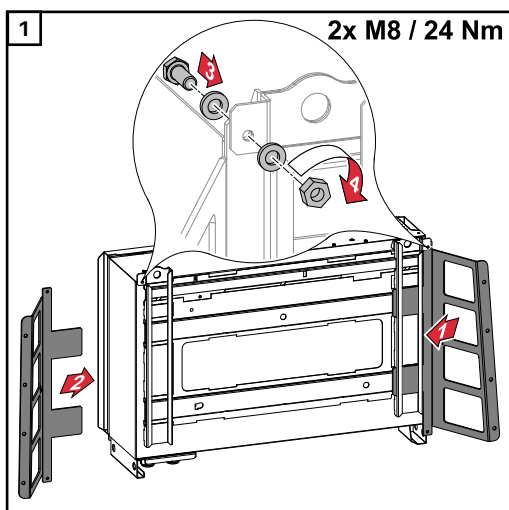


Observe the local regulations for lifting heavy loads or use a crane to lift the device (attach to crane-hoisting lugs)

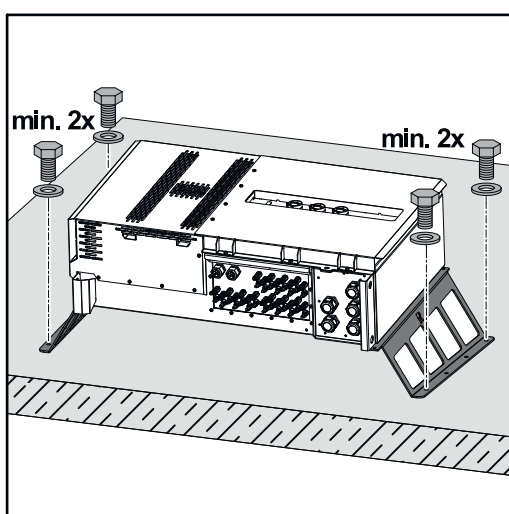


To attach the inverter to the mounting bracket, use only the screws included in the scope of delivery.

Mounting the in- verter on floor racks

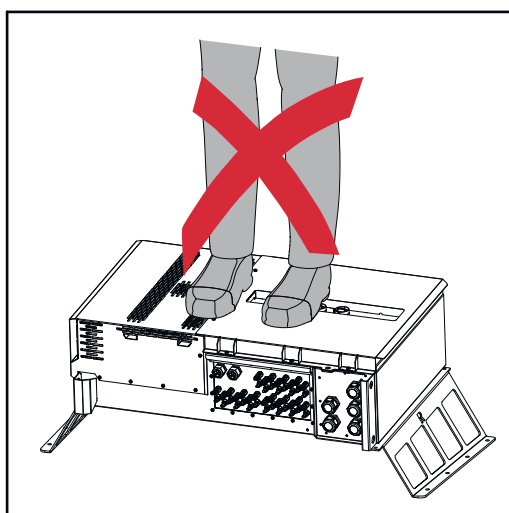


The floor racks can be ordered as an optional accessory.



Mounting the inverter on a horizontal mounting surface is not mandatory, but recommended. Depending on the surface, different wall plugs and screws are required for floor mounting the floor racks. Wall plugs and screws are therefore not included in the scope of supply of the inverter. The installer is responsible for selecting the correct wall plugs and screws.

- 2** Mount the inverter and floor racks securely to a suitable surface using the appropriate installation materials



Do not climb onto the device!

Connecting the inverter to the public grid (AC side)

Monitoring the grid

IMPORTANT! To provide the best possible grid monitoring, the resistance in the leads to the mains connections should be as low as possible.

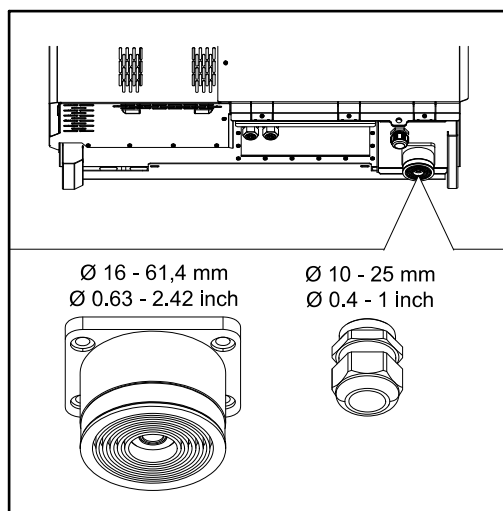
AC connection area

IMPORTANT! Only the following cables may be connected to V-type terminals:

- RE (solid round conductor)
- RM (stranded round conductor)
- SE (solid sector conductor)
- SM (stranded sector conductor)
- Fine-core cables only in conjunction with ferrules

Fine-core cables without ferrules may only be connected to the M12 threaded bolts of the grid connections using a suitable M12 cable lug;
torque = 32 Nm

Cable gland "Multicore" version

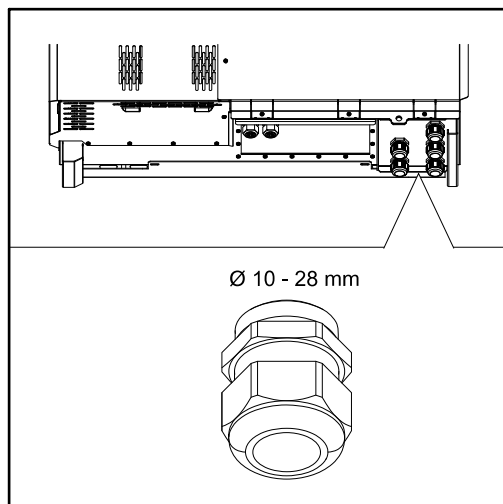


The following cable outer diameters are compatible with the larger bushing:

16 - 27.8 - 36.2 - 44.6 - 53 - 61.4 mm

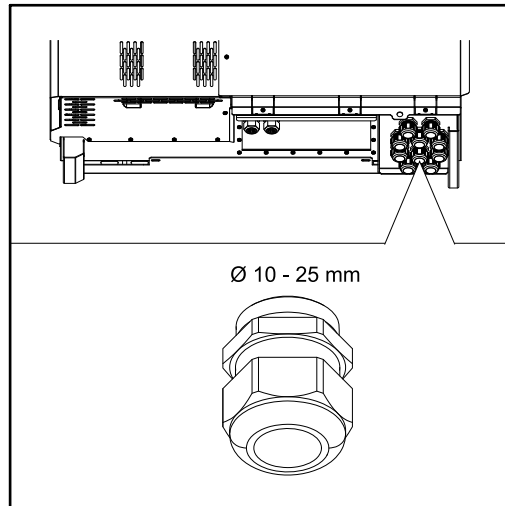
For the small bushing (M32 PG gland), earth cables of 10 - 25 mm can be fed through.

Cable gland "Singlecore" version



5 M40 bushings

Cable gland "AC Daisy Chain" version



10 M32 bushings

Connecting aluminum cables

Aluminum cables can also be connected to the AC connections.

NOTE

When using aluminum cables:

- ▶ Follow all national and international guidelines regarding the connection of aluminum cables.
- ▶ Grease aluminum wires with appropriate grease to protect them from oxidation.
- ▶ Follow the instructions of the cable manufacturer.

Permitted cables

The temperature resistance of the AC cables must be at least 90 °C.

If cables are used that do not withstand this temperature requirement, fit the protective hose (item number: 4.251.050) over the phases (L1 / L2 / L3) and neutral conductor (N)! The grounding PE does not need to be protected with a protective hose.

With the AC daisy chain option, all phases and neutral conductors must be protected with the protective hose. This means that the AC daisy chain option requires two protective hose sets.

AC connections

Select a sufficiently large cable cross-section based on the power category and connection variant!

Power category	Connection variant	Cable cross-section
Tauro 50-3 Tauro Eco 50-3	Single core / multi-core	35 - 240 mm ² *
	Optional AC disconnecter	35 - 240 mm ² *
	Daisy chain (without AC disconnecter)	35 - 240 mm ² *

Power category	Connection variant	Cable cross-section
Tauro ECO 99-3 Tauro ECO 100-3	Single core / multi-core	70 - 240 mm ² *
	Optional AC disconnecter	70 - 240 mm ² *
	Daisy chain (without AC disconnecter)	70 - 240 mm ² *

* The cable cross-section of the neutral conductor can be reduced to 25 mm² if no local guidelines or standards require otherwise.

Maximum alternating current fuse protection

NOTE

There is no general requirement to use a residual current circuit breaker. Nonetheless, if a residual current circuit breaker (RCD) is used then it must be a type B with a release current of at least 1000 mA.

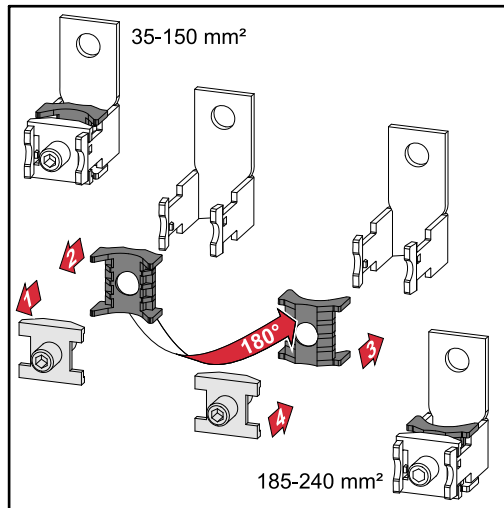
NOTE

The inverter may be used with a maximum C355 A automatic circuit breaker.

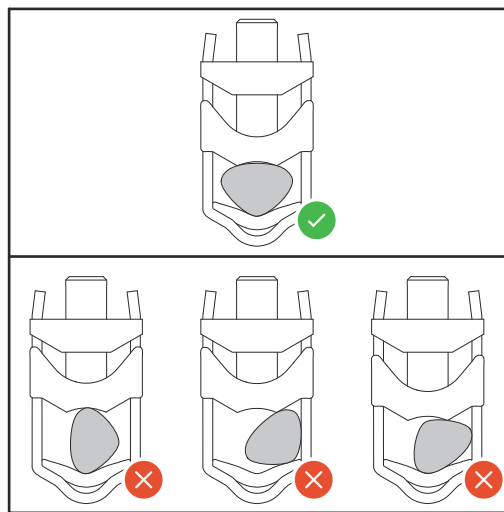
	50-3-D / 50-3-P	Eco 50-3-D / 50-3-P	Eco 99-3-P	Eco 99-3-D	Eco 100-3-P	Eco 100-3-D
Recommended output overcurrent protection [A] for 50 kW output power	80	80	-	-	-	-
Recommended output overcurrent protection [A] for 100 kW output power (Example: daisy chaining)	160	160	160	160	160	160
Recommended output overcurrent protection [A] for 150 kW output power (Example: daisy chaining)	250	250	250	250	250	250
Recommended output overcurrent protection [A] for 200 kW output power (Example: daisy chaining)	355	355	355	355	355	355

Changing the clamping area for V-type terminal

The clamping range of the V-type terminal is 35 - 150 mm² when delivered. The clamping range can be changed to 185 - 240 mm² by a simple modification of the V-type terminal.



Sector conductors at the V-type terminal



Additional PE introduction for earthing

An optional hole can be made on the right side of the housing at the bottom for an additional PE introduction.

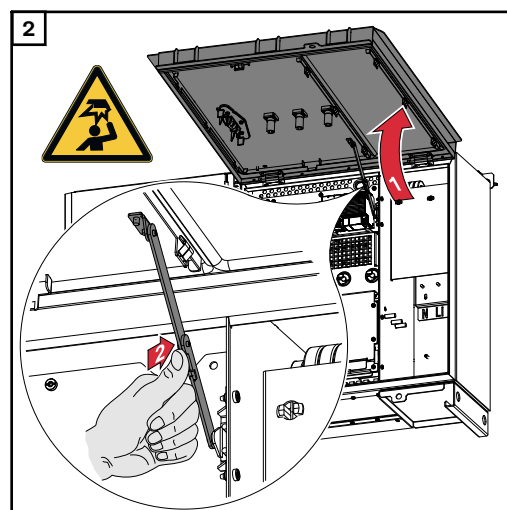
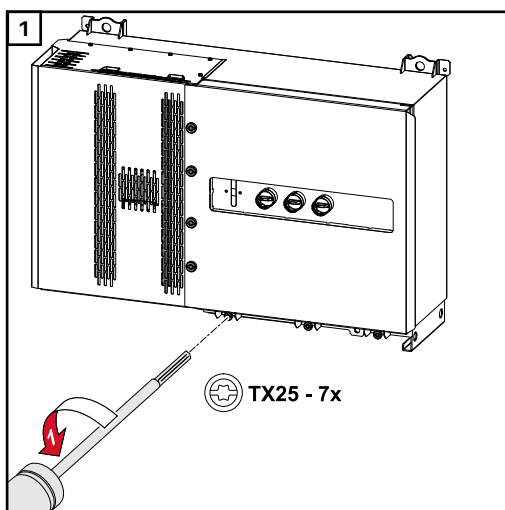
CAUTION

Danger from faulty or incorrect holes.

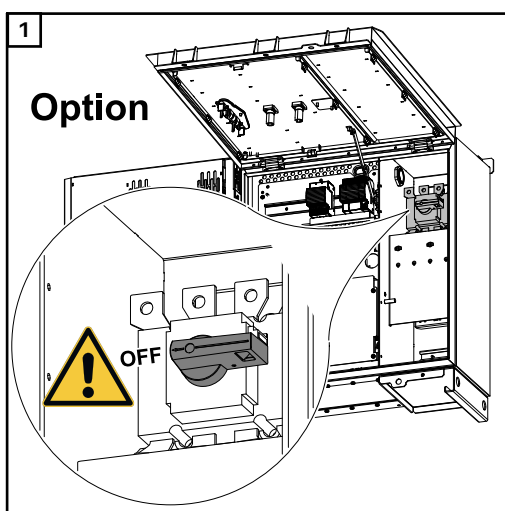
This may lead to injuries to the eyes and hands as a result of flying debris and sharp edges, as well as damage to the inverter.

- ▶ 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.

Opening the in- verter

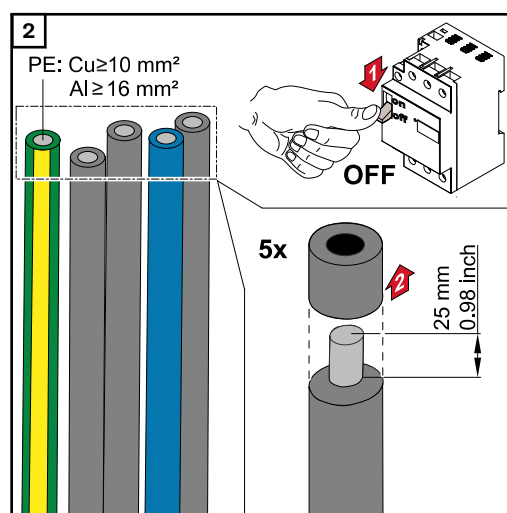
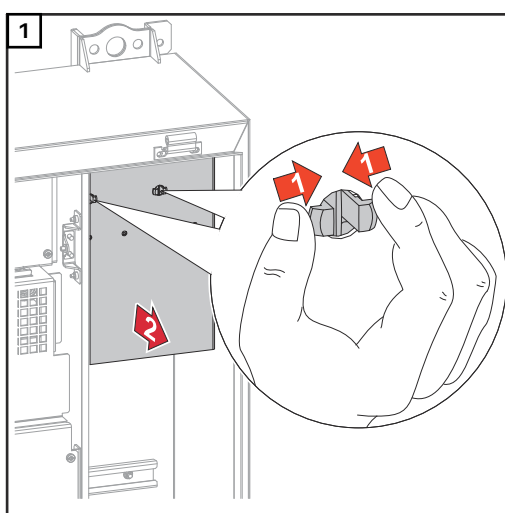


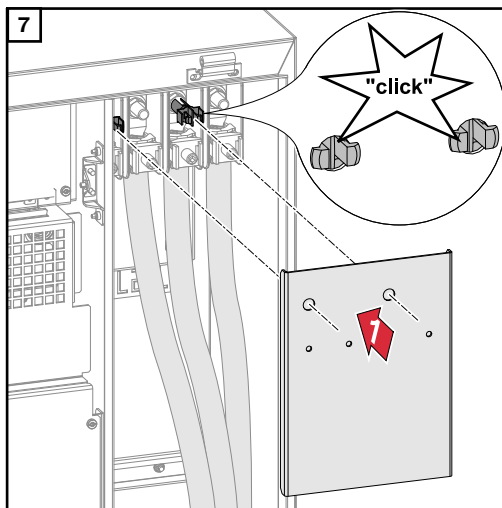
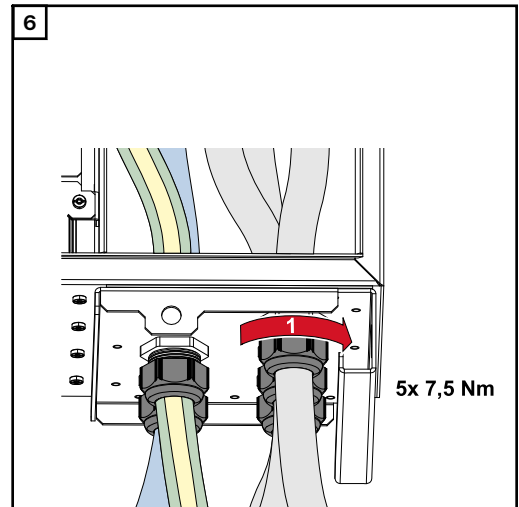
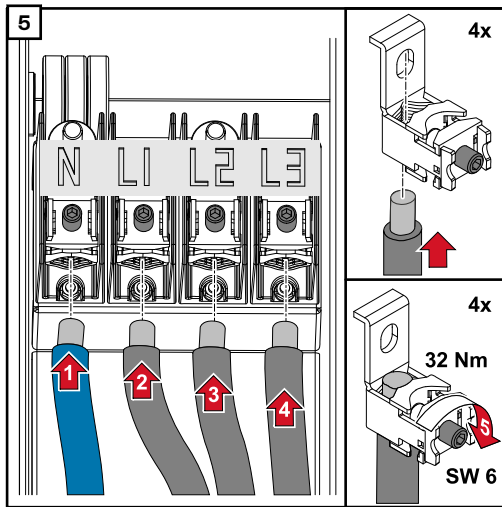
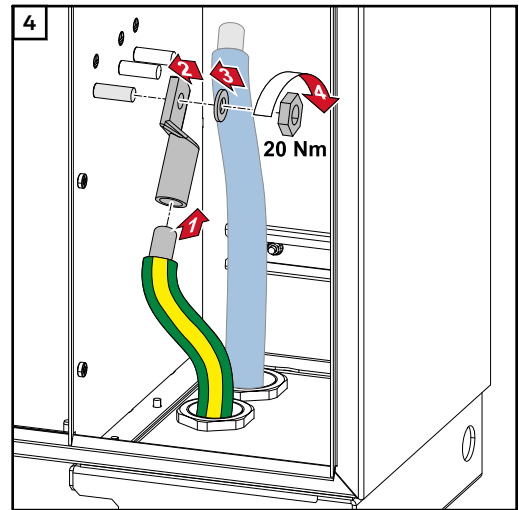
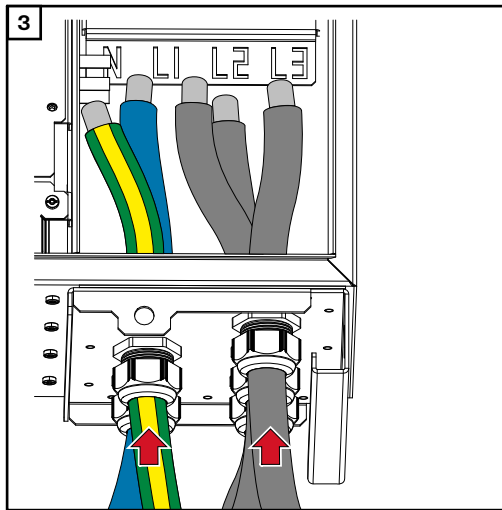
Switching off the AC disconnect option



Connecting the inverter to the public grid - Singlecore

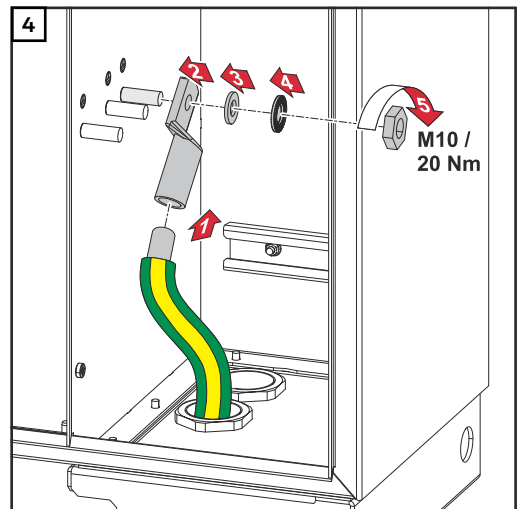
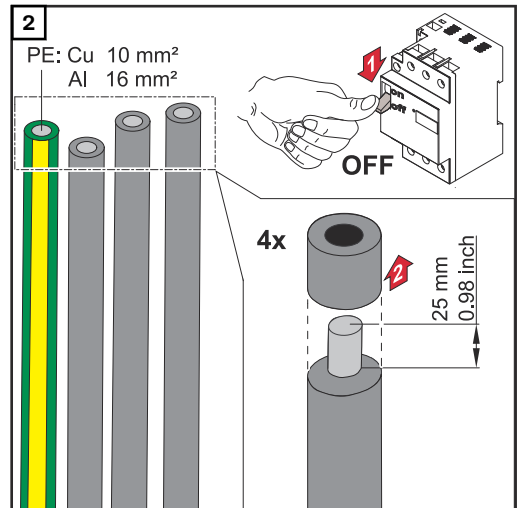
Ensure that the phases are connected in the right order: PE, N, L1, L2 and L3.



