Quick Start Guide

Fronius Primo GEN24 208-240
3.8 - 10.0 kW
3.8 - 10.0 kW Plus

42,0410,2417 018-27022025

EN: WARNING!

Operating the equipment incorrectly or poor workmanship can cause serious injury or damage. The inverter may only be installed and commissioned by trained personnel acting in accordance with the technical regulations. Before working with the device, ensure that you have read and understand all the documents provided (both hard copies enclosed with the product and documents provided online).

FR: AVERTISSEMENT!

Les erreurs de commande et les erreurs en cours d'opération peuvent entraîner des dommages corporels et matériels graves. L'installation et la mise en service de l'onduleur ne doivent être effectuées que par du personnel formé à cet effet et dans le cadre des dispositions techniques. Ne travailler avec l'appareil que lorsque tous les documents mis à disposition en annexe, imprimés et en ligne, ont été lus et compris !

ES-MX: ADVERTENCIA!

El manejo incorrecto y los trabajos realizados de forma incorrecta pueden provocar daños personales o materiales graves. La instalación y la puesta en marcha del inversor deben llevarse a cabo exclusivamente por personal formado y en el marco de las disposiciones técnicas. ¡Antes de trabajar con el equipo, leer y comprender todos los documentos adjuntos y puestos a disposición en línea!

FCC

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules. Operation is subject to the following two conditions:

Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Rapid Shutdown

Two different types of rapid shutdown (RSD) can be triggered depending on the configuration and on-site installation:

Via external buttons
One or more external buttons can be installed on the WSD (wired shutdown) interface of the Data communication area on page (→). Pressing one of these buttons triggers the rapid shutdown. The terminals are discharged to < 30 VDC / 8 A / 240 VA and < 15 VAC / 8 A / 240 VA. The inverter also interrupts the communication to the shutdown devices of the PV modules if they correspond to the SunSpec standard for rapid shutdown.

Via the loss of the grid connection
An automatic rapid shutdown can also occur if the grid connection is lost. The inverter identifies a failure of the grid connection and terminals are discharged to < 30 VDC / 8 A / 240 VA and < 15 VAC / 8 A / 240 VA. The inverter also interrupts the communication to the shutdown devices of the PV modules if they correspond to the SunSpec standard for rapid shutdown.

For more information see:

https://manuals.fronius.com/html/4204260312/#0_m_0000018823

Power Line Communication (PLC) transmitter

The inverter is equipped with a Power Line Communication (PLC) transmitter on the DC side. Its function is to ensure rapid shutdown in accordance with National Electric Code NEC 2023 Art. 690.12 and Canadian Electrical Code CSA C22.1:24 Art. 64-218. The PLC is implemented according to the specification "Communication Signal for Rapid Shutdown – SunSpec Interoperability Specification" (depending on national grid setup). Please visit www.sunspec.org for details.

AFCI - Arc Fault Circuit Interrupter (Arc Guard)

An AFCI (arc fault circuit interrupter) protects against arc faults in accordance with National Electric Code NEC 2023 Art. 690.11 and Canadian Electrical Code CSA C22.1:24 Art. 64-216 and, in the narrower sense, is a protection device in the event of contact errors. The AFCI evaluates faults that occur in the current and voltage flow on the DC side using an electronic circuit and shuts down the circuit if a contact error is detected. This significantly reduces potential overheating and fire risk at poor contact points.

⚠ DANGER

Danger from faulty or incorrect DC installation.
This may result in a risk of damage and, as a consequence, risk of fire in the PV system due to prohibited thermal loads that occur during an arc.

- ► Check the plug connections to ensure that they are correct.
- ► Repair faulty insulation correctly.
- ► Perform connection work in line with the instructions.

Detailed, country-specific warranty terms are available on: www.fronius.com/solar/warranty

Operating Instructions

Only suitable battery configurations for Fronius GEN24 inverters permitted.

Fronius Primo GEN24 208-240

3.8 - 6.0 kW
3.8 - 6.0 kW Plus
https://manuals.fronius.com/html/4204260530

7.7 - 10.0 kW
7.7 - 10.0 kW Plus
https://manuals.fronius.com/html/4204260312

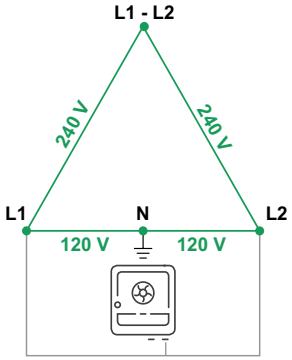
Fronius Primo GEN24 208-240 Plus
with third-party battery

https://www.fronius.com/en/solar-energy/installers-partners/downloads

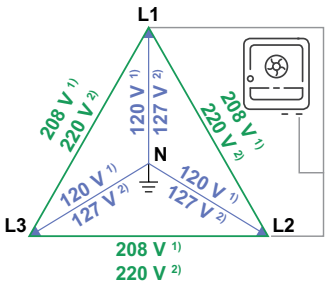
search for: „42,0410,3015"

Suitable grids

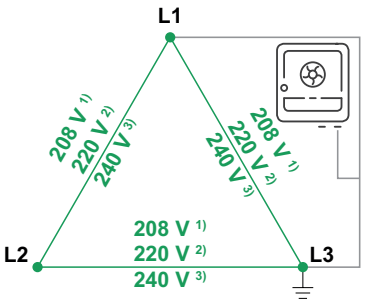
240 V: 120 V Split Phase
240 V: 120 V Stinger



[1] **208 V / 120 V** WYE
[2] **220 V / 127 V** WYE



[1] **208 V** Delta Corner Grounded
[2] **220 V** Delta Corner Grounded
[3] **240 V** Delta Corner Grounded

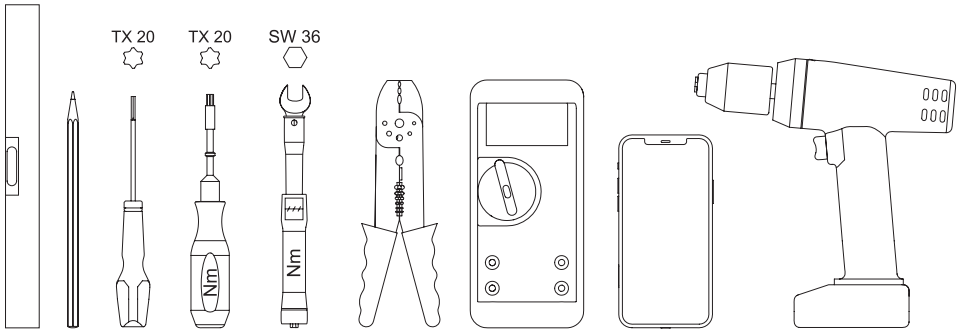


Warning signs explanation

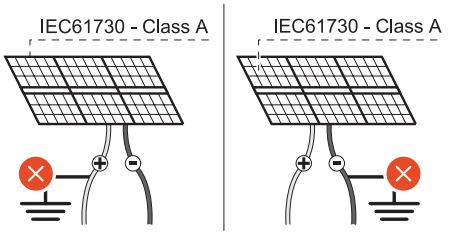
General warning sign
Panneau d'avertissement général
Señal de advertencia general

Electricity hazard
Risque électrique
Peligro de electricidad

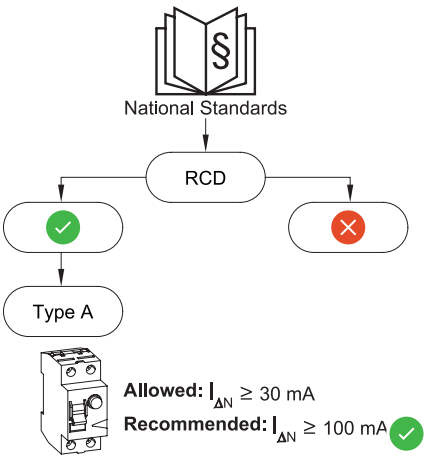
Tools



To note during installation

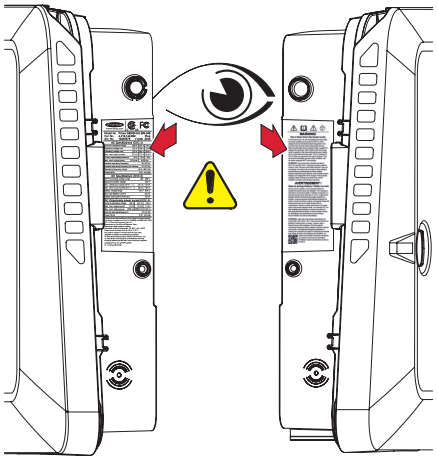


max. 600 V_{DC}

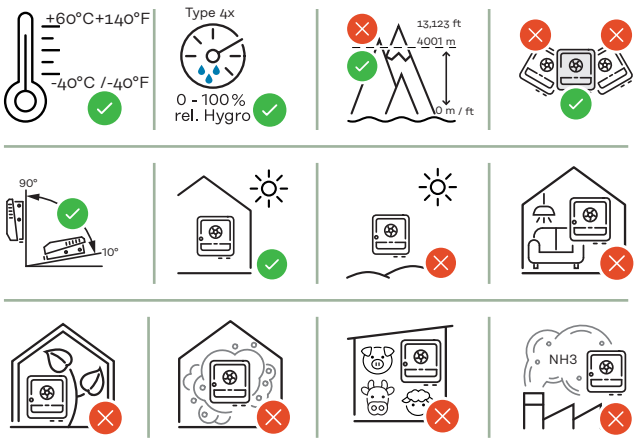


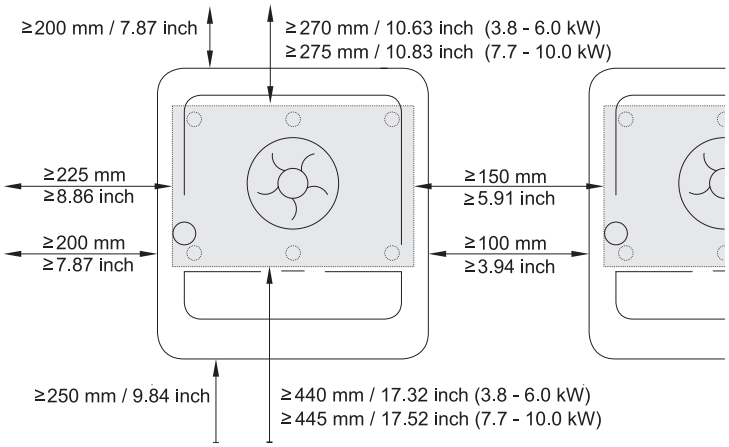
Rating plate

Safety information



Mounting conditions

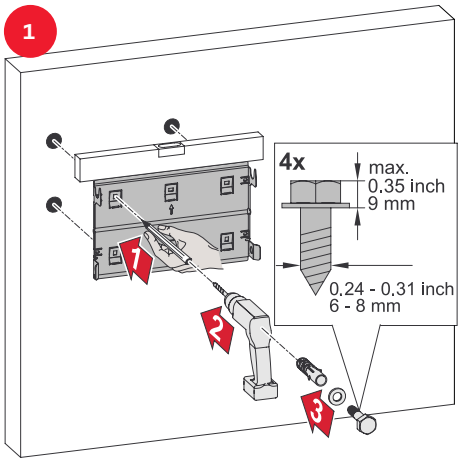




Mounting

AC~

1



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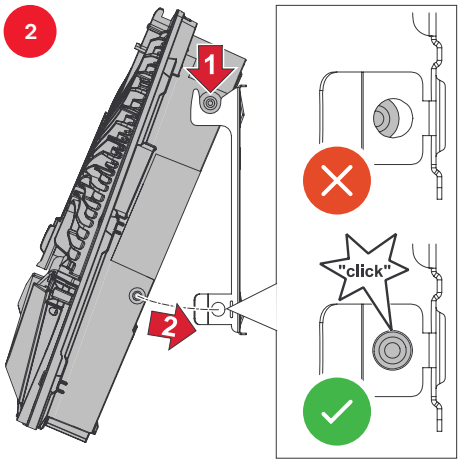

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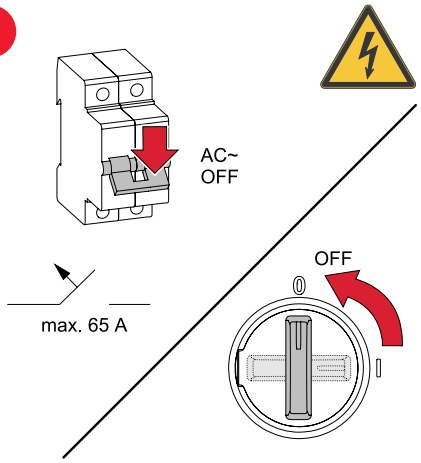

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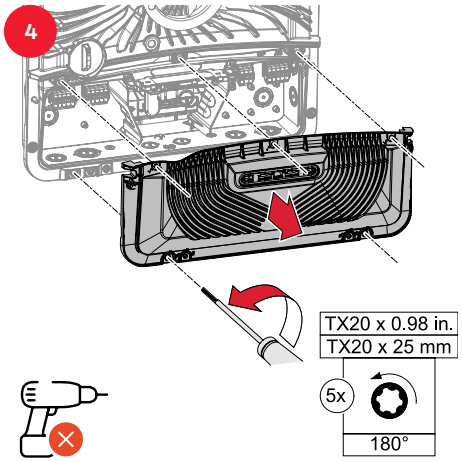

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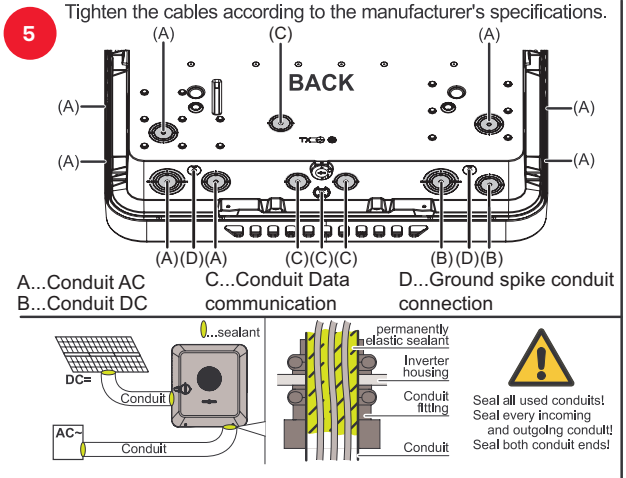
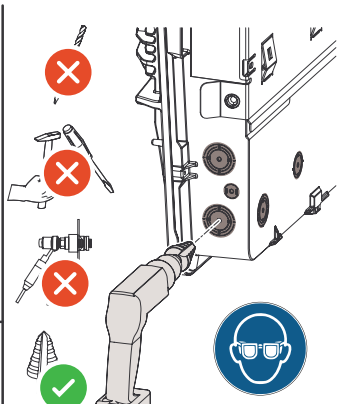
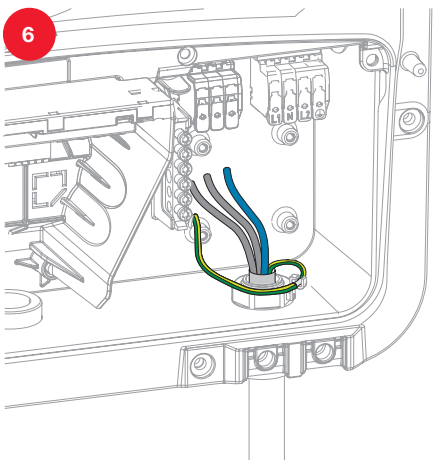
Tighten the cables according to the manufacturer's specifications.





Dimension and position of knockouts depend on the inverter type!

6



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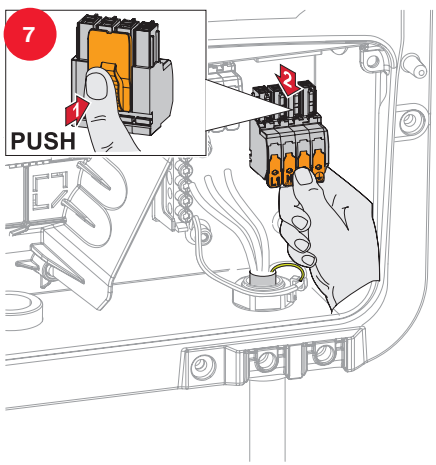

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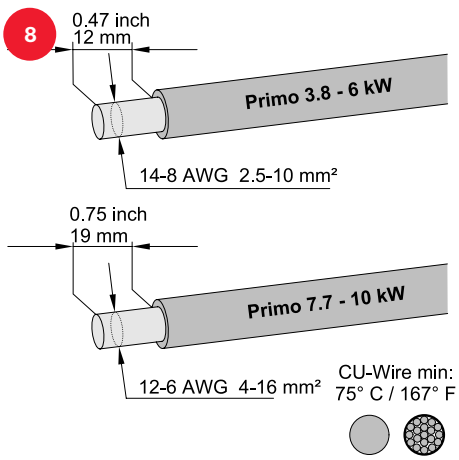

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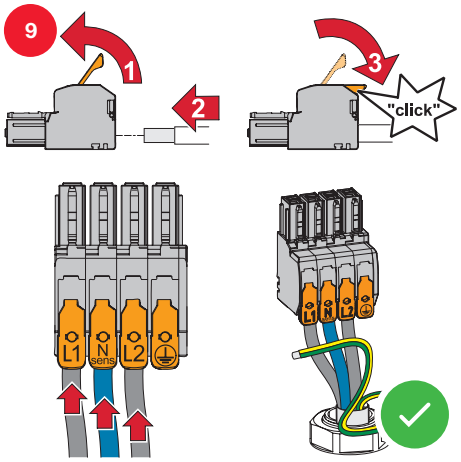

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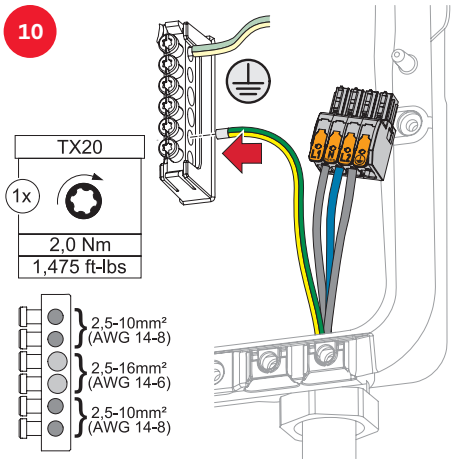

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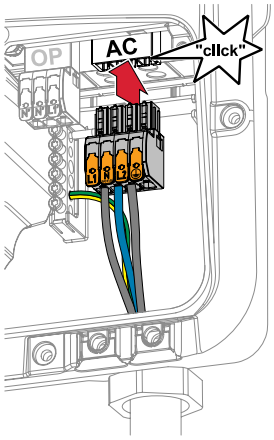
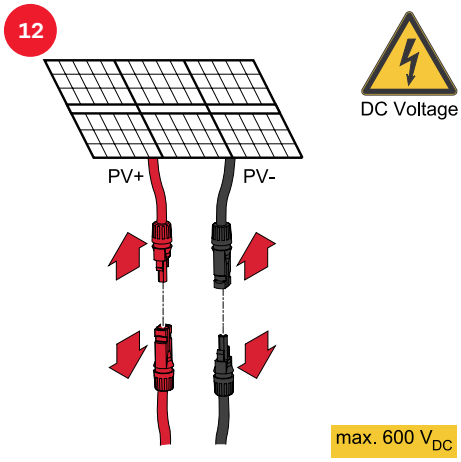


DC=

12



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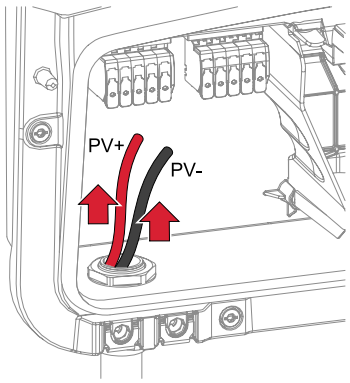

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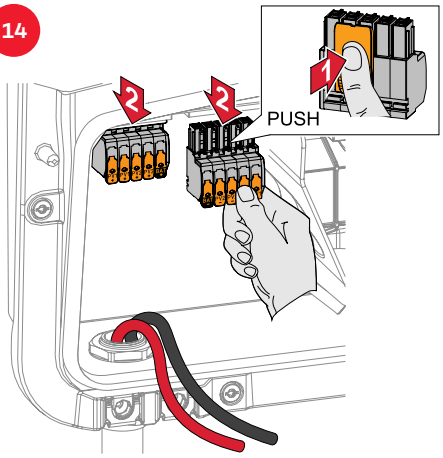

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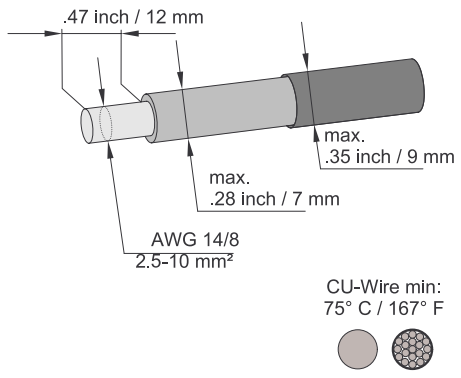

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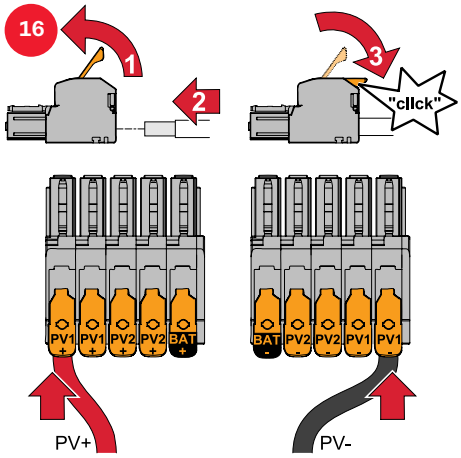

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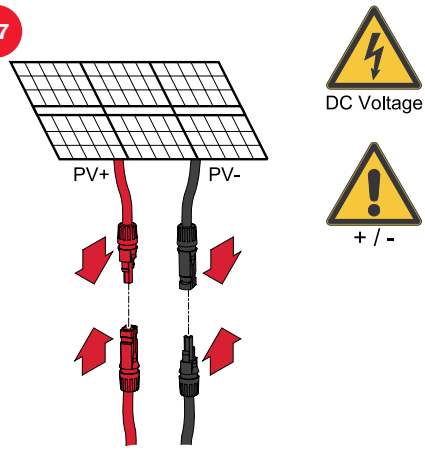

Data communication (optional)

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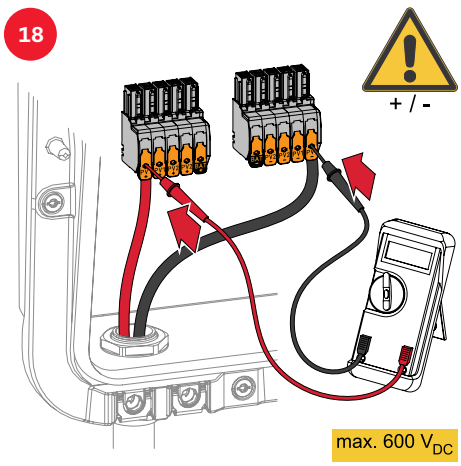

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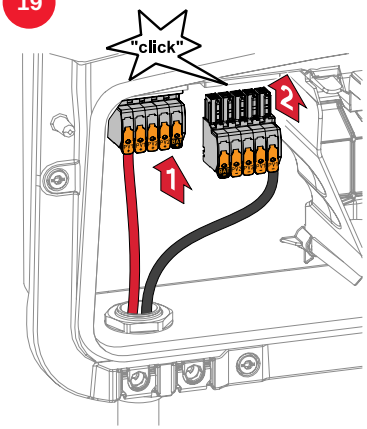

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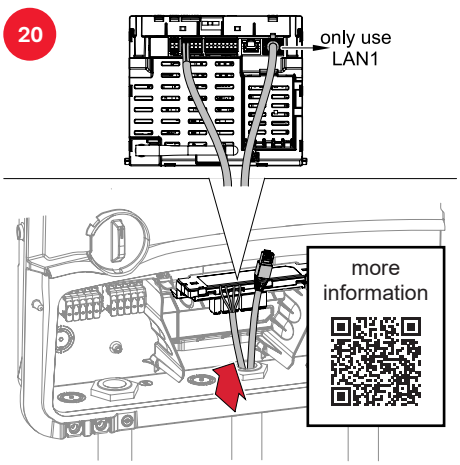

Commissioning

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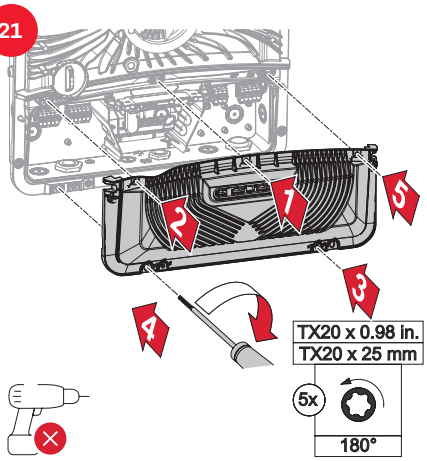

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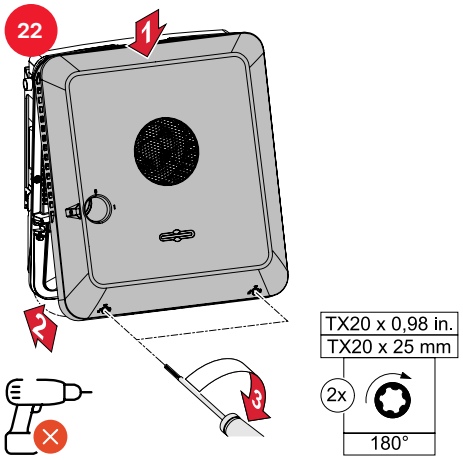

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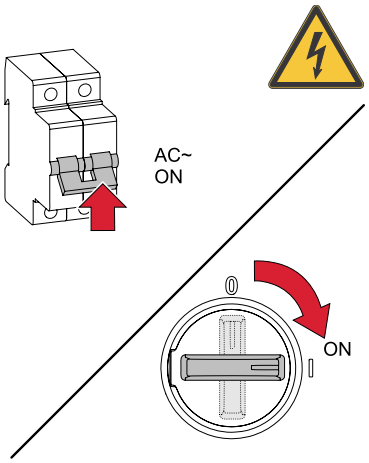

Control panel

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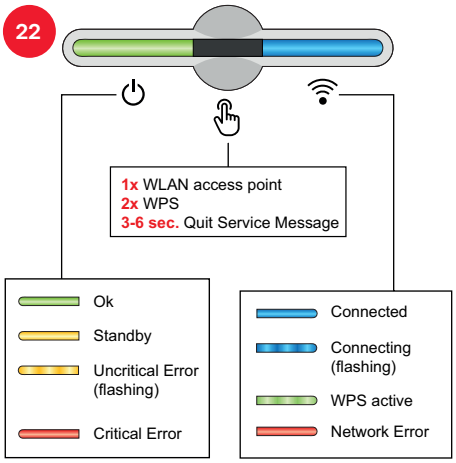

Setup with mobile phone

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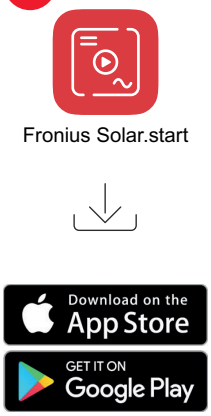
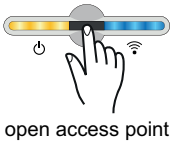
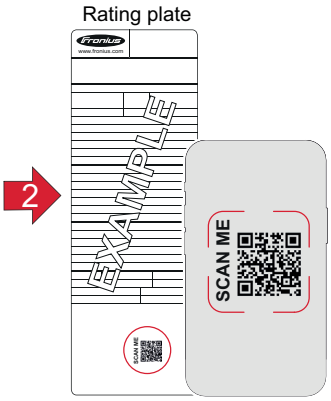
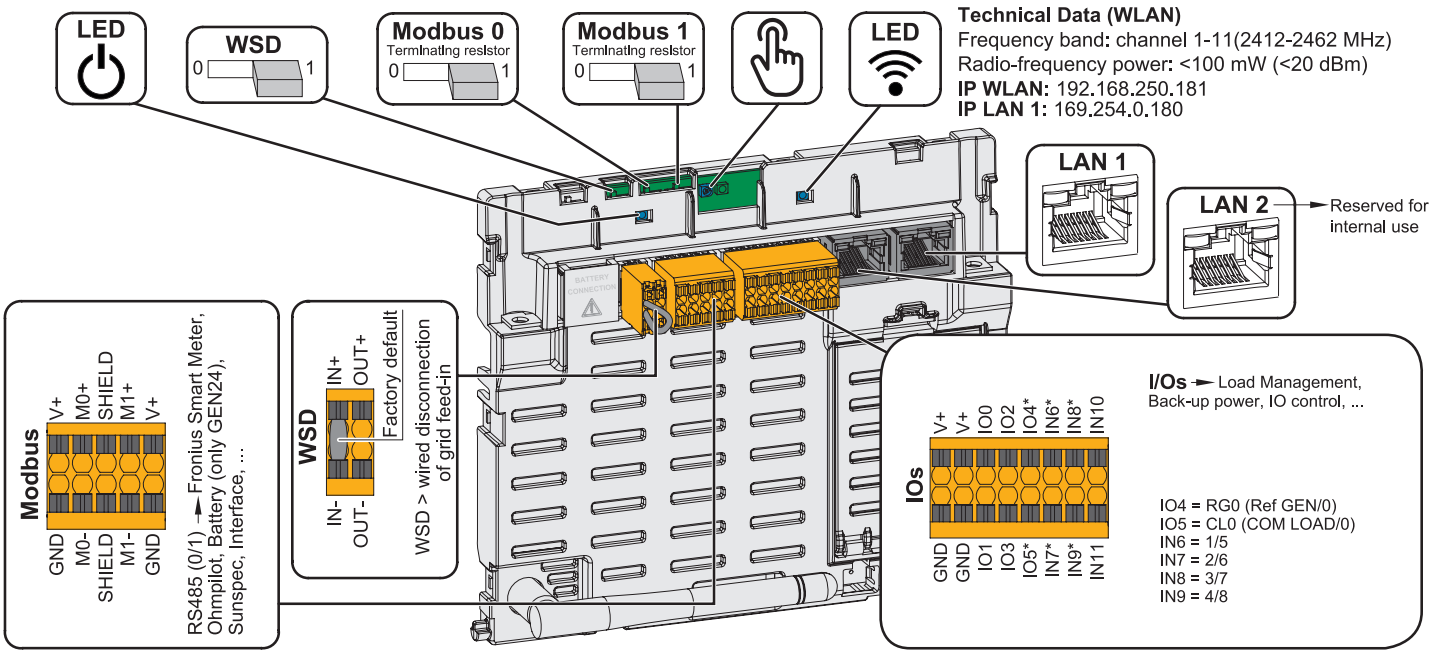








Fronius Primo GEN24 3.8 - 6.0 208 - 240 / 3.8 - 6.0 208 - 240 Plus	
Dimensions (height x width x depth)	20.3 × 18.7 × 6.5 inches (516 × 474 × 165 mm)
Max. short-circuit current (I_{sc} PV = I_{sc} max)	36 A (MPPT1) / 19 A (MPPT2)
Arc Fault Circuit Interrupter	PV DC Arc-Fault Circuit-Protection Type 1, according to UL1699B:2024

Fronius Primo GEN24 7.7 - 10.0 208 - 240 / 7.7 - 10.0 208 - 240 Plus	
Dimensions (height x width x depth)	23.0 × 20.8 × 7.1 inches (583 x 529 x 180 mm)
Max. short-circuit current (I_{sc} PV = I_{sc} max)	41.25 A (MPPT1) / 36 A (MPPT2)
Arc Fault Circuit Interrupter	PV DC Arc-Fault Circuit-Protection Type 1 according to UL1699B:2024

fronius.com/en/solar-energy/installers-partners/products-solutions/monitoring-digital-tools

MONITORING & DIGITAL TOOLS

Fronius International GmbH
Froniusstraße 1
4643 Pettenbach
Austria
contact@fronius.com
www.fronius.com

Under www.fronius.com/contact you will find the adresses of all Fronius Sales & Service Partners and locations.