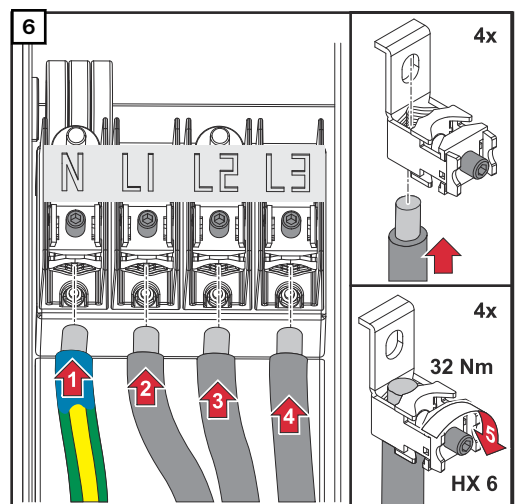


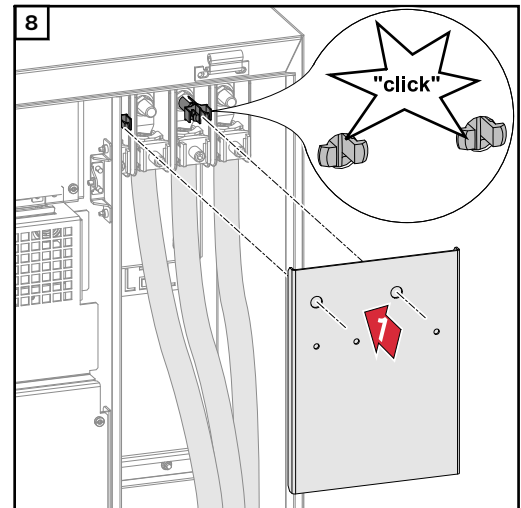
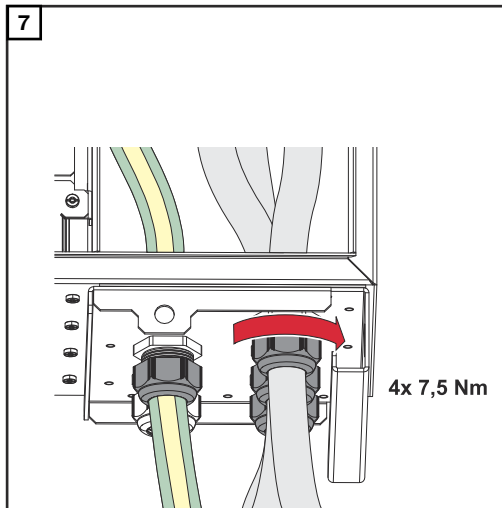
Connecting the inverter to the public grid - Singlecore with PEN conductor

Ensure that the phases are connected in the right order: PE, PEN, L1, L2 and L3.



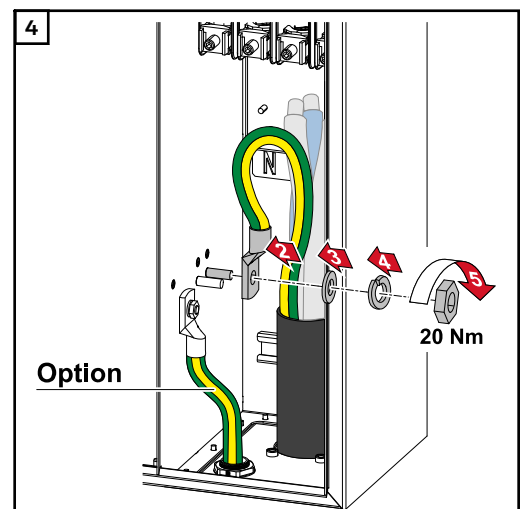
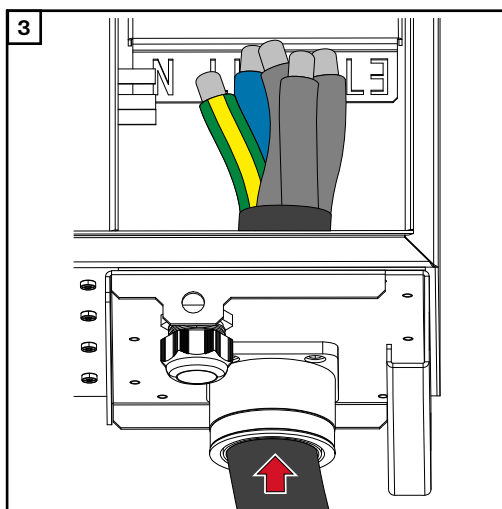
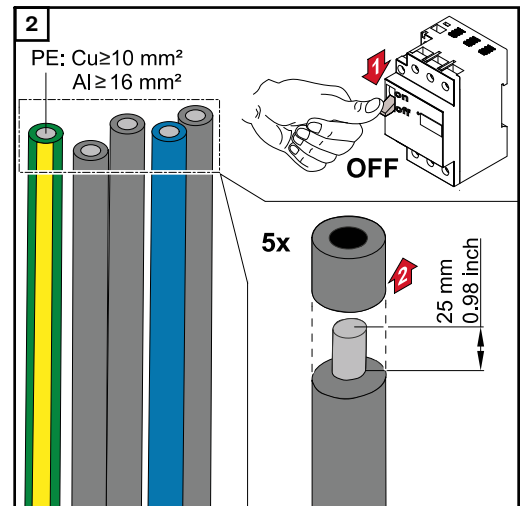
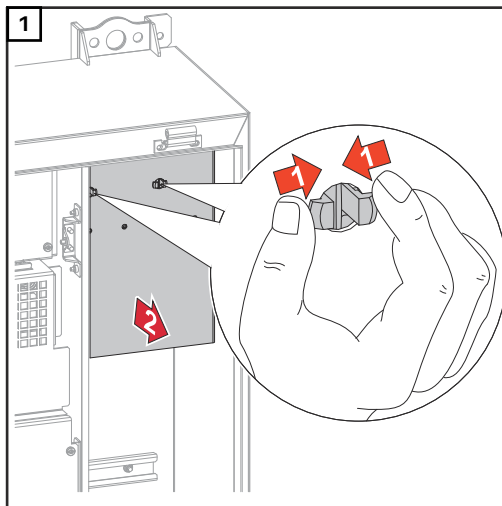
The PEN conductor must be produced with ends that are permanently marked blue, according to the national provisions.

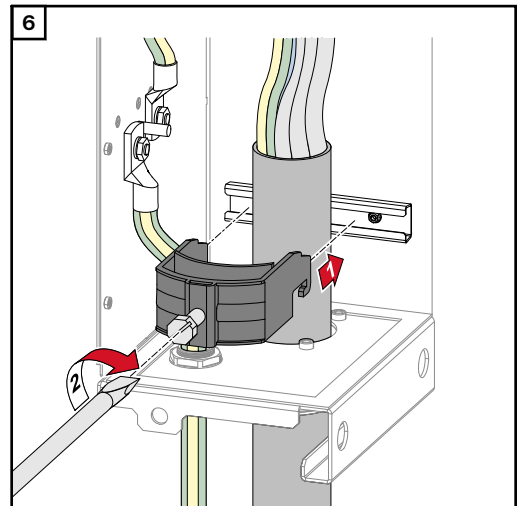
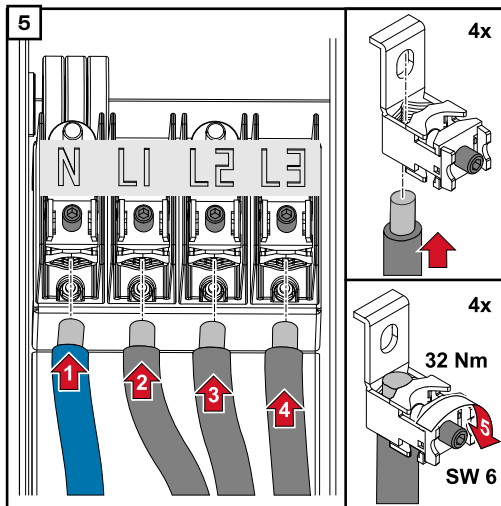




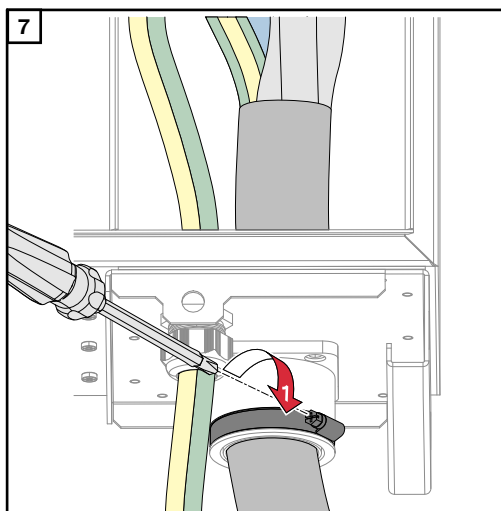
Connecting the inverter to the public grid - Multicore

When connecting, ensure that the phases are in the correct order: PE, N, L1, L2 and L3.

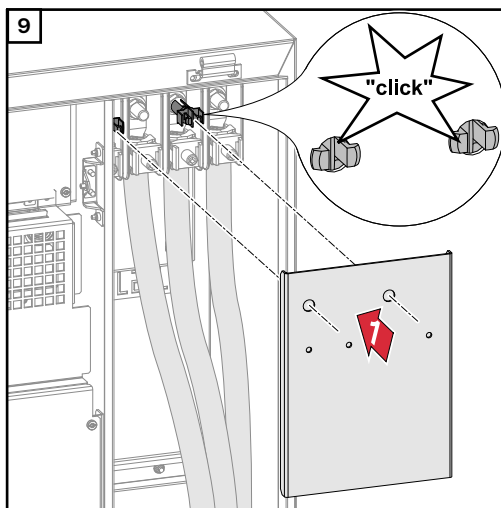
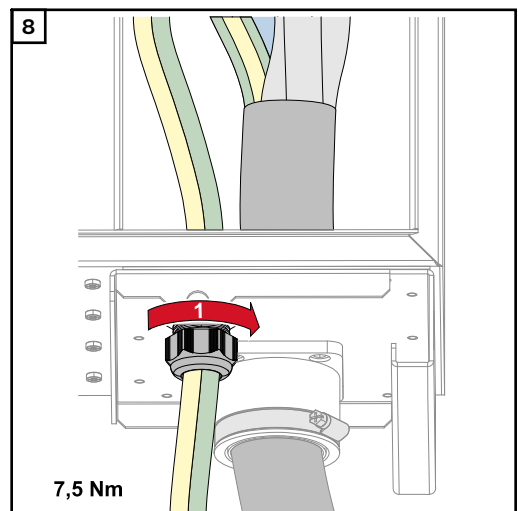




Secure to the torque specified by the manufacturer of the strain-relief device. The strain-relief device is not part of the scope of supply.

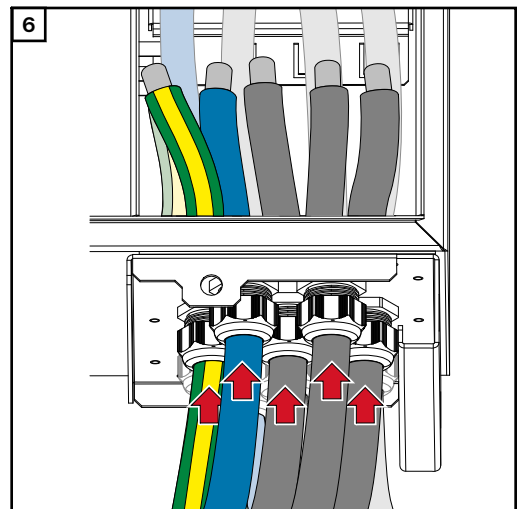
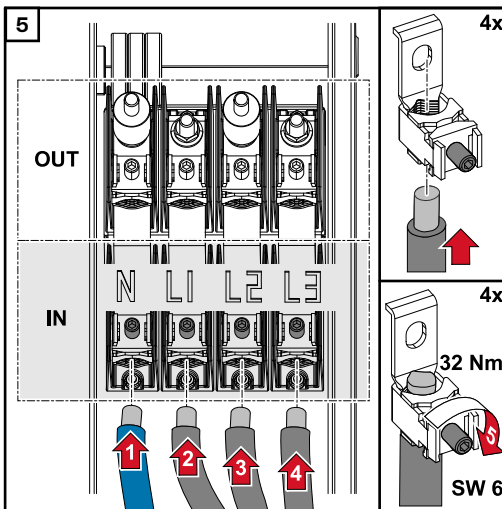
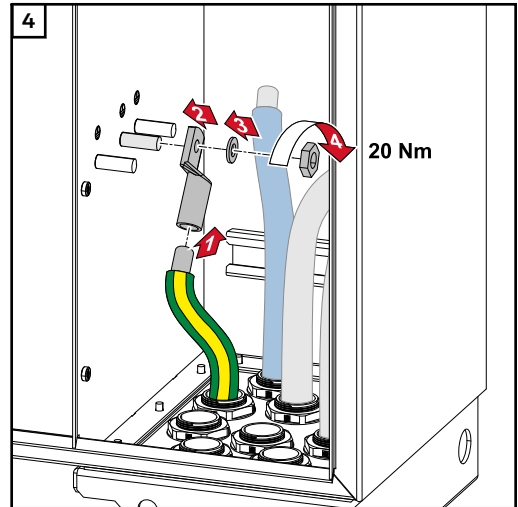
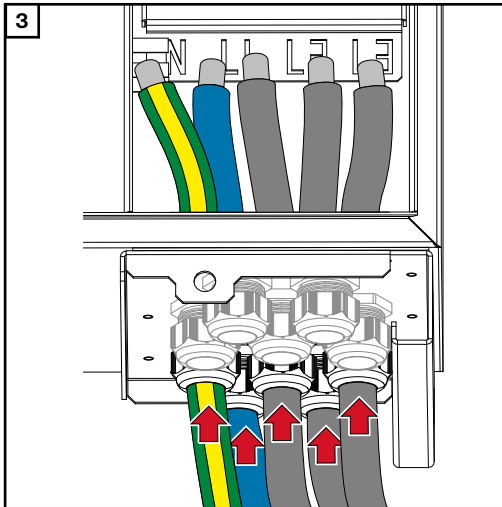
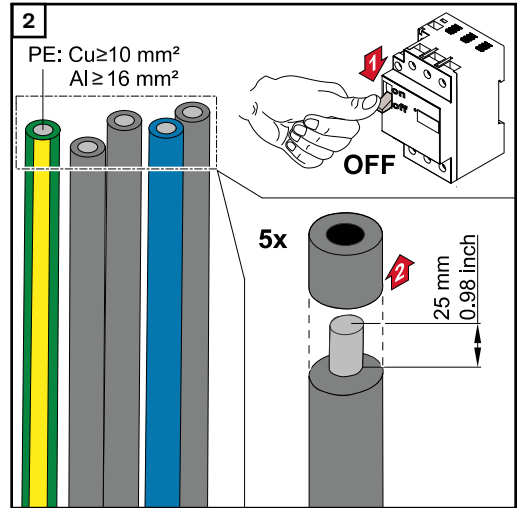
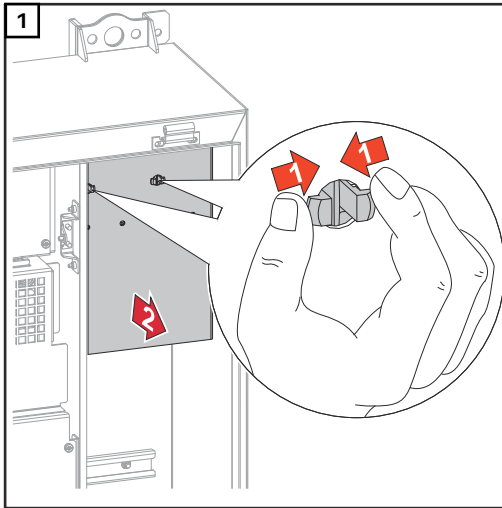


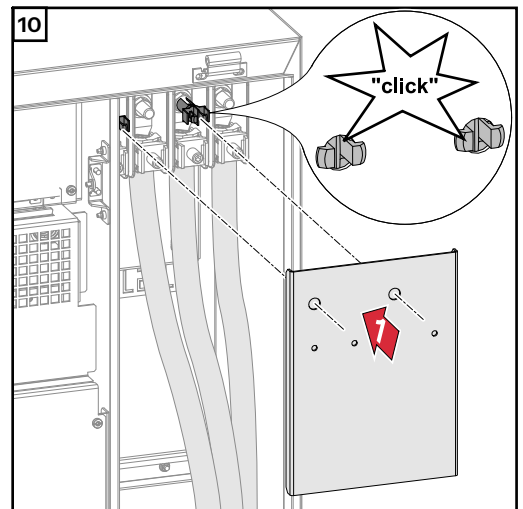
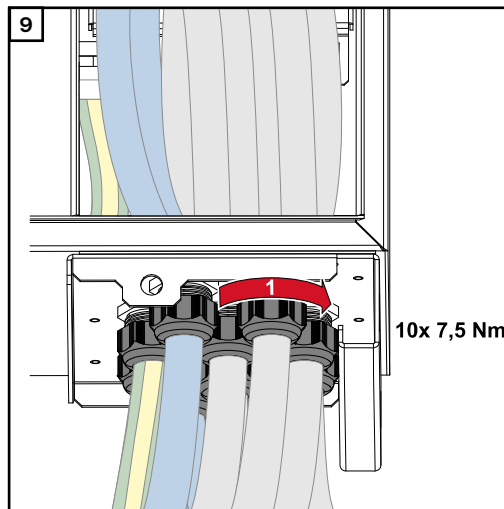
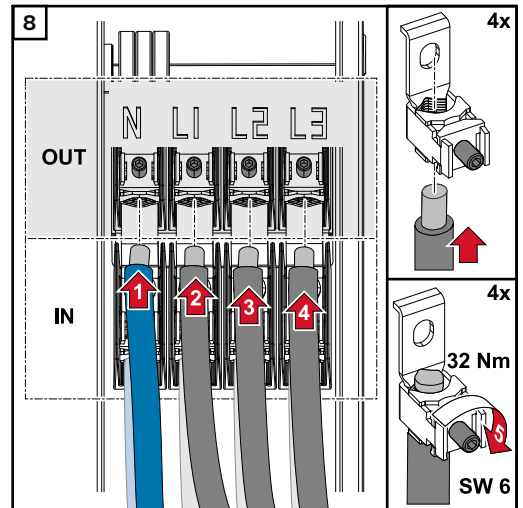
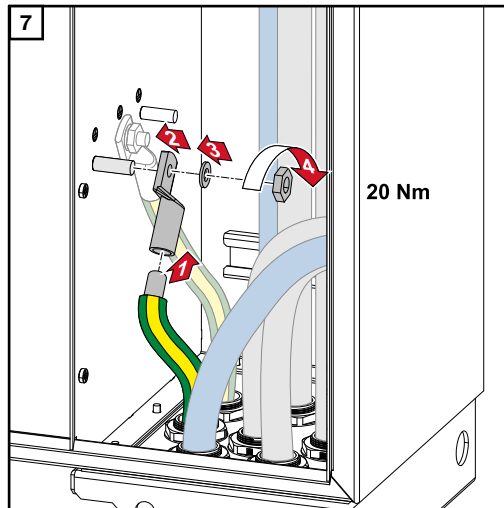
Secure to the torque specified by the manufacturer



Connecting the inverter to the public grid - Daisy Chain

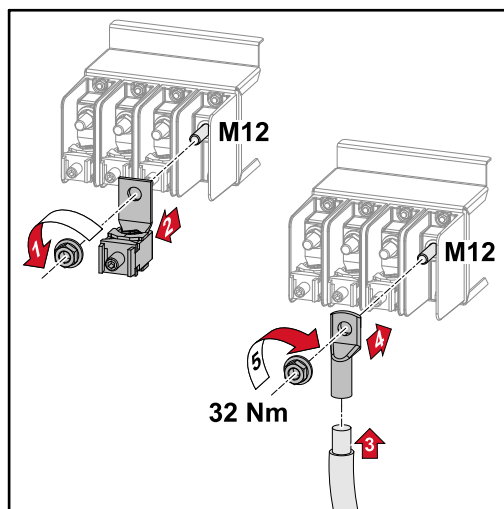
Ensure that the phases are connected in the right order: PE, N, L1, L2 and L3.