Quick Start Guide

Fronius Primo GEN24 208-240 Plus
Fronius Smart Meter WR
BYD Battery-Box Premium HVM-US

42,0410,3015 003-27022025

EN: WARNING!

Operating the equipment incorrectly or poor workmanship can cause serious injury or damage. The inverter may only be installed and commissioned by qualified personnel acting in accordance with the National Electric Code. Before working with the device, ensure that you have read and understood all the documents provided (both hard copies enclosed with the product and documents provided online). When solar modules are exposed to light, they supply voltage to the inverter. This document does not describe all of the possible system configurations.

ES: ¡ADVERTENCIA!

El manejo incorrecto y los trabajos realizados de forma incorrecta pueden provocar daños personales o materiales graves. La instalación y la puesta en marcha del inversor deben llevarse a cabo exclusivamente por personal calificado y en el marco de las normas técnicas locales. ¡Antes de trabajar con el equipo, leer y comprender todos los documentos adjuntos y puestos a disposición en línea! Los módulos solares expuestos a la luz envían tensión al inversor. Este documento no describe todas las configuraciones posibles del sistema.

FR: AVERTISSEMENT!

Les erreurs de commande et les erreurs en cours d'opération peuvent entraîner des dommages corporels et matériels graves. L'installation et la mise en service de l'onduleur ne doivent être effectuées que par du personnel formé à cet effet et dans le cadre des réglementations techniques locales. Ne travailler avec l'appareil que lorsque tous les documents mis à disposition en annexe, imprimés et en ligne, ont été lus et compris ! Les modules solaires exposés à la lumière fournissent la tension à l'onduleur. Ce document ne décrit pas toutes les possibilités de configurations système.

Operating Instructions

Fronius Primo GEN24 208-240

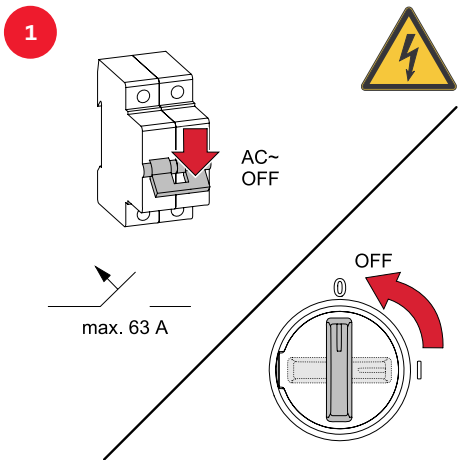
3.8 - 6.0 kW
3.8 - 6.0 kW Plus
manuals.fronius.com/html/4204260530

7.7 - 10.0 kW
7.7 - 10.0 kW Plus
manuals.fronius.com/html/4204260312

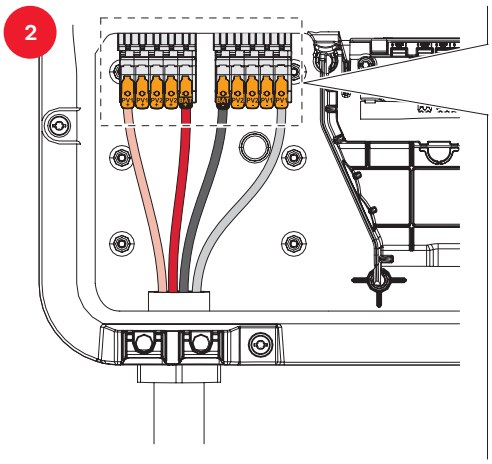
Fronius Smart Meter WR

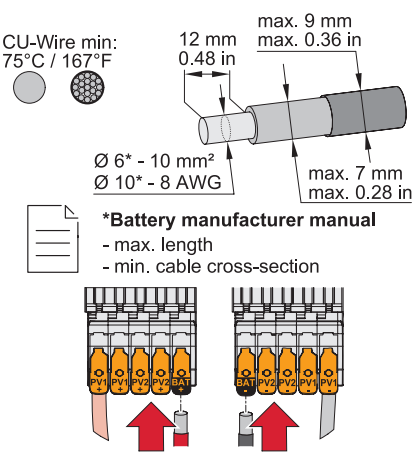
manuals.fronius.com/html/4204260455

Switching OFF inverter

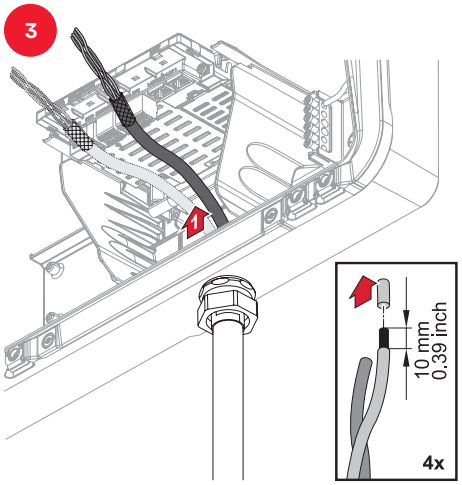


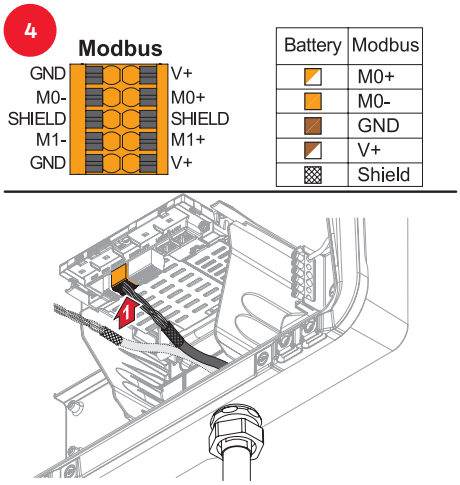
Connecting battery to inverter

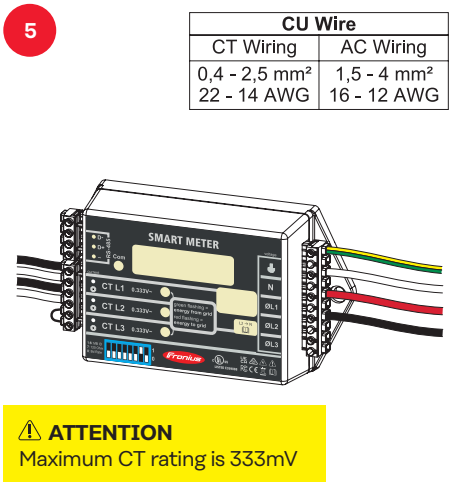




Connecting Smart Meter WR







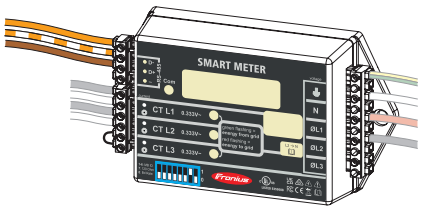
⚠ ATTENTION
Maximum CT rating is 333mV

Connecting BCU

6

CU Wire
0,4 - 2,5 mm²
22 - 14 AWG

	Smart Meter	Inverter
	D-	M1-
	D+	M1+
	-	GND



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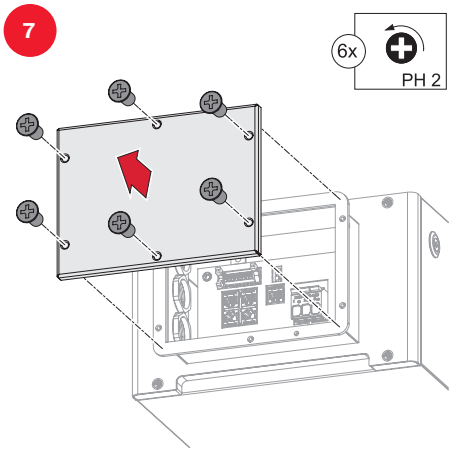

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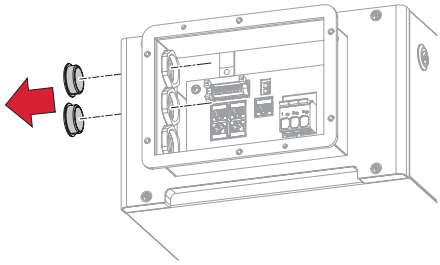

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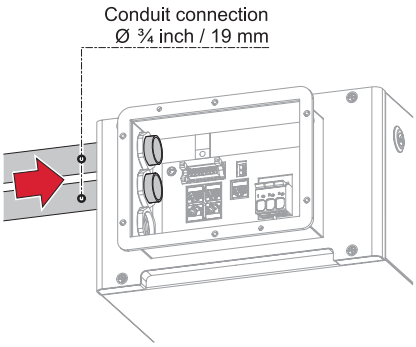

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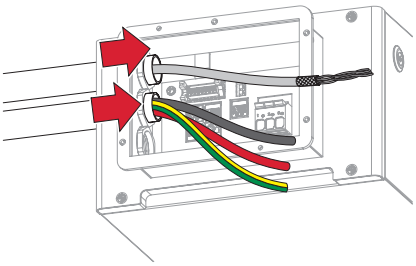

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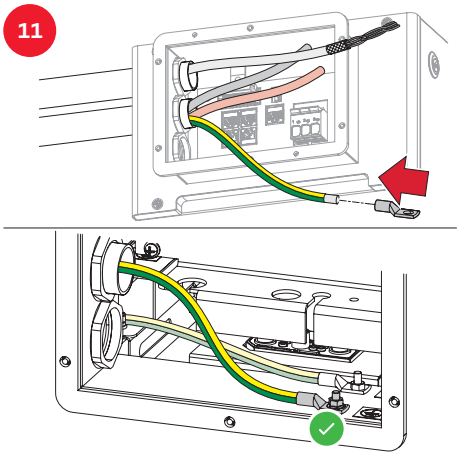

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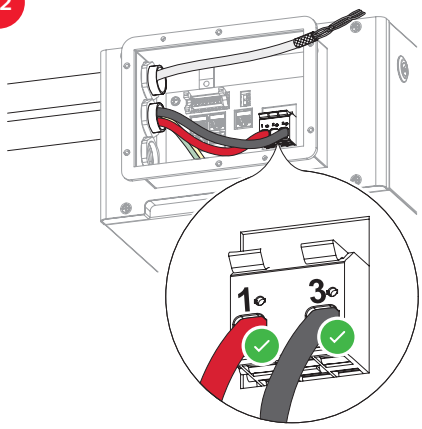

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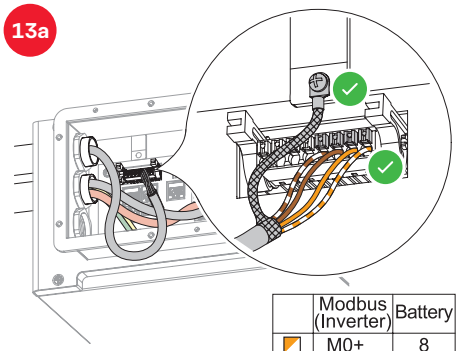
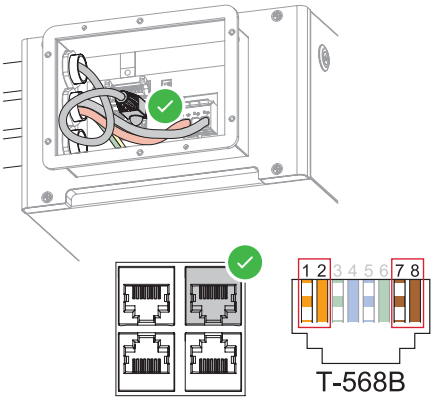


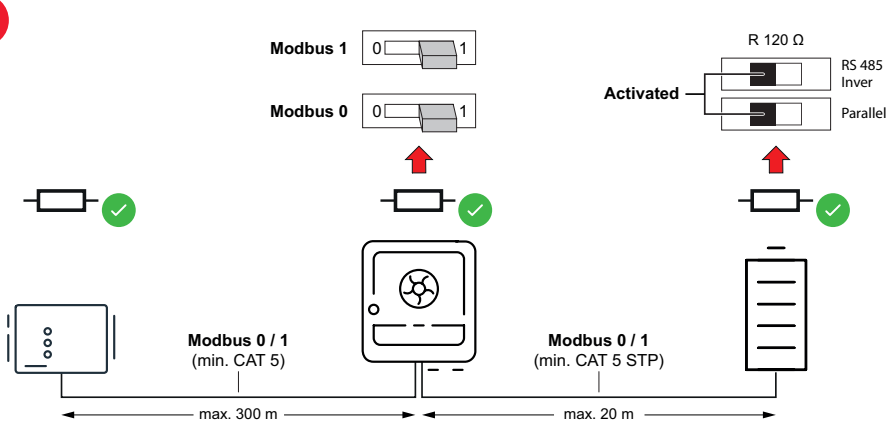
	Modbus (Inverter)	Battery
	M0+	8
	M0-	7
	GND	6
	V+	5
	Shield	Shield

13b



Setting up Terminating Resistor

14



Closing & Commissioning

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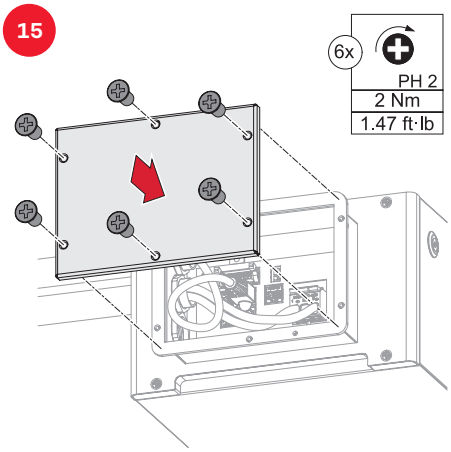
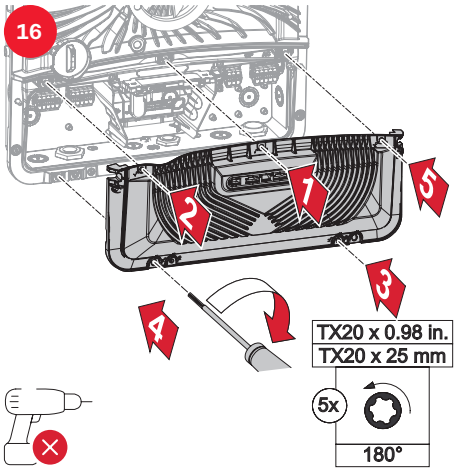
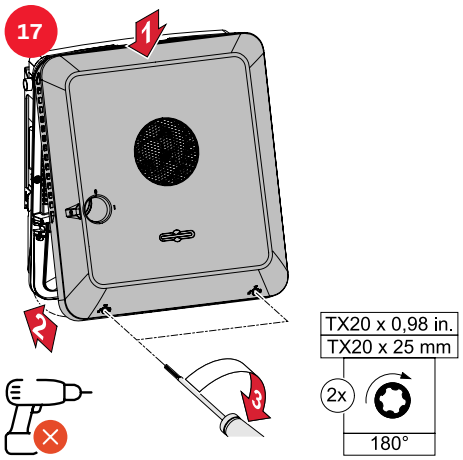
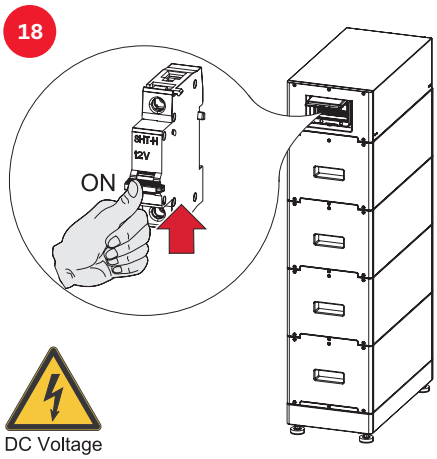
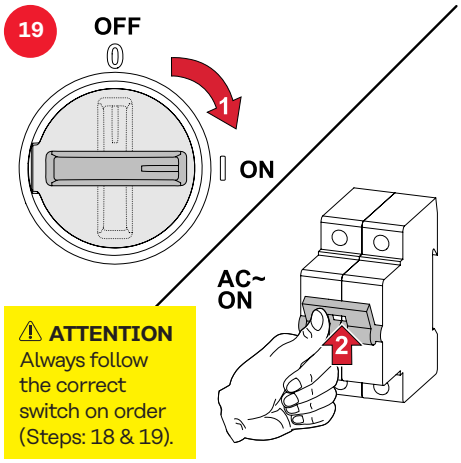
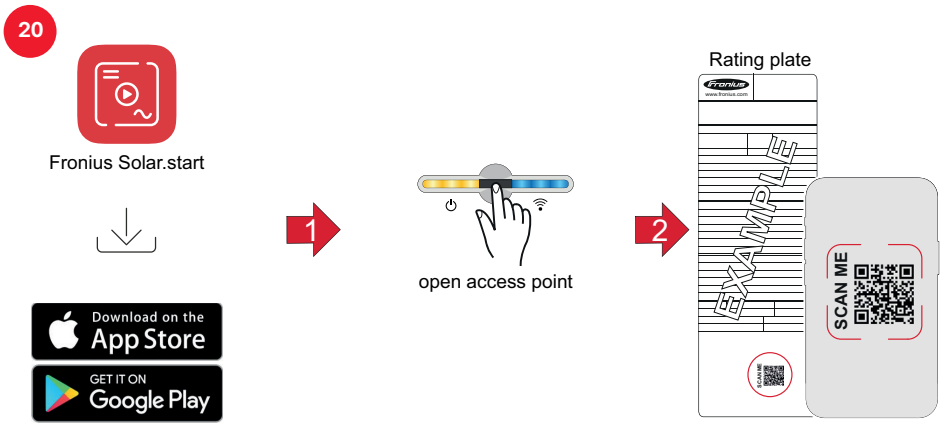


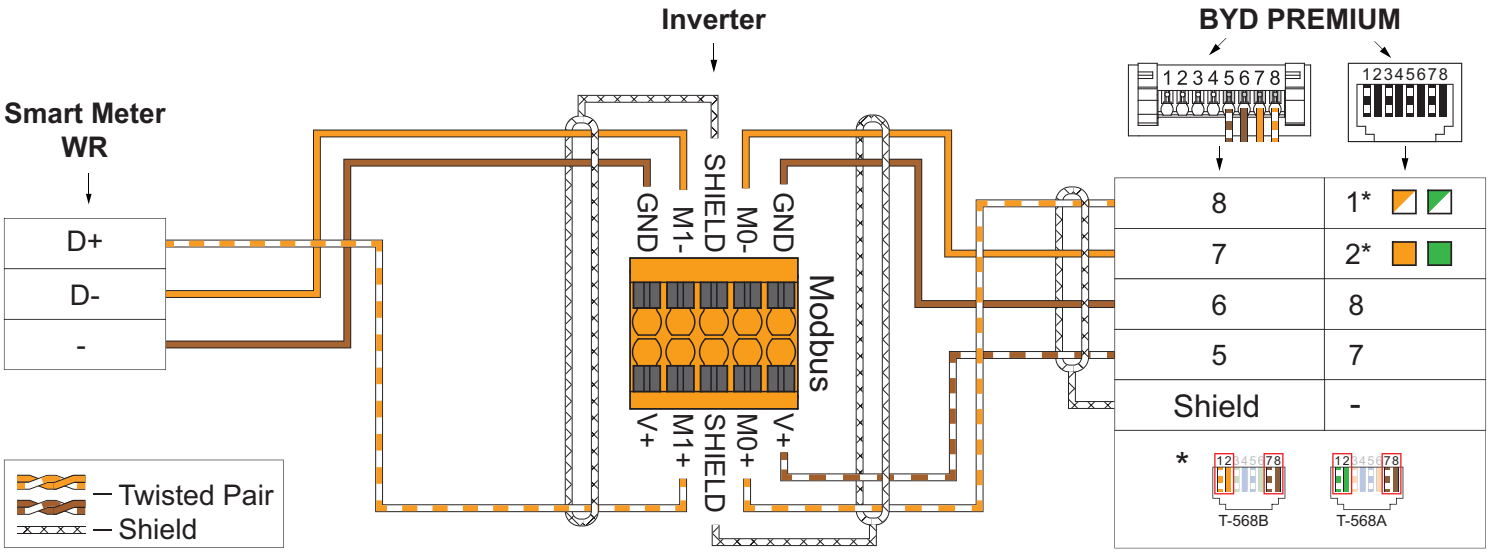










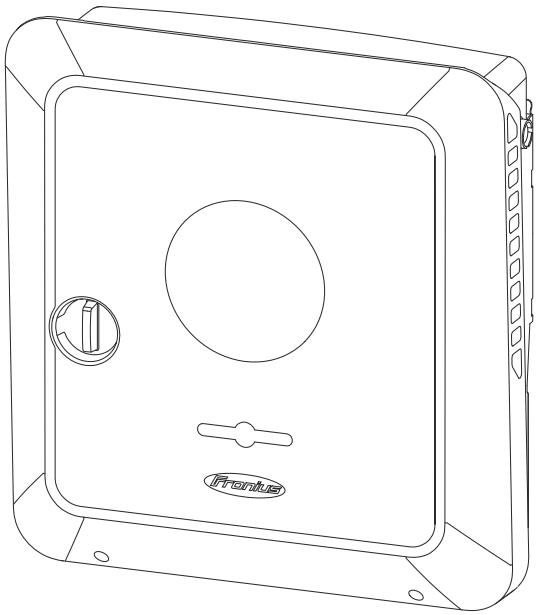


BYD Battery-Box Premium HVM-US						
Storage type	8.3	11.0	13.8	16.6	19.3	22.1
Number of battery modules	3	4	5	6	7	8
Compatible battery operation*	✗	✓	✓	✓	✓	✗
* Max. 3 batteries with a total capacity of 56 kWh can be combined.						

Operating Instructions

Fronius Primo GEN24 208-240

7.7 / 7.7 Plus
10.0 / 10.0 Plus



EN-US | Operating instructions

42,0426,0312,EA 016-10042025

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Safety rules

Explanation of safety instructions

⚠ WARNING!

Indicates a potentially dangerous situation.

▶ Death or serious injury may result if appropriate precautions are not taken.

⚠ CAUTION!

Indicates a potentially harmful situation.

▶ Minor injury or damage to property may result if appropriate precautions are not taken.

NOTE!

Indicates a possibility of flawed work results and possible damage to the equipment.

Please pay special attention when one of the symbols from the "Safety rules" chapter appears in these instructions.

Safety

IMPORTANT!
This unit must be operated in accordance with the technical specifications datasheet. This document is available on the corporate website of the manufacturer.

⚠ CAUTION!

Danger from crushing due to the incorrect handling of attachments and connection parts.
Injuries to limbs may result.

▶ To avoid muscle strain or injury, use proper lifting techniques and if required use a lifting aid.
▶ When lifting up, putting down, and attaching the inverter, use the integrated grips.
▶ When fitting any attachments, ensure that no limbs are located between the attachment and the inverter.
▶ Do not hold onto the terminals when locking and unlocking.

General

This device has been manufactured with quality control procedures and is in compliance with established safety regulations. However, improper use or misuse may pose potential risks including:

- Serious or fatal injury to the operator or third parties
- Damage to the device and other material assets belonging to the property owner

All personnel involved in commissioning, maintenance, and servicing of the device must:

- Be suitably qualified to perform electrical work, as defined by the NFPA 70
- Have knowledge of and experience in dealing with electrical installations
- Have fully read and precisely followed these Operating Instructions

All installations must comply with national and local electrical codes and standards.

In addition to the Operating Instructions, all applicable local regulations regarding accident prevention and environmental protection must also be followed.

All safety and danger notices on the device:
- Must be kept in a legible state
- Must not be damaged
- Must not be removed
- Must not be covered, pasted or painted over

Only operate the device when all protection devices are fully functional. If the protection devices are not fully functional, there is a danger of:
- Serious or fatal injury to the operator or third parties
- Damage to the device and other material assets belonging to the property owner

Any safety devices that are not fully functional must be repaired by an authorized specialist before the device is switched on.

Never bypass or disable protection devices.

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

Any equipment malfunctions which impair safety must be remedied before the device is turned on.

Environmental conditions

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

Qualified personnel

The servicing information contained in these Operating Instructions is intended only for the use of qualified personnel as defined by the NFPA 70. An electric shock can be fatal. Do not carry out any actions other than those described in the documentation.

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

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

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

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

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

Data on noise emission values

The sound pressure level of the inverter is indicated in the Technical data.

The cooling of the device takes place via an electronic temperature control system at the lowest possible noise level and depends on the power used, ambient temperature, and the soiling level of the device, etc.

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

EMC measures

In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g., when there is 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.

Backup power

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

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

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

The function of the residual current devices for the backup power supply must be checked at regular intervals (according to the manufacturer's instructions), but at least twice a year.
A description on how to perform the test operation can be found in the backup power checklist (https://www.fronius.com/en/search-page, item number: 42,0426,0365).

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

Influencing factors on the total power in backup power mode:

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

Devices with a high reactive power are mainly electric motors such as:
- Water pumps
- Circular saws
- Blowers and fans

High starting current
Electrical loads that need to accelerate a large mass usually require a high starting current. This can be up to 10 times higher than the nominal current. The maximum current of the inverter is available for the starting current. Loads with starting currents that are too high therefore cannot be started/operated, even

though the nominal output of the inverter suggests that they can. When dimensioning the backup power circuit, the connected load power and any starting current must also be taken into account.

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

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

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

Data backup

With regard to data security, the user is responsible for:
- backing up any changes made to the factory settings
- saving and storing personal settings

Copyright

Copyright of these operating instructions remains with the manufacturer.

Text and illustrations were accurate at the time of printing, subject to change. We are grateful for suggestions for improvement and information on any discrepancies in the operating instructions.

Equipment grounding (GND)

Grounding a point in the device, system, or installation serves as a protective measure against electric shock in the event of a fault. When installing an inverter from safety class 1 (see Technical data), a ground conductor connection is required.

When connecting the ground conductor, ensure that it is secured to prevent unintentional disconnection. All of the points listed in the chapter headed Connecting the inverter to the public grid (AC side) on page 58 must be observed. When using strain-relief devices, it is important to ensure that the ground conductor is loaded last in the event of a failure. The respective national standards and regulations and requirements for minimum cross-section must be observed when connecting the ground conductor.

General information

Fronius Primo GEN24 208 - 240

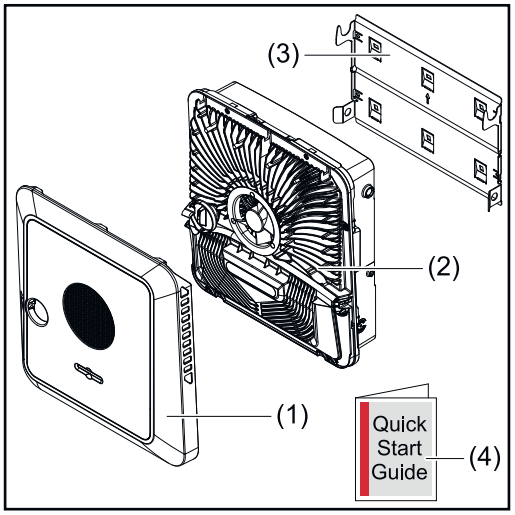
Function overview

Function	Primo GEN24	Primo GEN24 Plus
Backup power variant - PV Point (OP)	✓	✓
Battery connection*	Available as an option**	✓
Backup power variant - Essential Backup	Available as an option**	✓

* For suitable batteries, see chapter Suitable batteries.

** The functions are optionally available via Fronius UP (see chapter Fronius UP).

Scope of supply



(1) Housing cover
(2) Inverter
(3) Mounting bracket (illustration)
(4) Quick Start Guide

Fronius UP

With Fronius UP*, optionally available functions can be added to the inverter by the authorized specialist company (see chapter Function overview).

* The availability of Fronius UP is country-specific. Click here for further information on availability.

Intended use

The inverter is designed to convert direct current from PV modules into alternating current and feed this power into the public grid. A backup power mode* is possible if the wiring is set up accordingly.

Intended use also means:
- Carefully reading and following all the instructions as well as complying with the safety and danger notices in the operating instructions
- Installation in accordance with the chapter headed Installation, from page 43

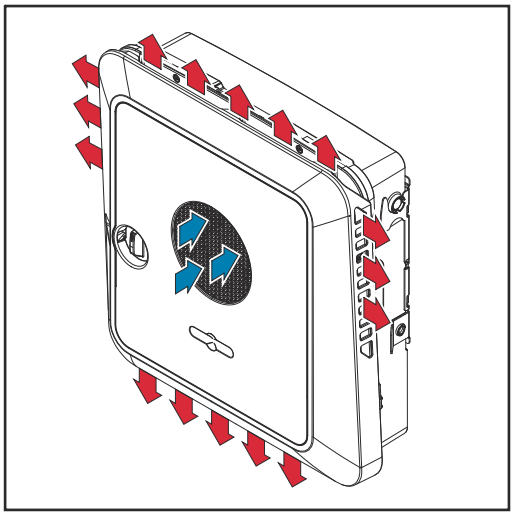
Follow all grid operator regulations regarding energy fed into the grid and connection methods.

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

- The inverter may be operated for max. 2000 operating hours in backup power mode
- The inverter may be operated for more than 2000 operating hours in backup power mode provided 20% of the grid power feed operating time of the inverter is not exceeded at the time in question

* Depending on the device variant, suitable battery, corresponding cabling, settings, and local standards and regulations.

Thermal concept



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

NOTE!

Risk due to insufficient cooling of the inverter.
This may result in a loss of power in the inverter.

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

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 using the Setup wizard; see the chapter headed Installation with the app on page 82 or Installation with the browser on page 82.

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.

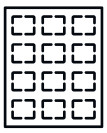
Local communication

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

Different operating modes

Operating modes - Explanation of symbols



PV module
generates direct current.

Fronius GEN24 inverter
converts direct current into alternating current and charges the battery (battery support is required to charge the battery, see Function overview on page13). The integrated system monitoring enables the inverter to be integrated into a network by means of WLAN.

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

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

Primary meter
records the system's load curve and provides measurement data for energy profiling in Fronius Solar.web. The primary meter also controls the dynamic feed-in control.

Secondary meter
records the load curve of individual loads (e.g., washing machine, lamps, TV, heat pump, etc.) in the consumption branch and provides measurement data for energy profiling in Fronius Solar.web.

Loads in the system
are the loads connected in the system.

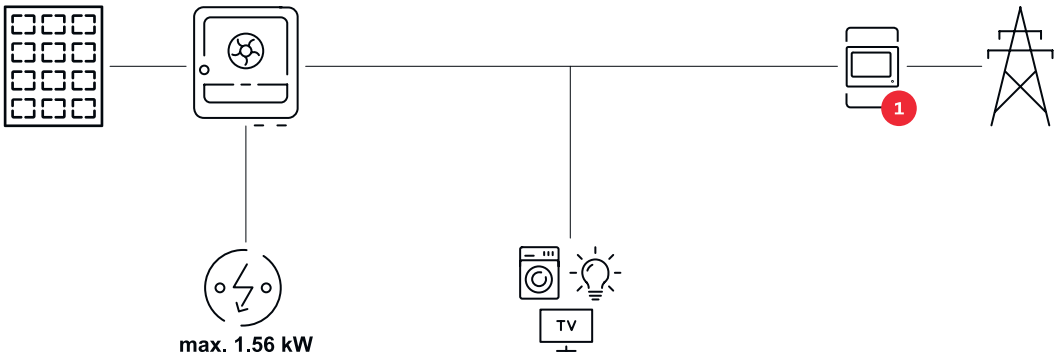
Additional loads and producers in the system
are connected to the system by means of a Smart Meter.

PV Point
is a non-uninterruptible 1-phase backup power circuit that supplies electrical devices with up to 1.56 kW if sufficient power is available from the PV modules or the battery.

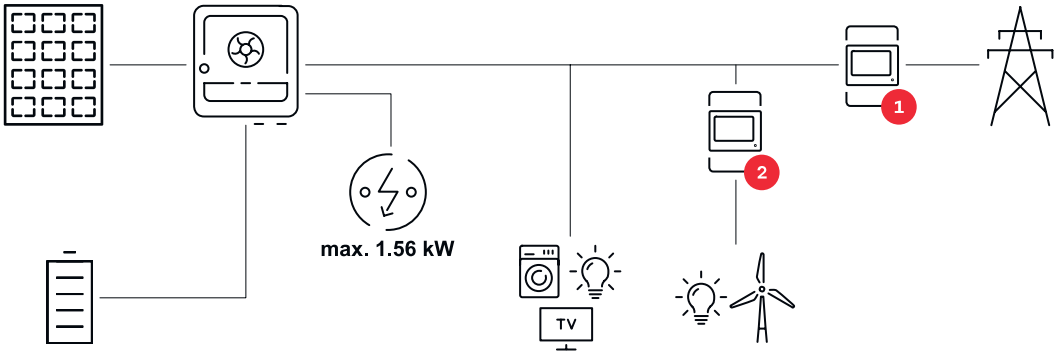
Essential Backup
the inverter is prepared for backup power mode. The backup power mode must be implemented in the switch cabinet by the electrician performing the installation. The PV system operates in a stand-alone manner in backup power mode.

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

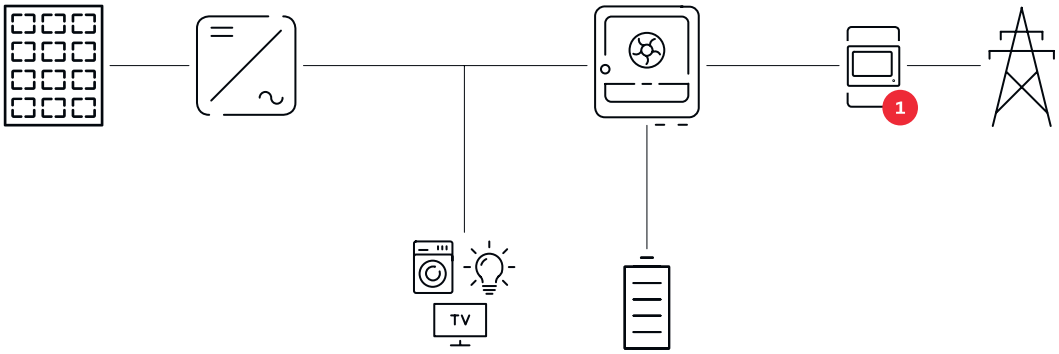
Operating mode - Inverter with Smart Meter



Operating mode - Inverter with battery and several Smart Meters



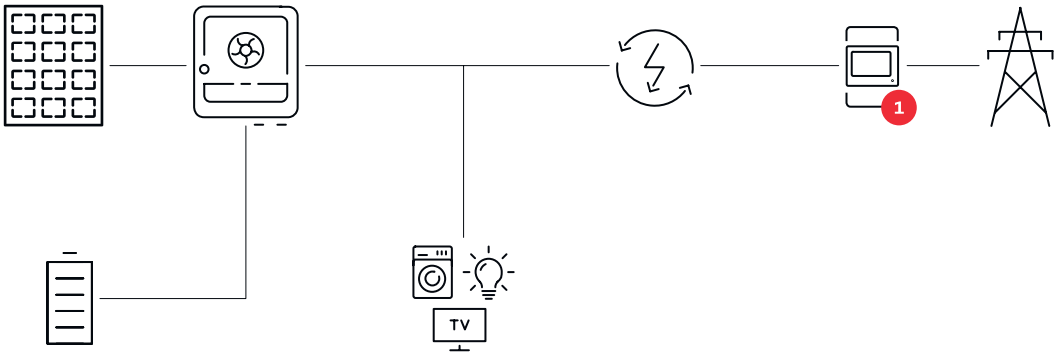
Operating mode – Inverter with battery, AC-coupled to another inverter



Operating mode - Inverter with battery and backup power function

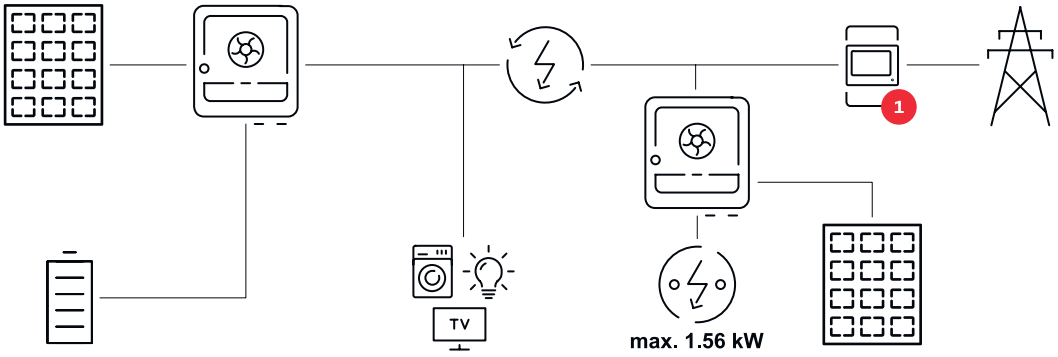
IMPORTANT!
For backup power mode, a **Backup Frequency Offset** can be set for loads in the backup power circuit (see Inverter).

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

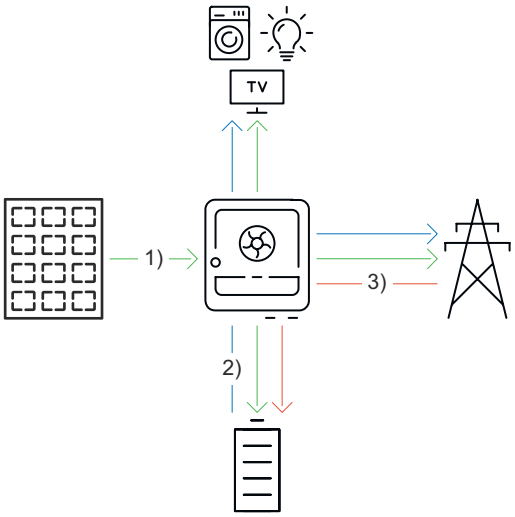


Operating mode - Inverter with battery, additional inverter, and backup power function

In the hybrid photovoltaic system, batteries must only be connected to one inverter with battery support. Batteries cannot be split between multiple inverters with battery support. However, depending on the battery manufacturer, several batteries can be combined on one inverter.



Energy flow direction of the inverter



(1) PV module – inverter – load/grid/battery
(2) Battery – inverter – load/grid*
(3) Grid – inverter – battery*

* Depending on the settings and local standards and regulations.

Operating states (only for battery systems)

Battery systems distinguish between different operating states. In each case, the relevant current operating state is displayed on the user interface of the inverter or in Fronius Solar.web.

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

Energy-saving mode

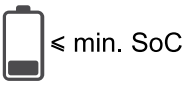
General

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

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

Switch-off conditions

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



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

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

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

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

Switch-on conditions

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

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

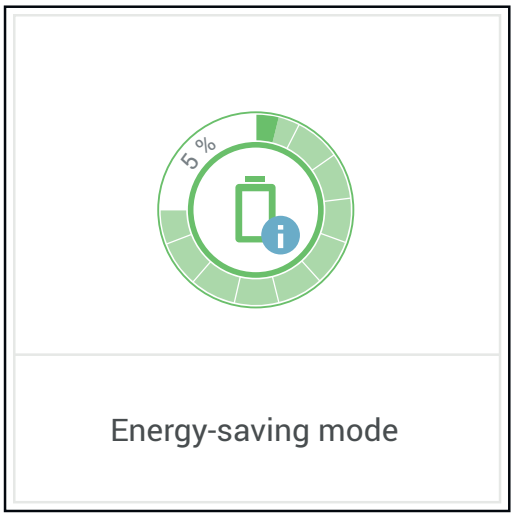
Special case

If the inverter does not operate for 12 minutes (e.g., fault), or there is an interruption in the electrical connection between the inverter and the battery and there is no backup power mode, the battery switches to energy-saving mode in any case. This reduces self discharge of the battery.

Indication of energy saving mode

During energy saving mode:

- Operating LED for the inverter lights up orange (see Button functions and LED status indicator on page 31).
- The user interface of the inverter can be reached.
- All the available data are saved and transmitted to Solar.web.
- The real-time data can be seen on Solar.web.



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

Suitable batteries

General

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

Install third-party batteries (part of a ESS (energy storage system)) according to applicable local and national codes.

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

1 Update battery software—see the battery documentation.

2 Update inverter firmware—see Update on page 100.

Read this document and the Installation Instructions before installing and commissioning the external battery. The documentation is either enclosed with the external battery or can be obtained from the battery manufacturer or their service partners

All documents associated with the inverter can be found at the following address:

https://www.fronius.com/en/solar-energy/installers-partners/service-support/tech-support

Limitations in operation

If the DC voltage exceeds 403 V, the battery can no longer be charged or discharged. The voltage of 403 V is rarely exceeded during normal operation of the inverter.

When the output power of the inverter is reduced, the operating point shifts towards higher DC voltages. The following conditions during normal operation can lead to the DC voltage of 403 V being exceeded:

- Overdimensioning of the module array.
- Feed-in limitation (e.g., zero feed-in).
- Specifications of the grid operator (e.g., mains voltage-dependent power reduction).
- Backup power mode. If the 403 V voltage is exceeded during backup power, backup power operation may be restricted. Therefore, an open-circuit voltage of max. 403 V is recommended.

BYD Battery-Box Premium

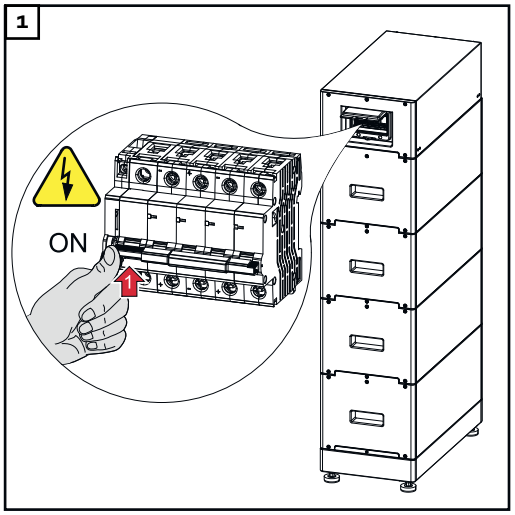
BYD Battery-Box Premium HVM-US	8.3	11.0	13.8	16.6	19.3	22.1
Number of battery modules	3	4	5	6	7	8
Fronius Primo GEN24 *	✗	✓	✓	✓	✓	✗
Fronius Primo GEN24 Plus	✗	✓	✓	✓	✓	✗
Battery parallel operation**	✗	✓	✓	✓	✓	✗

* Battery support optionally available.

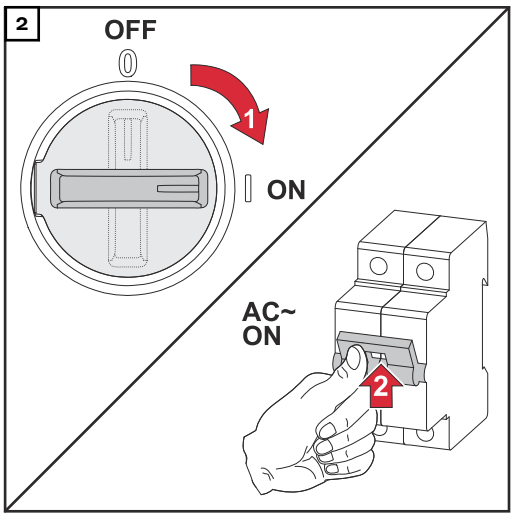
** Max. 3 batteries with the same capacity can be combined.

IMPORTANT!
According to the manufacturer's specifications, the max. DC cable length is 20 m. More detailed information can be found in the manufacturer's documents.

IMPORTANT!
To ensure reliable operation with a BYD Battery-Box Premium, the following switch-on sequence for the system must always be observed.



Switch on the battery.



Set the DC disconnector to the "On" switch position. Switch on the automatic circuit breaker.

Protection of people and equipment

Rapid shutdown

Two different types of rapid shutdown (RSD) can be triggered depending on the configuration and on-site installation:

- **Via external buttons**: One or more external buttons can be installed on the WSD (wired shutdown) interface of the Data communication area on page 30. Pressing one of these buttons interrupts the communication from the inverter to the rapid shutdown devices attached to the PV modules, only if they correspond to the SunSpec standard for rapid shutdown. The terminals are discharged to < 30 VDC and < 15 VAC within 30 seconds after RSD initiation.

- **Via the loss of the grid connection**: An automatic rapid shutdown can also occur if the grid connection is lost. The inverter identifies a failure of the grid connection and terminals are discharged to < 30 VDC and < 15 VAC. The inverter also interrupts the communication to the shutdown devices of the PV modules if they correspond to the SunSpec standard for rapid shutdown.

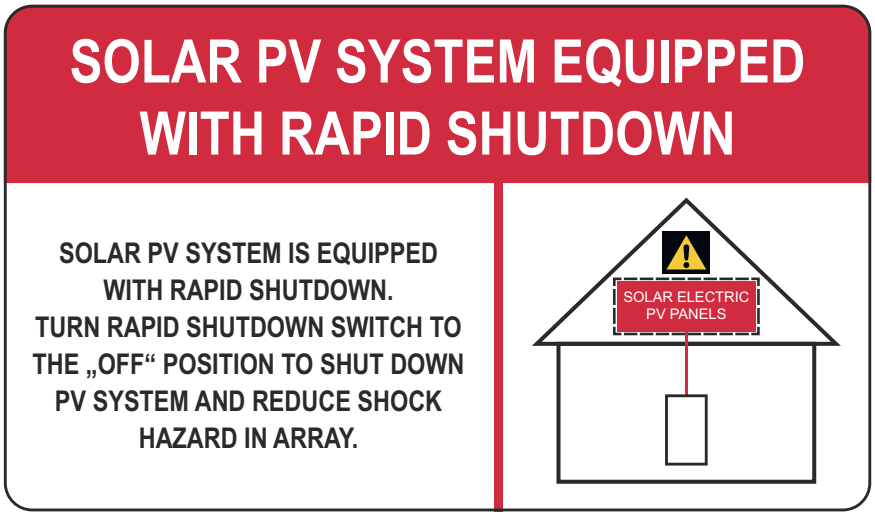
⚠ WARNING!

Limited rapid shutdown function in backup power mode (PV Point and Essential Backup)
If PV Point or Essential Backup is configured, rapid shutdown cannot be triggered via the loss of grid connection. This can result in serious personal injury and damage to the PV system.

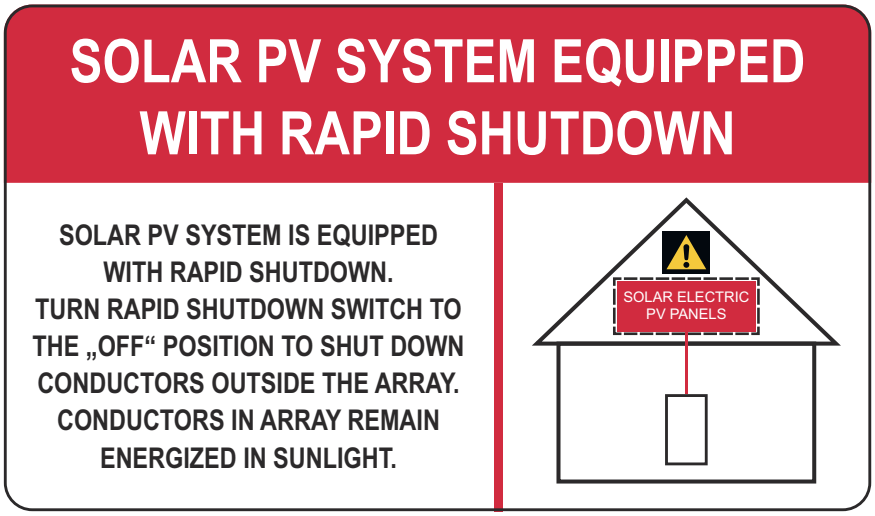
▶ A WSD switch must be installed for all backup power modes (PV-Point and Essential Backup) (see Installing the WSD (wired shutdown)). The rapid shutdown is then triggered via WSD.

Self test error automatic: RsdSelftestFailed
When an RSD occurs, an entry appears in the Event Log menu: RsdTriggeredByLossOfAc (interruption by AC breaker) or RsdTriggeredBySwitch (interruption by WSD circuit)

In case a module-level shutdown equipment within the PV array is used in combination with the inverter, this labeling has to be used acording to NEC (Section 690.12), CSA C22.1 (Section 64-218):



In case a string-level shutdown equipment at the PV array is used in combination with the inverter, this labeling has to be used acording to NEC (Section 690.12), CSA C22.1 (Section 64-218):



Warning - The installer is responsible for the correct labeling of the PV system. The rapid shutdown requirement of the inverter is not affected by the FRT (fault ride through) capability, so the inverter is „Grid support interactive compatible“.

Warning - This photovoltaic rapid shutdown equipment (PVRSE) does not perform all of the functions of a complete photovoltaic rapid shutdown system (PVRSS). This PVRSE must be installed with other equipment to from a complete PVRSS that meets the requirements of NEC (NFPA 70) section 690.12 for controlled conductors outside the array. Other equipment installed in or on this PV system may adversly affect the operation of the PVRSS. It is the responsibility of the installer to ensure that the completed PV system meets the rapid shutdown functional requirements. This equipment must be installed according to the manufacturer´s installation instructions.

Self-test
A self-test of the RSD function can be performed manually or automatically. The automatic self-test relates only to the discharge circuit of the RSD function. All other RSD circuit components are produced so as to be fail-safe.

Sequence of automatic self-test:
In each startup procedure—prior to connection to the public grid—when there is sufficient DC voltage (40 V) the discharge circuit is activated for 10 ms and the feedback pin is checked prior to and during charging.

Sequence of manual self-test:
A manual self-test can be triggered by an interruption in the grid connection (e.g., AC breaker) or by the WSD trigger device (see also WSD (wired shutdown) on page 26).

The discharge must be measured and checked using a multimeter.

Power Line Communication (PLC) transmitter

The inverter is equipped with a Power Line Communication (PLC) transmitter on the DC side. Its function is to ensure rapid shutdown in accordance with National Electric Code NEC 2023 Art. 690.12 and Canadian Electrical Code CSA C22.1:24 Art. 64-218. The PLC is implemented according to the specification “Communication Signal for Rapid Shutdown – SunSpec Interoperability Specification” (depending on national grid setup). Please visit www.sunspec.org for details.

To ensure compliance with all applicable regulations in your country and to ensure optimal reception among all recipients, please follow the recommendations below:

- Keep the distance between the DC+ and DC- conductors as small as possible
- Avoid cable loops caused by cables that are too long (coil effect)
- Use metal cable ducts where possible
- Do not place DC cables from different inverters in the same cable duct or cable tray

Additional external AC and/or DC disconnect

Depending on the installation, an additional external AC and/or DC disconnect may be required if the inverter is installed in a location not easily accessible to utility or first responders. Contact your local authorities for additional information.

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 the installation location requires inverter shutdown when the building fire alarm system is activated, the Wired Shut Down connection on the inverter can be used and connected to the building fire alarm system.

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

For installation, see Installing the WSD (wired shutdown) on page 79.

If the installation location requires inverter shutdown when the building fire alarm system is activated, the Wired Shut Down connection on the inverter can be used and connected to the building fire alarm system.

RCMU

The inverter is equipped with an RCMU (RCMU = residual current monitoring unit) according to UL1741 CRD 3rd Edition (Non-Isolated EPS Interactive PV Inverters).
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. If five faults are detected within a period of 24 hours, grid power feed operation can also be permanently interrupted until a manual reconnection has been performed.

Insulation Monitoring

In the case of PV systems with ungrounded PV source circuits, the inverter checks the resistance between the positive or negative pole of the PV system and the ground potential before feeding energy into the grid. In the event of a short circuit between the DC+ or DC- cable and ground (e.g. due to inadequately insulated DC cables or damaged solar modules), the inverter is prevented from feeding energy into the grid.

AFCI - Arc Fault Circuit Interrupter (Arc Guard)

An AFCI (arc fault circuit interrupter) protects against arc faults in accordance with National Electric Code NEC 2023 Art. 690.11 and Canadian Electrical Code CSA C22.1:24 Art. 64-216 and, in the narrower sense, is a protection device in the event of contact errors. The AFCI evaluates faults that occur in the current

and voltage flow on the DC side using an electronic circuit and shuts down the circuit if a contact error is detected. This significantly reduces potential overheating and fire risk at poor contact points.

⚠ CAUTION!

Danger from faulty or incorrect DC installation.
This may result in a risk of damage and, as a consequence, risk of fire in the PV system due to prohibited thermal loads that occur during an arc.

- ▶ Check the plug connections to ensure that they are correct.
- ▶ Repair faulty insulation correctly.
- ▶ Perform connection work in line with the instructions.

IMPORTANT!
Fronius will not bear any costs for production downtimes, installation costs, etc., which may arise due to a detected electric arc and its consequences. Fronius accepts no liability for damage which may occur despite the integrated Arc Fault Circuit Interrupter/interruption (e.g., due to a parallel arc).

IMPORTANT!
Active PV module electronics (e.g., power optimizers) can impair the function of the Arc Fault Circuit Interrupter. Fronius cannot guarantee the correct function of the Arc Fault Circuit Interrupter in combination with active PV module electronics.

Reconnection behavior
Grid power feed operation is interrupted for at least 5 minutes after an arc has been detected. Depending on the configuration, grid power feed operation is then automatically resumed. If several arcs are detected within a period of 24 hours, grid power feed operation can also be permanently interrupted until a manual reconnection has been performed.

Standby state

If one of the following safety devices is triggered, the inverter switches to the standby state:

- Rapid shutdown
- WSD
- RCMU
- Insulation monitoring
- AFCI

In the standby state, the inverter no longer feeds in and is disconnected from the grid by the opening of the AC relay.

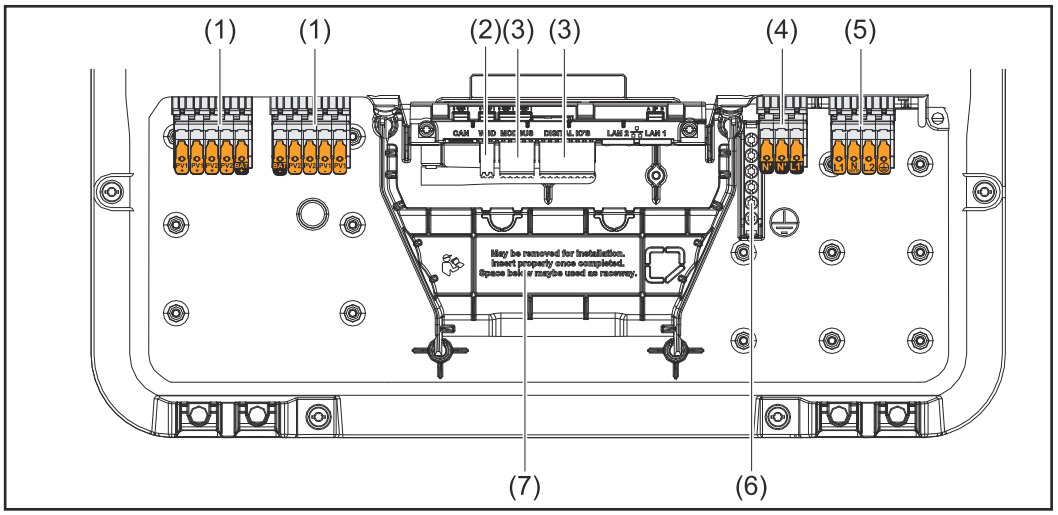
Surge protection device

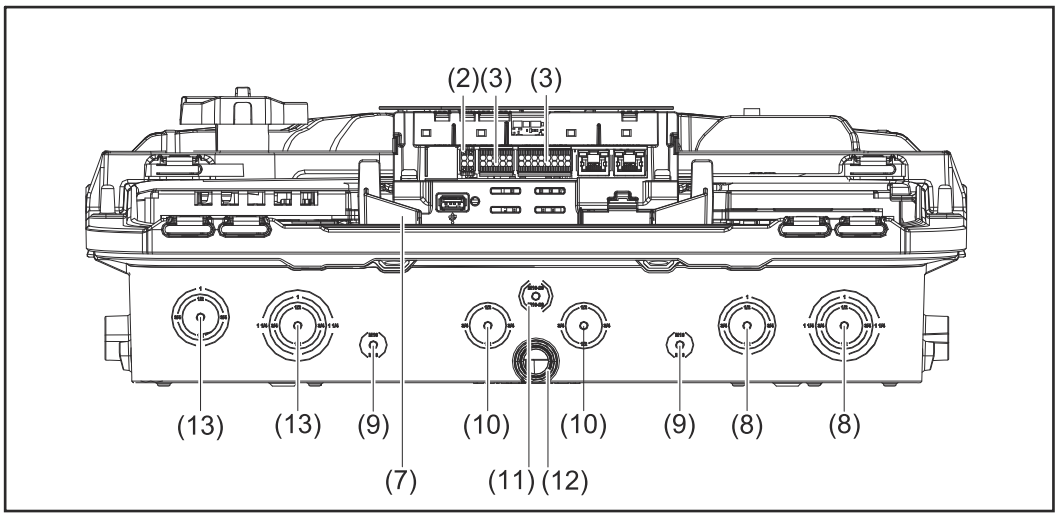
The inverter is equipped with an integrated surge protection device according to UL1741 3rd Edition, CSA-C22.2 No.107.1-16 on the DC (Category II) and AC (Category IV) side. The surge protection device protects the system against damage caused by overvoltage.

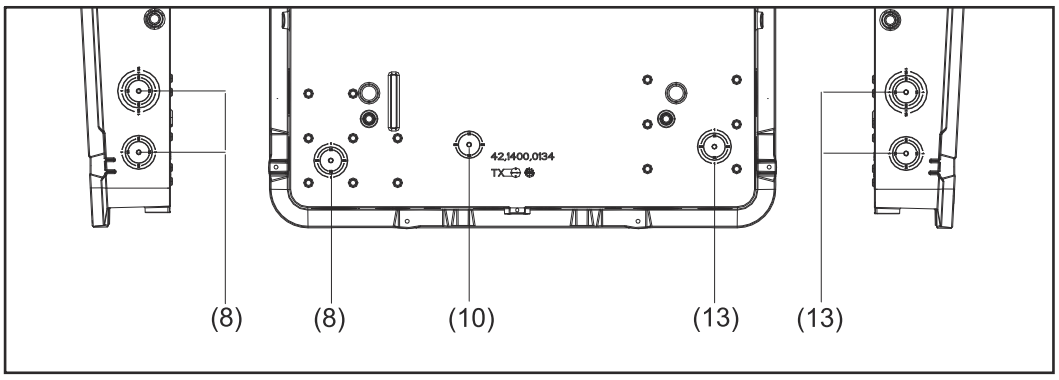
If the integrated surge protection devices become damaged due to prolonged overvoltage exposure, the damage may not be covered under the terms of warranty. See warranty terms for more information.

Operating controls and connections

Connection area





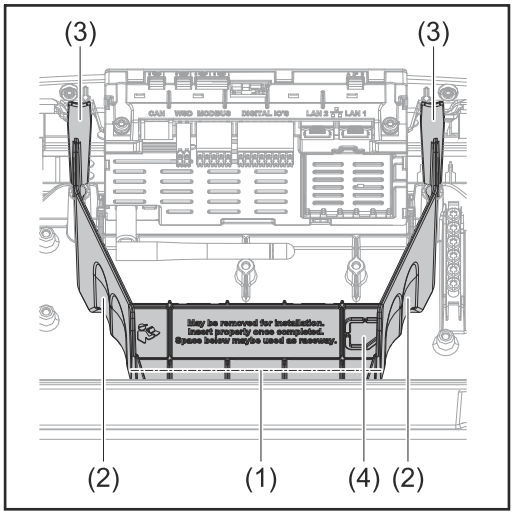


(1) 2 x 5-pin DC push-in terminal
(2) Push-in WSD (wired shutdown) terminal
(3) Push-in terminals in the data communication area (Modbus, digital inputs and outputs)
(4) 3-pin push-in terminal for PV Point (OP)
(5) 4-pin AC push-in terminal
(6) 6-pin ground electrode terminal

(7) Connection area divider
(8) AC conduit connection (Ø ½ - 1 inch / 13 - 25 mm) (Ø ½ - 1¼ inch / 13 - 32 mm)
(9) Ground spike conduit connection (Ø ⅝ inch / 16 mm)
(10) DatCom conduit connection (Ø ½ - ¾ inch / 13 - 19 mm)
(11) Data communication area conduit connection (Ø ⅝ - ¾ inch / 16 - 19 mm)
(12) Drain valve
(13) DC conduit connection (Ø ½ - 1 inch / 13 - 25 mm)

Connection area divider

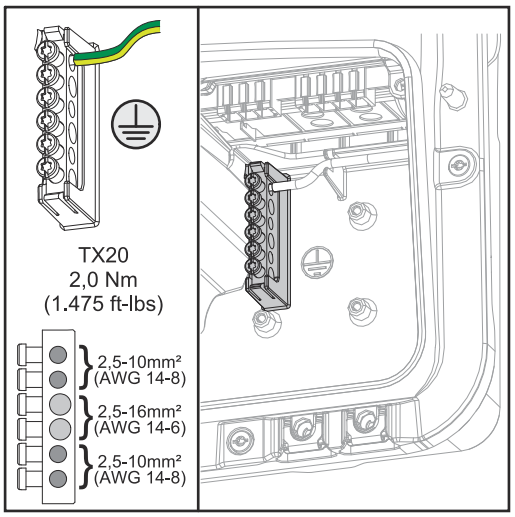
The connection area divider separates the high-voltage conductors (DC and AC) from the signal lines. To make it easier to reach the connection area, the divider can be removed for the connection work, and must be re-inserted.



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

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

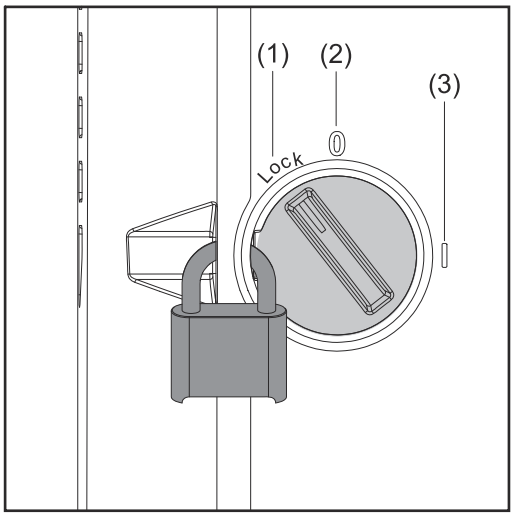
Ground electrode terminal



The ground electrode terminal ⏚ provides the option of grounding additional components, such as:

- AC cable
- Module mounting system
- Ground spike
- Battery

DC disconnector

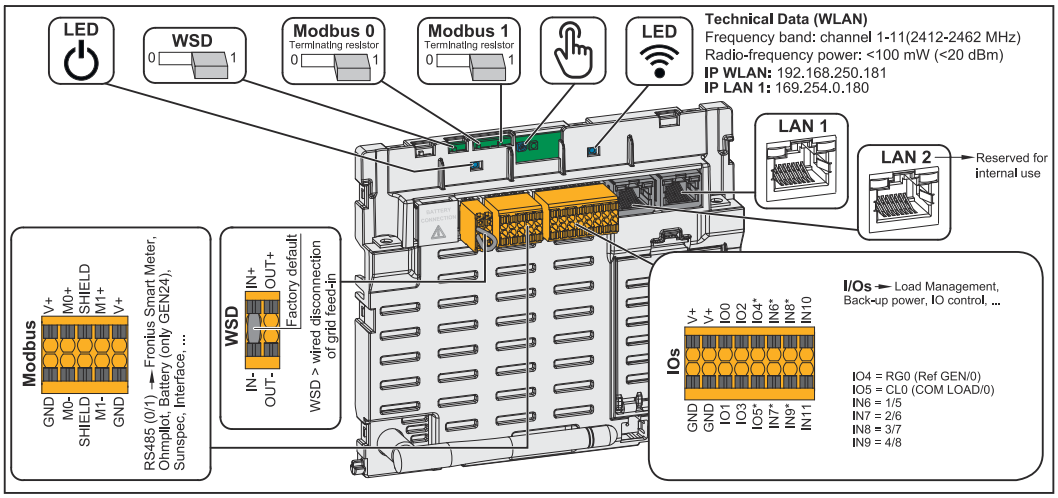


The DC disconnector has three switch settings:

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

IMPORTANT!
In switch settings (1) and (3), the inverter can be secured to prevent it from being switched on/off using a standard padlock. The national guidelines must be complied with in this respect.