Connecting cables with a cable lug

Alternatively, a cable with a cable lug can be connected to the M12 threaded bolts on the grid connections in order to connect the cables to the V-type terminals.



Connecting the PV cable to the inverter

Safety



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 authorized electrical technician is permitted to connect this equipment to the public grid.



WARNING

Danger of electric shock due to incorrectly connected terminals / PV plug connectors.

An electric shock can be fatal.

- ▶ When connecting version D ("direct string"), ensure that every pole of a string is fed across the same PV input, e.g.:
"+ pole string 1" at input PV 1.1+ and "- pole string 1" at input PV 1.1-



WARNING

Danger from DC voltage. Even when the DC disconnectors are switched off, the fuse boards (100-3-D / 99-3-D) / fuse board (50-3-D) and everything before the DC disconnectors are live.

An electric shock can be fatal.

- ▶ Prior to any connection work, disconnect the inverter on the AC side and the DC side.



CAUTION

Risk of damage to the inverter as the result of incorrectly tightened terminals.

Incorrectly tightened terminals can cause heat damage to the inverter that may result in a fire.

- ▶ When connecting AC and DC cables, ensure that all the terminals are tightened to the specified torque.



CAUTION

Risk of damage to the inverter due to PV modules that are not connected with the correct polarity.

PV modules that are not connected with the correct polarity can cause thermal damage to the inverter.

- ▶ Measure the DC cables from the PV modules and connect them to the inverter with the correct polarity.

CAUTION

Risk of damage to the inverter by exceeding the maximum input current per string.

Exceeding the maximum input current per string can cause damage to the inverter.

- Observe the maximum input current per string for the inverter according to the technical data.
- The maximum input current must not be exceeded even when using Y or T connectors.

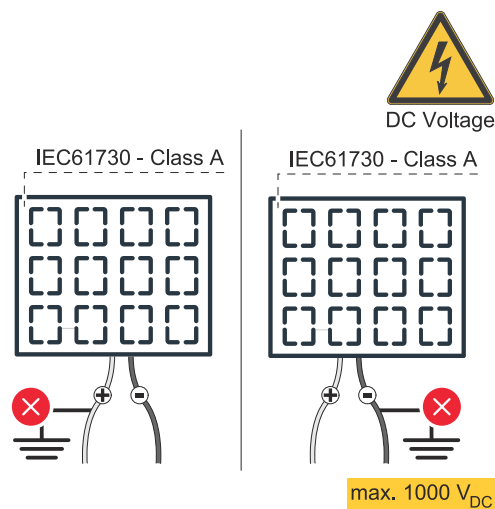
General information about PV modules

To enable suitable PV 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 PV modules will increase. The open circuit voltage must not exceed the max. permissible system voltage. An open circuit voltage above the indicated values will damage the inverter, and all warranty rights will become null and void.
- The temperature coefficients on the data sheet of the PV modules must be observed.
- Exact values for sizing the PV modules can be obtained using suitable calculation tools, such as the [Fronius Solar.creator](#).

IMPORTANT!

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



IMPORTANT!

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

IMPORTANT!

Solar module strings must not be grounded.

Permitted cables DC connections

Select a sufficiently large cable cross-section based on the device type! The temperature resistance of the DC cables must be at least 90 °C.

Power category	Device type	Cable cross-section
Tauro 50-3 / Eco 50-3 / Eco 99-3 / Eco 100-3	pre-combined	25 - 95 mm ²
	direct	2.5 - 10 mm ² (see data sheet of the plug)

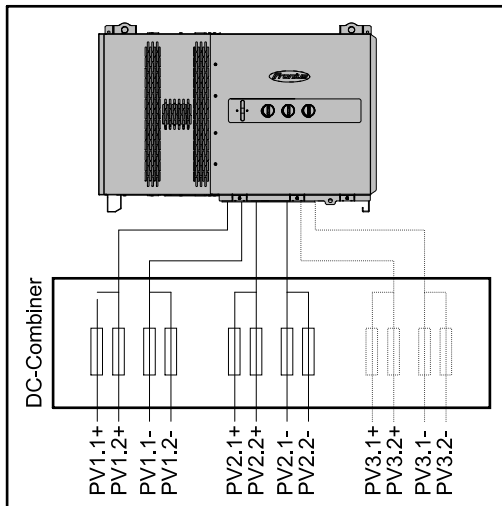
DC fuse protection - pre-combined

CAUTION

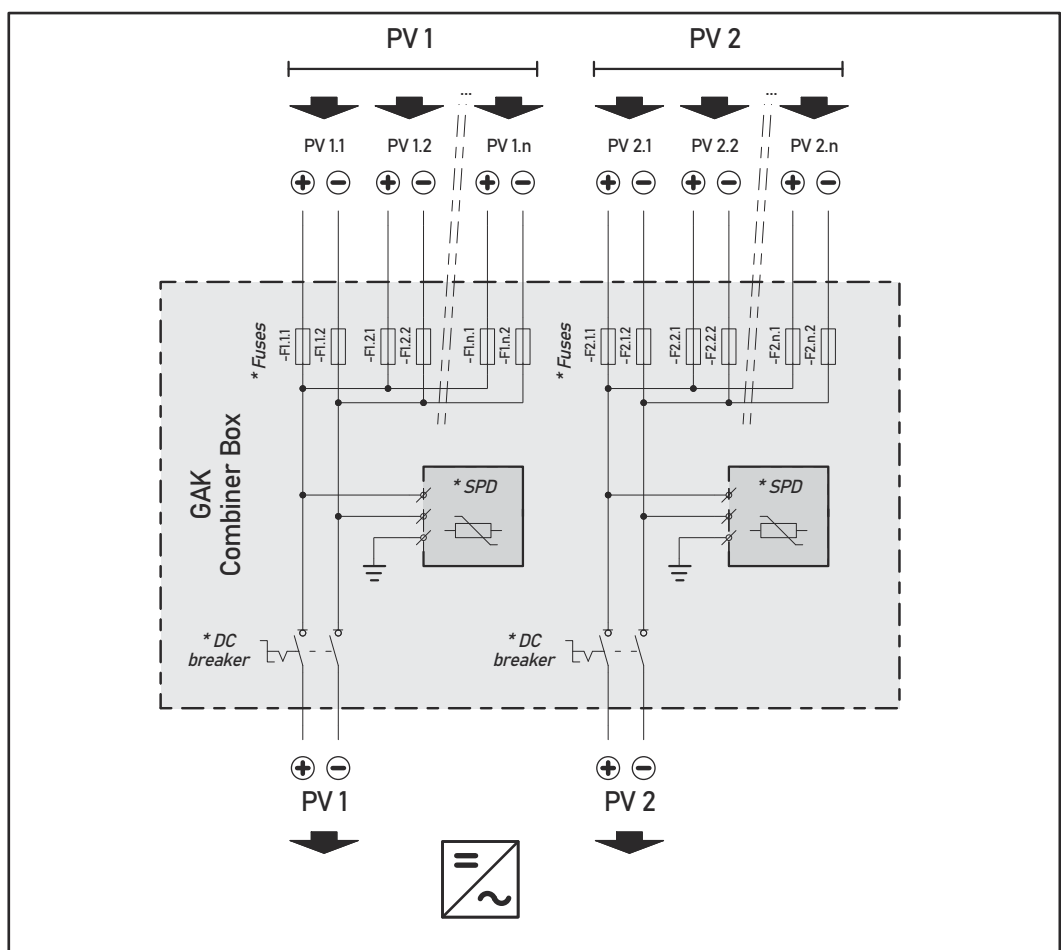
Risk of damage to the inverter as the result of incorrectly fused PV lines.

PV lines for the "pre-combined" model that are not fused can cause damage to the inverter.

- PV lines must be fused in a combiner box before the inverter ("pre-combined" version).

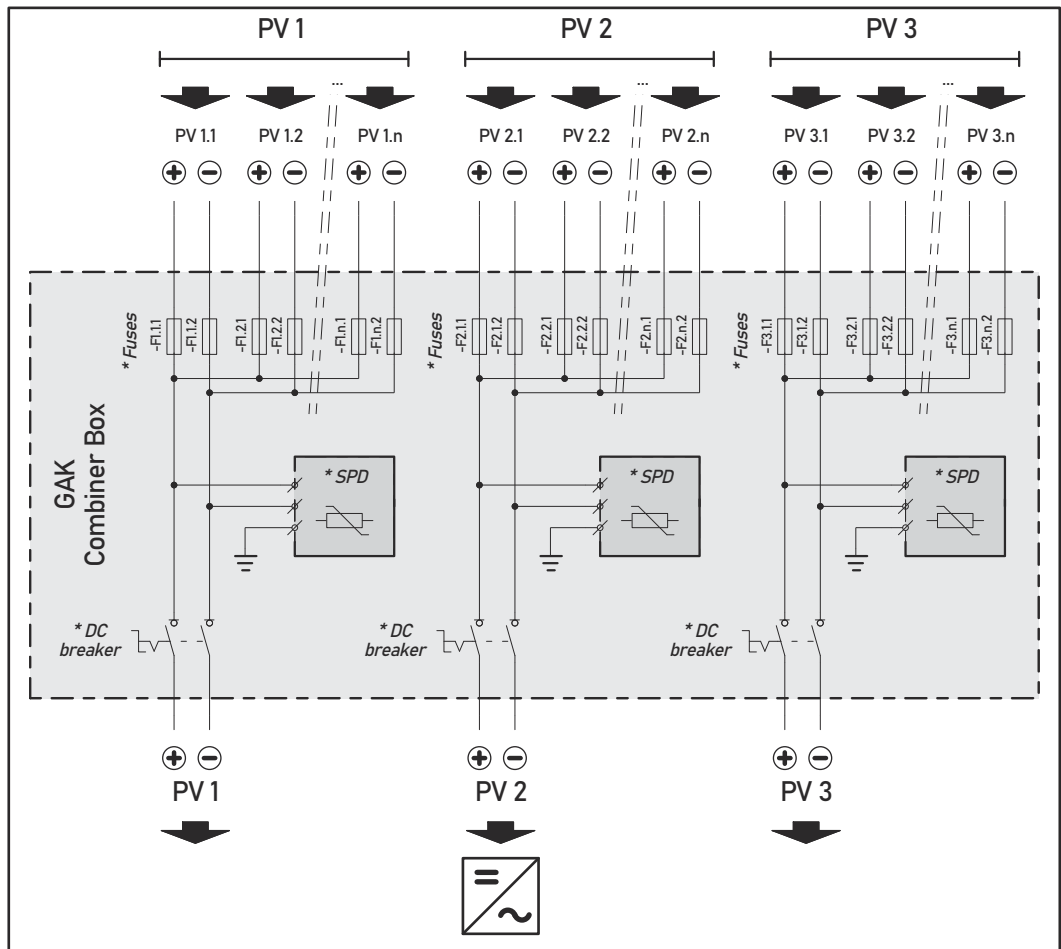


Example of
Fronius Tauro
Eco 50-3-P /
99-3-P / 100-3-P
combiner box



* DC fuse optional depending on national standard / DC breaker optional / DC SPD optional

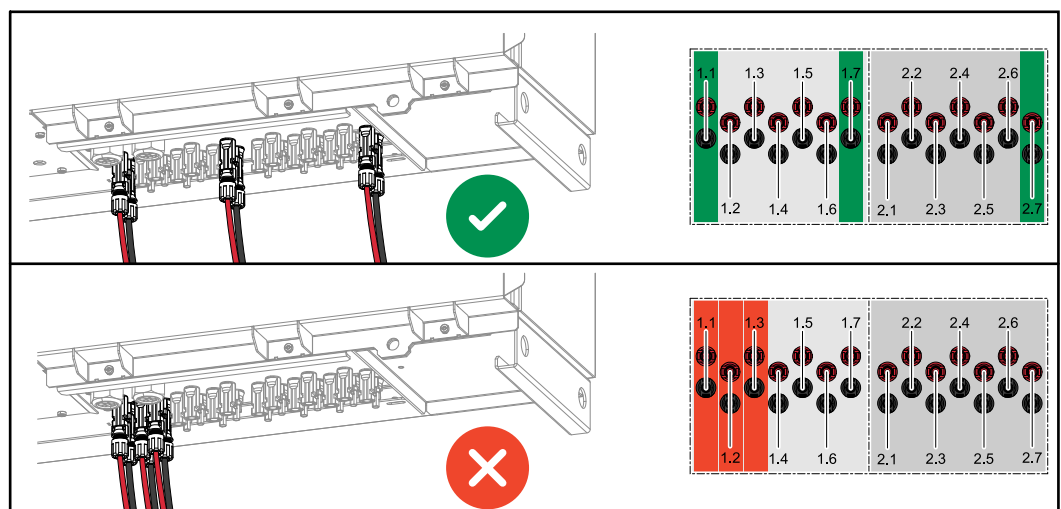
Example Fronius Tauro 50-3-P combiner box



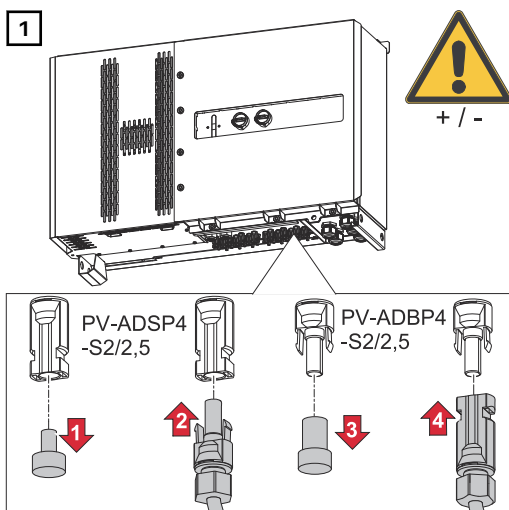
* DC fuse optional depending on national standard / DC breaker optional / DC SPD optional

Distribution of solar module strings in the direct variant

Distribute the existing solar module strings evenly between the PV inputs (PV1 / PV2 / PV3) of the inverter. Start with the odd inputs first and then fill the even inputs to distribute the power as evenly as possible and increase the service life of the fuses, for example: (1.1, 2.1, 3.1, 1.3, 2.3 etc.).



Connecting PV cables - MC4 connector

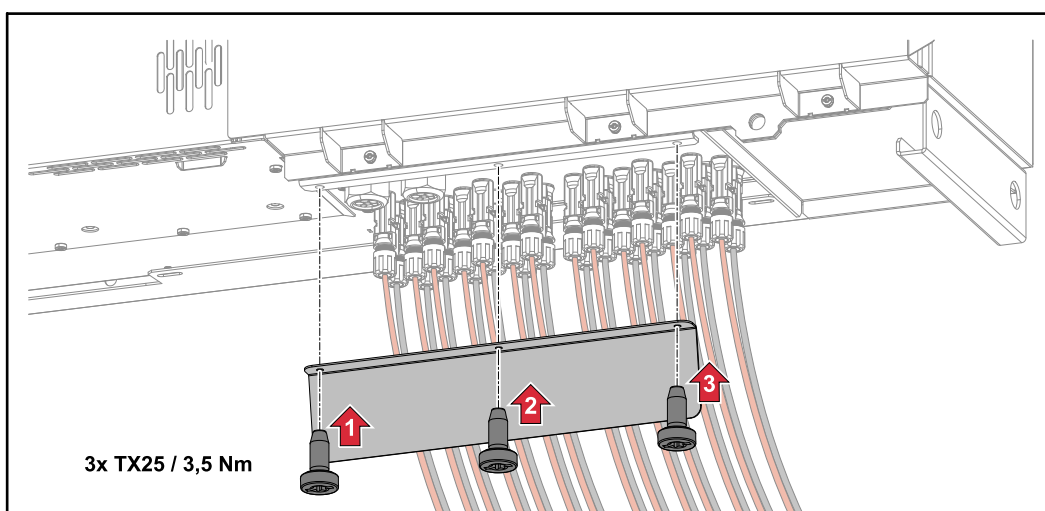
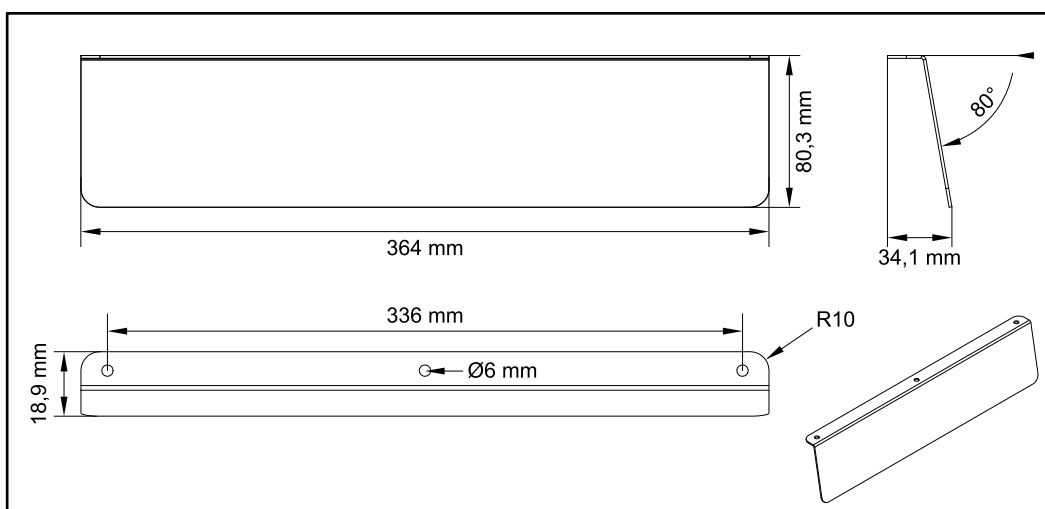


Connect the PV cables from the solar modules to the MC4 connectors as labeled

Unused MC4 connectors on the inverter must be covered with the cover plates supplied with the inverter.

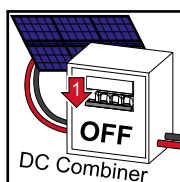
MC4 connector cover

To protect the MC4 connectors, a cover plate can be mounted on the inverter. The cover plate can be ordered as an optional accessory together with the floor racks.