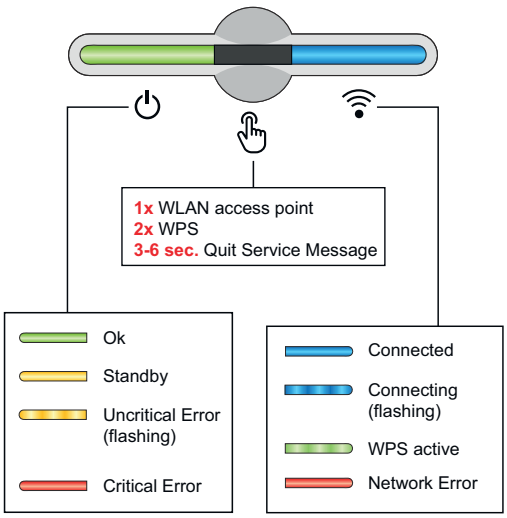
Data communication area



⏻ 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 the chapter headed Button functions and LED status indicator on page 31.
Communications LED	Indicates the inverter connection status.
LAN 1	Ethernet connection for data communication (e.g., WLAN router, home network or, for commissioning with a laptop, see the chapter headed Installation with the browser on page 82).
LAN 2	Reserved for future functions. To avoid malfunctions, only use LAN 1.
I/O terminal	Push-in terminal for digital inputs/outputs. See the chapter headed Permitted cables for the data communication connection on page 56.
WSD terminal	Push-in terminal for the WSD installation. See the chapter headed "WSD (wired shutdown)" on page 26.
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 the chapter headed Modbus participants on page 76.

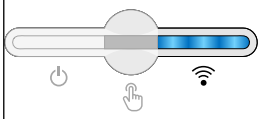
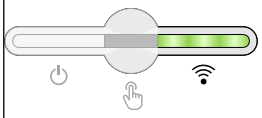
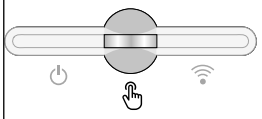
Button functions and LED status indicator

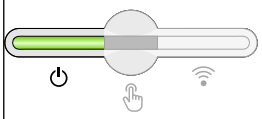
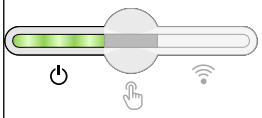
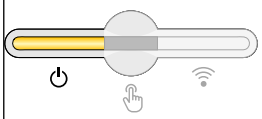
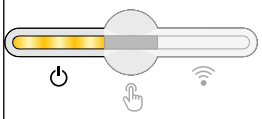
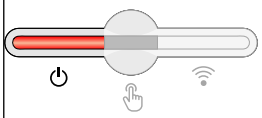
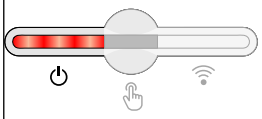
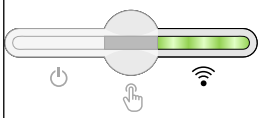
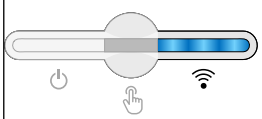
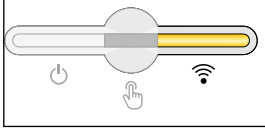


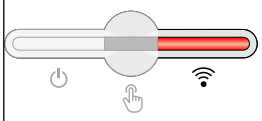
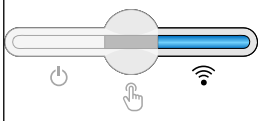
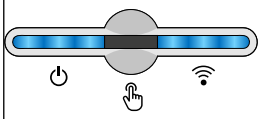
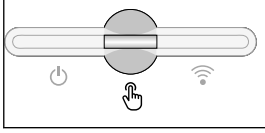
The status of the inverter is shown via the operating status LED. In the event of faults, carry out the individual steps in the Fronius Solar.start app.

The optical sensor is actuated by touching with a finger.

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

Sensor functions	
	1x = WLAN Access Point (AP) is opened. Flashing blue
	2x = WLAN Protected Setup (WPS) is activated. Flashing green
	3 seconds (max. 6 seconds) = the service message is acknowledged. Flashing white (rapidly)

LED status indicator	
	The inverter is operating correctly. Lights up green
	The inverter is performing the grid checks required by the applicable standards for feed-in mode. Flashing green
	The inverter is in standby, is not operational (e.g. no feed-in at night) or is not configured. Lights up yellow
	The inverter indicates a non-critical status. Flashing yellow
	The inverter indicates a critical status and there is no grid power feed process. Lights up red
	The inverter indicates a backup power overload. Flashing red
	The network connection is being established via WPS. 2x = WPS search mode. Flashing green
	The network connection is being established via WLAN AP. 1x = WLAN AP search mode (active for 30 minutes). Flashing blue
	The network connection is not configured. Lights up yellow

LED status indicator	
	The inverter is operating correctly, a network fault is indicated. Lights up red
	The network connection is active. Lights up blue
	The inverter is performing an update. / Flashing blue
	There is a service message. Lights up white

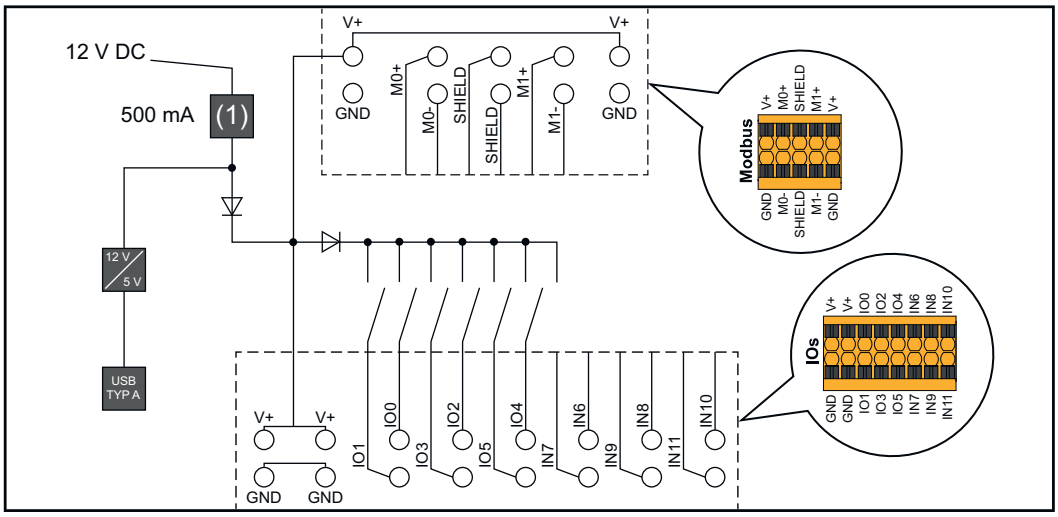
Schematic internal wiring of IOs

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



(1) Current limitation

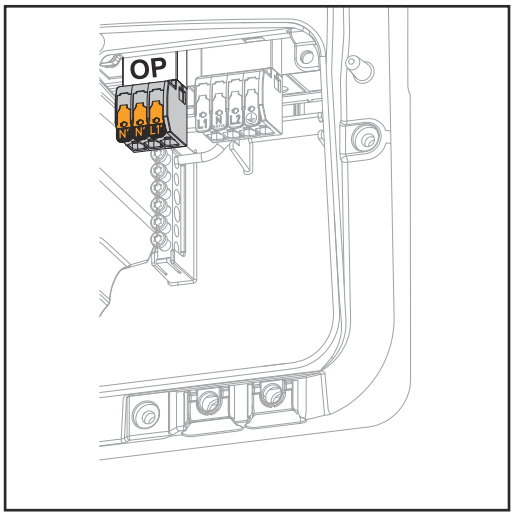
Manual system start

Requirements	There is no energy available from the PV modules or from the public grid. If backup power operation or battery operation are not possible (e.g., deep discharge protection of the battery), the inverter and battery switch off.
Notification of system shutdown	Status codes about the inactive state of the battery are displayed on the user interface of the inverter. A notification via e-mail can be activated in Fronius Solar.web.
Manual battery start after system shutdown	As soon as energy is available again, the inverter starts operation automatically; however, the battery must be started manually. The switch-on sequence must be observed for this, see chapter Suitable batteries on page 22.
Starting backup power operation after a system shutdown	The inverter requires energy from the battery to start backup power operation. This is done manually on the battery; further information on the power supply for restarting the inverter via the battery can be found in the battery manufacturer's Operating Instructions.

Backup power variant - PV Point (OP)

General

PV Point (OP)



⚠ WARNING!

Limited rapid shutdown function in backup power mode (PV Point and Essential Backup)
If PV Point or Essential Backup is configured, rapid shutdown cannot be triggered via the loss of grid connection. This can result in serious personal injury and damage to the PV system.

- ▶ A WSD switch must be installed for all backup power modes (PV-Point and Essentail Backup) (see Installing the WSD (wired shutdown)). The rapid shutdown is then triggered via WSD.

With the PV Point, in the event of a failure of the public grid, electrical devices can be connected to the Opportunity Power (OP) terminal and supplied with a maximum power of 1.56 kW, if enough power is available in the PV modules. In grid-connected operation, the OP terminal is not supplied with voltage, therefore the connected loads will not be supplied with power in this operating mode.

IMPORTANT!
A grid switchover with relay is not possible.

Explanation - PV Point (OP)

With the default settings, the inverter can provide 120V at the PV Point. A corresponding configuration must be set up during commissioning.

At the selected output voltage, a maximum of 13 A AC continuous current is available. The maximum continuous output is 1560 W.

Example:
120 V *13 A = 1560 W

In backup power mode, some electrical appliances cannot function properly as start-up currents are too high (e.g., fridges and freezers). In backup power mode, we recommend switching off non-essential loads. Overload capacity of 35% is possible for a duration of 5 seconds, depending on the current power of the PV module.

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

If no energy from the PV modules is available in backup power mode, backup power mode ends automatically. Backup power mode restarts again automatically once sufficient energy can once again be provided by the PV modules.

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

Backup power variant - Essential Backup

General

Prerequisites for backup power mode

IMPORTANT!
If several backup power variants are available, please note that only one backup power variant may be installed and configured.

In order to use the inverter's backup power function, the following prerequisites must be fulfilled:
- The inverter must support the backup power variant - Essential Backup (see chapter Function overview on page 13).
- A battery suitable for backup power use must be installed and configured.
- Correct cabling of the backup power system in the electrical installation or usage of a switch box
- **IMPORTANT!** The inverter provides a nominal output current of 240 V in backup power mode. The switch box must reduce the current to 120 V.
- Mount and configure the Fronius Smart Meter at the feed-in point.
- Attach a warning notice for the backup power supply (https://www.fronius.com/en/search-page, item number: 42,0409,0275) on the electrical distributor.
- Apply the necessary settings in the **"Devices and system components"** → **"Functions and pins"** → **"Backup Power"** menu area and activate backup power.

Transitioning from grid power feed operation to backup power mode

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

Transitioning from backup power mode to grid power feed operation

1. The inverter is operating in backup power mode.
2. **The public grid is functioning correctly again.**
3. The Fronius Smart Meter monitors the grid parameters on the public grid and passes this information to the inverter.
4. The stability of the restored public grid is determined by checking the measured values of the Fronius Smart Meter.
5. Backup power mode is terminated automatically or manually depending on the design of the backup power switchover facility.
6. All circuits are reconnected to the public grid and are supplied by the grid.
7. The inverter can start grid power feed operation again after performing the grid checks required by the relevant standard.

Backup power and energy saving mode

Under the following conditions, the battery and the inverter are switched to energy saving mode after a waiting time of 8-12 minutes and backup power mode is ended:
- The battery is discharged to the minimum state of charge and no energy is coming from the PV modules.
- The inverter is set to energy saving mode (standby mode).

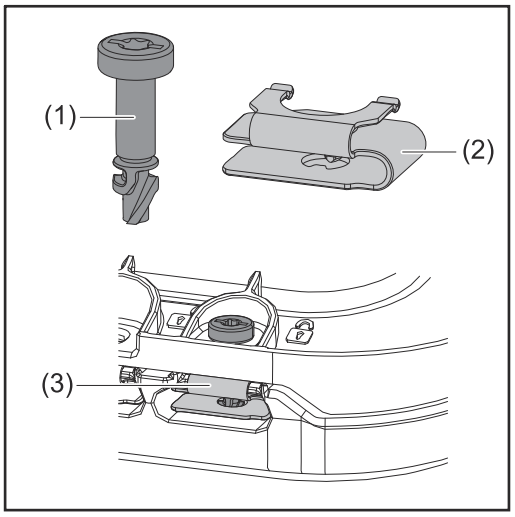
If the battery and inverter are in energy saving mode, the system is reactivated by the following:

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

Installation

General

Quick-fastener system



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

The system is independent of torque.

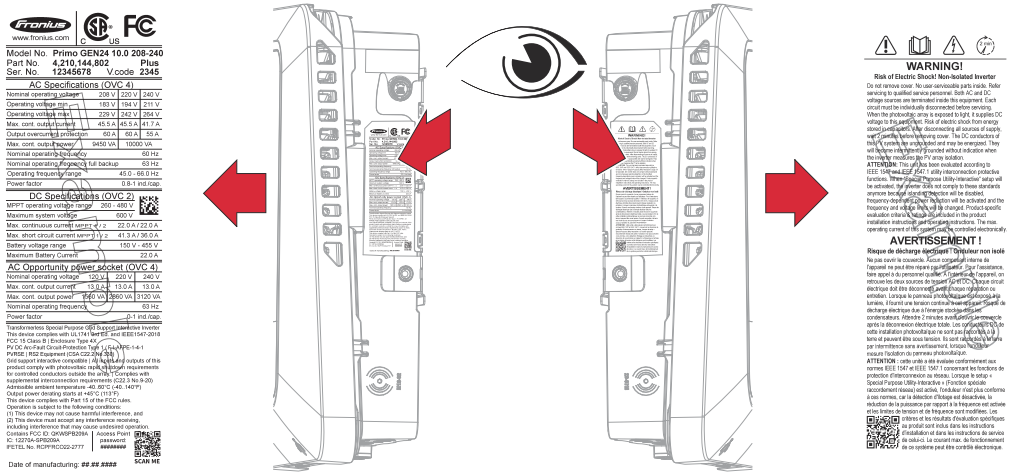
NOTE!

Danger when using a drill driver.
This may result in the destruction of the quick-fastener system due to over-torque.

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

Information on the device

Warning notices and safety symbols are located on the inverter. These warning notices and safety symbols must not be removed or painted over. They warn against incorrect operation, as this may result in serious injury and property damage.



Symbols on the rating plate:

Devices marked with the CSA certification mark satisfy the requirements of the relevant product standards for Canada and the USA.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Any changes or modification not expressly approved by the party responsible could void the user's authority to operate the device.

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Safety symbols:

Danger of serious injury and property damage due to incorrect operation

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

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

Dangerous electrical voltage

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

Warning notice text:

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

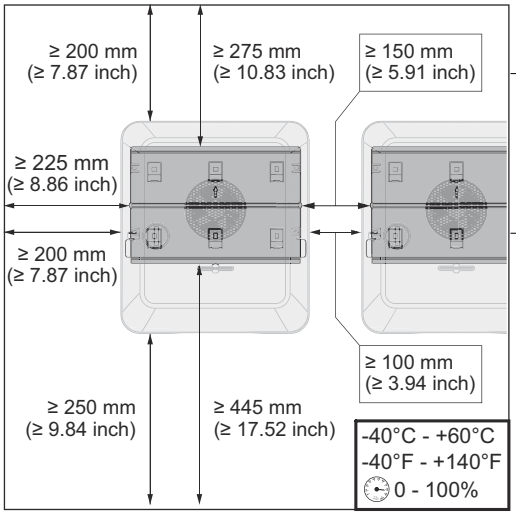
Installation location and position

Choosing the location of the inverter

NOTE!

Risk from unsuitable choice of location for the inverter.
Failure or restricted operation of the inverter may result.
- ▶ Adhere to the instructions relating to the location, according to this chapter
- ▶ Adhere to national provisions and guidelines when installing the inverter.

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



Only install on a solid, non-flammable surface.

Max. ambient temperatures:
-40 °F - +140 °F / -40 °C - 60 °C

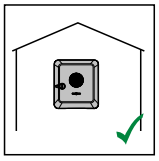
Relative humidity:
0 - 100%

When installing the inverter in a switch cabinet or similar closed environment, it is necessary to make sure that the hot air that develops will be dissipated by forced-air ventilation.

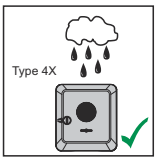
For more detailed information on inverter dimensions, refer to the chapter headed Fronius Primo GEN24 7.7 - 10.0 208-240 on page 147.

When installing the inverter on the outer walls of cattle sheds, it is important to maintain a minimum clearance of 6.5 ft between all sides of the inverter and the ventilation and building openings.

The following substrates are permissible for installation:
- Walls (non-flammable surfaces sufficiently capable of bearing loads):
  - Corrugated metal walls [mounting rails]
  - Brick walls
  - Concrete walls
  - Vinyl siding walls
  - Wood siding walls
  - Stucco wall
- Poles (installed using mounting rails, behind the PV modules directly on the PV mounting system)
- Covered parking lot roofs (no overhead installation)

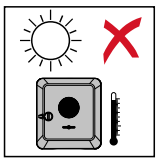


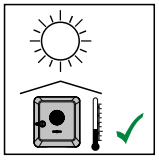
The inverter is suitable for indoor installation.



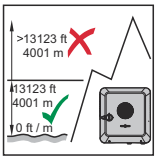
The inverter is suitable for outdoor installation.

When properly installed, the inverter has a Type 4X protection class, is not susceptible to spraying water on any side and can also be operated in moist environments.

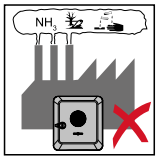




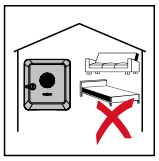
In order to keep inverter heating as low as possible, do not expose the inverter to direct sunlight. The inverter should be installed in a protected location, e.g., near the PV modules or under an overhanging roof.



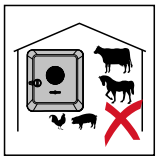
IMPORTANT! The inverter must not be installed or operated at more than 13,123 ft / 4001 m above sea level.



Do not install the inverter:
- Where it may be exposed to ammonia, corrosive gases, acids or salts (e.g., fertilizer storage areas, vent openings for livestock stables, chemical plants, tanneries, etc.)

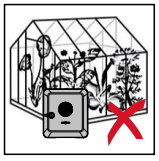


During certain operating phases the inverter may produce a slight noise. For this reason it should not be installed in an occupied living area.



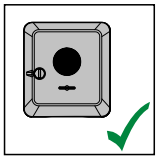
Do not install the inverter in:
- Areas where there is an increased risk of accidents from farm animals (horses, cattle, sheep, pigs, etc.)
- Stables or adjoining areas
- Storage areas for hay, straw, chaff, animal feed, fertilizers, etc.

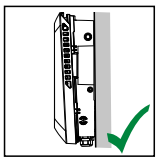
The inverter is essentially designed to be dustproof (Type 4X). In areas of high dust accumulation, dust deposits may collect on the cooling surfaces, and thus impair the thermal performance. Regular cleaning is required in this case; see the chapter headed Operation in dusty environments on page 125. We therefore recommend not installing the inverter in areas and environments with high dust accumulation.



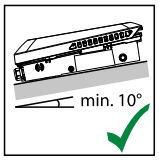
Do not install the inverter in:
- Greenhouses
- Storage or processing areas for fruit, vegetables or viticulture products
- Areas used in the preparation of grain, green fodder or animal feeds

Installation position of the inverter

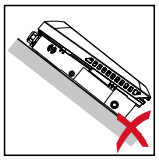




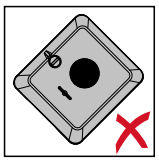
The inverter is suitable for vertical installation on a vertical wall or column.



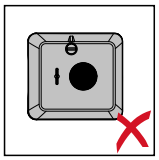
The inverter is suitable for installation on a sloping surface (min. slope of underside 10°).



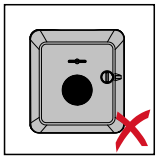
Do not install the inverter on a sloping surface with the connections upwards.

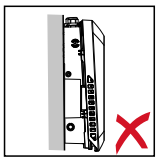


Do not install the inverter in a sloping position on a vertical wall or column.

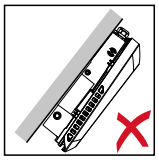


Do not install the inverter in a horizontal position on a vertical wall or column.

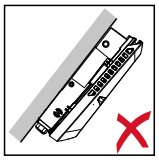




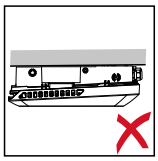
Do not install the inverter with the connections upwards on a vertical wall or column.



Do not install the inverter overhanging with the connections upwards.



Do not install the inverter overhanging with the connections downwards.



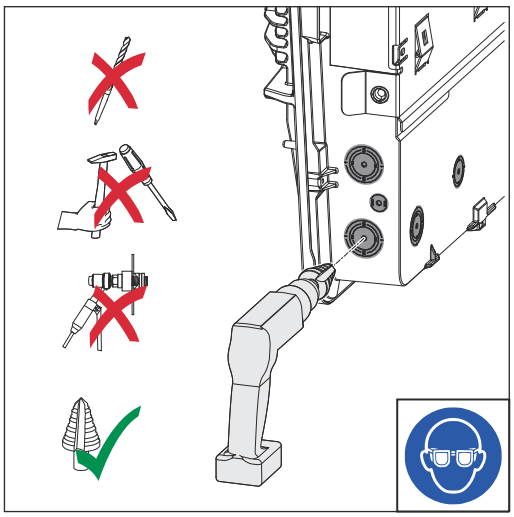
Do not install the inverter on the ceiling.

Knockouts

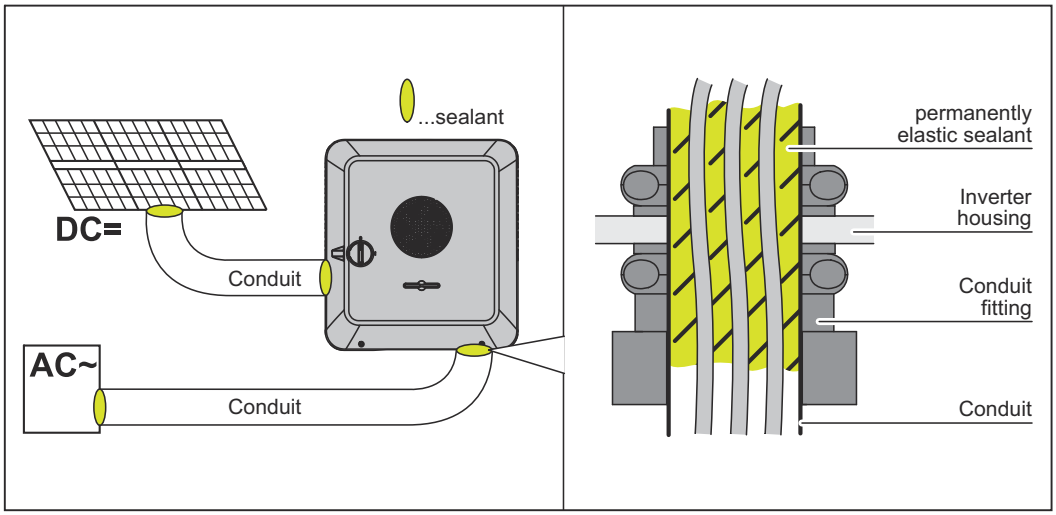
Preparing knockouts for connection

IMPORTANT! The knockouts must be drilled out using a step drill bit only. The maximum conduit sizes are ½ - 1 inch / 13 - 25 mm.

IMPORTANT! Void warranty if the conduit holes are drilled improperly.



- Use suitable eye protection when drilling out the knockouts.
- Avoid drilling too far to ensure the connection area is not damaged.
- When drilling out the knockouts at the back, place the inverter on an even surface with the back upwards so that shavings and pieces of plastic can fall out of the inverter.
- If necessary, deburr the knockouts with a suitable tool and remove the drilling residues from the inverter.



NOTE!

Condensation within the conduits can damage the inverter or components of the photovoltaic systems.
To avoid undesirable air circulation and condensation in the conduits:

- ▶ Attach appropriate conduits to all knockouts that have been drilled open.
- ▶ When installing outdoors, only use waterproof conduit fittings and conduits.
- ▶ Seal the conduits in accordance with the pictures above on both sides.

NOTE!

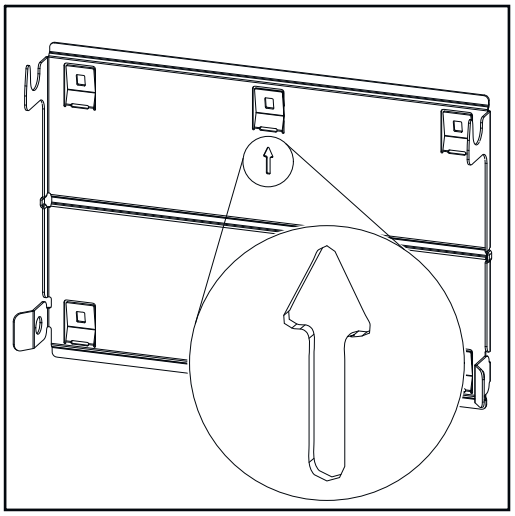
Conduit fittings and conduits are not part of the scope of supply for the inverter.

Installing the mounting bracket and attaching the inverter

Selecting the mounting material

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

Properties of the mounting bracket



The mounting bracket (illustration) can also be used as a guide.

The pre-drilled holes on the mounting bracket are intended for screws with a thread diameter of 6-8 mm (0.24-0.32 inches). The distance from the left to the right pre-drilled hole is 406 mm (16 inches).

Unevenness on the mounting surface (such as coarse-textured plaster) is largely compensated by the mounting bracket.

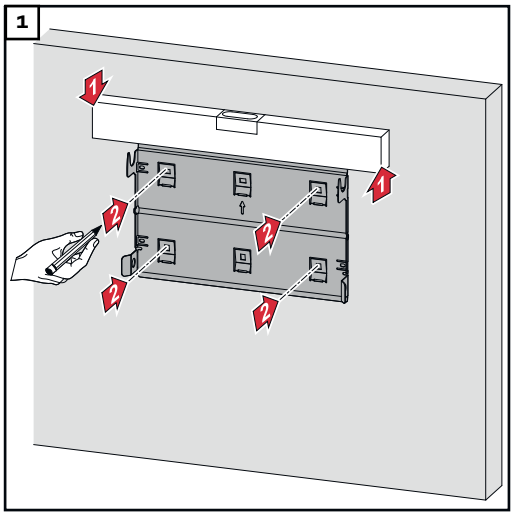
Do not deform the mounting bracket

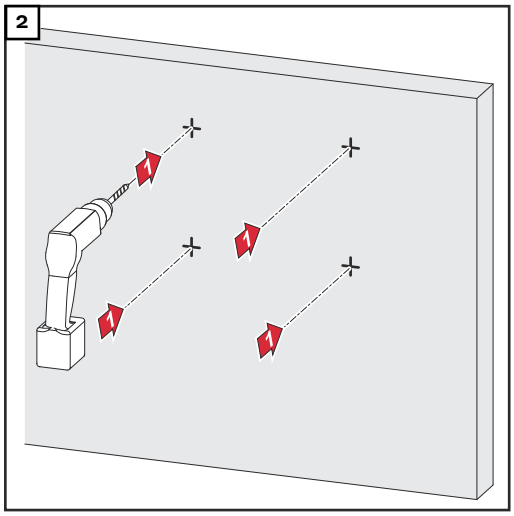
NOTE!

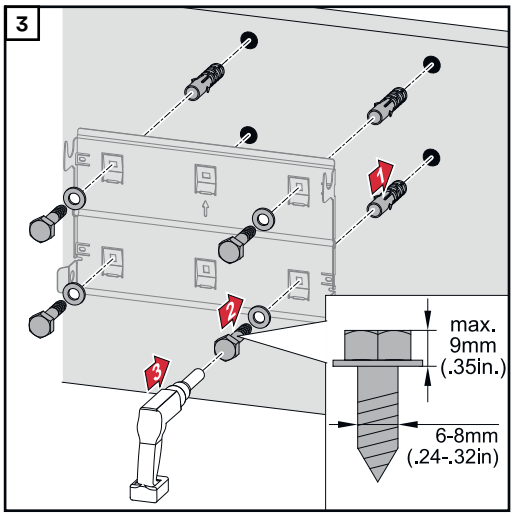
When attaching the mounting bracket to the wall or to a column, make sure that the mounting bracket is not deformed.
A deformed mounting bracket may make it difficult to clip/swivel the inverter into position.

Fitting the mounting bracket to a wall

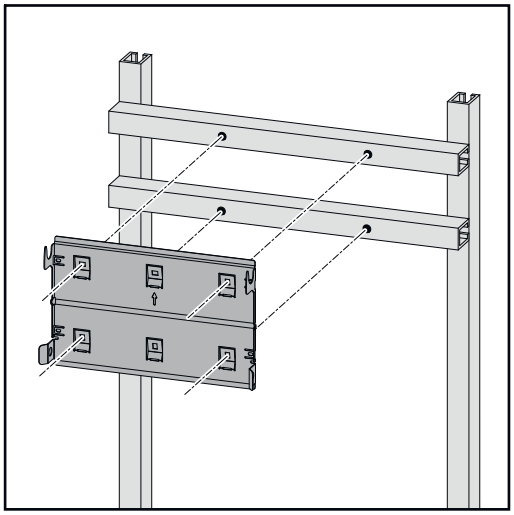
IMPORTANT!
When installing the mounting bracket, make sure that it is installed with the arrow pointing upwards.





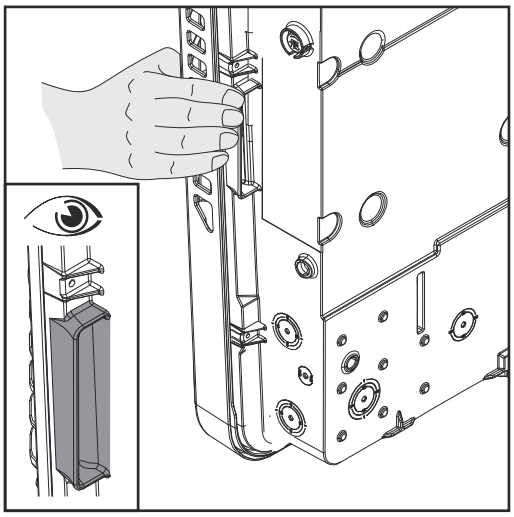


Attaching the mounting bracket to mounting rails

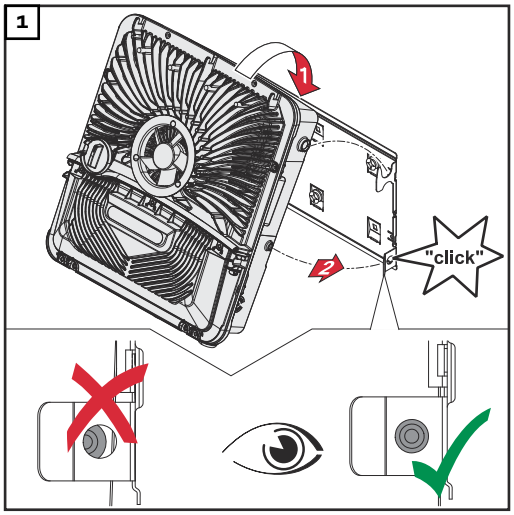


IMPORTANT!
The mounting bracket must be affixed at a minimum of four points.

Attaching the inverter to the mounting bracket



Integrated grips, which facilitate lifting/clipping, are located on the side of the inverter.



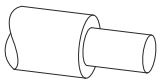
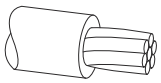
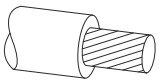
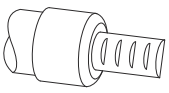
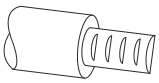
Clip the inverter into the mounting bracket from above. The connections must point downwards.

The lower area of the inverter is pushed into the snap-in tabs until the inverter engages on both sides with an audible click.

Ensure the correct position of the inverter on both sides.

Requirements for connecting the inverter

Different cable types

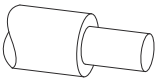
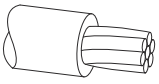
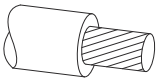
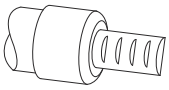
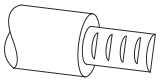
Single-core	Multi-stranded	Fine-stranded	Fine-stranded with ferrule and collar	Fine-stranded with ferrule without collar
				

Permitted cables for the electrical connection

"Round copper conductors can be connected to the terminals of the inverter as described below":
- Copper: round, solid
- Copper: round, fine-stranded

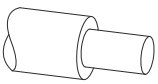
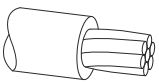
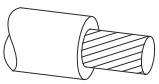
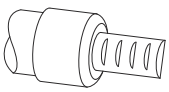
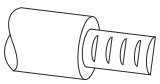
Grid connections with push-in terminal*

Select a sufficiently large cable cross-section based on the actual device output.

Number of pins					
4	AWG 12–6 / 4 - 16 mm²	AWG 12–6 / 4 - 16 mm²	AWG 12–6 / 4 - 16 mm²	AWG 12–6 / 4 - 16 mm²	AWG 12–6 / 4 - 16 mm²

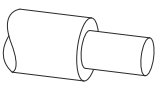
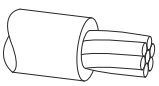
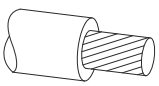
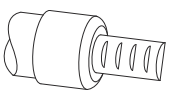
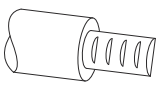
Grid connections for backup power with push-in terminal*

Select a sufficiently large cable cross-section based on the actual device output.

Number of pins					
3	AWG 16–8 / 1.5 - 10 mm²	AWG 16–8 / 1.5 - 10 mm²	AWG 16–8 / 1.5 - 10 mm²	AWG 16–8 / 1.5 - 10 mm²	AWG 16–8 / 1.5 - 10 mm²

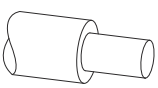
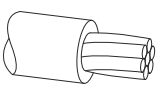
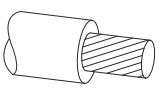
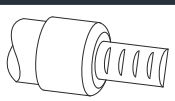
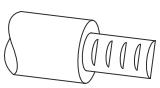
PV connections with push-in terminal

Select a sufficiently large cable cross-section based on the actual device output.

Number of pins					
2 x 5	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²

Ground electrode terminal (6-pin)

Select a sufficiently large cable cross-section based on the actual device output.

Number of pins					

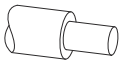
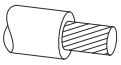
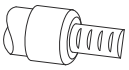
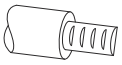
Ground electrode terminal (6-pin) Select a sufficiently large cable cross-section based on the actual device output.					
2	AWG 14–6 / 2.5 - 16 mm²	AWG 14–6 / 2.5 - 16 mm²	AWG 14–6 / 2.5 - 16 mm²	AWG 14–6 / 2.5 - 16 mm²	AWG 14–6 / 2.5 - 16 mm²
4	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²	AWG 14–8 / 2.5 - 10 mm²

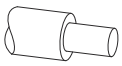
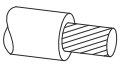
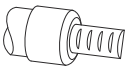
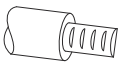
* According to product standards UL1741 3rd Edition, Table 20.1 and CSA-C22.2 No.107.1-16

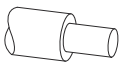
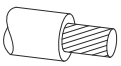
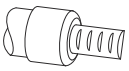
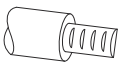
Permitted cables for the data communication connection

Cables with the following design can be connected to the terminals of the inverter:
- Copper: round, solid
- Copper: round, fine-stranded

IMPORTANT!
If several single conductors are connected to an input of the push-in terminals, connect the single conductors with a corresponding ferrule.

WSD connections with push-in terminal						
Distance	Stripping length					Cable recommendation
100 m 109 yd	10 mm 0.39 inch	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1 mm² AWG 26 - 18	0.14 - 1.5 mm² AWG 26 - 16	min. CAT 5 UTP (unshielded twisted pair)

Modbus connections with push-in terminal						
Distance	Stripping length					Cable recommendation
300 m 328 yd	10 mm 0.39 inch	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1 mm² AWG 26 - 18	0.14 - 1.5 mm² AWG 26 - 16	min. CAT 5 STP (shielded twisted pair)

IO connections with push-in terminal						
Distance	Stripping length					Cable recommendation
30 m 32 yd	10 mm 0.39 inch	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1.5 mm² AWG 26 - 16	0.14 - 1 mm² AWG 26 - 18	0.14 - 1.5 mm² AWG 26 - 16	Single conductors possible

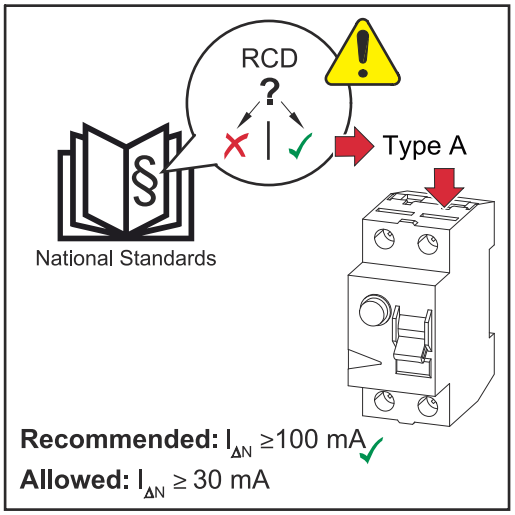
LAN connections
Fronius recommends using at least CAT 5 STP (shielded twisted pair) cables and a maximum distance of 100 m (109 yd).

Cable diameter for push-in terminals

Cable diameter for connection to the push-in terminal: 0.27 inches

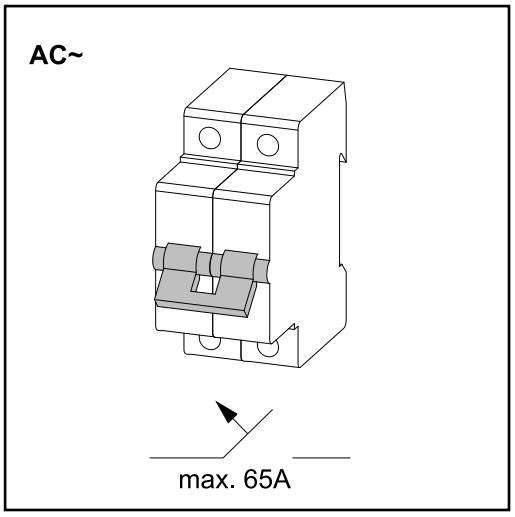
IMPORTANT
For double-insulated cables with a cable diameter above 0.27 inches, the outer layer of insulation must be removed for the connection to the push-in terminal.

Maximum alternating current fuse protection



NOTE!

The national regulations of the grid operator or other factors may require a residual current circuit breaker in the AC connection lead. For this situation, a type A residual current circuit breaker is generally adequate. Nevertheless, false alarms can be triggered for the type A residual-current circuit breaker in individual cases and depending on local conditions. For this reason, in accordance with national legislation, Fronius recommends that a residual-current circuit breaker with a tripping current of at least 100 mA suitable for frequency converters be used.



IMPORTANT!
The inverter can be fused with max. an automatic circuit breaker 65 A.

Inverter	Phases	Maximum fuse rating	Recommended fuse rating (208V / 220V / 240 V)
Fronius Primo GEN24 7.7 208-240	1	65 A	50 A / 45 A / 40 A
Fronius Primo GEN24 10.0 208-240	1	65 A	60 A / 60 A / 55 A

Connecting the inverter to the public grid (AC side)

Safety

⚠ WARNING!

Danger from incorrect operation and work that is not carried out properly.
This can result in severe personal injury and damage to property.
- ▶ Read the Installation Instructions and Operating Instructions before installing and commissioning the equipment.
- ▶ Only qualified personnel are authorized to commission the inverter and only within the scope of the respective technical regulations.

⚠ WARNING!

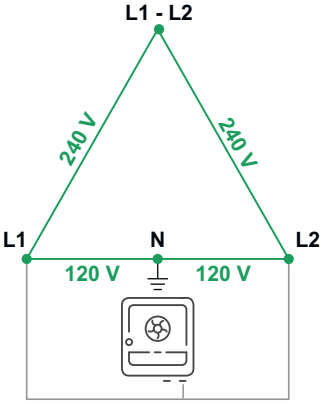
Danger from grid voltage and DC voltage from PV modules that are exposed to light.
An electric shock can be fatal.
- ▶ Prior to any connection work, ensure that the inverter is de-energized on the AC side and the DC side.
- ▶ Only qualified personnel may connect this equipment to the public grid

⚠ WARNING!

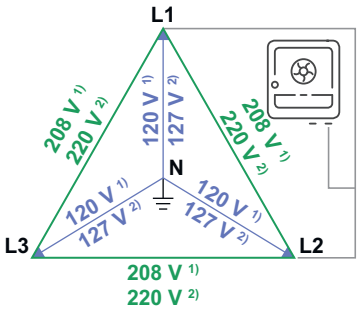
Danger from damaged and/or contaminated terminals.
This can result in severe personal injury and damage to property.
- ▶ Prior to connection work, check the terminals for damage and contamination.
- ▶ Remove any contamination while the equipment is de-energized.
- ▶ Have defective terminals replaced by an authorized technician.

Suitable AC grids

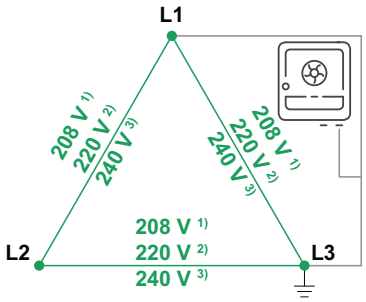
240 V: 120 V Split Phase
240 V: 120 V Stinger



[1] **208 V / 120 V** WYE
[2] **220 V / 127 V** WYE



[1] **208 V** Delta Corner Grounded
[2] **220 V** Delta Corner Grounded
[3] **240 V** Delta Corner Grounded



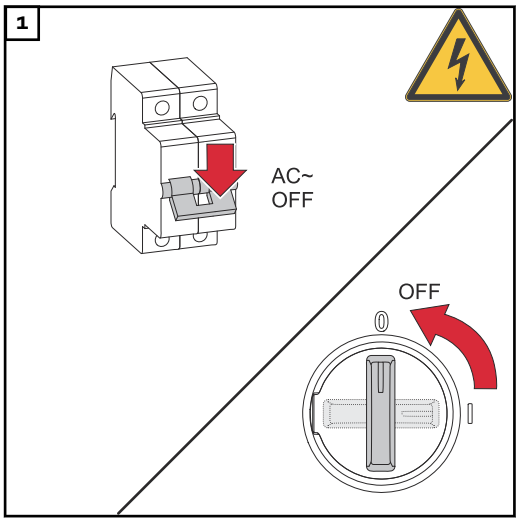
Connecting the inverter to the public grid (AC side)

NOTE!

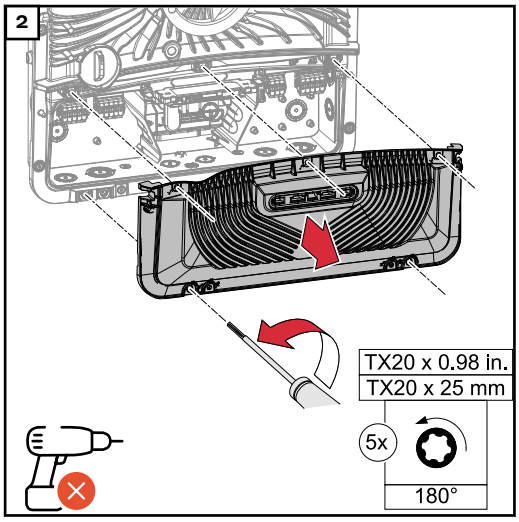
In grid configurations with neutral conductors, the neutral conductor must be connected in order to operate the inverter.
It is not possible to operate the inverter in ungrounded grids, e.g., IT grids (insulated grids without ground conductor). The grid power feed operation of the inverter can be adversely affected by an insufficiently dimensioned neutral conductor.

- ▶ Make sure that the grid's neutral conductor is grounded.
- ▶ Ensure the neutral conductor and live conductor are the same size.

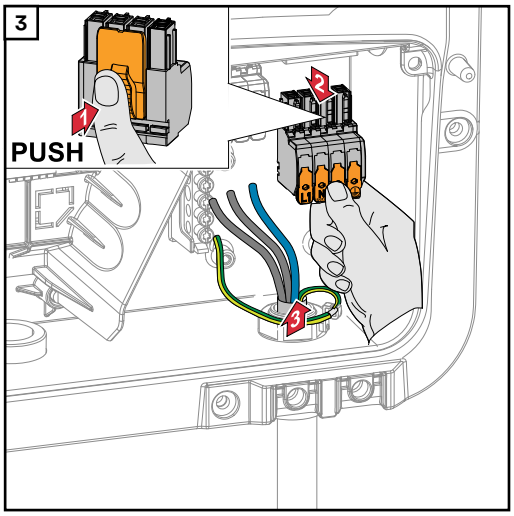
IMPORTANT! The ground conductor/grounding of the AC cable must be laid so that it is disconnected last in the event of a failure.



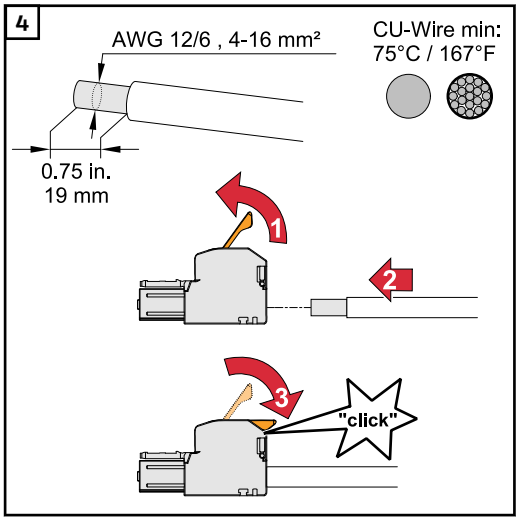
Turn off the automatic circuit breaker. Set the DC disconnector to the "Off" switch position.



Loosen the five screws of the connection area cover by rotating them 180° to the left using a screwdriver (TX20). Remove the connection area cover from the device.



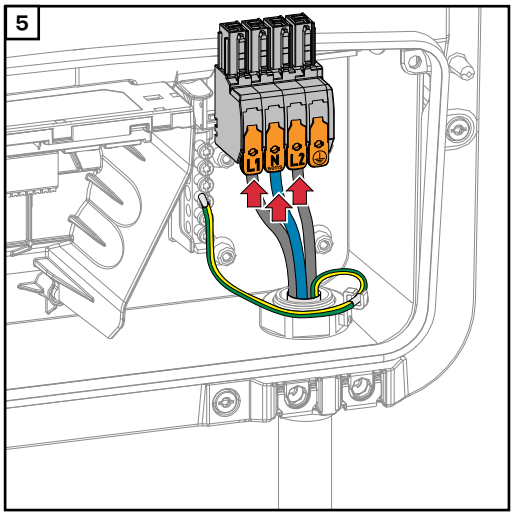
Guide the mains cable from below through the electrical installation tube on the right side.
Remove the AC terminal.



Strip the insulation of the single conductors by 0.75 inches.
The cable cross-section must be selected in accordance with the instructions in Permitted cables for the electrical connection from page 55.
Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided as far as it will go.
Then close the terminal's operating lever until it engages.

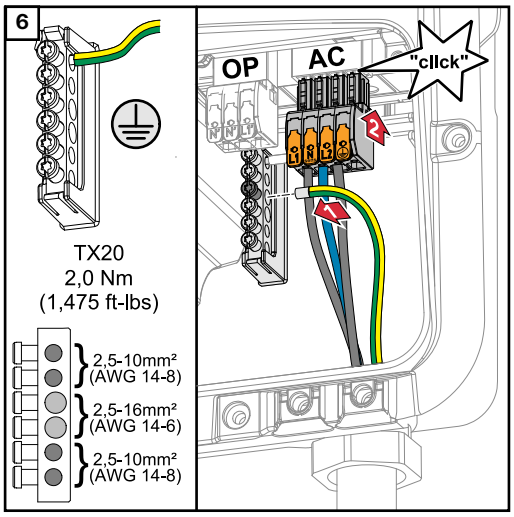
NOTE!

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



L1 Phase conductor
Nsens Neutral conductor*
L2 Phase conductor

* Valid for grid configurations with neutral conductors.



Fasten the grounding cable to the ground electrode terminal using a screwdriver (TX20) and a torque of 1.475 ft lbs / 2 Nm.
Insert the AC terminal into the AC slot until it engages.

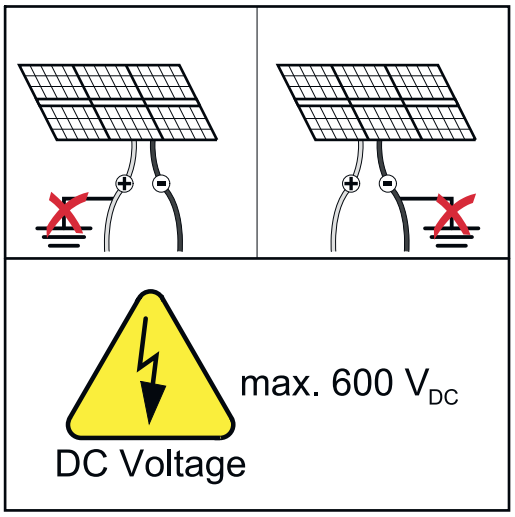
Connecting solar module strings to the inverter

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!
Solar module strings must not be grounded.

Safety

⚠ WARNING!

Danger from incorrect operation and work that is not carried out properly.
This can result in severe personal injury and damage to property.

- ▶ The commissioning, maintenance, and service work in the inverter's power stage set may only be carried out by Fronius-trained service personnel in accordance with the technical specifications.
- ▶ Read the installation instructions and operating instructions before installing and commissioning the equipment.

⚠ WARNING!

Danger from mains voltage and DC voltage from PV modules that are exposed to light.
This can result in severe personal injury and damage to property.
- ▶ All connection, maintenance, and service work should only be carried out when the AC and DC sides have been disconnected from the inverter and are de-energized.
- ▶ Only an authorized electrical engineer is permitted to connect this equipment to the public grid.

⚠ WARNING!

Danger of an electric shock due to improperly connected terminals/PV plug connectors.
An electric shock can be fatal.
- ▶ When connecting, ensure that each pole of a string is routed via the same PV input, e.g.:
  + pole string 1 to the input **PV 1.1+** and **- pole string 1** to the input **PV 1.1-**

⚠ WARNING!

Danger from damaged and/or contaminated terminals.
This can result in severe personal injury and damage to property.
- ▶ Prior to connection work, check the terminals for damage and contamination.
- ▶ Remove any contamination while the equipment is de-energized.
- ▶ Have defective terminals replaced by an authorized specialist company.

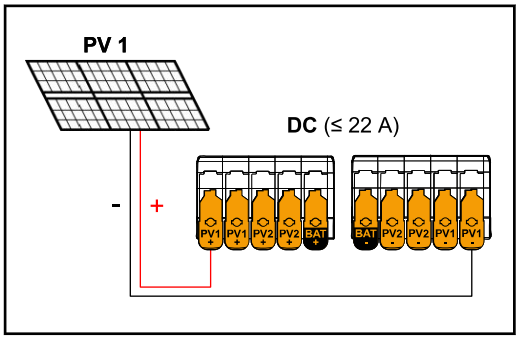
PV Generator, general

Two independent PV inputs (PV 1 and PV 2) are available. These inputs can be connected to a different number of modules.

When starting for the first time, set up the PV Generator in accordance with the respective configuration (can also be carried out at a later date in the **Device Configuration** > **Components** menu area).

Module array configuration 7.7 - 10.0 kW

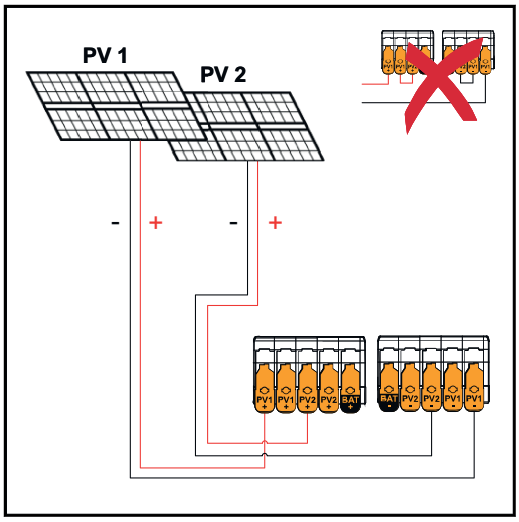
IMPORTANT!
The installation must be carried out in accordance with the nationally applicable standards and directives.If the Arc Fault Circuit Interrupter integrated in the inverter is used for the arc detection requirement according to IEC 63027, the solar module strings must not be combined in front of the inverter.



Current equal to or less than 22 A (I_{dcmax}).

Module array settings:
PV 1: **ON**
PV 2: **OFF**

IMPORTANT!
The maximum current load of a single terminal is 22 A.

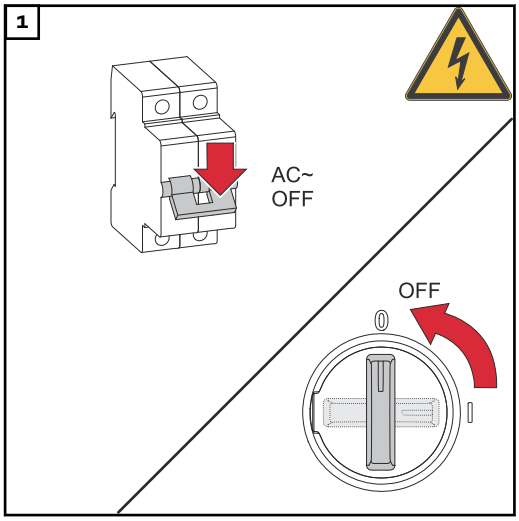


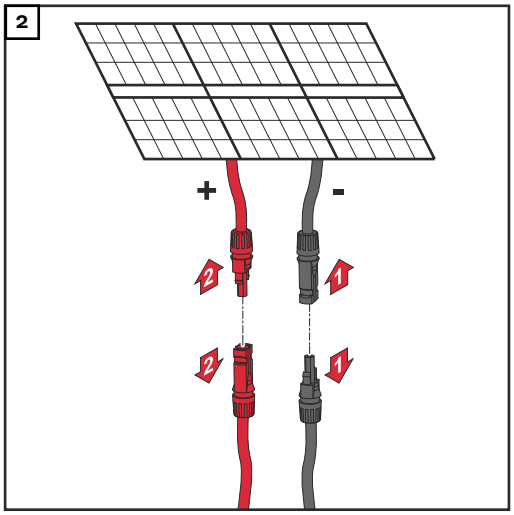
PV 1 less than or equal to 41.25 A ($I_{SC\ PV1}$)
PV 2 less than or equal to 36 A ($I_{SC\ PV2}$)

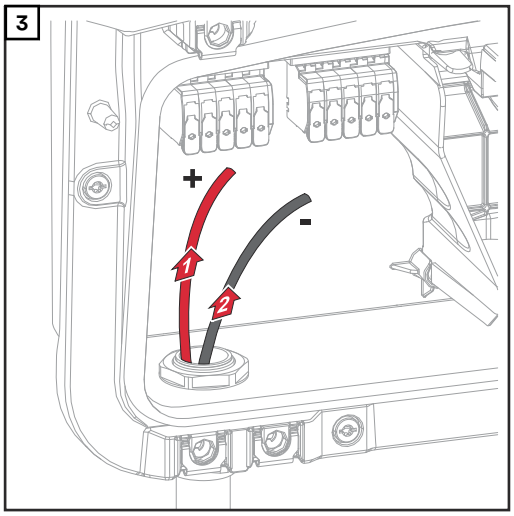
Module array settings:
PV 1: **ON**
PV 2: **ON**

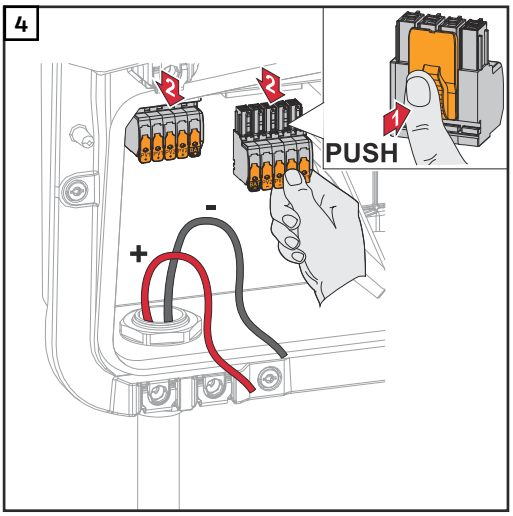
IMPORTANT!
It is not allowed to connect PV1 and PV2 in parallel, as otherwise currents of over 22A per terminal connection could flow.

Connecting solar module strings to the inverter



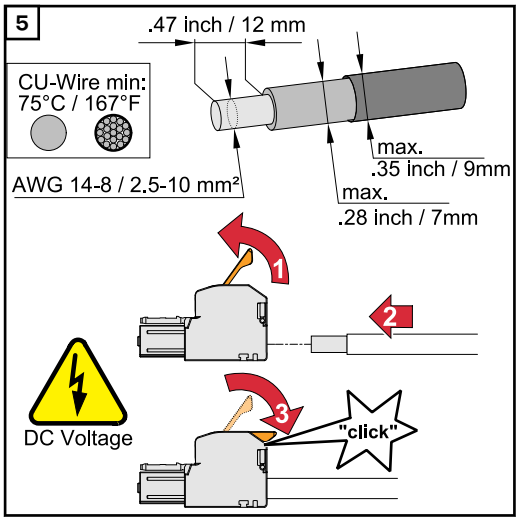






Guide the DC cables through the electrical installation tube.

IMPORTANT!
Guide the cables through the electrical installation tube before stripping them in order to avoid twisting/bending single wires.



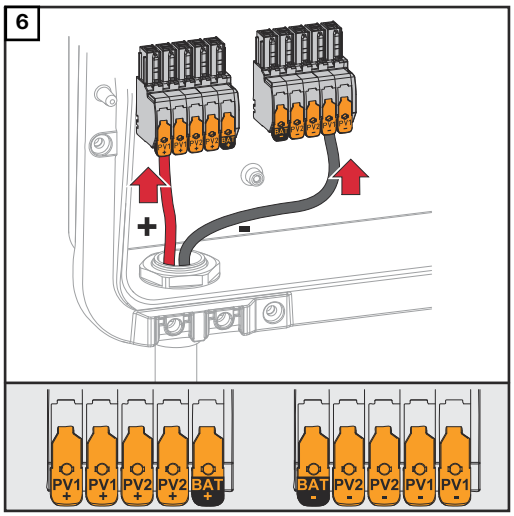
Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 55.
Strip the insulation of the single conductors by 0.47 inches. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided in the terminal as far as it will go.
Then close the terminal's operating lever until it engages.

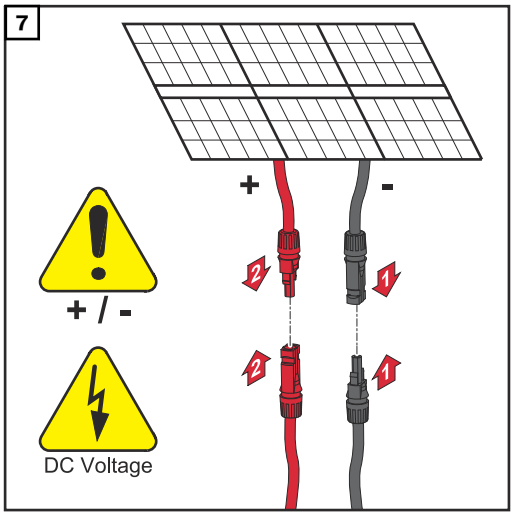
* For double-insulated cables, observe the max. cross-section of the insulation.

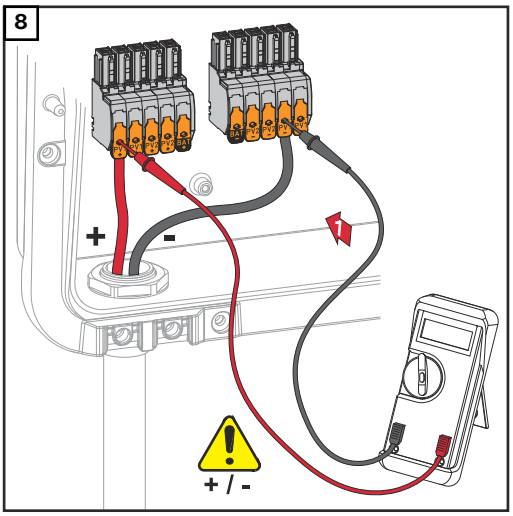
⚠ WARNING!

Danger from loose and/or incorrectly clamped single conductors in the terminal.
This can result in severe personal injury and damage to property.

- ▶ Only connect one single conductor at each slot provided in the terminal.
- ▶ Check that the single conductors are secure in the terminal.
- ▶ Make sure that the single conductor has been fully inserted into the terminal and that no single wires are protruding out of the terminal.





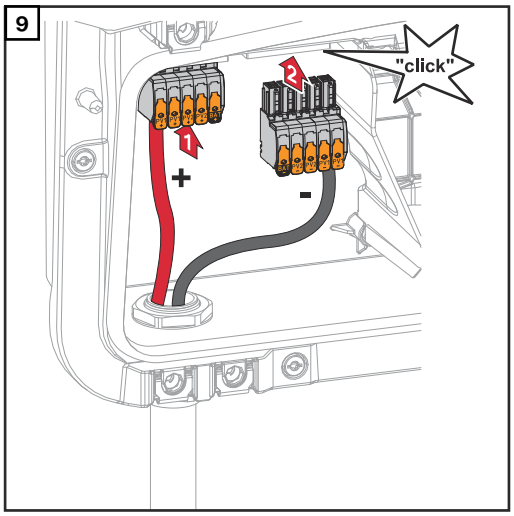


Use a suitable measuring instrument to check the voltage and polarity of the DC cabling. Remove both DC terminals from the slots.

⚠ CAUTION!

Danger due to polarity reversal at the terminals.
This may result in severe damage to the inverter.

- ▶ Use a suitable measuring instrument to check the polarity of the DC cabling.
- ▶ Use a suitable measuring instrument to check the voltage (**max. 600 V_{DC}**)



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

Connecting the battery to the inverter

Safety

⚠ WARNING!