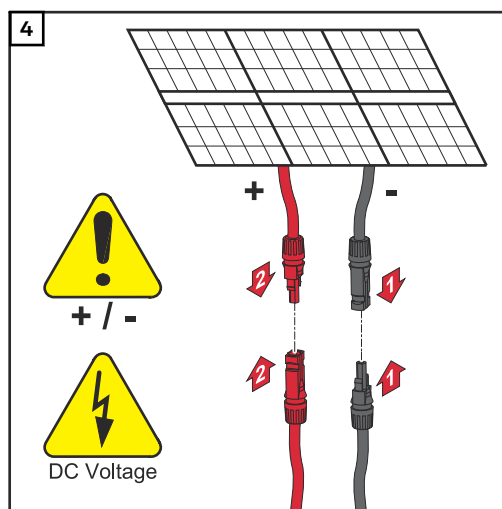
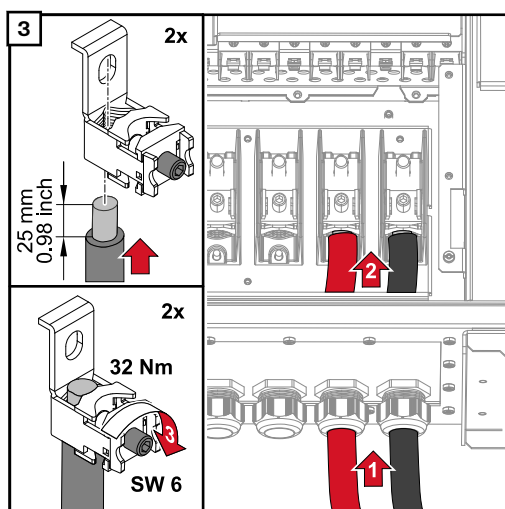
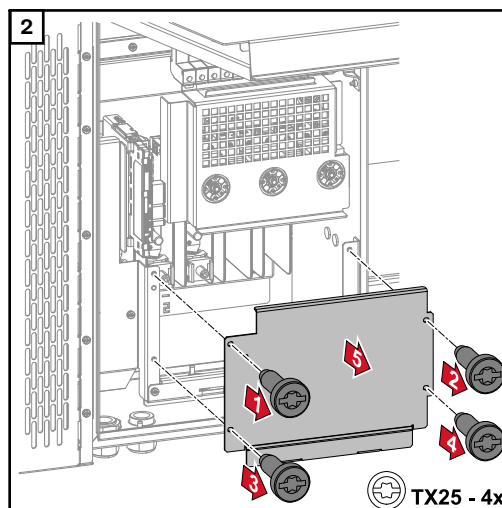
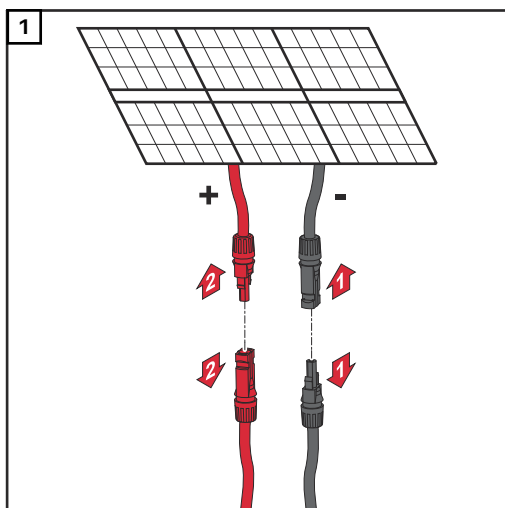


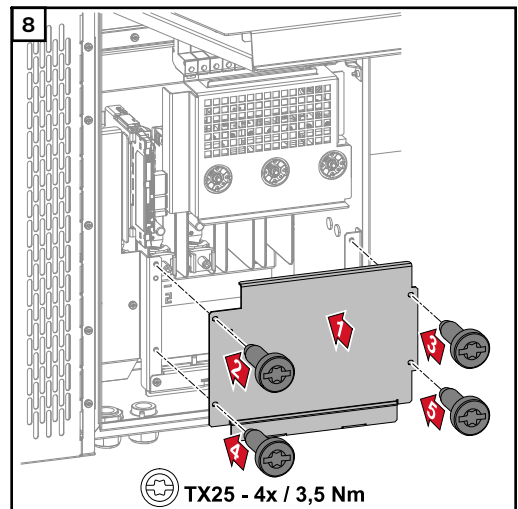
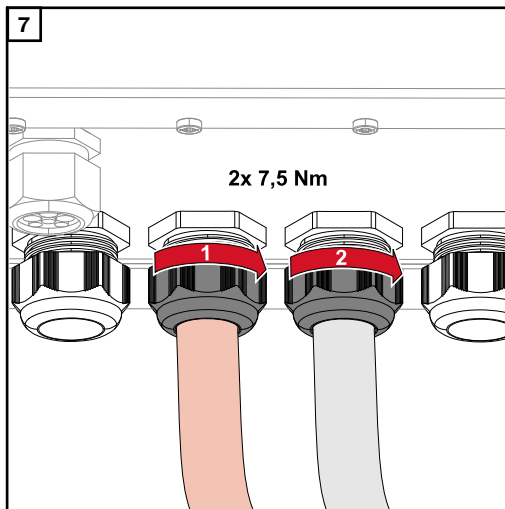
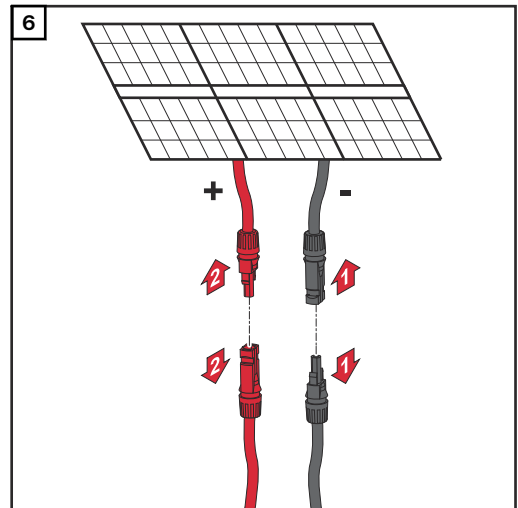
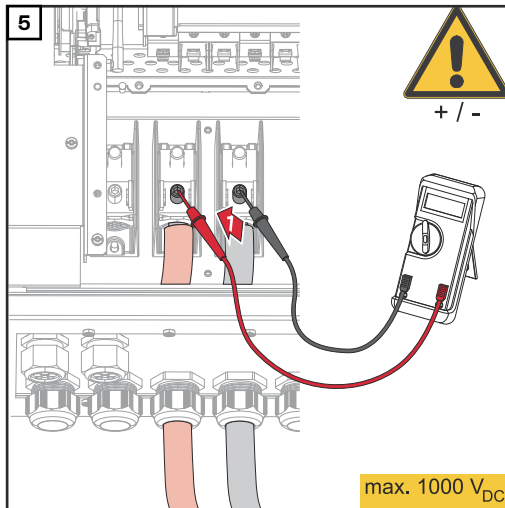
Connecting PV cables - pre-combined

Solar module strings that are combined in a DC combiner box, must, according to the applicable national regulations, be fused per string in the DC combiner box!



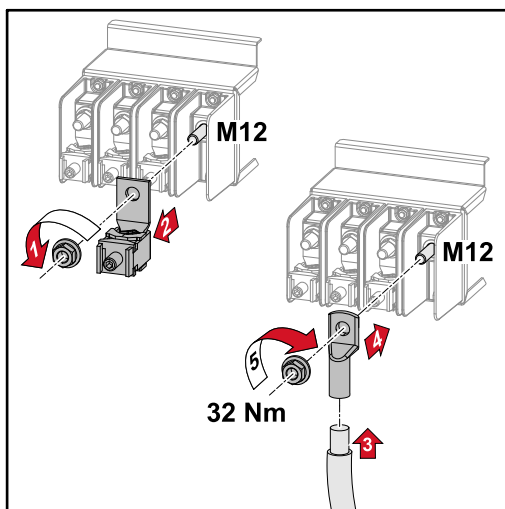
Before working in the connection area of the inverter, the DC voltage must be switched off. This can also be done in the DC combiner box.





Connecting cables with a cable lug

Alternatively, a cable with a cable lug can be connected to the M12 threaded bolts on the grid connections in order to connect the cables to the V-type terminals.



Replacing the string fuses

CAUTION

Danger due to faulty fuses.

This can lead to fires.

- ▶ Only replace faulty fuses with new ones of the same rating.
- ▶ Do not replace faulty fuses with bolts.

CAUTION

Danger due to incorrectly dimensioned string fuses

Incorrectly dimensioned string fuses can cause damage to the inverter for these connected components.

The following string fuses should be used for the -D (direct) version of the Fronius Tauro:

- ▶ Max. **10 A** per string → use of **15 A gPV fuse 1000 V** possible (Fronius item number: 41,0007,0230 - fuse 15 1000 F PV 15A)
- ▶ Max. **14.5 A** per string → use of **20 A gPV fuse 1000V** required (Fronius item number: 41,0007,0233 - fuse-HL 20 A 1KV fast)
- ▶ Max. **22 A** per string → use of **30 A gPV fuse 1000V** required (Fronius item number: 41,0007,0241 - fuse-HL 30 A 1KV fast)

Replacing fuses:

Fronius Tauro 50-3-D string 1.1 - 3.7 /

Fronius Tauro 50-3-D (30 A fuses) string 1.1 - 3.5 /

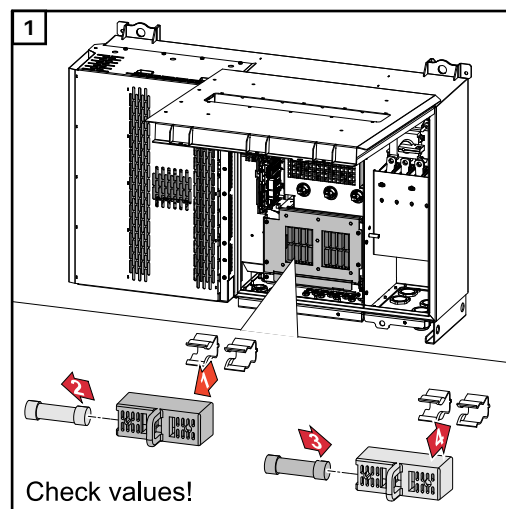
Fronius Tauro Eco 50-3-D string 1.1 - 2.7 /

Tauro Eco 50-3-D (30 A fuses) string 1.1 - 2.5 /

Fronius Tauro Eco 99 / 100-3-D string 1.1 - 2.7 /

Fronius Tauro Eco 99 / 100-3-D (30 A fuses) string 1.1 - 3.5

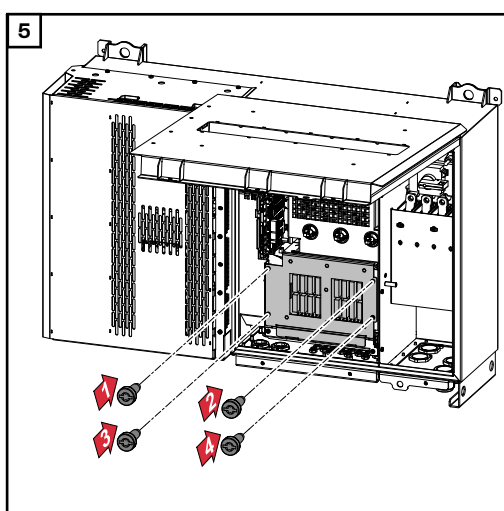
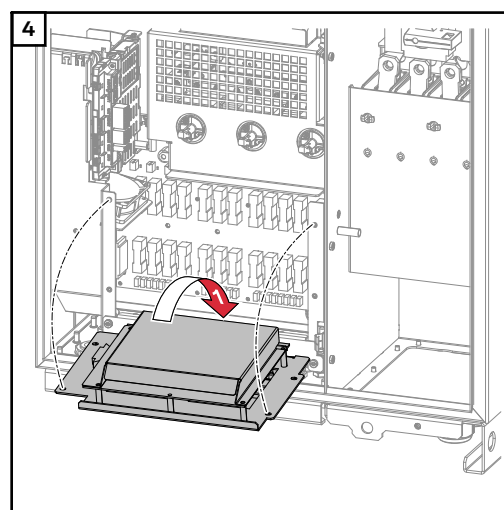
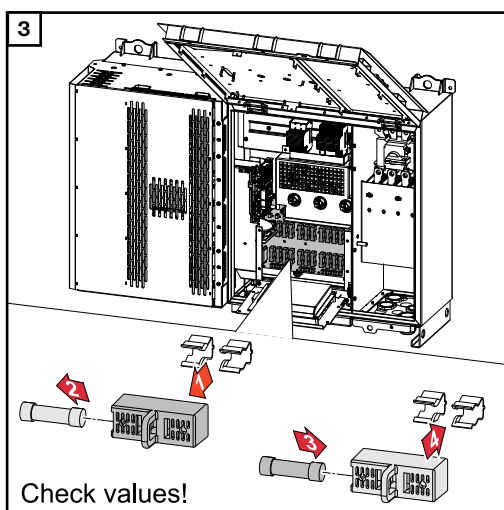
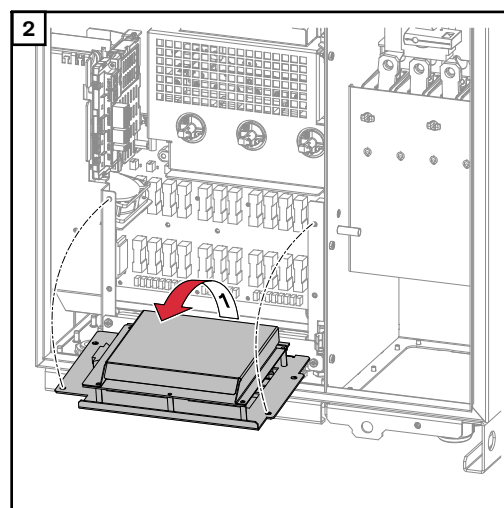
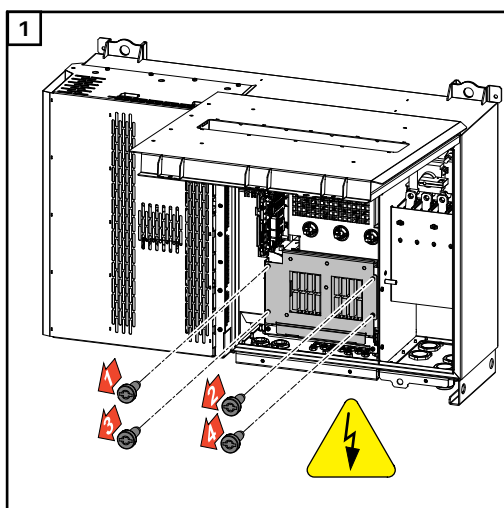
Check values! Only replace faulty fuses with new ones of the same rating.



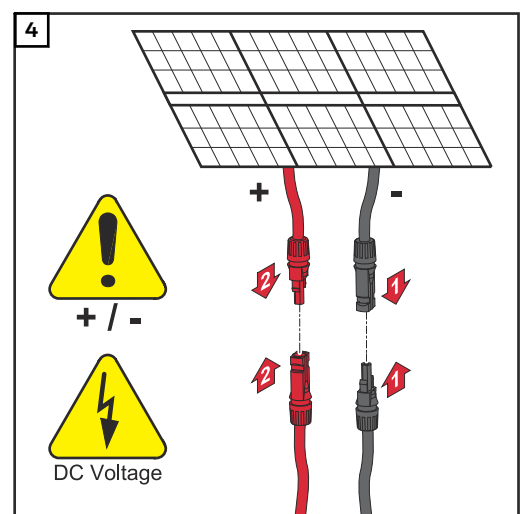
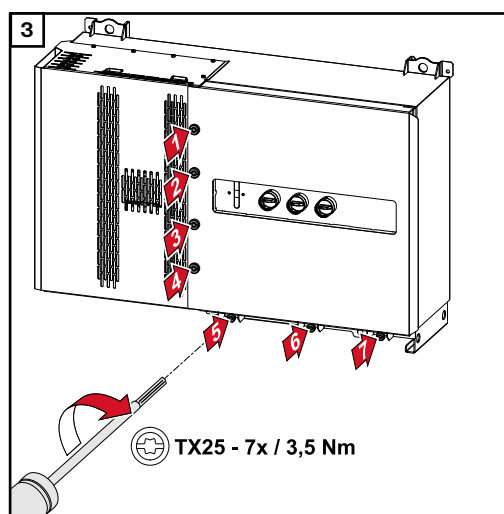
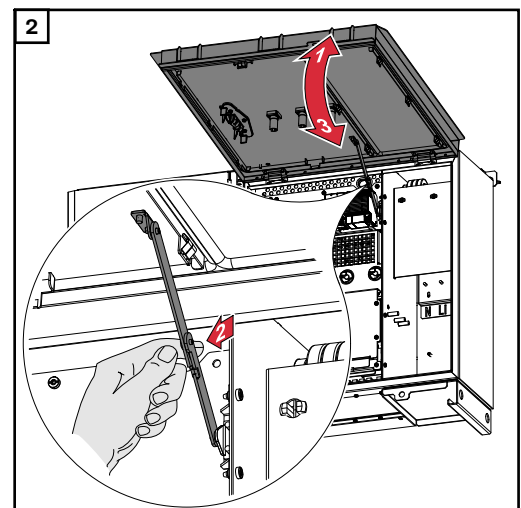
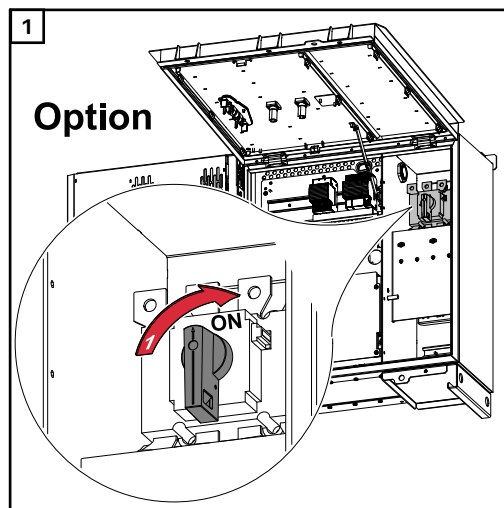
Replacing fuses:

Fronius Tauro Eco 99 / 100-3-D string 3.1 - 3.8

Check values! Only replace faulty fuses with new ones of the same rating.



Closing and switching on the inverter

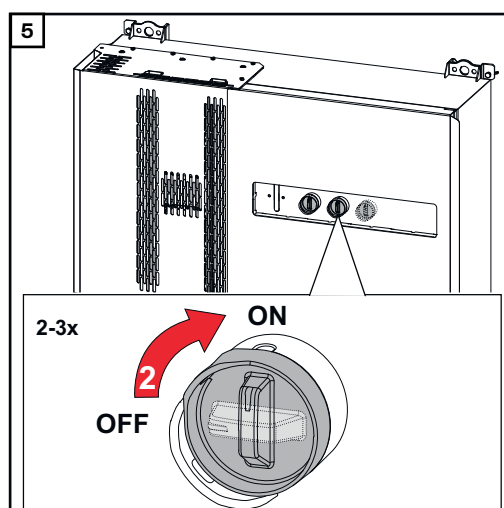


 WARNING

Danger due to DC disconnectors that are not switched on properly

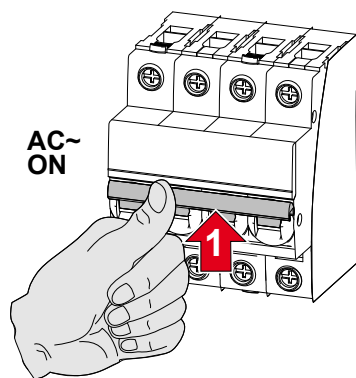
This can result in serious injury and damage to property.

- ▶ Turn all existing DC disconnectors to the ON position before turning on the AC connection.
- ▶ The DC disconnectors may only ever be actuated simultaneously (one immediately after the other).



The WLAN access point can be opened with the optical sensor, see chapter [Button functions and LED status indicator](#) on page 30

6



Connecting the data communication cables

Modbus participants

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

IMPORTANT!

If the function **"Inverter control via Modbus"** is activated in the menu area **"Communication"** → **"Modbus"**, no Modbus participants are possible. It is not possible to send and receive data at the same time.