Danger due to incorrect operation and incorrectly performed work.
This can result in serious injury and damage to property.
- ▶ Commissioning as well as maintenance and service work on the inverter and battery must only be carried out by service personnel trained by the respective inverter or battery manufacturer and only within the scope of the respective technical regulations.
- ▶ Read the Installation and Operating Instructions provided by the respective manufacturer before installing and commissioning the equipment.

⚠ WARNING!

Danger due to mains voltage and DC voltage from solar modules that are exposed to light and from batteries.
This can result in serious injury and damage to property.
- ▶ Ensure that the AC and DC side of the inverter and the battery are de-energized before carrying out any connection, maintenance, or service tasks.
- ▶ Only an authorized electrical engineer is permitted to connect this equipment to the public grid.

⚠ WARNING!

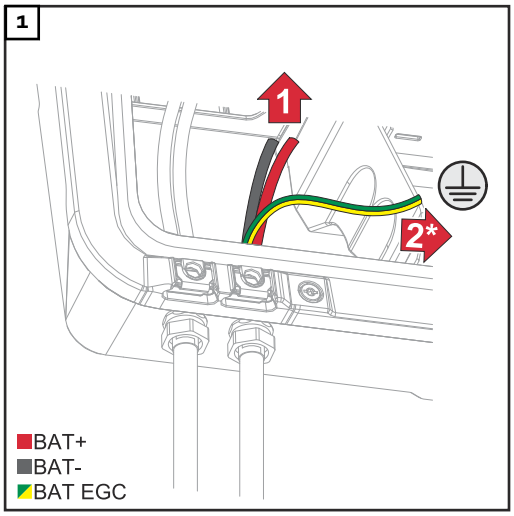
Danger due to damaged and/or contaminated terminals.
This can result in serious injury and damage to property.
- ▶ Before making any connections, check the terminals for damage and contamination.
- ▶ Remove contamination in the de-energized state.
- ▶ Have defective terminals repaired by an authorized specialist.

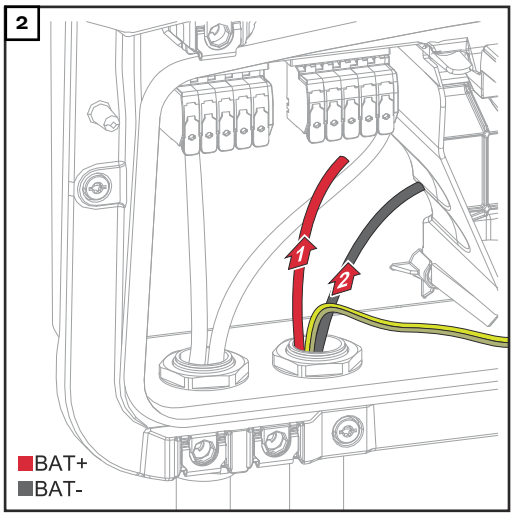
Connecting the battery on the DC side

⚠ CAUTION!

Danger due to operation of the battery above the permissible altitude as specified by the manufacturer.
Operating the battery above the permissible altitude can result in restricted operation, failure of the operation, and unsafe states of the battery.
- ▶ Adhere to the manufacturer's instructions regarding the permissible altitude.
- ▶ Operate the battery only at the altitude specified by the manufacturer.

IMPORTANT!
Prior to installing a battery, ensure that the battery is switched off. The max. DC cable length for the installation of external batteries must be taken into account according to the manufacturer's specifications, see chapter Suitable batteries on page 22.

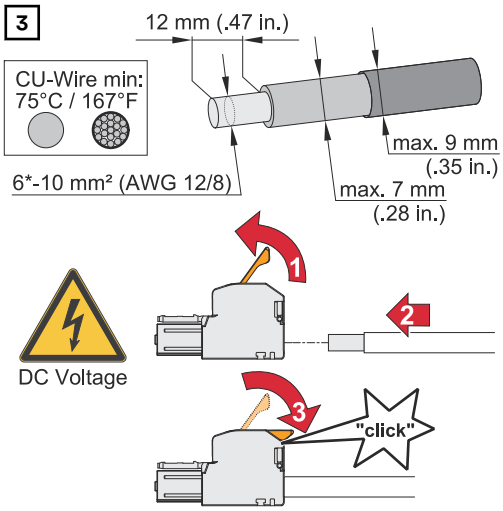




Manually push the battery cables through the DC bushings.

* The battery ground conductor must be connected to the ground electrode terminal of the inverter,

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

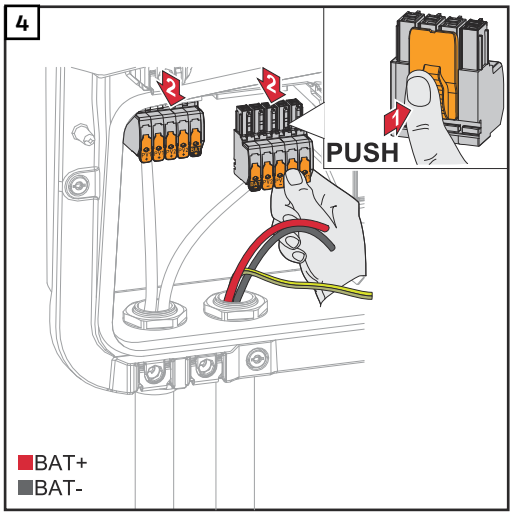


Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 55.
Strip the insulation of the individual conductors by 12 mm. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided, in each case as far as it will go. Then close the operating lever until it engages.

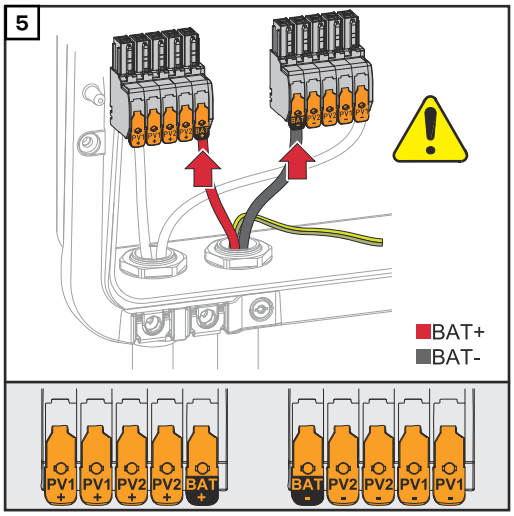
⚠ WARNING!

Danger due to individual conductors in the terminal that are loose and/or improperly connected.
This can result in serious injury and damage to property.

- ▶ Only connect one single conductor in the slot provided for each terminal.
- ▶ Check that the single conductor is held securely in the terminal.
- ▶ Ensure that all of the single conductor is within the terminal and that no individual wire strands are sticking out of the terminal.



5

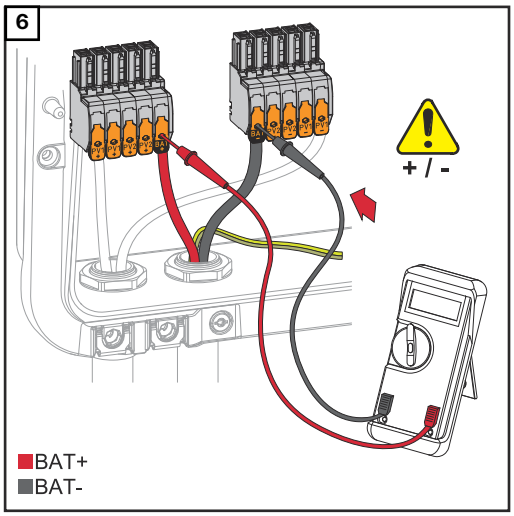


⚠ CAUTION!

Risk due to overvoltage when using other slots on the terminal.
This may result in damage to the battery and/or the PV modules due to discharge.

- ▶ Only use the slots marked BAT for connecting the battery.

6

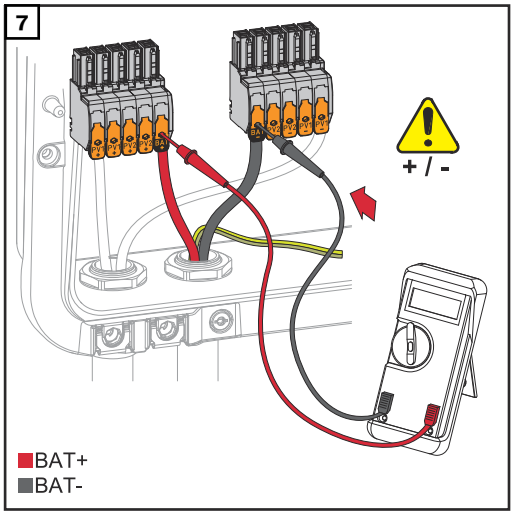


⚠ CAUTION!

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

- ▶ Use a suitable measuring instrument to check the polarity of the DC cabling when the battery is switched on.
- ▶ The maximum voltage for the battery input must not be exceeded (see Technical data on page 130).

7



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

IMPORTANT!
Information for the battery-side connection can be found in the installation instructions from the relevant manufacturer.

Connecting backup power - PV Point (OP)

Safety

⚠ WARNING!

Danger from incorrect installation, commissioning, operation or incorrect use.
This can result in severe personal injury and damage to property.
- ▶ Single 120 / 220 / 240 volt supply. Do not connect multi-wire branch circuits!
- ▶ Only trained and qualified personnel are authorized to install and commission the system, and only within the scope of the technical regulations.
- ▶ The Installation Instructions and Operating Instructions must be read carefully prior to use.
- ▶ If anything is unclear, contact your vendor immediately.

⚠ WARNING!

Danger from damaged and/or contaminated terminals.
This can result in severe personal injury and damage to property.
- ▶ Prior to connection work, check the terminals for damage and contamination.
- ▶ Remove any contamination while the equipment is de-energized.
- ▶ Have defective terminals replaced by an authorized technician.

⚠ WARNING!

Limited rapid shutdown function in backup power mode (PV Point and Essential Backup)
If PV Point or Essential Backup is configured, rapid shutdown cannot be triggered via the loss of grid connection. This can result in serious personal injury and damage to the PV system.
- ▶ A WSD switch must be installed for all backup power modes (PV-Point and Essential Backup) (see Installing the WSD (wired shutdown)). The rapid shutdown is then triggered via WSD.

NOTE!

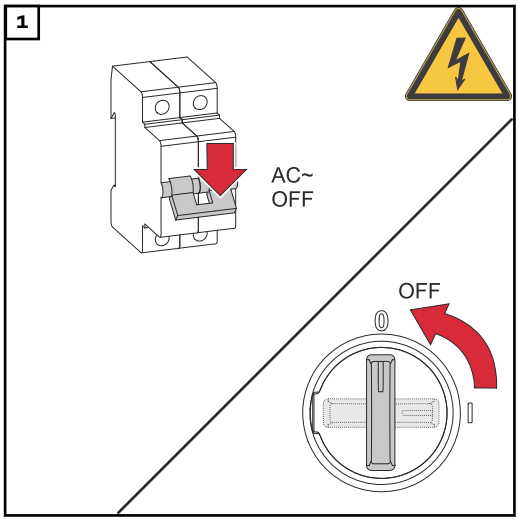
Power supply via the PV point is dependent on the available PV power
If the PV modules are not supplying enough power, interruptions may occur.
- ▶ Do not connect any loads that require an interruption-free supply.

IMPORTANT!
The valid national laws, standards, and provisions, as well as the specifications of the relevant grid operator are to be taken into account and applied.
It is highly recommended that the specific installation be agreed with the grid operator and explicitly approved by this operator. This obligation applies to system constructors in particular (e.g., installers).

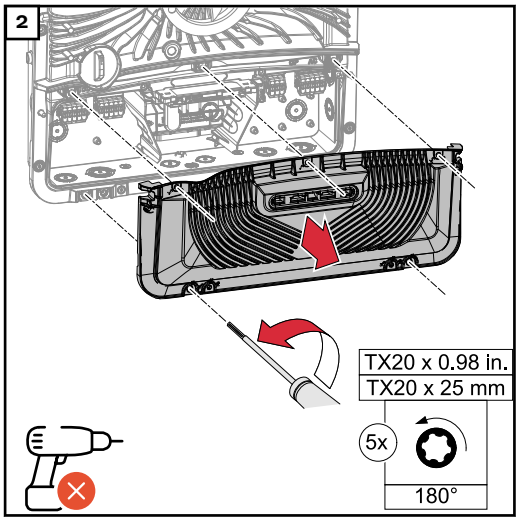
NOTE!

All loads that are to be supplied via the OP terminal must be protected by means of a ground fault circuit interrupter.
In order to ensure the ground fault circuit interrupter operates properly, a connection must be established between the neutral conductor N' (OP) and equipment grounding (GND).

Wiring proposal recommended by Fronius, see page 144.



Turn off the automatic circuit breaker. Set the DC disconnector to the "Off" switch position.

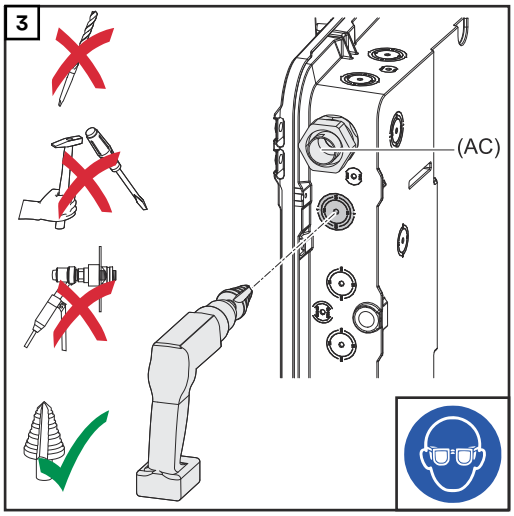


Loosen the five screws of the connection area cover by rotating them 180° to the left using a screwdriver (TX20). Remove the connection area cover from the device.

⚠ CAUTION!

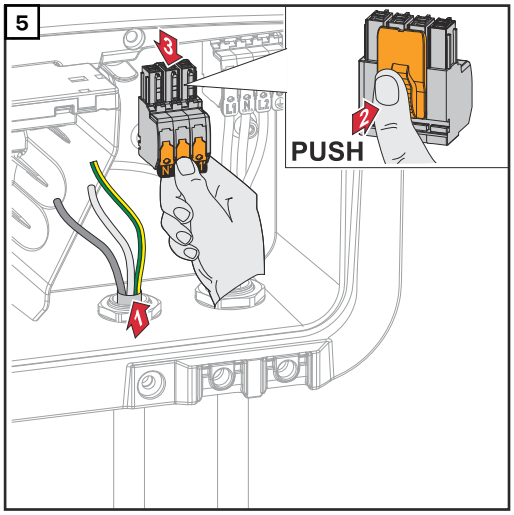
Danger from faulty or incorrect bores.
This may lead to injuries to the eyes and hands as a result of flying debris and sharp edges, as well as damage to the inverter.

- ▶ When drilling, wear suitable protective goggles.
- ▶ Only use a step drill when drilling.
- ▶ Ensure that nothing on the inside of the device is damaged (e.g., the connection block).
- ▶ Adapt the diameter of the bore to match the corresponding connection.
- ▶ Deburr the bores using a suitable tool.
- ▶ Remove the drilling residues from the inverter.

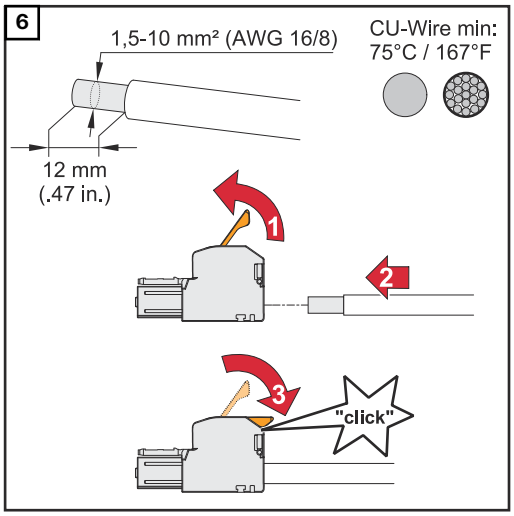


Drill out the knockout with a step drill.

4 Insert the conduit into the knockout and fasten it using the torque specified by the manufacturer. Seal the conduit as per the chapter headed Preparing knockouts for connection on page 51.



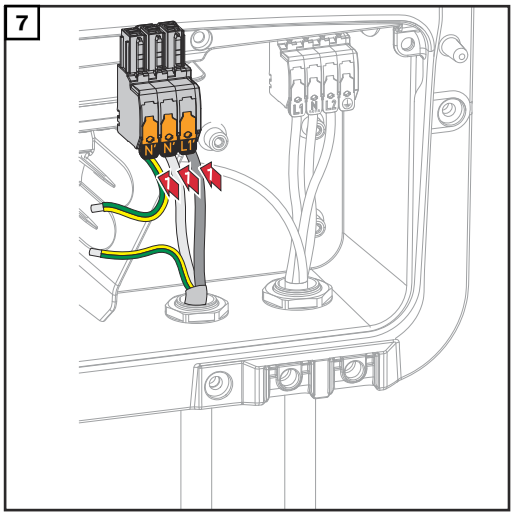
Guide the mains cable through the conduit from below.
Remove the OP terminal.



Strip the insulation of the single conductors by 0.47 inches / 12 mm.
The cable cross-section must be between AWG 16 and AWG 8. Lift to open the terminal's operating lever and insert the stripped single conductor into the slot provided, all the way up to the stop. Then close the operating lever until it engages.

NOTE!

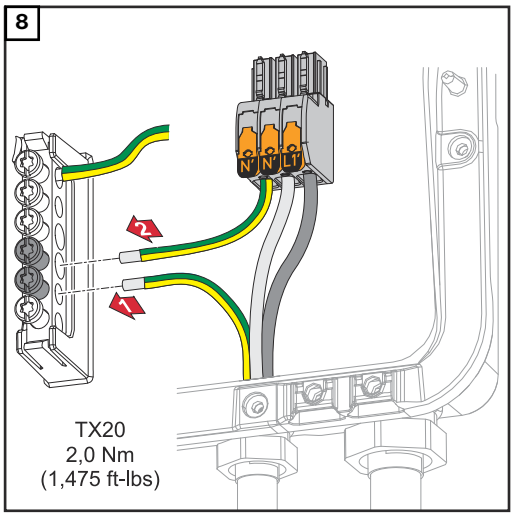
Only one conductor may be connected to each pin. The lines can be connected without ferrules.



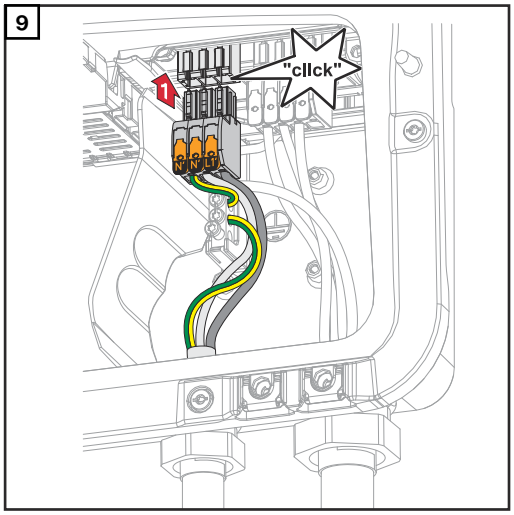
L1´ Phase conductor
N´ Neutral conductor
N´ Ground conductor

NOTE!

The ground conductor must have a cross-section of AWG 14-8.



Fasten the ground conductor and PEN conductor to the ground electrode terminal using a screwdriver (TX20) and a torque of 1.47 ft-lbs / 2 Nm.



Insert the OP terminal into the OP slot until it engages.

Testing backup power mode

Testing backup power mode is recommended:
- During the initial installation and configuration
- After working on the switch cabinet
- During ongoing operation (recommendation: at least once a year)

For test mode, a battery charge of min. 30% is recommended.

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

Connecting the data communication cables

Modbus participants

Inputs M0 and M1 can be selected for this purpose. A maximum of 4 Modbus participants can be connected to the Modbus terminal on inputs M0 and M1.

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

Example 1:

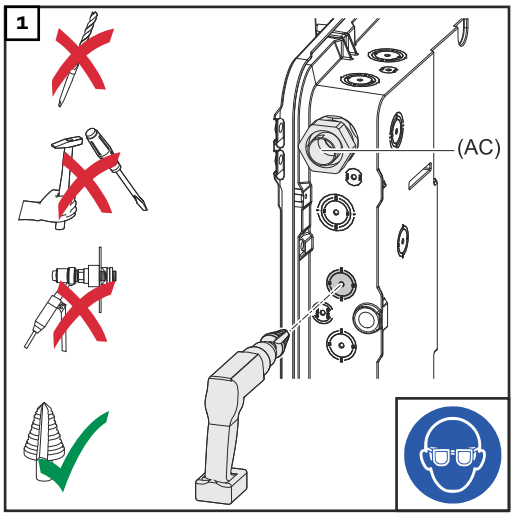
Input	Battery	Quantity Primary meter	Quantity Secondary meter
Modbus 0 (M0)	✗	0	4
	✓	0	2
	✓	0	1
Modbus 1 (M1)	✗	1	3

Example 2:

Input	Battery	Quantity Primary meter	Quantity Secondary meter
Modbus 0 (M0)	✗	1	3
Modbus 1 (M1)	✗	0	4
	✓	0	2
	✓	0	1

Routing data communication cables

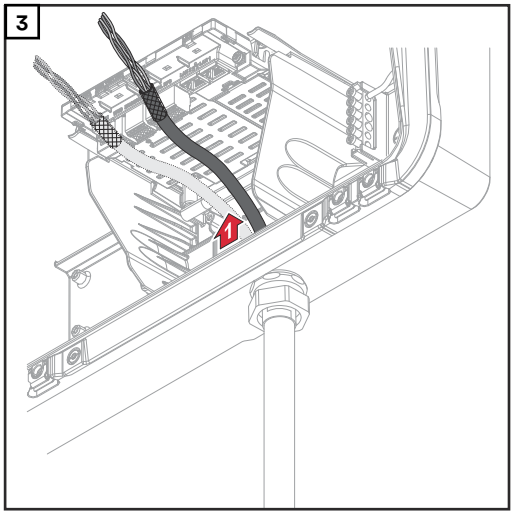
1



Drill out the knockout with a step drill.

2 Insert the conduit into the hole and fasten it using the torque specified by the manufacturer. Seal the conduit as per the chapter headed Preparing knockouts for connection on page 51.

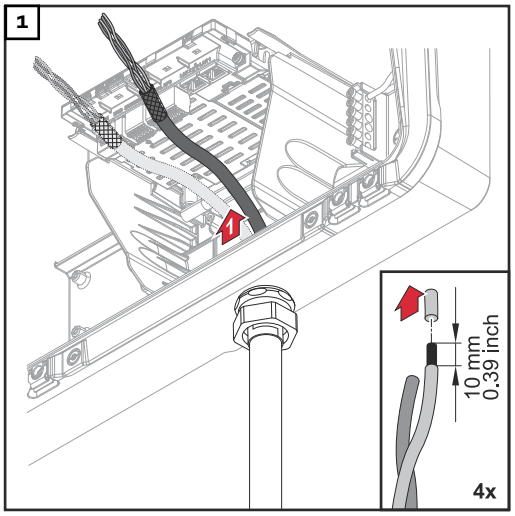
3



Run the data communication cables through the electrical installation tube from below.

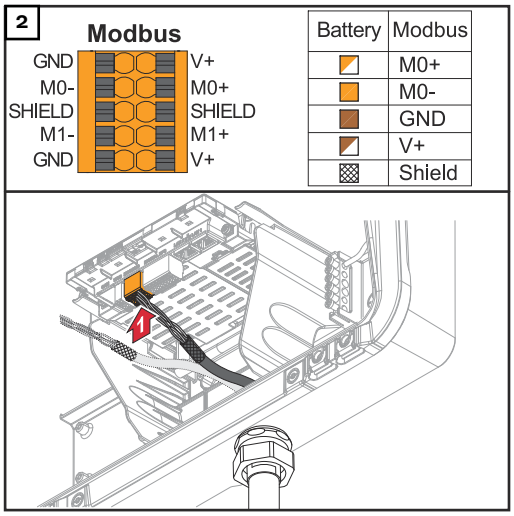
Connecting the battery communication cable

1



Strip 10 mm/ 0.39 inch from the single conductors and mount the ferrules if necessary.

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



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

IMPORTANT!
Use only twisted pairs for connecting "Data +/-" and "Enable +/-", see Permitted cables for the data communication connection on page 56.

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

IMPORTANT!
Improperly fitted shielding can cause data communication problems.

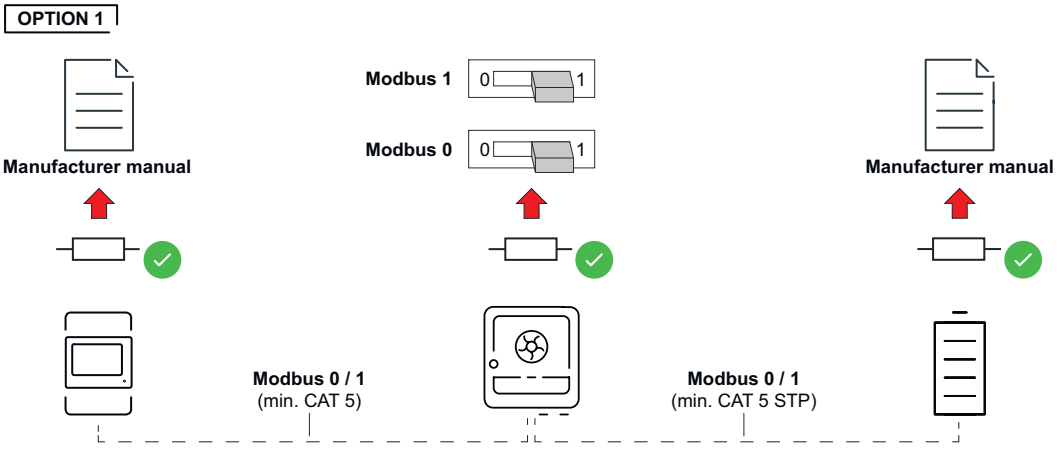
For the wiring proposal recommended by Fronius, see page 141.

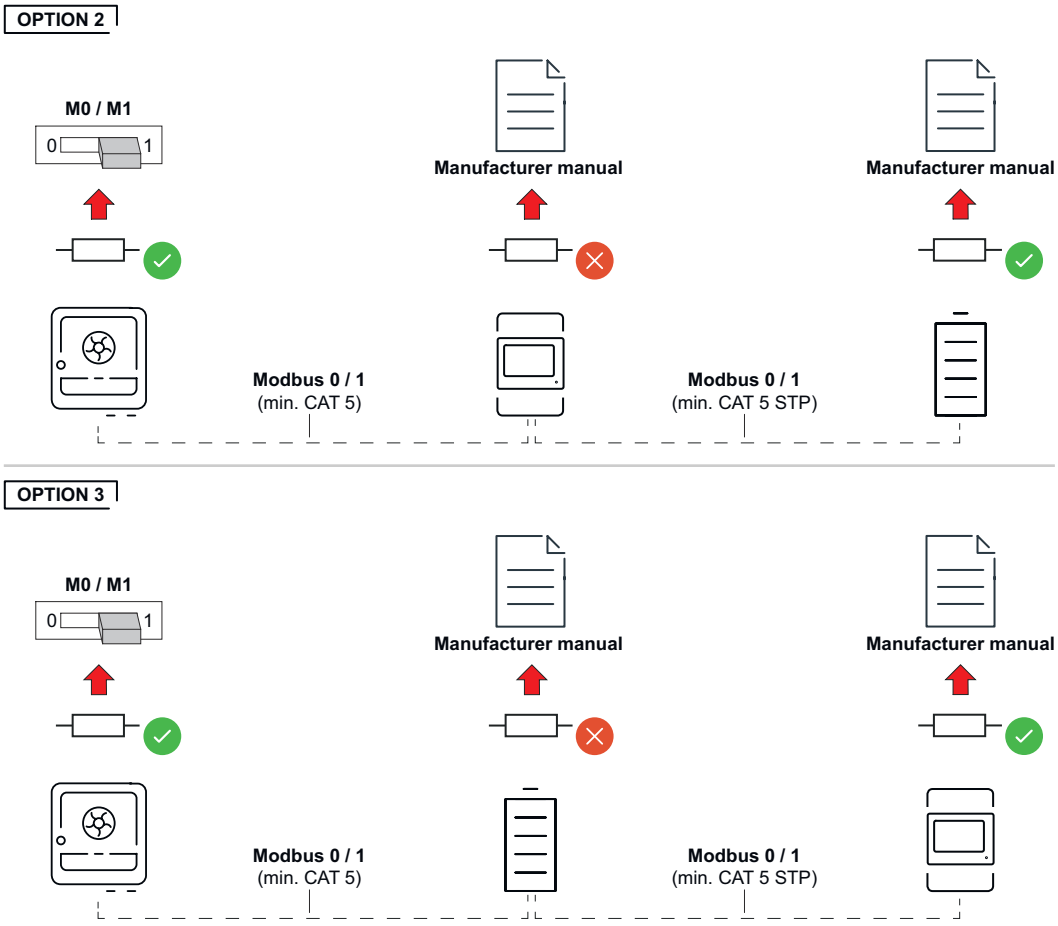
Terminating resistors

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

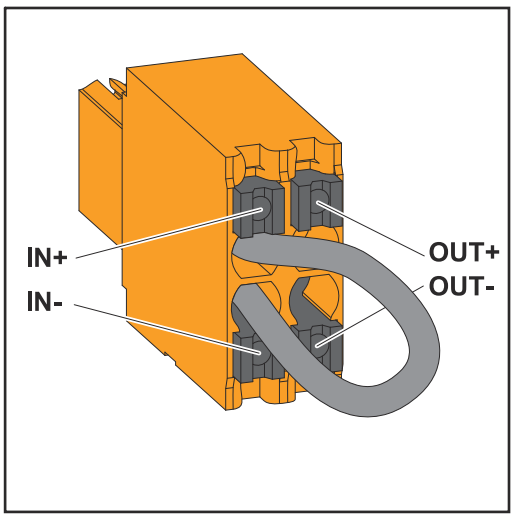
For permissible cables and max. distances for the data communication area, refer to the chapter headed Permitted cables for the data communication connection on page 56.

IMPORTANT!Terminating resistors that are not positioned as illustrated can result in interference in the data communication.





Installing the WSD (wired shutdown)



⚠ WARNING!

Limited rapid shutdown function in backup power mode (PV Point and Essential Backup)

If PV Point or Essential Backup is configured, rapid shutdown cannot be triggered via the loss of grid connection. This can result in serious personal injury and damage to the PV system.

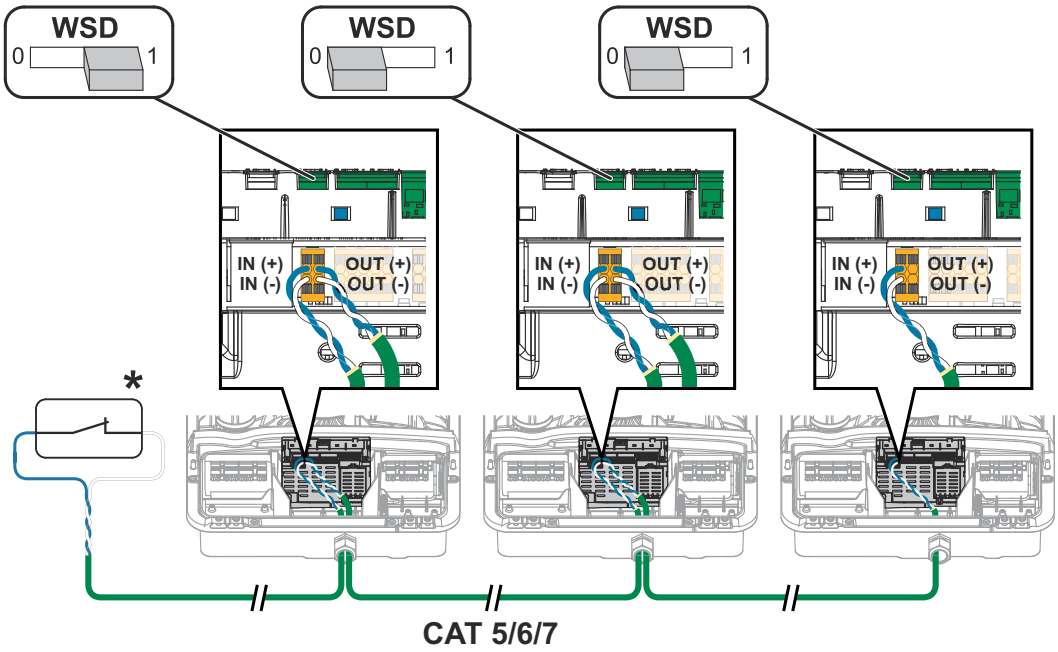
▶ A WSD switch must be installed for all backup power modes (PV-Point and Essential Backup) (see Installing the WSD (wired shutdown)). The rapid shutdown is then triggered via WSD.