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

WSD connections with push-in terminal						
Distance max.	Stripping length	Solid	Fine-stranded	Fine-stranded with ferrules with collar	Fine-stranded with ferrules without collar	Cable recommendation
100 m	10 mm	0.14 - 1.5 mm ²	0.14 - 1.5 mm ²	0.14 - 1 mm ²	0.14 - 1.5 mm ²	min. CAT 5 UTP

Modbus connections with push-in terminal						
Distance max.	Stripping length	Solid	Fine-stranded	Fine-stranded with ferrules with collar	Fine-stranded with ferrules without collar	Cable recommendation
300 m	10 mm	0.14 - 1.5 mm ²	0.14 - 1.5 mm ²	0.14 - 1 mm ²	0.14 - 1.5 mm ²	min. CAT 5 STP

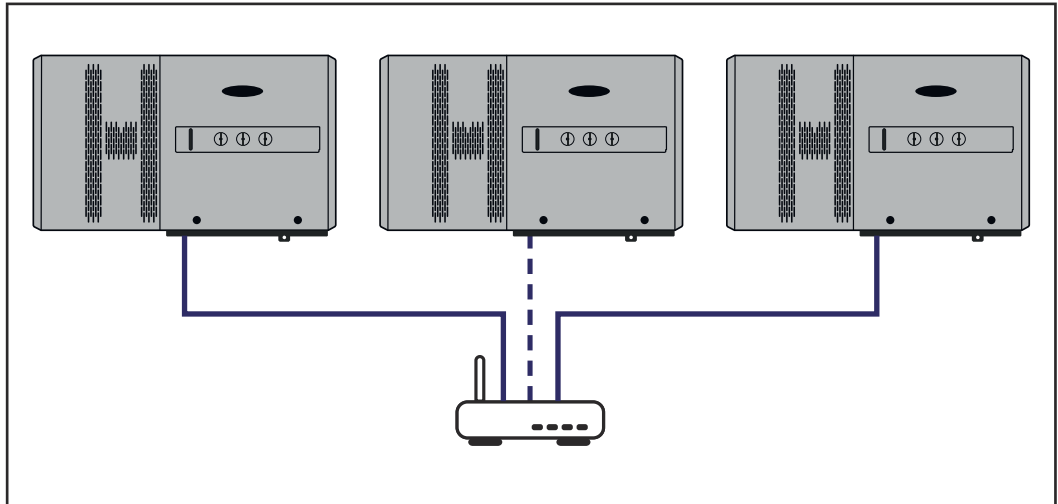
IO connections with push-in terminal						
Distance max.	Stripping length	Solid	Fine-stranded	Fine-stranded with ferrules with collar	Fine-stranded with ferrules without collar	Cable recommendation
30 m	10 mm	0.14 - 1.5 mm ²	0.14 - 1.5 mm ²	0.14 - 1 mm ²	0.14 - 1.5 mm ²	Single conductors possible

LAN connections

Fronius recommends using at least CAT 5 STP (shielded twisted pair) cables and a maximum distance of 100 m.

Multiple inverters in one network

The network cabling of the inverters must be in a star arrangement. Observe the maximum lengths and requirements for the cable!



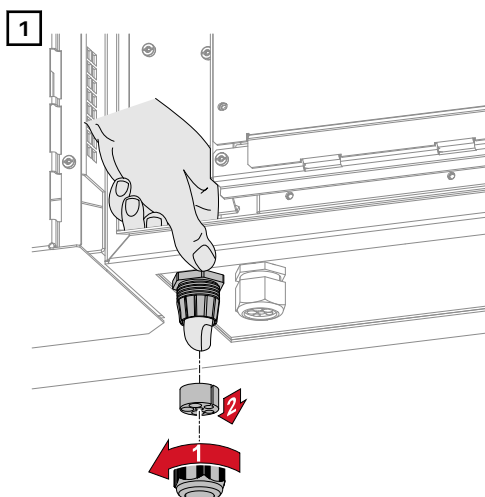
Routing data communication cables

In order to be able to use the connection to Fronius Solar.web or Modbus TCP, each Tauro must be connected directly to the network via LAN.

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.

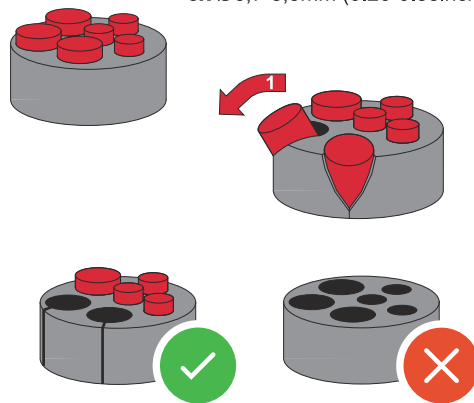
Note! Ingress protection rating IP65 cannot be ensured if blanking plugs are missing or incorrectly inserted.



Remove the cap nut on the strain-relief device and press the sealing ring out from the inside of the device using the blanking plugs.

2

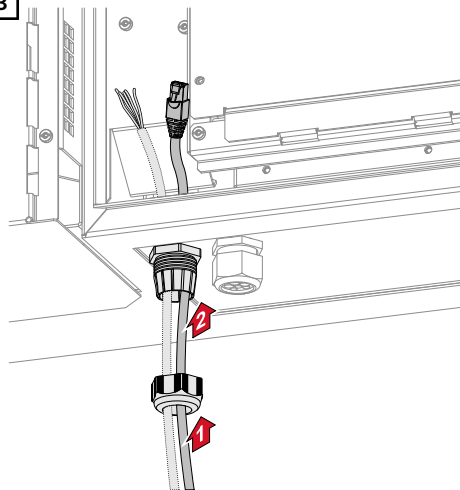
3x Ø4,9-5,5mm (0.19-0.22inch)
3x Ø6,7-8,5mm (0.26-0.33inch)



Open up the sealing ring at the location where the blanking plugs are to be removed.

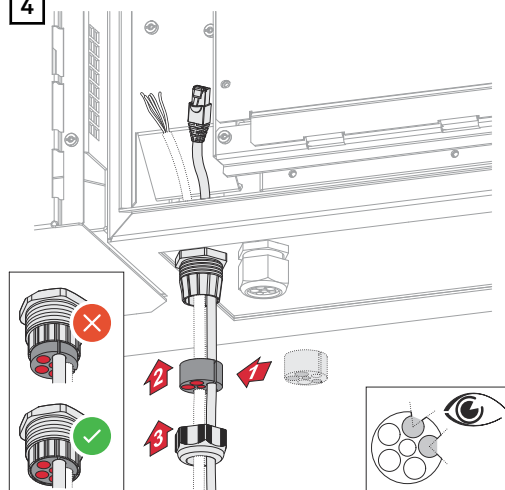
* Remove the blanking plugs with a sideways motion.

3

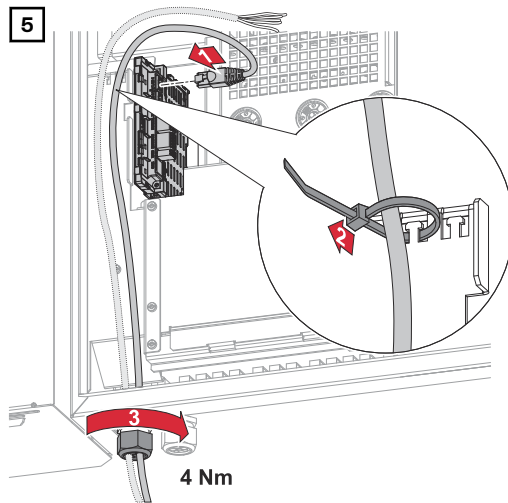


First, guide the data cables through the cap nut of the strain-relief device and then through the housing opening.

4

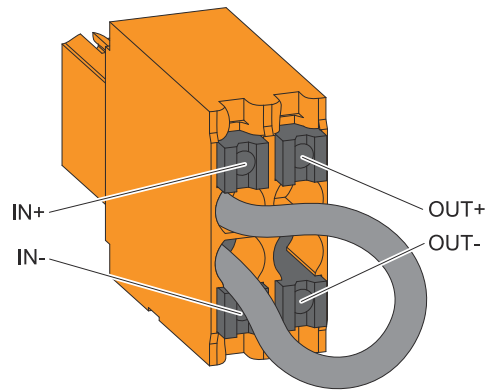


Insert the sealing ring between the cap nut and the housing opening. Press the data cables into the seal's cable guide. Then press in the seal until it reaches the underside of the strain-relief device.



Connect the data cables to the data communication area using a movement loop, and fasten the cap nut with min. 2.5–max. 4 Nm.

Installing the WSD (wired shutdown)

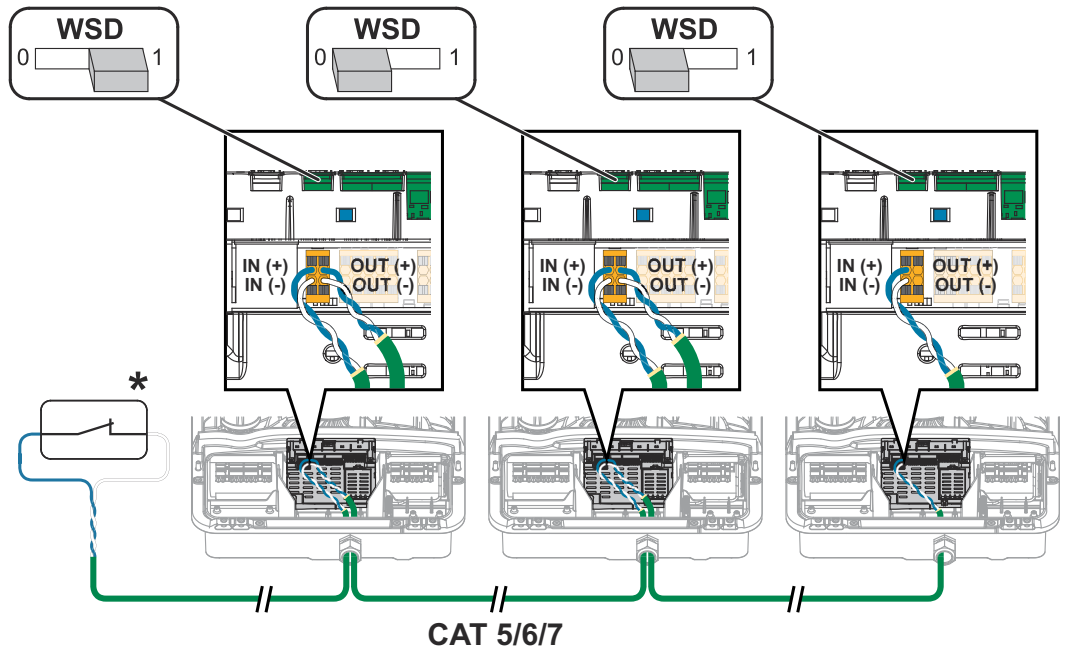


IMPORTANT!

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 position 0 (secondary device).

Max. distance between 2 devices: 100 m
Max. Number of devices: 28



* Floating contact of the trigger device (e.g., central grid and system protection). If several floating contacts are used in a WSD chain, these must be connected in series.

First startup

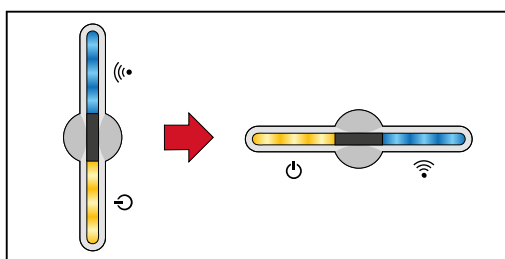
Starting the inverter for the first time

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

If the setup is canceled before completion, the input data is not saved and the start screen with the installation wizard is shown once again. The data is saved in the event of an interruption, e.g., a power failure. Commissioning is continued at the point at which the interruption occurred after the power supply is 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 starting the inverter for the first time. If the country setup needs to be changed at a later date, contact your installer/technical support.

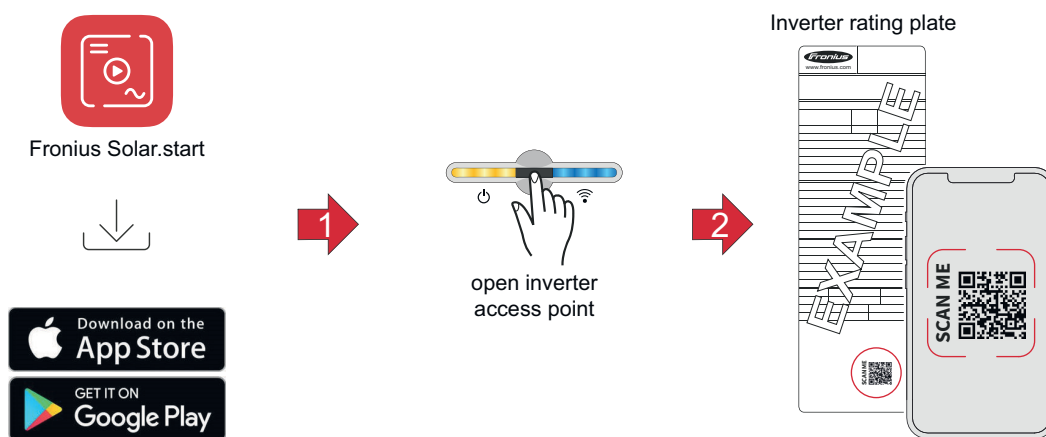
Fronius system monitoring (Pilot) display



To simplify the display, the vertical installation position of the Pilot PC board (LED display) is shown horizontally below.

Installation with the app

The Fronius Solar.start app is required for installation. Depending on the mobile device used to perform the installation, the app is available on the relevant platform.



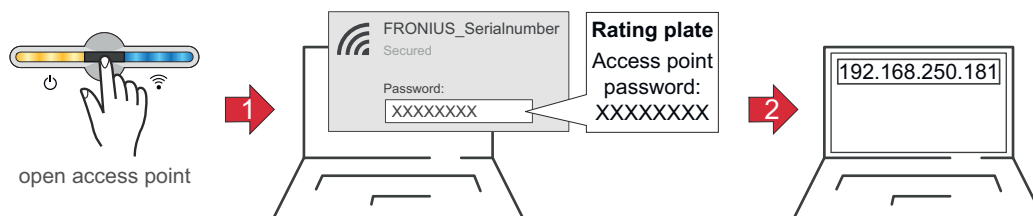
- 1 Download and install the Fronius Solar.start app.
- 2 Open the access point by touching the sensor .
✓ Communication LED flashes blue.
- 3 Open the Fronius Solar.start app and follow the installation wizard. Scan the QR code on the rating plate with a smartphone or tablet to connect to the inverter.
- 4 Add system components in Fronius Solar.web and commission the PV system.

The network wizard and product setup can be performed independently. A network connection is required for the Fronius Solar.web installation wizard.

Installation with the browser

The network wizard and product setup can be performed independently. A network connection is required for the Fronius Solar.web installation wizard.

WiFi:

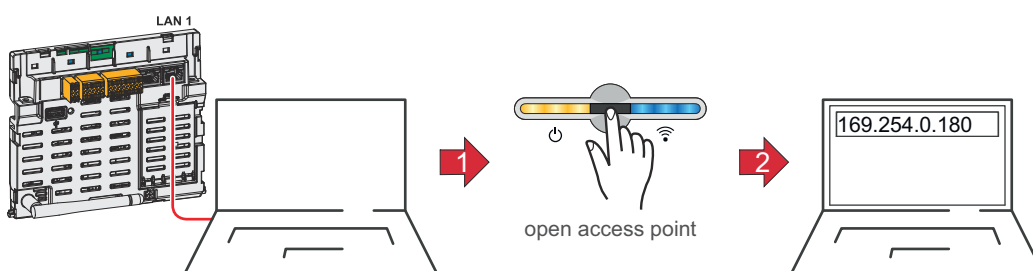


- 1 Open the access point by touching the sensor .
 - ✓ *Communication LED flashes blue.*
- 2 Establish the connection to the inverter in the network settings (the inverter is displayed with the name "FRONIUS_" and the serial number of the device).
- 3 Enter the password from the rating plate and confirm.

IMPORTANT!

To enter the password, first select the **Connect using a security key instead** link in order to establish the connection with the password.
- 4 Enter the IP address 192.168.250.181 in the address bar of the browser and confirm. The installation wizard opens.
- 5 Follow the installation wizard and complete the installation in the individual areas.
- 6 Add the system components in Fronius Solar.web and commission the PV system.

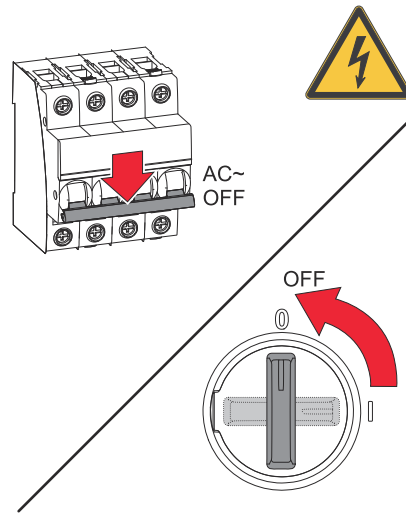
Ethernet:



- 1 Establish a connection to the inverter (LAN1) using a network cable (min. CAT5 STP).
- 2 Open the access point by touching the sensor once .
 - ✓ *Communication LED flashes blue.*
- 3 Enter the IP address 169.254.0.180 in the address bar of the browser and confirm. The installation wizard opens.
- 4 Follow the installation wizard and complete the installation in the individual areas.
- 5 Add the system components in Fronius Solar.web and commission the PV system.

De-energizing the inverter and switching it back on

De-energizing the inverter and switching it back on



Disconnecting the inverter from the power supply:

- 1 Switch off the automatic circuit breaker (AC and, if present, battery).
- 2 Turn the DC disconnect to the "Off" switch setting.

IMPORTANT!

Wait for the capacitors of the inverter to discharge!

Switching on the inverter:

If the inverter has not been in operation for six months or more after installation, it must be tested before commissioning.

- 1 Turn the DC disconnect to the "On" switch setting.
- 2 Switch on the automatic circuit breaker (AC and, if present, battery).

Settings – User interface of the in- verter

User settings

User login

- 1 Open the user interface of the inverter in the browser.
- 2 In the **Login** menu area, log in with username and password, or, in the **User > User Login** menu area, log in with username and password.

IMPORTANT!

Depending on the authorization of the user, settings can be made in the individual menu areas.

Selecting languages

- 1 In the **User > Language** menu area, select the desired language.

Device configuration

Components

All available components of the system can be added via **"Add component+"**.

PV Generator

Activate the respective PV generator and enter the connected PV output in the relevant field.

Primary meter

For problem-free operation with further energy generators, it is important to install the Fronius Smart Meter at the feed-in point. The inverter and further generators must be connected to the public grid via the Fronius Smart Meter. This setting also has an effect on the behavior of the inverter during the night. If the function is deactivated, the inverter switches to standby mode as soon as there is no more PV power available. The message "Power low" appears. The inverter starts up again as soon as sufficient PV power is available.

After connecting the meter, select one of the following device types:

- **Modbus RTU**
- **Modbus TCP**
- **MQTT** (available **MQTT device** is displayed automatically)

NOTE

For communication via MQTT, the inverter and Smart Meter must be in the same sub-network.

The following parameters must also be defined for the Smart Meter:

- **Application** (**Production meter** or **Secondary meter**)
- **Name**
- **Category** (e.g., **Inverter**)
- **IP Address** (for Modbus TCP)
- **Port** (for Modbus TCP)
- **Modbus Address** (for Modbus RTU and TCP)

Several Fronius Smart Meters can be installed in the system. The Watt value in the "Production meter" field is the sum of all the production meters. The Watt value in the "Consumption meter" field is the sum of all the secondary meters.

Ohmpilot

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

Functions and IOs

Load Management

Select up to four pins for the load management. Further settings for the load management are available in the **Load Management** menu item.
Default: Pin 1

Australia - Demand Response Modes (DRM)

Activate the slider if DRM is required. Configure the pins for control via DRM as follows:

Mode	Description	Information	Default pin
DRM0	Inverter disconnects from the grid	Grid relays open	
	REF GEN		RG0
	COM LOAD		CLO
		DRM0 occurs in the event of an interruption or short circuit on the REF GEN or COM LOAD lines. Or in the event of an invalid combination of DRM1—DRM8.	

IMPORTANT! If the **Australia - Demand Response Modes (DRM)** function is activated and no DRM control is connected, the inverter switches to standby mode.

UC Editor—AUS —Demand Response Modes (DRM)

Here, for the Australian country setup, a value for the apparent power consumption and the apparent power output can be entered.

Inverter

"Force standby"

When this function is activated, the power feed from the inverter into the grid is interrupted. This makes it possible to shut down the inverter without power and protect its components. The standby function is automatically deactivated when the inverter is restarted.

"PV 1" and "PV 2"

Parameter	Value range	Description
"Mode"	Off	The MPP tracker is deactivated.
	Auto	The inverter uses the voltage at which the maximum possible output of the MPP tracker is possible.
	Fixed	The MPP tracker uses the voltage defined in "UDC fixed" .
"UDC fixed"	80 - 530 V	The inverter uses the fixed voltage that is used on the MPP tracker.
"Dynamic Peak Manager"	Off	Function is deactivated.
	On	The entire solar module string is checked for optimization potential and the best possible voltage for the supply of energy from the inverter into the grid is determined.

"Ripple control signal"

Ripple control signals are signals that are sent by the energy company in order to switch controllable loads on and off. Depending on the installation situation,

ripple control signals can be dampened or amplified by the inverter. This can be counteracted if necessary by applying the following settings.

Parameter	Value range	Description
"Reduction of influence"	Off	Function is deactivated.
	On	Function is activated.
"Frequency of the ripple control signal"	100 - 3000 Hz	The frequency specified by the energy company must be entered here.
"Grid inductance"	0.00001 - 0.005 H	The value measured at the feed-in point must be entered here.

"Measure against RCD false triggers"

(when using a 30 mA residual current circuit breaker)

NOTE

A residual current circuit breaker for the AC connecting cable may be required depending on national regulations, the grid operator, and other conditions.

A type A residual current circuit breaker is generally sufficient in this case. 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, Fronius recommends using a residual current circuit breaker suitable for frequency inverters with a release current of least 100 mA, taking into account national provisions.

Parameter	Value range	Description
Leakage current factor to reduce RCMU/FI false tripping	0 - 0.25 (default: 0.16)	By reducing the setting value, the leakage current is reduced and the intermediate circuit voltage is increased, which slightly lowers the efficiency. - A setting value of 0.16 ensures optimum efficiency. - A setting value of 0 enables minimum leakage currents.
Shutdown before 30 mA RCD triggers	Off	The function for reducing false tripping of the residual current circuit breaker is deactivated.
	On	The function for reducing false tripping of the residual current circuit breaker is activated.
Rated non-tripping fault current limit value	0.015 - 0.3	Value of the non-tripping residual current specified by the manufacturer for the residual current circuit breaker at which the residual current circuit breaker does not switch off under specified conditions.

"Insulation warning"

Parameter	Value range	Description
"Insulation warning"	Off	The insulation warning is deactivated.
	On	The insulation warning is activated. A warning is output in the event of an insulation fault.

Parameter	Value range	Description
"Insulation measurement mode"	Exact	Insulation monitoring takes place with the highest degree of accuracy and the measured insulation resistance is displayed on the user interface of the inverter.
	Fast	Insulation monitoring takes place with a lesser degree of accuracy, whereby the time to take the insulation measurement is shortened and the insulation value is not displayed on the user interface of the inverter.
"Threshold for the insulation warning"	10 - 10,000 kΩ	If the value drops below the threshold, status code 1083 is displayed on the user interface of the inverter.

System

General

- 1** Enter the name of the system in the input field **PV System Name** (max. 30 characters).
 - 2** Select the **Timezone Region** and **Timezone Location** in the drop-down lists.
 - 3** Click **Save**.
- ✓ *System name, time zone, and time zone location are saved.*
-

Update

All available updates for inverters and other Fronius devices are provided on the product pages and in the "Fronius Download Search" area at www.fronius.com.

Update

- 1** Drag the firmware file into the **Drag & drop file here** field, or select via **Browse file**.
- ✓ *Update is started.*
-

Setup wizard

The guided setup wizard can be accessed here.

Restoring factory settings

All settings

Resets all configuration data, apart from the country setup. Changes to the country setup may only be made by authorized personnel.

All settings without network

Resets all configuration data, apart from the country setup and the network settings. Changes to the country setup may only be made by authorized personnel.

Event log

Current messages All current events of the linked system components are displayed here.

IMPORTANT!

Depending on the type of event, this must be confirmed via the "tick" button so that it can be further processed.

History

All events of the linked system components that are no longer present are displayed here.

Information

All the information regarding the system and the current settings is displayed and provided for download in this menu area.

License Manager

The power data and functional scope of the inverter are stored in the license file. If the inverter, power stage set control PCB, or the data communication area is replaced, the license file must also be replaced.

Licensing

Licensing - online (recommended)

This requires an Internet connection and a completed Fronius Solar.web configuration.

- 1 Finish all installation work (refer to the chapter headed [Starting the inverter for the first time](#) on page 71).
- 2 Establish a connection to the user interface of the inverter.
- 3 Enter the serial number and verification code (VCode) of the defective and replacement device. The serial number and VCode can be found on the rating plate of the inverter (refer to the chapter headed [Information on the device](#) on page 15).
- 4 Click the **Start online licensing** button.
- 5 Skip past the Terms and conditions of use and Network settings menu items by clicking **Next**.

✓ *License activation is started.*

Licensing - offline

There must be no Internet connection in this case. If offline licensing is carried out while there is an active Internet connection, the license file is automatically loaded onto the inverter, resulting in the following error when the license file is uploaded: "The license has already been installed and the wizard can be closed".

- 1 Finish all installation work (refer to the chapter headed [First startup](#) on page 71).
- 2 Establish a connection to the user interface of the inverter.
- 3 Enter the serial number and verification code (VCode) of the defective and replacement device. The serial number and VCode can be found on the rating plate of the inverter (refer to the chapter headed [Information on the device](#) on page 15).
- 4 Click the **Start offline licensing** button.
- 5 Download the service file onto the mobile device by clicking the **Download service file** button.
- 6 Open licensemanager.solarweb.com and log in with username and password.
- 7 Drag the service file into the **Drag service file here or click to upload** field or click to upload it.
- 8 Download the newly generated license file onto the mobile device by clicking the **Download license file** button.
- 9 Switch to the user interface of the inverter and drag the license file into the **Drag & drop license file here** field or select via **Choose license file**.

✓ *License activation is started.*

Support

Activating the support user

- 1 Click the **Enable Support User Account** button.

✓ *The support user is activated.*

IMPORTANT!

The support user exclusively enables Fronius Technical Support to configure settings on the inverter via a secure connection. Access is deactivated by clicking the **Terminate Support User Session** button.

Generating support info (for Fronius Support)

- 1** Click the **Generate support info** button.
- 2** The sdp.cry file is downloaded automatically. For manual download, click the **Download support info** button.

✓ *The sdp.cry file is saved in the downloads.*

Activating remote access

- 1** Click the **Activate Remote Access** button.

✓ *Remote access is activated for Fronius Support.*

IMPORTANT!

The remote access exclusively enables Fronius Technical Support to access the inverter via a secure connection. In this case, diagnostics data are transmitted, which are used for troubleshooting. The remote access can be activated only upon request by Fronius Support.

Communication

Network

Server addresses for data transfer

If a firewall is used for outgoing connections, allow the below protocols, server addresses, and ports for successful data transfer, see:

https://www.fronius.com/~/downloads/Solar%20Energy/Firmware/SE_FW_Changelog_Firewall_Rules_EN.pdf

When using FRITZ!Box products, configure Internet access without any restrictions or limitations. Do not set the DHCP Lease Time (validity) to 0 (=infinite).

LAN:



Establishing a connection:

- 1 Enter the host name.
- 2 Select the connection type: **Automatic** or **Static**.
- 3 For the **Static** connection type, enter the IP address, subnet mask, DNS, and gateway.
- 4 Click the **Connect** button.

✓ *The connection is established.*

After establishing the connection, check the connection status.

WiFi:



Establishing a connection via WPS:

- ☐ Activate the access point of the inverter. This is opened by touching the sensor  > Communications LED flashes blue
- 1 Establish the connection to the inverter in the network settings (the inverter is displayed with the name "FRONIUS_" and the serial number of the device).
 - 2 Enter the password from the rating plate and confirm.
IMPORTANT!
To enter the password, first select the **Connect using a security key instead** link in order to establish the connection with the password.
 - 3 Enter the IP address 192.168.250.181 in the address bar of the browser and confirm.
 - 4 In the **Communication > Network > WLAN > WPS** menu area, click the **Activate** button.
 - 5 Activate WPS on the WiFi router (see WiFi router documentation).
 - 6 Click on the **Start** button. The connection is established automatically.
 - 7 Log in to the user interface of the inverter.
 - 8 Check the network details and connection to Fronius Solar.web.

After connecting, the status of the connection should be checked.

Selecting and connecting to a WiFi network:

The networks found are displayed in the list. Click the refresh button ↻ to perform a new search for available WiFi networks. If necessary, restrict the selection list further via the **Search network** input field.

- 1 Select network from the list.
- 2 Select the connection type: **Automatic** or **Static**.
- 3 For the **Automatic** connection type, enter the WiFi password and host name.
- 4 For the **Static** connection type, enter the IP address, subnet mask, DNS, and gateway.
- 5 Click the **Connect** button.

✓ *The connection is established.*

After establishing the connection, check the connection status.

Access point:



The inverter serves as the access point. A PC or mobile device connects directly to the inverter. Connecting to the Internet is not possible. Assign a **Network Name (SSID)** and **Network Key (PSK)** to establish a connection. Assign a **Network Key (PSK)** with at least 20 characters, consisting of upper and lower case letters, special characters, and numbers, to protect the device from unauthorized access.

It is possible to operate a connection via WiFi and via the access point at the same time.

Modbus

To use the Modbus TCP or the connection to Fronius Solar.web, each Tauro must be connected directly to the network via LAN.

Modbus RTU interface 0 / 1

If one of the two Modbus RTU interfaces is set to Slave, the following input fields are available:

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.

Meter address

The value entered is the identification number (Unit ID) assigned to the meter. Can be found on the user interface of the inverter in the **Communication** → **Modbus** menu.

Factory setting: 200

Meter address

The value entered is the identification number (Unit ID) assigned to the meter.

Can be found on the user interface of the inverter in the **Communication** → **Modbus** menu.

Factory setting: 1

Slave as Modbus TCP

This setting is necessary to enable inverter control via Modbus. If the function **Slave as Modbus TCP** is activated, the following input fields are available:

Modbus port

Number of the TCP port that is to be used for Modbus communication.

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.

Meter address

The value entered is the identification number (Unit ID) assigned to the meter. Can be found on the user interface of the inverter in the **Communication** → **Modbus** menu.

Factory setting: 200

Inverter address

The value entered is the identification number (Unit ID) assigned to the inverter. Can be found on the user interface of the inverter in the **Communication** → **Modbus** menu.

Factory setting: This value is invariably defined as 1.

Inverter control via Modbus

If this option is activated, the inverter is controlled via Modbus.

Inverter control includes the following functions:

- on/off
 - Power reduction
 - Specification of a constant power factor (cos phi)
 - Specification of a constant reactive power value
-

Restrict Control

An IP address can be entered here, which is the only one authorized to control the inverter.

Cloud control

The utility/energy supplier can influence the output power of the inverter with **Cloud control**. This requires the inverter to have an active Internet connection.

Parameter	Display	Description
Cloud control	Off	Cloud control of the inverter is deactivated.
	On	Cloud control of the inverter is activated.

Profile	Value range	Description
Allow cloud control for regulatory purposes (Technician)	Deactivated/ Activated	The function may be mandatory for proper operation of the system.*
Allow cloud control for Virtual Power Plants (Customer)	Deactivated/ Activated	If the Allow remote control for regulatory purposes (technician) function is activated (technician access required), the Allow remote control for virtual power plants function is automatically activated and cannot be deactivated.*

* Cloud control

A virtual power plant is an interconnection of multiple generators. This virtual power plant can be controlled by means of the cloud control via the Internet. An active inverter Internet connection is a prerequisite for this. System data are transferred.

Solar API

The **Solar API** is an IP-based, open JSON interface. If enabled, IOT devices in the local network may access inverter information without authentication. For security reasons, the interface is disabled in the factory. Activate the interface manually if it is required for a third-party application (e.g., EV charger, smart home solutions, etc.). If there is a Fronius Wattpilot in the network, the inverter automatically activates the **Solar API**.

Fronius recommends using Fronius Solar.web for monitoring and analyzing the inverter and connected system components.

In the event of a firmware update to version 1.14.x, the Solar API setting is applied. In systems with a version below 1.14.x, the Solar API is activated; with higher versions, it is deactivated but can be switched on and off via the menu.

Manually activating the Fronius Solar API

On the user interface of the inverter in the **Communication > Solar API** menu area, activate the function **Activate communication via Solar API**.

Fronius Solar.web

In this menu, you can agree to the technically necessary data processing or reject it.

In addition, the transfer of analysis data and remote configuration via Fronius Solar.web can be enabled or disabled.

Safety and grid requirements

Country setup



WARNING

Danger from unauthorized fault analyses and repair work.

This can result in serious injury and damage to property.

- ▶ Fault analyses and repair work on the PV system may only be carried out by installers/service technicians from authorized specialist companies in accordance with national standards and regulations.

NOTE

Risk due to unauthorized access.

Incorrectly set parameters can have a negative effect on the public grid and/or the grid power feed operation of the inverter and result in the loss of standard conformity.

- ▶ Parameters may only be adjusted by installers/service technicians from authorized specialist companies.
- ▶ Do not give the access code to third parties and/or unauthorized persons.

NOTE

Risk due to incorrectly set parameters.

Incorrectly set parameters can have a negative effect on the public grid and/or cause inverter malfunctions and failures and result in the loss of standard conformity.

- ▶ Parameters may only be adjusted by installers/service technicians from authorized specialist companies.
- ▶ Parameters may only be adjusted if this has been approved or requested by the utility.
- ▶ Any parameter adjustments must be made in compliance with nationally applicable standards and/or directives as well as the specifications of the utility.

The **Country Setup** menu area is intended exclusively for installers/service technicians from authorized specialist companies. To apply for the access code required for this menu area, see chapter [Requesting inverter codes in Solar.SOS](#).

The selected country setup for the country in question contains preset parameters in accordance with nationally applicable standards and requirements. Changes may need to be made to the selected country setup depending on local grid conditions and the specifications of the utility.

Requesting inverter codes in Solar.SOS

The **Country Setup** menu area is intended exclusively for installers/service technicians from authorized specialist companies. The inverter access code required for this menu area can be requested in the Fronius Solar.SOS portal.

Requesting inverter codes in Fronius Solar.SOS:

- 1 Open solar-sos.fronius.com in the browser
- 2 Log in with your Fronius account
- 3 At the top right, click on the drop-down menu

- 4 Select the **Show inverter codes** menu item
 - ✓ A contract page appears on which the request for the access code to change the grid parameters for Fronius inverters is located
- 5 Accept the terms and conditions of use by checking **Yes, I have read and agree to the terms of use** and click **Confirm & Save**
- 6 After that, the codes can be retrieved in the drop-down menu at the top right under **Show inverter codes**



CAUTION

Risk due to unauthorized access.

Incorrectly set parameters can have a negative effect on the public grid and/or the grid power feed operation of the inverter and result in the loss of standard conformity.

- Parameters may only be adjusted by installers/service technicians from authorized specialist companies.
- Do not give the access code to third parties and/or unauthorized persons.

Absolute Generation Limit

Activating this function limits the output power of the inverter to the specified value in watts.

Import limitation

Energy companies or grid operators can prescribe import limitations for inverters. The amperage is limited to the set value.

- 1 Under **Limit** select **Current Limitation**.
- 2 Enter the **limit value** in amperes.
- 3 Click on **Save**.

Feed-in limit

Due to hardware limitations, the Fronius Tauro cannot reduce the power to 0%, but only to 0.5 to 1%.

Grid operators or utilities can prescribe feed-in limits for an inverter (e.g., max. 70% of the kWp or max. 5 kW).

The feed-in limit takes account of self-consumption before the power of an inverter is reduced:

There are two options for the feed-in limit:

- a) Easily reduce the power of an inverter with a Fronius Smart Meter
- b) Reduce the power with an external plant controller

The following formulas provide guidance on which solution can be used:

P_{WRn} ... Power of inverter n

$0\% P_{WR1} + 100\% P_{WR2} + 100\% P_{WR3} \dots \leq \text{feed-in limit} \rightarrow \text{solution a)}$

$0\% P_{WR1} + 100\% P_{WR2} + 100\% P_{WR3} \dots > \text{feed-in limit} \rightarrow \text{solution b)}$

Solution a) – Power reduction of a single inverter

The specifications can be met if the prescribed feed-in limit is reached by reducing the power of a single inverter to $\geq 0\%$.

Example:

There are 3 inverters in a system: 1x Fronius Tauro 100 kW, 2x Fronius Tauro 50 kW. The specified feed-in limit at the transfer point must not exceed 100 kW.

Solution:

The Fronius Tauro can be regulated to 0% output power to meet the feed-in limit. The power of the other two inverters is not reduced and can be fed in at any time without restriction.

If the power reduction of an inverter to 0% is not sufficient, solution b) must be used.

Solution b) – Integration of a plant controller

This solution is used if the requirements of the utility cannot be met by limiting a single inverter or if permanent access (e.g., remote shutdown) is required. In this case, the integration of a PLANT CONTROLLER is recommended.

A detailed technical overview of this solution can be found at www.fronius.com using the keyword "feed-in management".

In order to benefit from the advantages of Fronius Solar.web in addition to the monitoring function of the PLANT CONTROLLER system, a Fronius Smart Meter can also be installed. The integration of a Fronius Smart Meter ensures that the consumption and feed-in data of the PV system are visualized in Fronius Solar.web and are available for analysis.

Total DC power of the system

Input field for the total DC power of the entire system in Wp. Always enter this value if the **Maximum grid feed-in power** is specified in %.

Power Control deactivated

The inverter converts all available PV energy.

Power Control activated

Feeding in limited with the following selection options:

- **Total Power Limit**
The entire photovoltaic system is limited to a fixed feed-in limit. Set a value for the permissible total power of feeding in.
- **Limit per phase – weakest phase**
The inverter measures each individual phase. If the permissible feed-in limit is exceeded on one phase, the inverter symmetrically reduces the total power for all phases until the limit is reached.

Export Limit Control (Soft Limit)

If this value is exceeded, the inverter readjusts down to the set value. The adjustment of the value takes place within the time required by the national standards and regulations.

Maximum grid feed-in power

Input field for the **Maximum grid feed-in power** in W or % (setting range: -10 to 100%).

If there is no meter in the system or if the primary meter has failed, the inverter limits its output power to the set value.

Export Limit Protection ($P_{AV,E}$ protection)

This function monitors compliance with the feed-in limit. If **Dynamic feed-in limit (Soft Limit)** is activated, the inverter controls the power of feeding in in such a way that this function is usually not activated. If the specified limit values and the switch-off times are exceeded, this protection function disconnects the inverter from the grid.

The **Maximum grid feed-in power ($P_{AV,E}$)** in the case of an asymmetric feed-in (**Limit per phase – weakest phase**) can be combined with the export limit protection ($P_{AV,E}$ protection) function. The **Maximum grid feed-in power** is calculated as follows: **Maximum grid feed-in power per phase ($P_{AV,E}$)** $\times 3$.

The export limit protection ($P_{AV,E}$ protection) function is only possible if a Smart Meter IP configured with MQTT is installed at the feed-in point.

Multiple Inverter Control

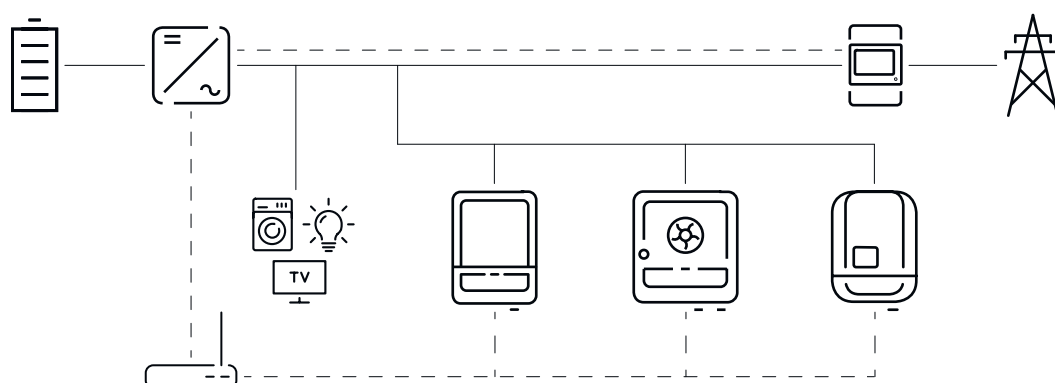
IMPORTANT! To view and change settings in this menu item, select the **Technician** user. Enter and confirm the password for the **Technician** user. Settings in this menu area may only be made by trained and qualified personnel.

The inverter can be used as a primary device to control dynamic feed-in limits for additional Fronius inverters (secondary devices) so that feed-in limits prescribed by energy companies or utilities can be centrally managed. This control refers to the **Soft Limit** feed-in limit see [Feed-in limit](#). To do so, the following requirements must be met:

- A Fronius Smart Meter is configured as a primary meter and connected to the master.
- **Power Control** is activated and configured in the **Feed-in limit** menu on the user interface of the primary device. The power control limit is set to **Total Power Limit**.
- Master and secondary device(s) are physically connected to the same network router via LAN.
- If **Use Modbus TCP** is enabled, the inverter control via Modbus TCP must be activated and configured for all secondary devices.

IMPORTANT! Only one primary meter is required for the primary device.

IMPORTANT! If an inverter with a battery is connected, use this inverter as the primary device for **Multiple Inverter Control**.