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 (slave).

Max. distance between two devices: 109 yd / 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.

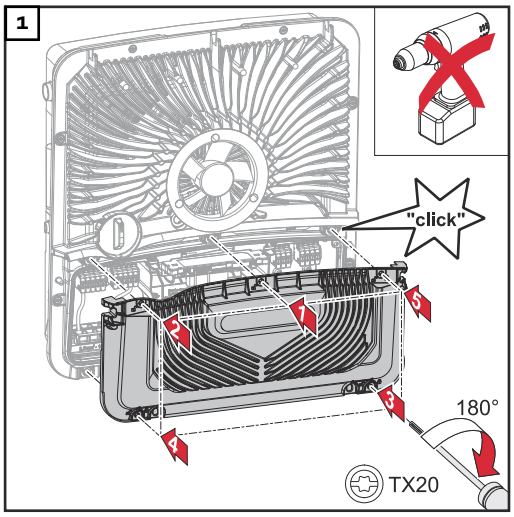
Closing and commissioning the inverter

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

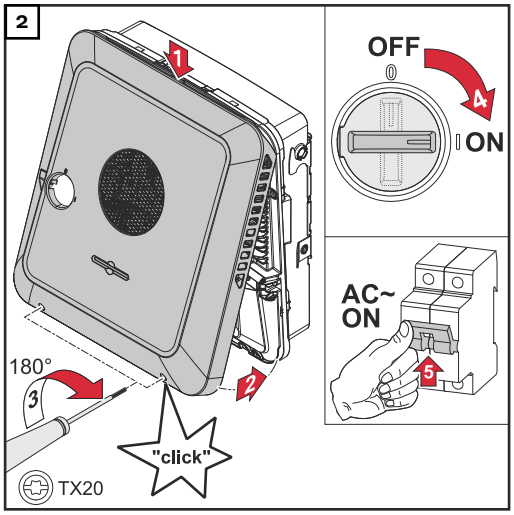
NOTE!

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

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



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



Clip the housing cover in at the top of the inverter.
Press on the lower part of the housing cover and tighten the two screws 180° to the right using a TORX® screwdriver (TX20).
Turn the DC disconnector to the "On" switch position. Switch on the automatic circuit breaker. For systems with a battery, observe the switch-on sequence as per chapter Suitable batteries on page 22.

IMPORTANT! Open WLAN Access Point with the optical sensor, see chapter Button functions and LED status indicator on page 31

Starting the inverter for the first time

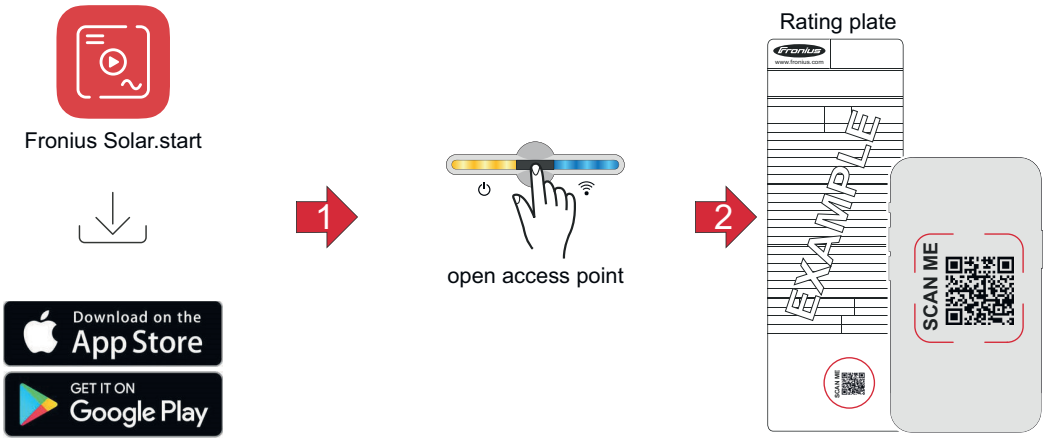
When starting the inverter for the first time, various setup settings must be configured.

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.

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 .

✓ *Communications LED flashes blue.*

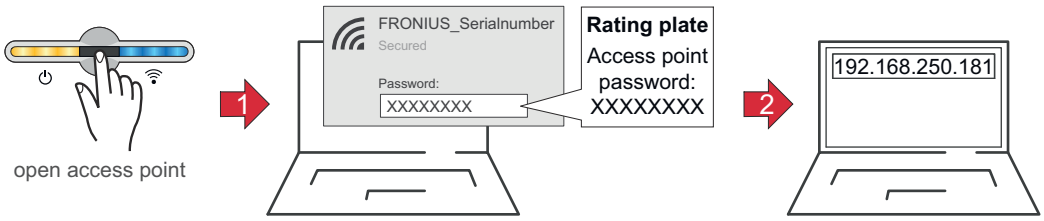
3 Open the Fronius Solar.start app and follow the installation wizard. Scan the QR code on the rating plate with a smartphone or tablet to connect to the inverter.

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

WLAN:



1 Open the access point by touching the sensor

✓ *Communications 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 in Windows 10, first select the **Connect using a security key instead** link to be able to establish the connection with the password.

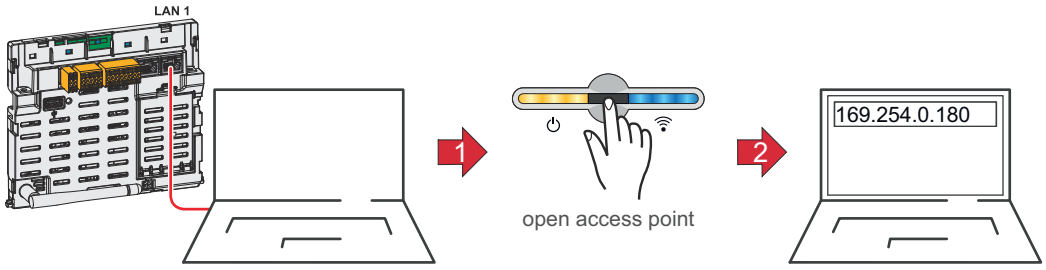
4 Enter the IP address 192.168.250.181 in the address bar of the browser and confirm. The installation wizard opens.

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.

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

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

✓ *Communications 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.

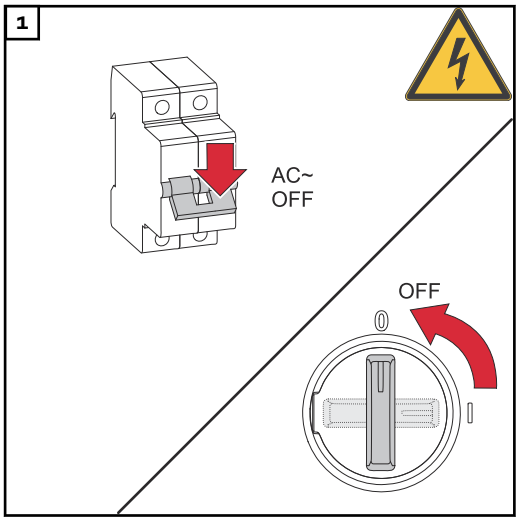
4 Follow the installation wizard and complete the installation in the individual areas.

5 Add the system components in Fronius Solar.web and commission the PV system.

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

De-energizing the inverter and switching it back on

De-energizing the inverter and switching it back on



1. Turn off the automatic circuit breaker.
2. Turn the DC disconnector to the "Off" switch setting.

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

IMPORTANT!
Wait for the capacitors of the inverter to discharge!

Settings – User interface of the inverter

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

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

PV Generator
Activate the MPP tracker and enter the connected PV power in the associated field. For combined solar module strings, "PV 1 + PV 2 connected in parallel" must be activated.

Battery
If the SoC mode is set to "Automatic", the values "Minimum SoC" and "Maximum SoC" are preset according to the technical specifications of the battery manufacturer.

If the SoC mode is set to "Manual", the values "Minimum SoC" and "Maximum SoC" may be changed after consultation with the battery manufacturer within the scope of their technical specifications. In the event of a power outage requiring backup power, the set values are not taken into account.

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

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

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

Primary meter
To ensure smooth operation in conjunction with other energy producers and in Essential Backup backup power mode, it is important to install the Fronius Smart Meter at the feed-in point. The inverter and other producers must be connected to the public grid via the Fronius Smart Meter.
This setting also affects the behavior of the inverter at night. If the function is deactivated, the inverter switches to Standby mode as soon as there is no more PV power available, provided that no energy management command is sent to the battery (e.g., minimum state of charge reached). The message "Power low" is displayed. The inverter restarts as soon as an energy management command is sent or sufficient PV power is available.
If the function is activated, the inverter remains permanently connected to the grid so that energy can be drawn from other producers at any time.
After connecting the meter, the position must be configured. A different Modbus address needs to be set for each Smart Meter.
The watt value on the generator meter is the sum of all generator meters. The watt value on the consumption meter is the value of all secondary meters.

Functions and I/Os

Backup power
Off, PV **Point**, or **Essential Backup** can be selected for backup power mode.
Essential Backup backup power mode can only be activated once the required I/O assignments have been configured for backup power. In addition, a meter

must be mounted and configured at the feed-in point for **Essential Backup** backup power mode.

IMPORTANT!
When configuring **PV Point** backup power mode, the information in chapter Safety on page 72 must be observed.

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

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

Reserve capacity
The set value results in a residual capacity (depending on the capacity of the battery) that is reserved for backup power. The battery is not discharged below the residual capacity in grid-connected operation. In backup power mode, the manually set value **Minimum SoC** is not taken into account. If there is a power outage, the battery is always discharged down to the automatically preset minimum SoC in accordance with the technical specifications of the battery manufacturer.

Load management
Up to 4 pins can be selected for load management here. Additional load management settings are available in the **Load management** menu item.
Default: Pin 1

Inverter

Enforce Standby
When the function is activated, the feed-in mode of the inverter is interrupted. This enables a powerless shutdown of the inverter and protects its components. When the inverter is restarted, the standby function is automatically deactivated.

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 max. 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 determines the best possible voltage for the supply of energy from the inverter into the grid.
	On (MLSD)	The entire solar module string is checked for optimization. The inverter can communicates with module level shutdown devices (MLSD).

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 infeed 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	Wertebereich	Beschreibung
Leakage current factor to reduce RCMU/RCD false trips	0 - 0,25 (default: 0,16)	Reducing the setting value reduces the leakage current and raises the intermediate circuit voltage, which slightly reduces the efficiency. - Setting value 0.16 enables optimumefficiency. - Setting value 0 enables minimalleakage currents.
Switch-Off before 30mA RCD Trip	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 residual non-operating current threshold	0,015 - 0,3	The value of residual non-operating current, assigned to the residual current circuit breaker by the manufacturer, at which the residual current circuit breaker does not operate 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.
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	100000 - 10000000 Ω	If the value drops below the threshold, status code 1083 is displayed on the user interface of the inverter.

Backup power

Parameter	Value range	Description
Backup power nominal voltage	120 - 240 V	The nominal phase voltage that is output in backup power mode.
Backup power undervoltage protection limit value U< [pu]	0 - 2 % V	This set value represents the limit value for shutting down backup power mode. e. g., set value 0.9 = 90 % of the nominal voltage.
Backup Frequency Offset	-5 - +5 Hz	The setting value can be used to reduce or increase the nominal backup power frequency (see Technical data) by the offset value. The default value is +3 Hz. Connected loads detect that backup power mode is active based on the change in frequency and react accordingly (e.g., by activating energy saving mode) **IMPORTANT** If another AC source is available in the system, the backup power frequency must not be changed. The standard value (+3 Hz) prevents further AC sources from feeding in parallel to the inverter in backup power mode and triggering overvoltages as well as switching off their own backup power supply.
Backup power undervoltage protection time U<	0.04 - 20 s	Trip time for falling below the backup power undervoltage protection limit value.

Parameter	Value range	Description
Backup power surge protection limit value U> [pu]	0 - 2 % V	This set value represents the limit value for shutting down backup power mode. e. g., set value 1.1 = 110 % of the nominal voltage.
Backup power surge protection time U>	0.04 - 20 s	Trip time for exceeding the backup power surge protection limit value.
Backup power restart delay	0 - 600 s	Waiting time for restarting backup power mode following a shutdown.
Backup power restart attempts	1 - 10	The max. number of automated restart attempts. Once the max. number of automated restart attempts has been reached, service message 1177 must be manually acknowledged.
Backup power short circuit switch-off time	0.001 - 60 s	If a short circuit occurs during backup power mode, backup power mode is interrupted within the set time.

Energy management

Energy management

"Self-Consumption Optimization"
Set the operating mode to **"Manual"** or **"Automatic"**. The inverter always regulates to the set **"Target Value at Feed-In Point"**. In the **"Automatic"** operating mode (factory setting), an adjustment is made to 0 W at the feed-in point (maximum self-consumption).

The "Target Value at Feed-In Point" also applies if a further source feeds into this Smart Meter. However, in this case:
- The Fronius Smart Meter must be installed and configured at the feed-in point.
- The **"Allow battery charging from additional producers in home network"** function must be activated in the **"Components"** → **"Battery"** menu area.

"Target Value at Feed-In Point"
If "Manual" has been selected under Self-Consumption Optimization, the **"Operating Mode"** (**"Consumption"/"Feed-In")** and the **"Target Value at Feed-In Point"** can be set.

IMPORTANT!
"Self-Consumption Optimization" has lower priority than **"Battery Management"**.

External producers (only possible with active battery)
If further decentralized producers are installed in the house, and these are incorporated into the self-consumption control of the Fronius Hybrid inverter, the setting **"Allow battery charging from additional producers in home network"** must be activated in the menu area **"Device Configuration"** → **"Components"** (see Components on page 88
.This means that energy can be drawn from the home network and fed into the battery via the Fronius inverter (battery support required). You can restrict how much power is consumed by the Fronius inverter by specifying the maximum AC power (AC max.). A maximum power consumption of the AC rated power of the Fronius inverter is possible.

"Battery Management"
Using the time-dependent battery control, it is possible to prevent or restrict charging/discharging of the battery and to specify a defined charging power.

Battery management is influenced by the following settings, for example:
- Permitted battery charging from the public grid
- Power limitation of the inverter, energy storage device, or overall system
- Control specifications via Modbus
- Self-Consumption Optimization

IMPORTANT!
The defined rules for battery control have the second lowest priority after Self-Consumption Optimization. Depending on the configuration, the rules may not be satisfied due to other settings.

The following values can be selected for the rules of the time-dependent battery control:

- **"Max. charging power"**
  The battery is charged to the maximum level with the value set in the "**Power**" input field.
  If no feed-in to the public grid and/or direct consumption in the house is possible, the set "**Max. charging power**" value is ignored and the energy generated is charged into the battery.
- **"Min. charging power"**
  The battery is charged as a minimum by the value set in the input field "**Power**".
- **"Max. discharge power"**
  The battery is discharged at most by the value set in the input field "**Power**".
- **"Min. discharge power"**
  The battery is discharged as a minimum by the value set in the input field "**Power**".

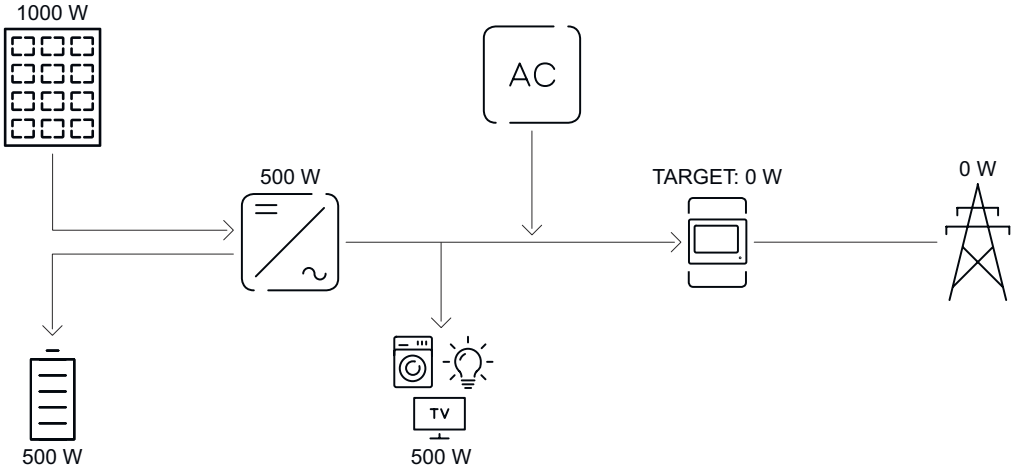
The timing for when the rule applies is set in the **"Time"** input fields and by selecting the relevant "**Weekdays**".

It is not possible to define a time window over midnight (0:00 am).
Example: To set a control from 10 pm to 6 am, two inputs are required: "10 pm-11:59 pm" and "0:00 am-06 am".

Examples - Time-dependent battery control

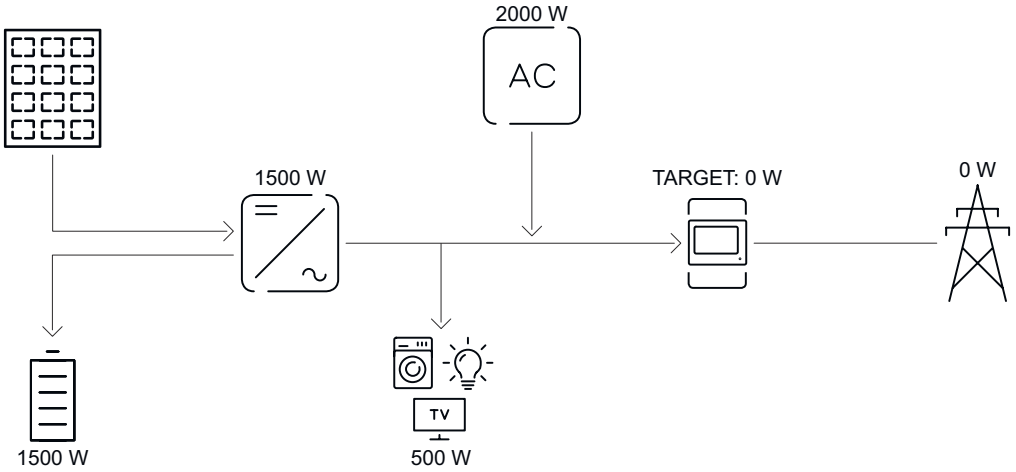
The following examples serve to explain the energy flows. Efficiency levels are not taken into account.

Battery system



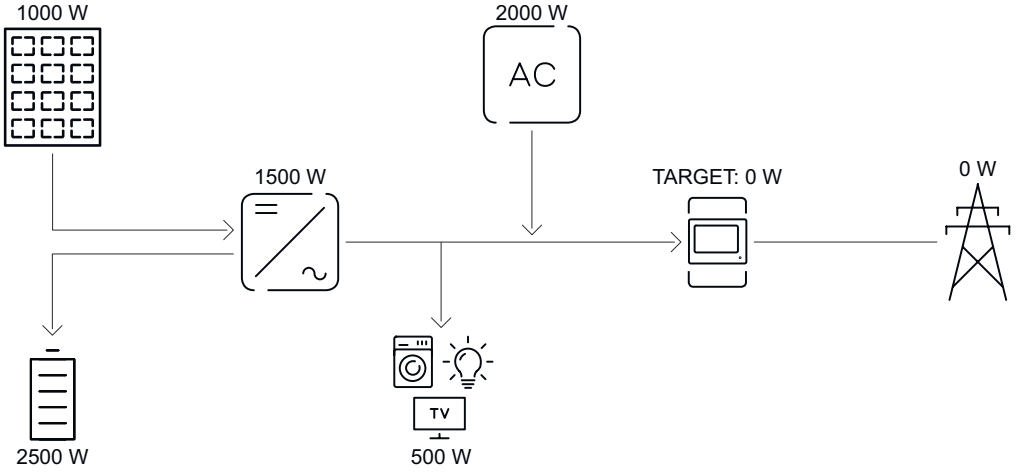
PV system to inverter	1000 W
Power into the battery	500 W
Power output (AC) of the inverter	500 W
Set target value at feed-in point	0 W
Infeed into the public grid	0 W
Consumption in home	500 W

Battery system without photovoltaics, including second generator in the house



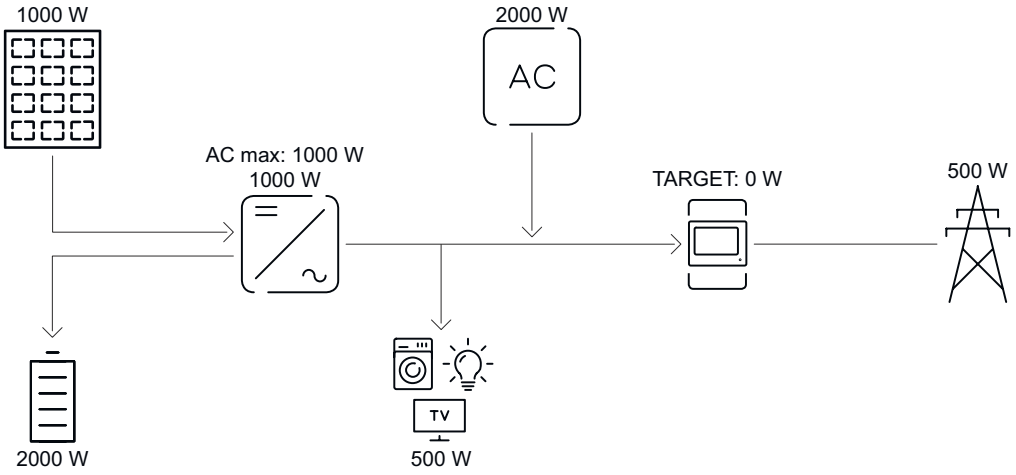
Power into the battery	1500 W
Power consumption (AC) of the inverter	1500 W
Second generator in home network	2000 W
Set target value at feed-in point	0 W
Infeed into the public grid	0 W
Consumption in home	500 W

Battery system including second generator in the house



PV system to inverter	1000 W
Power into the battery	2500 W
Power consumption (AC) of the inverter	1500 W
Second generator in home network	2000 W
Set target value at feed-in point	0 W
Infeed into the public grid	0 W
Consumption in home	500 W

Battery system including second generator in the house
(with AC max. limitation)

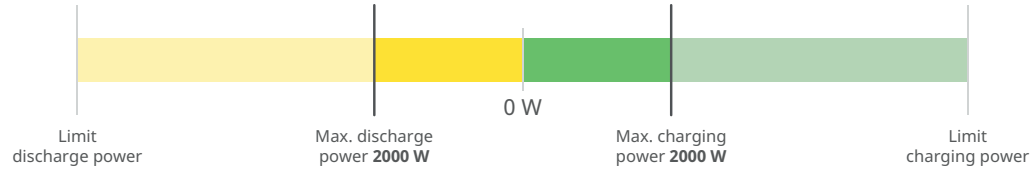


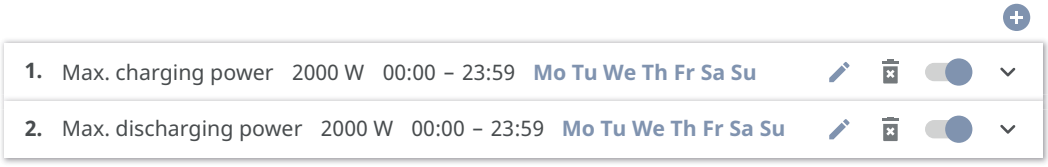
PV system to inverter	1000 W
Power into the battery	2000 W
Power consumption AC max. limited to	1000 W
Power consumption (AC) of the inverter	1000 W
Second generator in home network	2000 W
Set target value at feed-in point	0 W
Infeed into the public grid	500 W
Consumption in home	500 W

Permitted battery control regulations

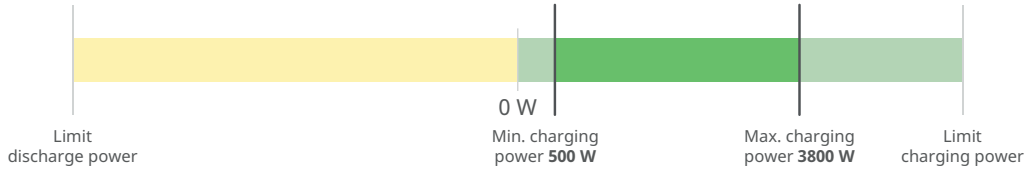
A regulation always consists of a restriction or specification, and the **time** and **days of the week** when the regulation is active. The time of regulations with the same restriction (e.g., max. charging power) must not overlap.

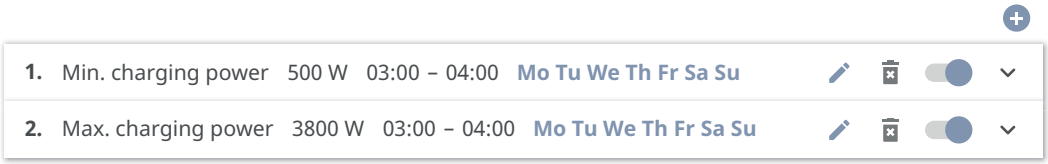
Max. charging and discharging limits
One max. charging and one max. discharging power can be configured at the same time.



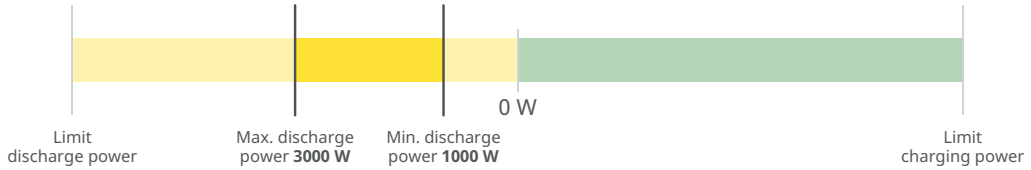


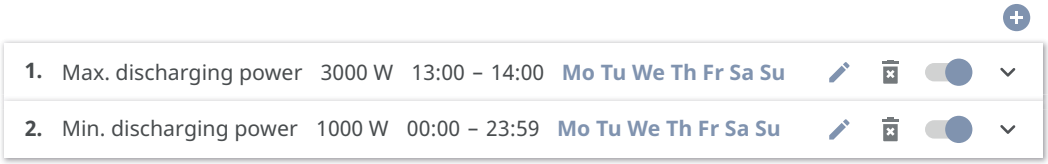
Specify charging range
It is possible to define a charging range using a min. and max. charging limit. In this case, it is not possible to discharge the battery.



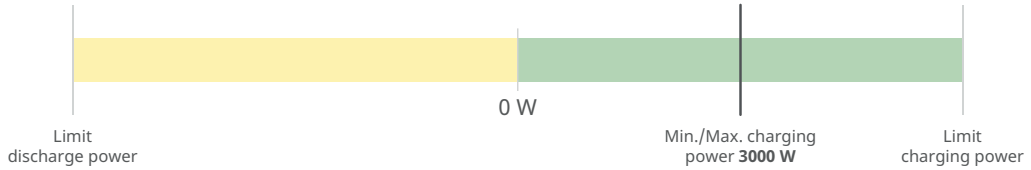


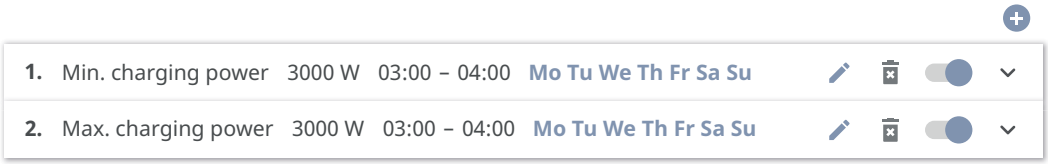
Specify discharging range
It is possible to define a discharging range using a min. and max. discharging limit. In this case, it is not possible to charge the battery.



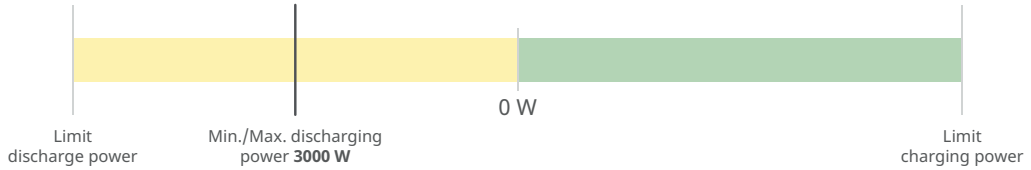


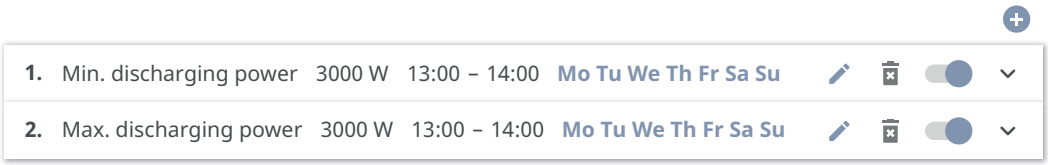
Specify a defined charge
It is possible to specify a defined charging power by setting the min. and max. charging power to the same value.





Specify a defined discharge
It is possible to specify a defined discharging power by setting the min. and max. discharging power to the same value.





Possible applications
- Time-dependent energy tariffs
- Battery reservation in the event of market-specific power limitation
- Time-dependent storage reservation for a backup power situation

PV power reduction

The regulations in the **Battery Management** menu area enable optimal use of the energy generated. Situations may arise, however, in which PV power cannot be used in full due to the time-dependent battery control.

Example	
Fronius inverter (max. output power)	6000 W
Defined discharge of the battery	6000 W
PV power	1000 W

In this case, the inverter would have to reduce the PV power to 0 W, since the output power of the inverter is max. 6000 W and the device is already being fully utilized through discharging.

Since it does not make sense to waste PV power, the power limit is automatically adjusted in battery management such that no PV power is wasted. In the example above, this means that the battery is discharged only at 5000 W, so that the 1000 W PV power can be used.

Load management

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

IMPORTANT!
An I/O is activated/deactivated after 60 seconds.

"Load"
- Control is **"Off"** (deactivated).
- Control is effected by the **"Power generated"**.
- Control is effected by **"Excess power"** (with feed-in limits). This option can only be selected if a meter has been connected. Control is effected using the actual power of feeding in with respect to the grid.

"Thresholds"

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

"Runtimes"

- Field for activating the **"Minimum runtime per switch-on process"** for which the output is to be activated for each switch-on process.
- Field for activating the **"Maximum runtime per day"**.
- Field for activating the **"Target runtime"** for which the output is to be activated in total per day (several switch-on processes are allowed for).

System

General

1 Enter the name of the system in the input field **PV System Name** (max. 30 characters).

2 Select the **Timezone** and **Time zone location** in the drop-down lists. The date and time are taken over from the time zone entered.

2 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.

Configuration Report

After the guided **setup wizard** is finished, a configuration report according to the standards of the Electric Power Research Institute (EPRI) can be created.This function can also be retrieved in the **System** menu. The report serves as essential documentation to verify that the appropriate settings in compliance with utility requirements have been applied.