Example connection diagram for Multiple Inverter Control

System limits

- Systems with a maximum of 20 inverters (1 primary device + 19 secondary devices) are supported if the **Use Modbus TCP** function is activated. Otherwise, a maximum of one primary device and two secondary devices are supported.
- The control system is designed for photovoltaic systems with a total output of up to 300 kW.
- In the case of larger system capacities, the control times in the system are extended.
- The use of a plant controller is recommended for systems >300 kW.

External grid and system protection

- Regional standards and guidelines may require the installation of external grid and system protection for systems >30 kVA.
- External grid and system protection can be omitted under the following conditions:
 - A Fronius Smart Meter IP performs the external voltage measurement.
 - The Fronius Smart Meter IP communicates with the primary device via the MQTT protocol.
 - In the country setup, select **On at Smart Meter** from the **Long Time Average Limit** menu.
 - On the user interface of the secondary device, the **Use Modbus TCP** function is disabled.

Multiple Inverter Control is available for the following device combinations:

Primary devices	Secondary devices
GEN24, Verto, Tauro	- GEN24 - Verto - Tauro - Argeno - SnapINverter with Fronius Datamanager 2.0*

** Up to four additional SnapINverters can be connected to each SnapINverter with Fronius Datamanager 2.0.*

Primary meter

One Fronius Smart Meter acts as the only primary meter and is connected directly to the primary device. This Smart Meter measures the total output power of all inverters into the grid and passes this information to the primary device.

Primary device

Configure the feed-in limit on the user interface of the inverter:

- 1 In the **Safety and Grid Regulations > Feed-in limit** menu area, activate the **Power Control** function and Select **Total Power Limit**.
- 2 Configure the country-specific settings.
- 3 In the **Safety and Grid Regulations > Multiple Inverter Control** menu area, activate the **Multiple Inverter Control** function.
The primary device automatically scans the network for available secondary devices.
✓ A list shows the inverters found.

To perform the search again, press the Refresh button .

If **Use Modbus TCP** is activated, it is also possible to select Fronius SnapINverters with Datamanager 2.0 and Fronius Argeno with **Use Inverter**.

- 4 Activate **Use Inverter** against all secondary devices to which a common feed-in limit applies. Click **Use all Inverters** to enable the function for the primary device and all secondary devices.

The status of the inverters listed is displayed as follows:

- **Inactive:** Secondary device is not configured for the power control or a firmware update is required.
- **Disconnected:** Secondary device is configured, network connection not possible.
- **Connected:** Secondary device is configured and accessible via the network of the primary device.

- 5 In the **Safety and Grid Regulations > I/O Power Management** menu area, set the controlling priorities as follows:
 1. **I/O Power Limit**
 2. **Feed-in limit**
 3. **Modbus Control**

Adding Fronius Argeno and other inverters manually

- 1 In the **Multiple Inverter Control** menu, select the **Multiple Inverter Control** function.
- 2 Select additional inverters and click **+ Add**.
- 3 Enter the name, hostname or IP address, and the Modbus address of the secondary device.
- 4 Click **Add**.

For more information on configuring the Fronius Argeno or Fronius Dataman-ager 2.0 as a secondary device, refer to the respective operating instructions.

Secondary device

Each secondary device takes over the settings for the feed-in limit from the primary device. A secondary device does not transmit any data for the feed-in limit to the primary device. To do so, the following requirements must be met:

- **Multiple Inverter Control** is activated and configured in the **Multiple Inverter Control** menu on the user interface of the primary device.

Set the following configurations for the feed-in limit on the secondary device:

User interface secondary device GEN24 / Verto / Tauro

- 1 Select the user **Technician** and enter the password for the user **Technician**.

Only carry out work steps 2 and 3 if **Use Modbus TCP** is activated on the primary device.

- 2 In the **Communication > Modbus** menu area, activate the **TCP Server** mode and the **Allow Control** function.
- 3 For a fail-safe scenario, in the **Safety and Grid Regulations > I/O Power Management** menu area, set the controlling priorities as follows:
 1. **Modbus Control**
 2. **Feed-in limit**
 3. **I/O Power Limit**
- 4 In the **Safety and Grid Regulations > Feed-in limit** menu area, select and edit the following settings:
 - Enable the **Power Control** function.
 - Select **Total Power Limit** and specify the **Total DC power of the system** in watts.
 - Activate the **Dynamic feed-in limit (Soft Limit)** and enter a value of 0 W for the **Maximum grid feed-in power**.
 - Enable the **Reduce inverter power to 0% if meter connection has been lost** function.

I/O Power Management

General

Settings relevant to the grid operator are defined as rules under this menu item. This relates to an effective power limit in % or watts and/or a power factor specification. To view and change settings, select the **Technician** user, and enter and confirm the password. Only technical specialists may make settings in this menu area.

Under **Rules**, expand a menu area (e.g., **Rule 1**). Configure the following settings:

Limitation

IMPORTANT!

A dynamic feed-in limit for several inverters can be configured under [Feed-in limit](#). I/O power management rules are transferred from the inverter (primary device) to connected inverters in the system (secondary devices).

Select the following rules for power management:

- **I/O Generation Limit (%)**: The total output power of the connected inverter is statically limited to the defined value of the absolute rated power.
- **Export Limit Control (W)**: The active power fed in at the grid connection point is limited to the set value (e.g., 5000 watts). The output powers of the inverters (primary and secondary devices) are dynamically adjusted depending on their self-consumption.
- **Shutdown single device**: The inverter stops grid power feed operation and switches to standby mode.

IMPORTANT!

The rules for shutdown apply to this device and cannot be applied to other inverters in the system.

Input pattern (assignment of individual I/Os)

1 click = white, contact open

2 clicks = blue, contact closed

3 clicks = gray, not used

Power Factor ($\cos \varphi$) (define value)

Impedance response

- **Capacitive**
- **Inductive**

DNO Feedback

If the rule is activated, always configure the **DNO Feedback** output, e.g., for operating a signal device.

The **Import** and **Export** of defined rules can be carried out in the data format *.fpc. The rules and pin assignments in the following connection examples are not the only possible configurations. For pin assignment, take into account the available connections at the [Data communication area](#) and settings of the device configuration.

If there is an active rule for the control of the inverter, the device indicates this in the **overview** of the user interface under **Device State**.

Controlling Priorities

Used to set controlling priorities for I/O Power Management (DRM or ripple control receiver), the feed-in limit, and control via Modbus.

1 = highest priority, 3 = lowest priority

Local priorities of the I/O power management, the feed-in limit, and the Modbus interface are deactivated by cloud control commands (regulatory purposes and virtual power plants) – see [Cloud control](#) – and by backup power.

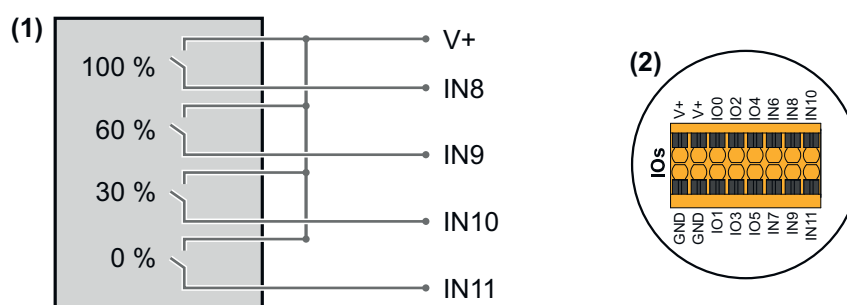
In terms of controlling priorities, the device differentiates between **power control** and **inverter shutdown**. Inverter shutdown always takes precedence over

Power control

- ## Inverter shutdown

- #### 4-relay connection example

For distances greater than 10 m between the inverter and the ripple control signal receiver, use a shielded data communication cable (CAT 5 or higher) with twisted cable pairs. Connect the shielding on one side to the terminal of the data communication area (SHIELD).



- Use pre-configured file for 4-relay operation:**

- ✓ The settings for 4-relay operation are saved.

I/O power management settings – 4 relay example

I/O Power Management

V+/GND

V+ I/O I

0 2 4 6 8 10

1 3 5 7 9 11

DNO feedback pin
Not used

Rules

+ Add

Rule 1

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 100 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 2

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 60 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 3

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 30 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 4

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 0 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Import

Export

0 Activate Backup interlock

1 Rule 1

2 None

3 None

4 None

5 None

6 Open grid relais feedback

7 Backup interlock feedback

8 I/O control

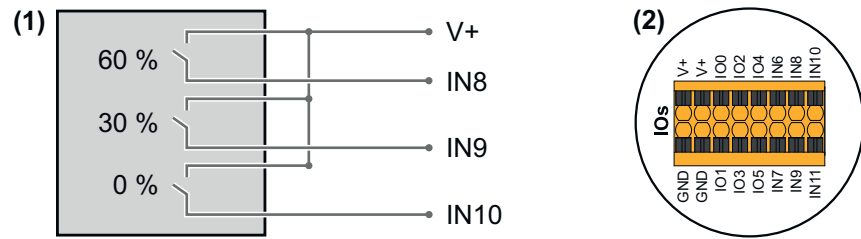
9 I/O control

10 I/O control

11 I/O control

3-relay connection example

Connect the ripple control signal receiver and the I/O terminals of the inverter to one another as shown in the connection diagram. For distances greater than 10 m between the inverter and the ripple control signal receiver, use a shielded data communication cable (CAT 5 or higher) with twisted cable pairs. Connect the shielding on one side to the terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 3 relays for effective power limitation.
- (2) I/O connection terminals of the data communication area.

Use pre-configured file for 3-relay operation:

- 1** Download the file (.fpc) under [3-relay operation](#) to the mobile device.
- 2** Upload the file (.fpc) in the **I/O Power Management** menu area by clicking the **Import** button.
- 3** Click **Save**.

✓ The settings for 3-relay operation are saved.

I/O power management settings – 3 relay example

I/O Power Management

V+/GND

V+

V+

0

2

4

6

8

10

GND

GND

1

3

5

7

9

11

I

DNO feedback pin
Not used

Rules

+ Add

Rule 1

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *
100%

Power Factor (cos φ) *
1

Impedance response
Capacitive

DNO Feedback

Rule 2

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *
60%

Power Factor (cos φ) *
1

Impedance response
Capacitive

DNO Feedback

Rule 3

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *
30%

Power Factor (cos φ) *
1

Impedance response
Capacitive

DNO Feedback

Rule 4

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *
0%

Power Factor (cos φ) *
1

Impedance response
Capacitive

DNO Feedback

Import

Export

0

1

2

3

4

5

6

7

8

9

10

11

0

1

2

3

4

5

6

7

8

9

10

11

Activate Backup interlock

Rule 1

None

None

None

None

Open grid relais feedback

Backup interlock feedback

I/O control

I/O control

I/O control

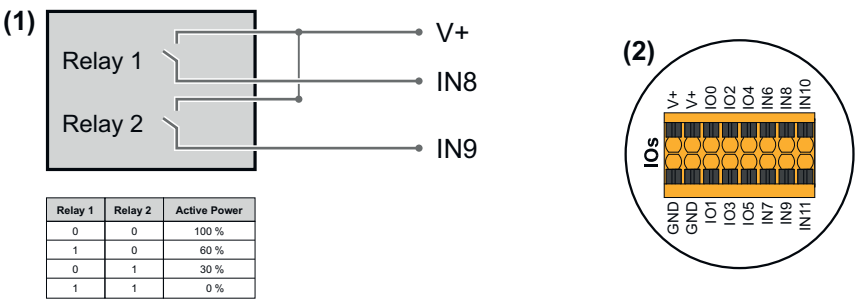
None

2-relay connection example

Connect the ripple control signal receiver and the I/O terminals of the inverter to one another as shown in the connection diagram.
For distances greater than 10 m between the inverter and the ripple control sig-

99

nal receiver, use a shielded data communication cable (CAT 5 or higher) with twisted cable pairs. Connect the shielding on one side to the terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 2 relays for effective power limitation.
- (2) I/O connection terminals of the data communication area.

Use pre-configured file for 2-relay operation:

- 1 Download the file (.fpc) under [2-relay operation](#) to the mobile device.
 - 2 Upload the file (.fpc) in the **I/O Power Management** menu area by clicking the **Import** button.
 - 3 Click **Save**.
- ✓ The settings for 2-relay operation are saved.

I/O power management settings – 2 relay example

I/O Power Management

V+/GND

V+

V-

GND

I/O

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 pin
Not used

Rules

+ Add

Rule 1

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 100 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 2

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 60 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 3

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 30 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Rule 4

0 2 4 6 8 10

1 3 5 7 9 11

Limitation

I/O Generation Limit (%)

Active Power * 0 %

Power Factor (cos φ) * 1 Impedance response Capacitive

DNO Feedback

Import

Export

0 Activate Backup interlock

1 Rule 1

2 None

3 None

4 None

5 None

6 Open grid relais feedback

7 Backup interlock feedback

8 I/O control

9 I/O control

10 None

11 None

1-relay connection example

Connect the ripple control signal receiver and the I/O terminals of the inverter to one another as shown in the connection diagram.
For distances greater than 10 m between the inverter and the ripple control signal receiver, use a shielded data communication cable (CAT 5 or higher) with twisted cable pairs. Connect the shielding on one side to the terminal of the data communication area (SHIELD).



- (1) Ripple control signal receiver with 1 relay for effective power limitation.
- (2) I/O connection terminals of the data communication area.

Use pre-configured file for 1-relay operation:

- 1** Download the file (.fpc) under [1-relay operation](#) to the mobile device.
- 2** Upload the file (.fpc) in the **I/O Power Management** menu area by clicking the **Import** button.
- 3** Click **Save**.

✓ *The settings for 1-relay operation are saved.*

I/O power management settings – 1 relay example

I/O Power Management

V+/GND

I/O

I

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

DNO feedback pin
Not used

Rules

+ Add

Rule 1

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *

100

%

Power Factor (cos φ) *

1

Impedance response

Capacitive

DNO Feedback

Rule 2

0

2

4

6

8

10

1

3

5

7

9

11

Limitation

I/O Generation Limit (%)

Active Power *

0

%

Power Factor (cos φ) *

1

Impedance response

Capacitive

DNO Feedback

Import

Export

0 Activate Backup interlock

1 Rule 1

2 None

3 None

4 None

5 None

6 Open grid relais feedback

7 Backup interlock feedback

8 I/O control

9 None

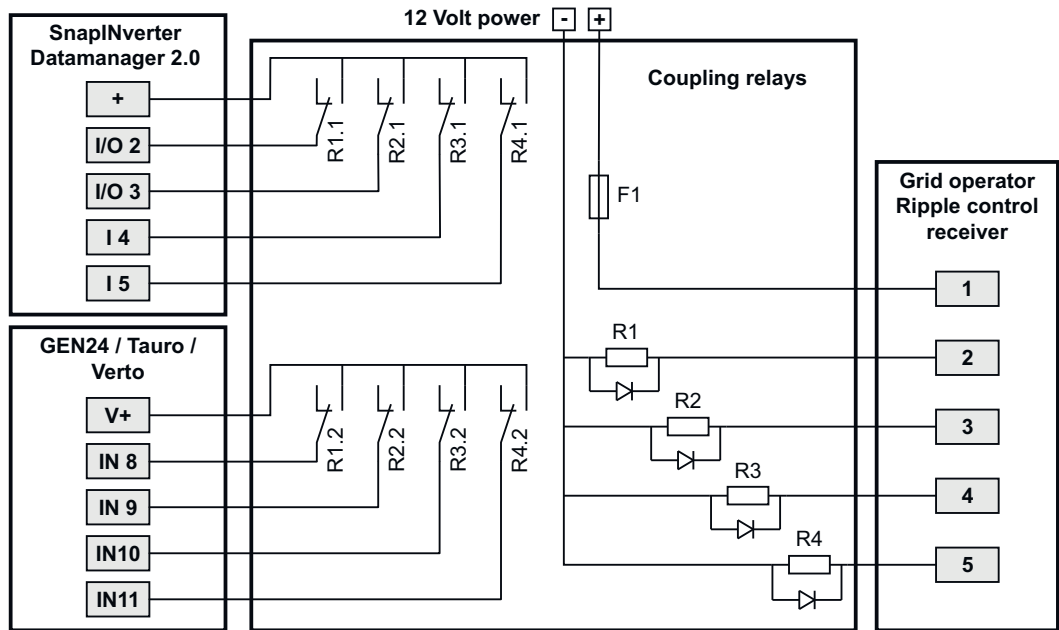
10 None

11 None

Connecting the ripple control receiver with several inverters

The grid operator may request the connection of one or more inverters to a ripple control receiver in order to limit the active power and/or the power factor of the photovoltaic system.

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Connection diagram for ripple control receiver with several inverters

Connect the following Fronius inverters to a ripple control receiver via a distributor (coupling relay):

- Symo GEN24
- Primo GEN24
- Tauro
- Verto
- SnapINverter (only devices with Fronius Datamanager 2.0)

On the user interface of each inverter connected to the ripple control receiver, set the same parameters for I/O power management.

Appendix

Status codes and remedy

Status codes

1006 – ArcDetected (operation LED: flashes yellow)

Cause: An arc was detected at a specific point on the PV system.

Remedy: No action required. Feed-in mode is restarted again automatically after 5 minutes.

1030 – WSD Open (operating LED: flashes red)

Cause: A device that is connected in the WSD chain has interrupted the signal line (e.g., surge protection device) or the bypass installed ex works as standard has been removed and no trigger device has been installed.

Remedy: If the SPD surge protection device has tripped, the inverter must be repaired by an authorized specialist.

OR: Install the bypass installed ex works as standard or a trigger device.

OR: Turn the WSD (wired shutdown) switch to position 1 (WSD primary device).



WARNING

Danger from work that is not carried out properly.

This can result in serious injury and damage to property.

- The installation and connection of an SPD surge protection device may only be carried out by Fronius-trained service personnel in accordance with the technical specifications.
- Observe safety rules.

1173 – ArcContinuousFault (operating LED: flashes red)

Cause: An electric arc has been identified on the PV system, and the maximum number of automatic connections within 24 hours has been reached.

Remedy: Keep the sensor pressed on the inverter for 3 seconds (max. 6 seconds).

OR: On the user interface of the inverter, in the **System > Event Log** menu area, confirm the status **1173 – ArcContinuousFault**.

OR: On the user interface of the inverter, in the **Notifications** user menu, confirm the status **1173 – ArcContinuousFault**.



CAUTION

Danger from damaged components of the PV system

Serious personal injury/damage to property may result.

- Before the status **1173 – ArcContinuousFault** is confirmed, the entire photovoltaic system affected must be checked for any possible damage.
- Damaged components must be repaired by qualified specialists.

Technical data

Tauro 50-3-D / 50-3-P

Input data	
Maximum input voltage (at 1000 W/m ² / -10 °C in an open circuit)	1000 V _{DC}
Start-up input voltage	200 V _{DC}
MPP voltage range	400 - 870 V _{DC}
Number MPP-controller	3
Maximum input current (I _{DC max}) Total PV1 / PV2 / PV3 per string (only for D variant)	134 A 36 A / 36 A / 72 A 14.5 A (20 A fuses) / 22 A (30A fuses)
Max. short circuit current ⁸⁾ Total PV1 / PV2 / PV3 per string (only for D variant)	240 A 72 A / 72 A / 125 A 20 A (20 A fuses) / 30 A (30A fuses)
Maximum PV field power (P _{PV max}) Total PV1 / PV2 / PV3	75 kWp 25 kWp / 25 kWp / 50 kWp
DC overvoltage category	2
Max. inverter backfeed current to the array ³⁾ D variant PV1 / PV2 / PV3 P variant PV1 / PV2 / PV3	72 / 72 / 125 A ⁴⁾ 0 / 0 / 0 A ⁴⁾
Max. capacity of the PV generator against earth inverter	10,000 nF
Max. capacity of the PV generator against earth per input PV1 / PV2 / PV3	3325 / 3325 / 6650 nF
Limit value of the insulation resistance test between PV gen- erator and ground (on delivery) ⁷⁾	34 kΩ
Adjustable range of insulation resistance test between PV generator and ground ⁶⁾	10 - 10,000 kΩ
Limit value and trip time of sudden residual fault current mon- itoring (on delivery)	30 / 300 mA / ms 60 / 150 mA / ms 90 / 40 mA / ms
Limit value and trip time of continuous residual fault current monitoring (on delivery)	450 / 300 mA / ms
Adjustable range of continuous residual current monitoring ⁶⁾	30 - 1000 mA
Cyclic repetition of the insulation resistance test (on delivery)	24 h
Adjustable range for cyclic repetition of the insulation resist- ance test	-

Output data	
Grid voltage range	180 - 270 V _{AC}
Rated grid voltage	220 V _{AC} 230 V _{AC} ¹⁾
Rated power	50 kW
Rated apparent power	50 kVA
Rated frequency	50/60 Hz ¹⁾
Maximum output current / phase	76 A

Output data	
Initial symmetrical short-circuit current / phase $I_{K''}$	76 A
Power factor (cos phi)	0 - 1 ind./cap. ²⁾
Grid connection	3~ (N)PE 380 / 220 V _{AC} 3~ (N)PE 400 / 230 V _{AC}
Earthing systems	TT (allowed if UN_PE < 30V) TN-S (allowed) TN-C (allowed) TN-C-S (allowed) IT (not allowed)
Maximum output power	50 kW
Nominal output power	50 kW
Rated output current / phase	75.8 A / 72.5 A
Total harmonic distortion	< 3%
AC overvoltage category	3
Current (inrush) ⁵⁾	228 A peak / 26.6 A rms over 3.2 ms ⁴⁾
Max. output fault current / duration	44.7 A / 16.24 ms

General data	
Night-time power loss = standby consumption	15 W
European Efficiency (400 / 600 / 800 / 870 V _{DC})	97.8 / 98.3 / 97.9 / 97.7%
Maximum efficiency	98.5%
Safety class	1
EMC emission class	B
Pollution degree	3
Permitted ambient temperature with built-in "AC disconnect" option	- 40 °C - +65 °C -30 °C - +65 °C
Permitted storage temperature	- 40 °C - +70 °C
Relative humidity	0 - 100%
Sound pressure level (600 V _{DC})	68.4 dB(A) (ref. 20 µPA)
Protection class	IP65
Dimensions (height x width x depth)	755 x 1109 x 346 mm
Weight	98 kg
Inverter topology	Non-insulated, no transformer

Protection devices	
DC disconnect	Integrated
Cooling principle	Controlled forced-air ventilation
RCMU ⁹⁾	Integrated
DC isolation measurement ⁹⁾	integrated ²⁾
Overload performance	Operating point shift, power limitation
Active anti-islanding method	Frequency shift method
AFCI (only for D variant with 15/20 A fuse)	Optional

Protection devices	
AFPE (AFCI) classification (according to IEC 63027) ⁹⁾ (only for D variant with 15/20 A fuse)	= F-I-AFPE-1-4/3/7-3 Full coverage Integrated AFPE 1 monitored string per input port 4/3/7 input ports per channel (AFD1: 4, AFD2: 3, AFD3: 7) 3 monitored channels

Tauro Eco 50-3-D / 50-3-P

Input data	
Maximum input voltage (at 1000 W/m ² / -10 °C in an open circuit)	1000 V _{DC}
Start-up input voltage	650 V _{DC}
MPP voltage range	580 - 930 V _{DC}
Number MPP-controller	1
Maximum input current (I _{DC max}) Total PV1 / PV2 per string (only for D variant)	87.5 A 75 A / 75 A 14.5 A (20 A fuses) / 22 A (30A fuses)
Max. short circuit current ⁸⁾ Total PV1 / PV2 per string (only for D variant)	178 A 125 A / 125 A 20 A (20 A fuses) / 30 A (30A fuses)
Maximum PV field power (P _{PV max}) Total PV1 / PV2	75 kW _p 60 kW _p / 60 kW _p
DC overvoltage category	2
Max. inverter backfeed current to the array ³⁾	125 A ⁴⁾
Max. capacity of the PV generator against earth inverter	10,000 nF
Max. capacity of the PV generator against earth per input PV1 / PV2	7980 / 7980 nF
Limit value of the insulation resistance test between PV Generator and ground (on delivery) ⁷⁾	34 kΩ
Adjustable range of insulation resistance test between PV generator and ground ⁶⁾	10 - 10,000 kΩ
Limit value and trip time of sudden residual fault current monitoring (on delivery)	30 / 300 mA / ms 60 / 150 mA / ms 90 / 40 mA / ms
Limit value and trip time of continuous residual fault current monitoring (on delivery)	450 / 300 mA / ms
Adjustable range of continuous residual current monitoring ⁶⁾	30 - 1000 mA
Cyclic repetition of the insulation resistance test (on delivery)	24 h
Adjustable range for cyclic repetition of the insulation resistance test	-

Output data	
Grid voltage range	180 - 270 V _{AC}
Rated grid voltage	220 V _{AC} 230 V _{AC} ¹⁾
Rated power	50 kW

Output data	
Rated apparent power	50 kVA
Rated frequency	50/60 Hz ¹⁾
Maximum output current / phase	76 A
Initial symmetrical short-circuit current / phase $I_{K''}$	76 A
Power factor (cos phi)	0 - 1 ind./cap. ²⁾
Grid connection	3~ (N)PE 380 / 220 V _{AC} 3~ (N)PE 400 / 230 V _{AC}
Earthing systems	TT (allowed if UN_PE < 30V) TN-S (allowed) TN-C (allowed) TN-C-S (allowed) IT (not allowed)
Maximum output power	50 kW
Nominal output power	50 kW
Rated output current / phase	75.8 A / 72.5 A
Total harmonic distortion	< 3%
AC overvoltage category	3
Current (inrush) ⁵⁾	209 A peak / 30.5 A rms over 2.1 ms ⁴⁾
Max. output fault current / duration	37.2 A / 19.4 ms

General data	
Night-time power loss = standby consumption	15 W
European Efficiency (580 / 800 / 930 V _{DC})	98.2 / 97.7 / 97.3%
Maximum efficiency	98.5%
Safety class	1
EMC emission class	B
Pollution degree	3
Permitted ambient temperature with built-in "AC disconnect" option	- 40 °C - +65 °C -30 °C - +65 °C
Permitted storage temperature	- 40 °C - +70 °C
Relative humidity	0 - 100%
Sound pressure level (580 V _{DC})	68.5 dB(A) (ref. 20 µPA)
Protection class	IP65
Dimensions (height x width x depth)	755 x 1109 x 346 mm
Weight	74 kg
Inverter topology	Non-insulated, no transformer

Protection devices	
DC disconnect	Integrated
Cooling principle	Controlled forced-air ventilation
RCMU ⁹⁾	Integrated
DC isolation measurement ⁹⁾	integrated ²⁾
Overload performance	Operating point shift, power limitation
Active anti-islanding method	Frequency shift method

Protection devices	
AFCI (only for D variant with 15/20 A fuse)	Optional
AFPE (AFCI) classification (according to IEC 63027) ⁹⁾ (only for D variant with 15/20 A fuse)	= F-I-AFPE-1-7/7-2 Full coverage Integrated AFPE 1 monitored string per input port 7/7 input ports per channel (AF- D1: 7, AFD2: 7) 2 monitored channels

Tauro Eco 99-3-D / 99-3-P

Input data	
Maximum input voltage (at 1000 W/m ² / -10 °C in an open circuit)	1000 V _{DC}
Start-up input voltage	650 V _{DC}
MPP voltage range	580 - 930 V _{DC}
Number MPP-controller	1
Maximum input current (I _{DC max}) Total P variant PV1 / PV2 D variant PV1 / PV2 / PV3 per string (only for D variant)	175 A 100 A / 100 A 75 A / 75 A / 75 A 14.5 A (20 A fuses) / 22 A (30A fuses)
Max. short circuit current ⁸⁾ P variant Total D variant Total PV1 / PV2 / (PV3 only for D variant) per string (only for D variant)	250 A 355 A 125 A / 125 A / 125 A 20 A (20 A fuses) / 30 A (30A fuses)
Maximum PV field power (P _{PV max}) Total P variant PV1 / PV2 D variant PV1 / PV2 / PV3	150 kWp 79 kWp / 79 kWp 57 kWp / 57 kWp / 57 kWp
DC overvoltage category	2
Max. inverter backfeed current to the array ³⁾ P variant Total D variant Total	125 A ⁴⁾ 250 A ⁴⁾
Max. capacity of the PV generator against earth inverter	19,998 nF
Max. capacity of the PV generator against earth per input P variant PV1 / PV2 per input D variant PV1 / PV2 / PV3	10,507 / 10,507 nF 7581 / 7581 / 7581 nF
Limit value of the insulation resistance test between PV generator and ground (on delivery) ⁷⁾	34 kΩ
Adjustable range of insulation resistance test between PV generator and ground ⁶⁾	10 - 10,000 kΩ
Limit value and trip time of sudden residual fault current monitoring (on delivery)	30 / 300 mA / ms 60 / 150 mA / ms 90 / 40 mA / ms
Limit value and trip time of continuous residual fault current monitoring (on delivery)	900 / 300 mA / ms
Adjustable range of continuous residual current monitoring ⁶⁾	30 - 1000 mA
Cyclic repetition of the insulation resistance test (on delivery)	24 h
Adjustable range for cyclic repetition of the insulation resistance test	-

Output data	
Grid voltage range	180 - 270 V _{AC}
Rated grid voltage	220 V _{AC} 230 V _{AC} ¹⁾
Rated power	99.99 kW
Rated apparent power	99.99 kVA
Rated frequency	50/60 Hz ¹⁾
Maximum output current / phase	152 A
Initial symmetrical short-circuit current / phase I _{K"}	152 A
Power factor (cos phi)	0 - 1 ind./cap. ²⁾
Grid connection	3~ (N)PE 380 / 220 V _{AC} 3~ (N)PE 400 / 230 V _{AC}
Earthing systems	TT (allowed if UN_PE < 30V) TN-S (allowed) TN-C (allowed) TN-C-S (allowed) IT (not allowed)
Maximum output power	99.99 kW
Nominal output power	99.99 kW
Rated output current / phase	151.5 A / 144.9 A
Total harmonic distortion	< 3%
AC overvoltage category	3
Current (inrush) ⁵⁾	244 A peak / 27.2 A rms over 3.2 ms ⁴⁾
Max. output fault current / duration	93.9 A / 22 ms

General data	
Night-time power loss = standby consumption	15 W
European Efficiency (580 / 800 / 930 V _{DC})	98.2 / 97.7 / 97.3%
Maximum efficiency	98.5%
Safety class	1
EMC emission class	B
Pollution degree	3
Permitted ambient temperature with built-in "AC disconnect" option	- 40 °C - +65 °C -30 °C - +65 °C
Permitted storage temperature	- 40 °C - +70 °C
Relative humidity	0 - 100%
Sound pressure level (580 V _{DC} / 930 V _{DC})	74.4 / 79.3 dB(A) (ref. 20 µPA)
Protection class	IP65
Dimensions (height x width x depth)	755 x 1109 x 346 mm
Weight	103 kg
Inverter topology	Non-insulated, no transformer

Protection devices	
DC disconnect	Integrated
Cooling principle	Controlled forced-air ventilation
RCMU ⁹⁾	Integrated

Protection devices	
DC isolation measurement ⁹⁾	integrated ²⁾
Overload performance	Operating point shift, power limitation
Active anti-islanding method	Frequency shift method
AFCI (only for D variant with 15/20 A fuse)	Optional
AFPE (AFCI) classification (according to IEC 63027) ⁹⁾ (only for D variant with 15/20 A fuse)	= F-I-AFPE-1-7/7/8-3 Full coverage Integrated AFPE 1 monitored string per input port 7/7/8 input ports per channel (AFD1: 7, AFD2: 7, AFD3: 8) 3 monitored channels

Tauro Eco 100-3-D / 100-3-P

Input data	
Maximum input voltage (at 1000 W/m ² / -10 °C in an open circuit)	1000 V _{DC}
Start-up input voltage	650 V _{DC}
MPP voltage range	580 - 930 V _{DC}
Number MPP-controller	1
Maximum input current (I _{DC max}) Total P variant PV1 / PV2 D variant PV1 / PV2 / PV3 per string (only for D variant)	175 A 100 A / 100 A 75 A / 75 A / 75 A 14.5 A (20 A fuses) / 22 A (30A fuses)
Max. short circuit current ⁸⁾ P variant Total D variant Total PV1 / PV2 / (PV3 only for D variant) per string (only for D variant)	250 A 355 A 125 A / 125 A / 125 A 20 A (20 A fuses) / 30 A (30A fuses)
Maximum PV field power (P _{PV max}) Total P variant PV1 / PV2 D variant PV1 / PV2 / PV3	150 kWp 79 kWp / 79 kWp 57 kWp / 57 kWp / 57 kWp
DC overvoltage category	2
Max. inverter backfeed current to the array ³⁾ P variant Total D variant Total	125 A ⁴⁾ 250 A ⁴⁾
Max. capacity of the PV generator against earth inverter	20,000 nF
Max. capacity of the PV generator against earth per input P variant PV1 / PV2 per input D variant PV1 / PV2 / PV3	10,507 / 10,507 nF 7581 / 7581 / 7581 nF
Limit value of the insulation resistance test between PV generator and ground (on delivery) ⁷⁾	34 kΩ
Adjustable range of insulation resistance test between PV generator and ground ⁶⁾	10 - 10,000 kΩ
Limit value and trip time of sudden residual fault current monitoring (on delivery)	30 / 300 mA / ms 60 / 150 mA / ms 90 / 40 mA / ms

Input data	
Limit value and trip time of continuous residual fault current monitoring (on delivery)	900 / 300 mA / ms
Adjustable range of continuous residual current monitoring ⁶⁾	30 - 1000 mA
Cyclic repetition of the insulation resistance test (on delivery)	24 h
Adjustable range for cyclic repetition of the insulation resistance test	-

Output data	
Grid voltage range	180 - 270 V _{AC}
Rated grid voltage	220 V _{AC} 230 V _{AC} ¹⁾
Rated power	100 kW
Rated apparent power	100 kVA
Rated frequency	50/60 Hz ¹⁾
Maximum output current / phase	152 A
Initial symmetrical short-circuit current / phase I _{K"}	152 A
Power factor (cos phi)	0 - 1 ind./cap. ²⁾
Grid connection	3~ (N)PE 380 / 220 V _{AC} 3~ (N)PE 400 / 230 V _{AC}
Earthing systems	TT (allowed if UN_PE < 30V) TN-S (allowed) TN-C (allowed) TN-C-S (allowed) IT (not allowed)
Maximum output power	100 kW
Nominal output power	100 kW
Rated output current / phase	151.5 A / 144.9 A
Total harmonic distortion	< 3%
AC overvoltage category	3
Current (inrush) ⁵⁾	244 A peak / 27.2 A rms over 3.2 ms ⁴⁾
Max. output fault current / duration	93.9 A / 22 ms

General data	
Night-time power loss = standby consumption	15 W
European Efficiency (580 / 800 / 930 V _{DC})	98.2 / 97.7 / 97.3%
Maximum efficiency	98.5%
Safety class	1
EMC emission class	B
Pollution degree	3
Permitted ambient temperature with built-in "AC disconnect" option	- 40 °C - +65 °C -30 °C - +65 °C
Permitted storage temperature	- 40 °C - +70 °C
Relative humidity	0 - 100%
Sound pressure level (580 V _{DC} / 930 V _{DC})	74.4 / 79.3 dB(A) (ref. 20 µPA)
Protection class	IP65
Dimensions (height x width x depth)	755 x 1109 x 346 mm

General data	
Weight	103 kg
Inverter topology	Non-insulated, no transformer

Protection devices	
DC disconnector	Integrated
Cooling principle	Controlled forced-air ventilation
RCMU ⁹⁾	Integrated
DC isolation measurement ⁹⁾	integrated ²⁾
Overload performance	Operating point shift, power limitation
Active anti-islanding method	Frequency shift method
AFCI (only for D variant with 15/20 A fuse)	Optional
AFPE (AFCI) classification (according to IEC 63027) ⁹⁾ (only for D variant with 15/20 A fuse)	= F-I-AFPE-1-7/7/8-3 Full coverage Integrated AFPE 1 monitored string per input port 7/7/8 input ports per channel (AFD1: 7, AFD2: 7, AFD3: 8) 3 monitored channels

WLAN

Frequency range	2412 - 2462 MHz
Channels / power used	Channel: 1-11 b,g,n HT20 Channel: 3-9 HT40 <18 dBm
Modulation	802.11b: DSSS (1Mbps DBPSK, 2Mbps DQPSK, 5.5/11Mbps CCK) 802.11g: OFDM (6/9Mbps BPSK, 12/18Mbps QPSK, 24/36Mbps 16-QAM, 48/54Mbps 64-QAM) 802.11n: OFDM (6.5 BPSK, QPSK, 16-QAM, 64-QAM)

Explanation of footnotes

- 1) The values stated are defaults; the inverter is configured specifically to suit the requirements of the relevant country.
- 2) Depending on the country setup or device-specific settings (ind. = inductive; cap. = capacitive).
- 3) Maximum current from a defective PV module to all other PV modules. From the inverter itself to the PV side of the inverter, it is 0 A.
- 4) Guaranteed by the electrical configuration of the inverter.
- 5) Current peak when switching on the inverter.
- 6) Specified values are standard values; depending on the requirement and PV power, these values must be adjusted accordingly.
- 7) Specified value is a max. value; exceeding the max. value may negatively affect the function.

- 8) $I_{SC\ PV} = I_{CP\ PV} \geq I_{SC\ max} = I_{SC\ (STC)} \times 1.25$ according to e.g., IEC 60364-7-712, NEC 2020, AS/NZS 5033:2021
- 9) Software class B (single channel with periodic self-test) control function according to IEC60730-1 Annex H.

Integrated DC disconnector

General data	
Product name	EATON PV-DIS-10-125/2-REFOHA
Rated insulation voltage	1000 V _{DC}
Rated impulse withstand voltage	6 kV
Suitability for insulation	Yes, DC only
Rated operating current	Rated operating current $I_e \leq 100$ A: DC-PV2 utilization category (according to IEC/EN 60947-3)
	Rated operating current $I_e \leq 125$ A: DC-PV1 utilization category (according to IEC/EN 60947-3)
Utilization category and/or PV utilization category	according to IEC/EN 60947-3 utilization category DC-PV2
Rated short-time withstand current (I_{CW})	12 x I_e
Rated short-circuit capacity (I_{CM})	1 000 A

Rated operating current and rated breaking capacity				
Rated operating voltage (U_e)	Rated operating current (I_e) DC-PV1	$I_{(make)} / I_{(break)}$ DC-PV1	Rated operating current (I_e) DC-PV2	$I_{(make)} / I_{(break)}$ DC-PV2
≤ 500 V _{DC}	125 A	187.5 A	125 A	500 A
600 V _{DC}	125 A	187.5 A	125 A	500 A
800 V _{DC}	125 A	187.5 A	125 A	500 A
900 V _{DC}	125 A	187.5 A	110 A	440 A
1 000 V _{DC}	125 A	187.5 A	100 A	400 A

Relevant Standards and Directives

CE Conformity Marking

The equipment complies with all the requisite and relevant standards and directives that form part of the relevant EU directive, and therefore is permitted to display the CE mark.

WLAN

Compliance with 2014/53/EU Radio Equipment Directive (RED)

The above table of technical data lists the frequency ranges and maximum HF transmission power used by Fronius wireless products available for sale in the EU in accordance with Article 10.8 (a) and 10.8 (b) of the RED.

Fronius products must be installed and operated such that the product is always 20 cm or more away from the body.

Mains failure

The standard measurement and safety procedures integrated into the inverter ensure that the power feed is immediately interrupted in the event of a grid failure (for example shut-off by the grid operator or damage to lines).

Service, warranty terms and conditions, and disposal

Fronius SOS

Under sos.fronius.com you can retrieve warranty and device information at any time, start troubleshooting independently, and request replacement components.

For more information on spare parts, contact your installer or point of contact for the PV system.

Warranty

Detailed warranty conditions specific to your country can be found at <https://www.fronius.com/en/download-center?searchword=Warranty+conditions>.

If there is a warranty for the relevant product, register the product at <https://warranty.fronius.com/> and activate or extend the warranty.

Disposal

In accordance with the EU Directive and national law, the following products must be disposed of separately and recycled:

- Waste electrical and electronic equipment
- Used batteries (portable batteries, industrial batteries)

Used equipment and batteries must be returned to the distributor or an authorized local collection system. Do not dispose of batteries with domestic waste. Protect batteries from high temperatures, direct sunlight, moisture and corrosive environments.

Arrange for the safe collection and proper disposal of damaged, leaking or used batteries by a battery recycling company or the Fronius Service Partner.

In addition, it should be noted that batteries contain substances that, if disposed of improperly, can have a significant negative impact on the environment as well as on human health and the safety of persons, in particular due to the leakage of hazardous substances such as heavy metals or electrolytes, which can contaminate soil, water and air.

This ensures environmental protection and the sustainable use of natural resources.

Packaging materials

- Collect separately
- Observe local regulations
- Compress the cardboard box to reduce volume



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