The filename contains the serial number of the inverter and can be changed individually. Click the button to download the report either as a csv or a pdf file.

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, or data communication area is replaced, the license file must also be replaced.

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 Closing the inverter's connection area/housing cover, and commissioning on page 81).
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 45).
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 Closing the inverter's connection area/housing cover, and commissioning on page 81).
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 45).
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

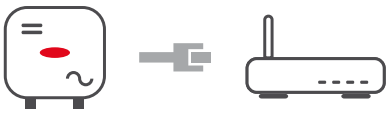
Network

Server addresses for data transfer
If a firewall is used for outgoing connections, the below protocols, server addresses, and ports must be allowed 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, Internet access must be configured without any restrictions or limitations. The DHCP Lease Time (validity) must not be set 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 connecting, the status of the connection should be checked (refer to the chapter headed Internet services on page 106).

WLAN:

Establishing a connection via WPS:

☐ The access point of the inverter must be active. 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 in Windows 10, first select the **Connect using a security key instead** link to be able 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 WLAN router (see WLAN 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 (refer to the chapter headed Internet services on page 106).

Selecting and connecting to a WLAN network:
The networks found are displayed in the list. Clicking on the Refresh button will ⟳ perform a new search for available WLAN networks. The selection list can be limited 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 WLAN 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 connecting, the status of the connection should be checked (refer to the chapter headed Internet services on page 106).

Access point:

The inverter serves as the access point. A PC or smart device connects directly to the inverter. Connecting to the Internet is not possible. In this menu area, **Network Name (SSID)** and **Network Key (PSK)** can be assigned.
It is possible to operate a connection via WLAN and via the access point at the same time.

Modbus

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 or 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713
int + SF: SunSpec Inverter Model 101, 102, 103 or 201, 202, 203 or 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713

"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
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 or 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713
int + SF: SunSpec Inverter Model 101, 102, 103 or 201, 202, 203 or 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713

"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: 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

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.*

Profile	Value range	Description
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.

Fronius Solar API

The Fronius Solar API is an IP-based, open JSON interface. If it is activated, IOT devices in the local network can access inverter information without authentication. For security reasons, the interface is deactivated ex works and must be activated if it is required for a third-party application (e.g., EV charger, Smart Home solutions, etc.).

For monitoring, Fronius recommends using Fronius Solar.web, which offers secure access to the inverter status and production information.

In the event of a firmware update to version 1.14.x, the setting is taken from the Fronius Solar API. 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

Activating the Fronius Solar API

Activate the **"Activate communication via Solar API"** function in the menu area **"Communication"** → **"Solar API"** on the user interface of the inverter.

Internet services

Information regarding connections and the current connection status is displayed in this menu. If there are problems with the connection, a short description of the error is displayed.

Safety and grid requirements

Country setup

⚠ WARNING!

Danger from unauthorized fault analyses and repair work.
This can result in severe personal 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.

ESS Modes (UL3141)

NOTE!

This system is equipped with a power control system (PCS) according to UL3141. All PCS controlled busbars or conductors shall be protected with suitably rated overcurrent devices appropriately sized for the busbar rating or conductor ampacity.

The Application Guide for the ESS modes is available at the following link:

https://www.fronius.com/~/downloads/Solar%20Energy/Whitepaper/SE_WP_Fronius_GEN24_Plus_ESS_Modes_EN.pdf

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Feed-in limit

Energy companies 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 in the household before the power of an inverter is reduced:

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

The PV power that cannot be fed into the public grid is used to charge the battery by the inverter and/or used by the Fronius Ohmpilot so that it does not go to waste. The feed-in limit only becomes active if the power of feeding in is higher than the set power reduction.

Power Control deactivated
The inverter converts all available PV energy and feeds it into the public grid.

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. A value must be set for the permissible total power of feeding in.

Total DC power of the Entire System
Input field for the total DC power of the entire system in Wp.
This value is used if the **Maximum grid feed-in power** is specified in %.

Export Limit Control (Soft Limit)
If this value is exceeded, the inverter readjusts down to the set value within the time required by the national standards and regulations.

Maximum grid feed-in power
Input field for the maximum permitted power of feeding into the public network in W or % (setting range: -10 to 100%). If there is no meter in the system, the inverter limits the feed-in power to the set value.

Export Limit Protection (Hard limit)
If this value is exceeded, the inverter switches off within max. 5 seconds. This value must be higher than the value set for **Export Limit Control (Soft Limit)**.

Activate the function **Reduce inverter power to 0% for control if meter connection has been lost** for control in the event of a fail-safe.

The use of WLAN for communication between the Smart Meter and the inverter is not recommended for the fail-safe function. Even short-term disconnections can cause the inverter to shut down. This problem is particularly common with weak WLAN signal strengths, a slow or overloaded WLAN connection, and automatic channel selection of the router.

Limit multiple inverters (only Soft Limit)
Control of the dynamic feed-in limit for several inverters, for details on configuration, see chapter Dynamic feed-in limitation with multiple inverters on page 110.

Example: Feed-in limit (not taking into account the efficiency)	
PV system to Fronius inverter:	5000 W
Consumption in home:	1000 W
Maximum permitted power of feeding in of the entire system:	60% = 3000 W
Situation 1: The battery may be charged	
Power at the grid feed-in point:	0 W
Power at the inverter output:	1000 W
Power into the battery:	3000 W
Situation 2: The battery must not be charged	
Power at the grid feed-in point	3000 W
Power at the inverter output:	4000 W
Power into the battery:	0 W

Example: Feed-in limit (not taking into account the efficiency)
In this example, only 3000 W may be fed into the grid at the grid feed-in point. However, loads that are located between the inverter and grid feed-in point can be supplied by means of additional feed-in of the inverter and are adjusted.

Dynamic feed-in limitation with multiple inverters

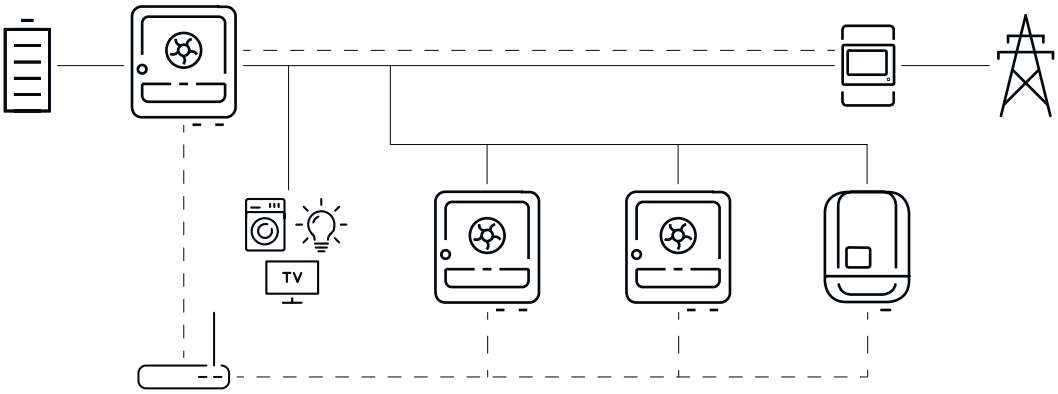
IMPORTANT!
Select the "Technician" user for settings in this menu item, enter and confirm the password for the "Technician" user. Settings in this menu area must only be made by trained and qualified personnel.

The inverter can be used as a primary device to control the dynamic feed-in limitation of additional Fronius inverters (secondary devices) so that feed-in limitations of energy companies or grid operators can be centrally managed. This control relates to the **"soft limit"** feed-in limitation (see Feed-in limit). The following prerequisites must be met:

- Power limitation and the **"Limit multiple inverters"** function are activated and configured on the user interface of the primary device.
- The primary device and secondary device(s) are physically connected to the same network router via LAN.
- **"Inverter control via Modbus"** is activated and configured for all secondary devices.
- The Fronius Smart Meter is configured as the primary meter and connected to the primary device.

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

IMPORTANT!
If a GEN24 inverter is connected to a battery, it must be used as the primary device for dynamic feed-in limitation.



Example connection diagram for dynamic feed-in limitation with multiple inverters

Dynamic feed-in limitation is available with the following device combinations:

Primary device	Secondary devices
Fronius Primo GEN24	Fronius Primo GEN24, Fronius SnapINverter with Fronius Datamanager 2.0*

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

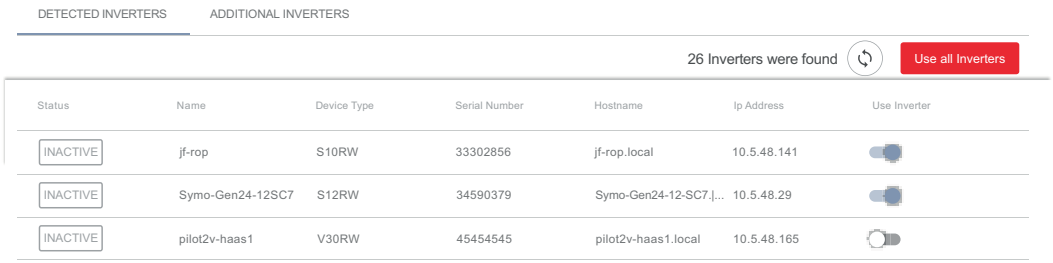
Primary meter
The Fronius Smart Meter acts as the only primary meter and is connected directly to the primary device. The Smart Meter monitors the total output power of all inverters into the grid and passes this information to the primary device via Modbus.

Primary device

The feed-in limitation is configured on the user interface of the inverter:

1. Activate the **"Power limitation"** function and select **"Limit Entire System"** in the **"Safety and Grid Regulations"** → **"Export Limitation"** menu area.
2. Configure the country-specific settings.
3. Activate the **"Limit multiple inverters"** function in **the** "Safety and Grid Regulations" **→ "Export Limitation"** menu area.

The primary device automatically scans the network for available secondary devices. A list of the inverters found is displayed. Click **"Refresh"** to perform the search again.



4. Activate **"Use Inverter"** for all secondary devices for which a feed-in limitation applies. Click on **"Use all inverters"** to activate the function for all secondary devices.
5. In the **"Safety and Grid Regulations"** → **"I/O power management"** menu area, set the control priorities as follows:
   1. I/O power management
   2. Modbus control
   3. Feed-in limitation

The following statuses are displayed for the listed inverters:
- **Inactive**: Secondary device is not configured for power regulation
- **Disconnected**: Secondary device is configured, network connection not possible
- **Connected**: Secondary device is configured and accessible via the network of the primary device.

Adding an inverter manually

1. Select the **"Additional inverters"** menu area.
2. Enter the name, host name, and IP address and the Modbus address of the secondary device.
3. Click **"Add inverter"**.

Secondary device
A secondary device takes over the feed-in limitation by the primary device. No data is sent to the primary device for the feed-in limitation. The following configurations must be set for power limitation:

User interface of the GEN24 / Tauro secondary device

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

2 In the **"Modbus"** menu area, activate the **Modbus Server via TCP** functions.

3 In the **"Safety and Grid Regulations"** → **"I/O power management"** menu area, set the control priorities for a Fail-Safe scenario as follows:
1. I/O power management
2. Modbus control
3. Feed-in limitation

4 In the **"Safety and Grid Regulations"** menu area, select **"Export Limitation"** and apply the following settings:
- Enable the **"Power limitation"** function
- Select **"Limit Entire System"** and specify the total value of the DC system power in W
- Enable **"Export Limiting Control (Soft Limit)"** and enter a value of 0 W for **"Maximum Permissible Export Power of Entire System"**.
- Activate the **"Reduce inverter power to 0% if meter connection has been lost"** function

User interface of the Fronius Datamanager 2.0 secondary device

1 Select the **"Admin"** user and enter the password for the **"Admin"** user.

2 In the **"Settings – Modbus"** menu area, activate the **"Exporting data via Modbus"** and **"Inverter control via Modbus"** functions.

3 In the **"DNO Editor"** → **"Control priorities"** menu area, set the control priorities for a Fail-Safe scenario as follows:
1. I/O control
2. Control via Modbus
3. Dynamic power reduction

4 Select the **"DNO Editor"** → **"Dynamic power reduction"** menu area

5 Under the menu item "**Export Limitation"**, activate the function **"Limit for entire system"** and apply the following settings:
- Enter the total value of the DC system power in W
- Enable **"Export Limiting Control (Soft Limit)"** and enter a value of 0 W for **"Maximum Permissible Export Power of Entire System"**.
- Activate the **"Reduce inverter power to 0% if meter connection has been lost"** function

IMPORTANT!
The secondary device automatically stops energy from being fed into the grid in the event of a communication failure if the Modbus control does not send a signal to the inverter.

I/O Power Management

General
Settings relevant to a grid operator are made under this menu item. Rules for an effective power limit in % and/or a power factor limit in watts can be set.

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

Input pattern (assignment of individual I/Os)
1 click = white (contact open)
2 clicks = blue (contact closed)
3 clicks = gray (not used)

Power Factor (cos φ) (define value)

Impedance response
- **Capacitive**
- **Inductive**

DNO feedback
If the rule is activated, the **DNO feedback** output (pin 1 recommended) must be configured (e.g., for operating a signal device).

The following rules for power management can be defined:
- **I/O Generation Limit local (%)**: The output power of the inverter is limited to the defined value of the absolute effective power.
- **Export Limit Control (W)**: The effective power is reduced to a defined value (e.g., 5000 watts).
- **Shutdown**: The inverter stops grid power feed operation and switches to standby mode.

The data format *.fpc is supported for the **Import** and **Export** of defined rules.

If there is an active rule for the control of the inverter, this is shown 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 export limitation, and control via Modbus.

1 = highest priority, 3 = lowest priority

Local priorities of the I/O power management, the export limitation, and the Modbus interface are overridden by cloud control commands (regulatory purposes and virtual power plants) – see Cloud control on page 105 and by backup power.

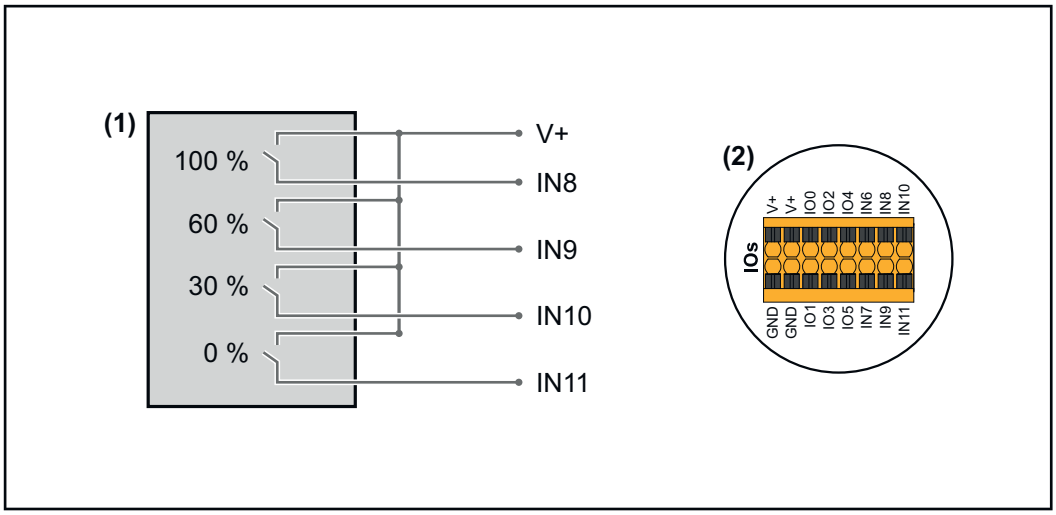
The controlling priorities are differentiated internally by **power control** and **inverter shutdown**. Inverter shutdown always takes precedence over power control. An inverter shutdown command is always executed, regardless of the priority.

Power control
- I/O Powerlimit (DRM/ripple control receiver signal) – according to command
- Export Limitation (Soft Limit) – always active
- Modbus (generation limit) – according to command

Inverter shutdown
- I/O Powerlimit with export limitation = 0% (DRM/ripple control receiver signal) – according to command
- Export Limitation (Hard Limit)
- Modbus (shutdown command) – according to command

Connection diagram - 4 relays

The ripple control signal receiver and the I/O terminal of the inverter can be connected to one another as shown in the connection diagram.
For distances of over 11 yd between the inverter and the ripple control signal receiver, a CAT 5 cable is recommended as a minimum and the shielding must be connected on one side at the push-in terminal of the data communication area (SHIELD).



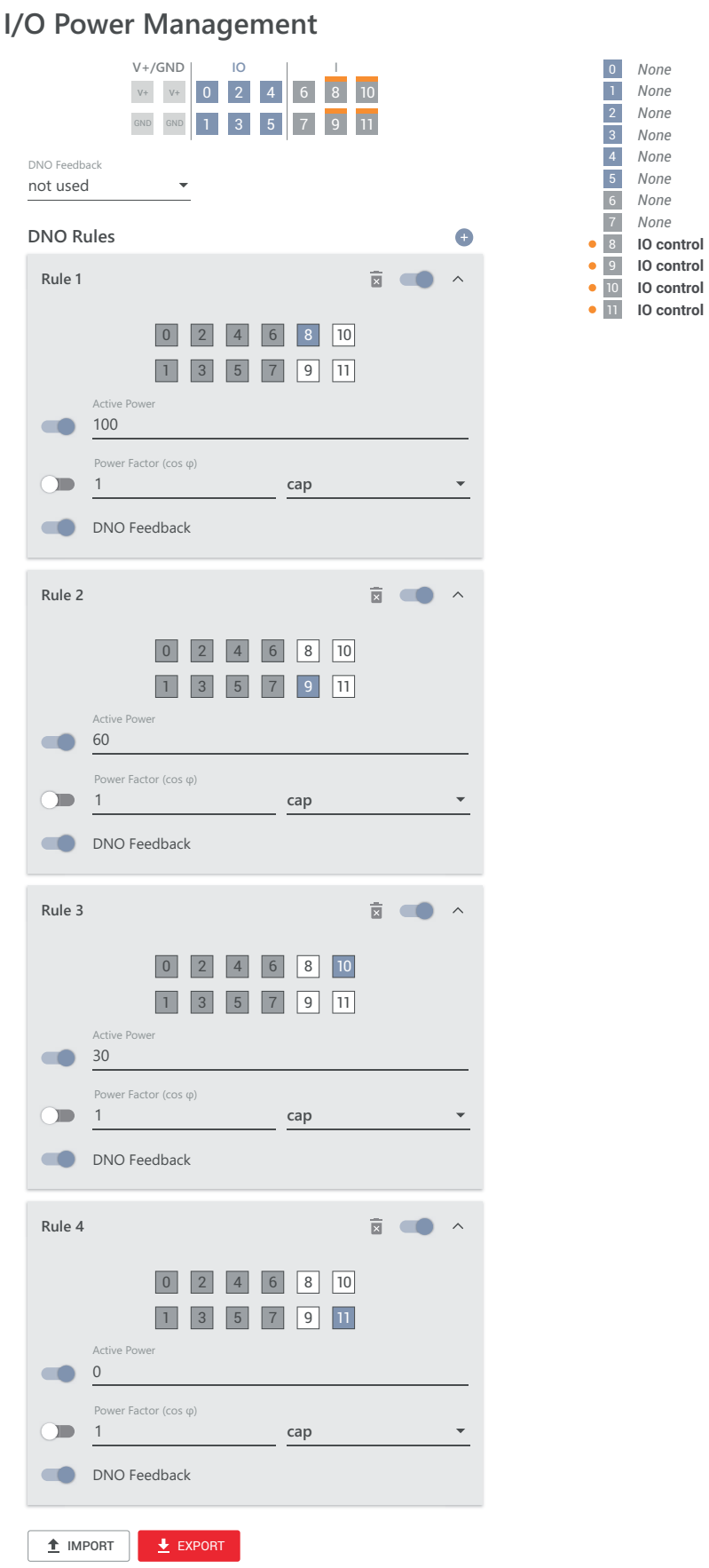
(1) Ripple control signal receiver with 4 relays for effective power limitation.
(2) I/Os of the data communication area.

Use pre-configured file for 4-relay operation:

1. Download the file (.fpc) under 4-relay operation to the mobile device.
2. Upload the file (.fpc) in the **"I/O power management"** menu field by clicking the **"Import"** button.
3. Click **"Save"**.

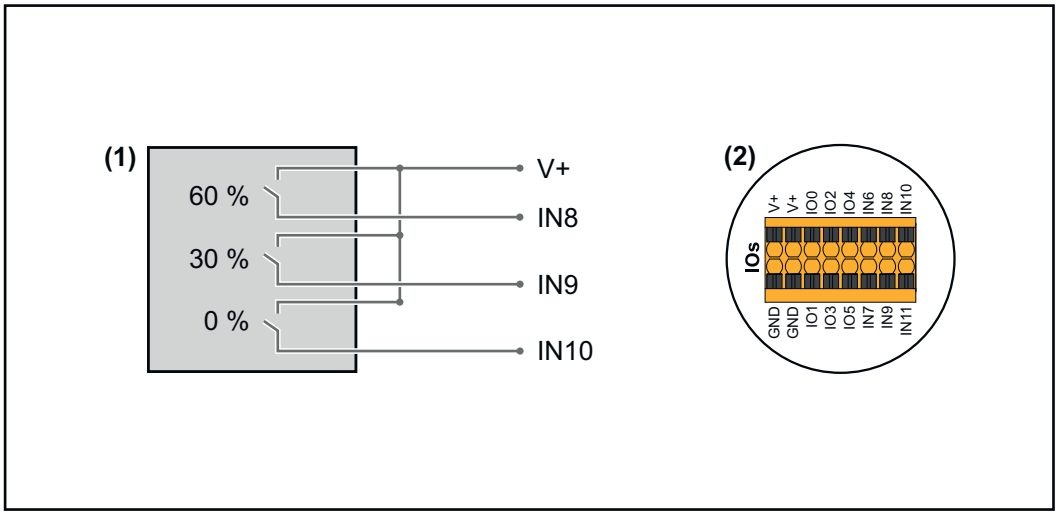
The settings for 4-relay operation are saved.

I/O power management settings - 4 relays



Connection diagram - 3 relays

The ripple control signal receiver and the I/O terminal of the inverter can be connected to one another as shown in the connection diagram.
For distances of over 11 yd between the inverter and the ripple control signal receiver, a CAT 5 cable is recommended as a minimum and the shielding must be connected on one side at the push-in terminal of the data communication area (SHIELD).



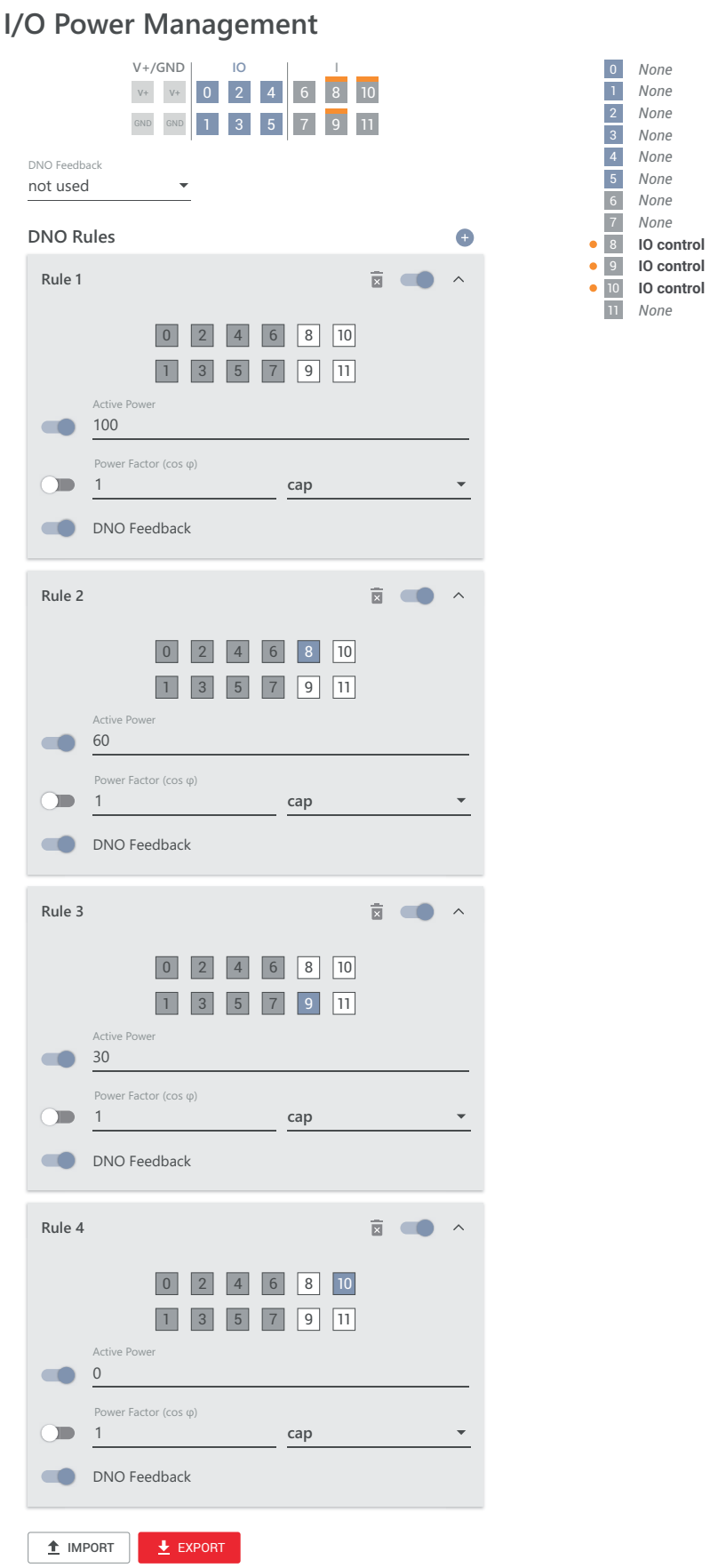
(1) Ripple control signal receiver with 3 relays for effective power limitation.
(2) I/Os of the data communication area.

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 field by clicking the **"Import"** button.
3. Click **"Save"**.

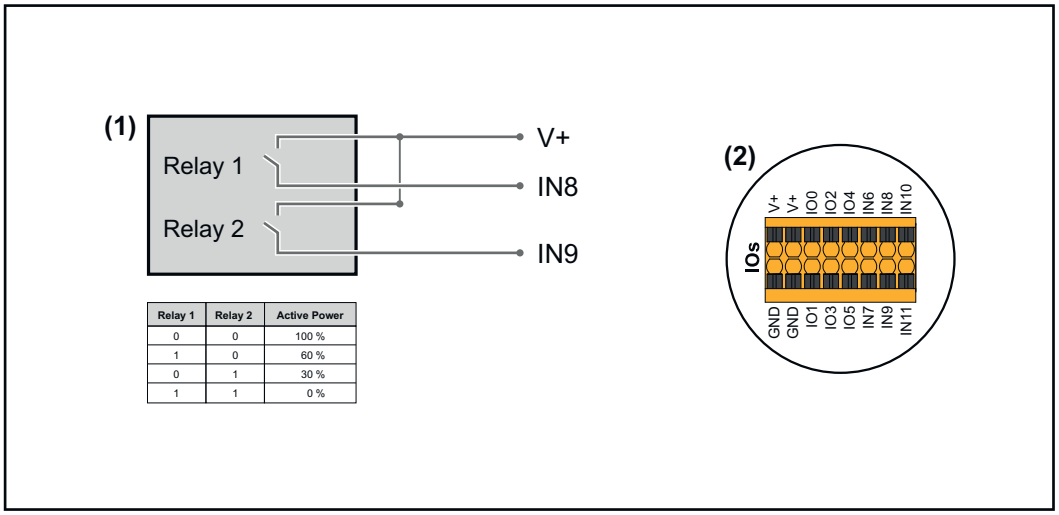
The settings for 3-relay operation are saved.

I/O power management settings - 3 relays



Connection diagram - 2 relays

The ripple control signal receiver and the I/O terminal of the inverter can be connected to one another as shown in the connection diagram.
For distances of over 11 yd between the inverter and the ripple control signal receiver, a CAT 5 cable is recommended as a minimum and the shielding must be connected on one side at the push-in terminal of the data communication area (SHIELD).



Relay 1	Relay 2	Active Power
0	0	100 %
1	0	60 %
0	1	30 %
1	1	0 %

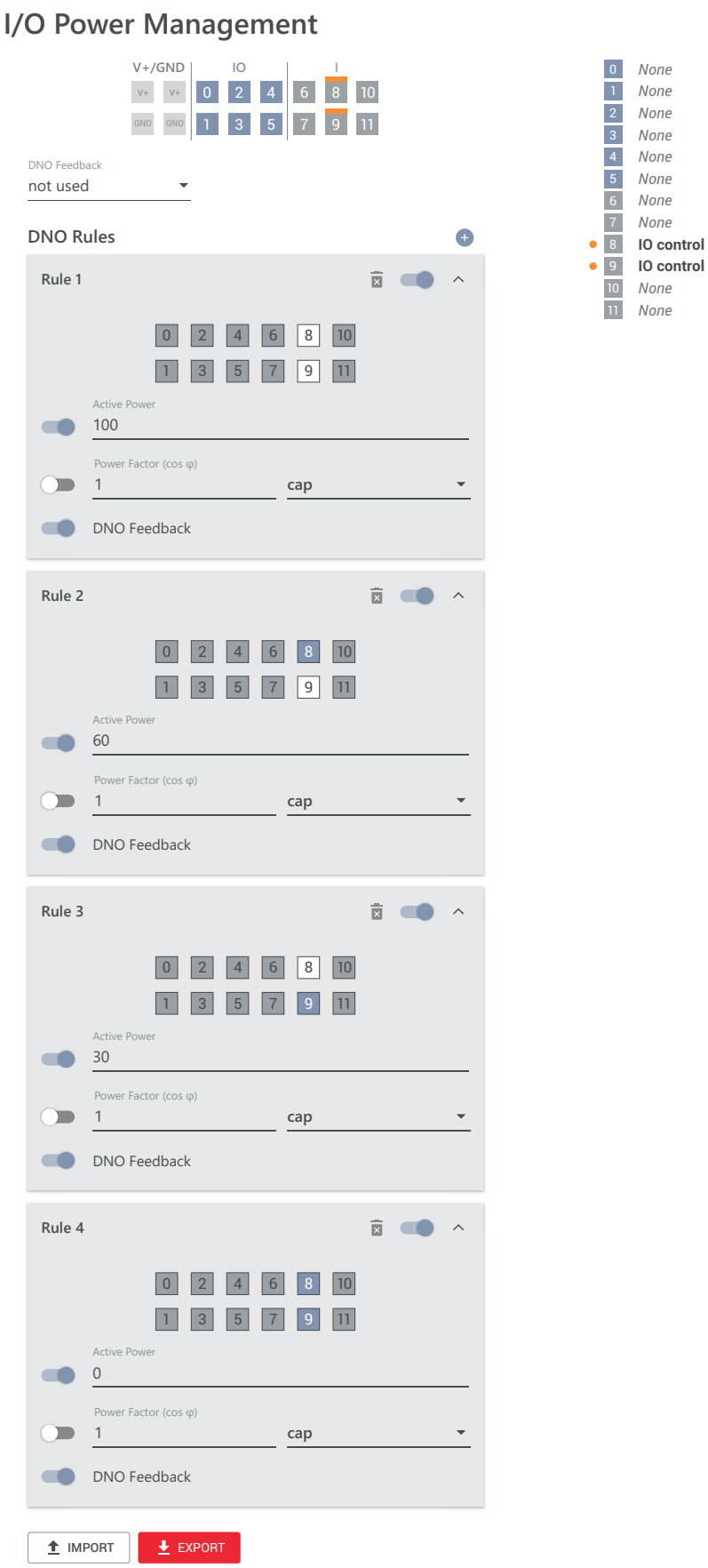
(1) Ripple control signal receiver with 2 relays for effective power limitation.
(2) I/Os of the data communication area.

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 field by clicking the **"Import"** button.
3. Click **"Save"**.

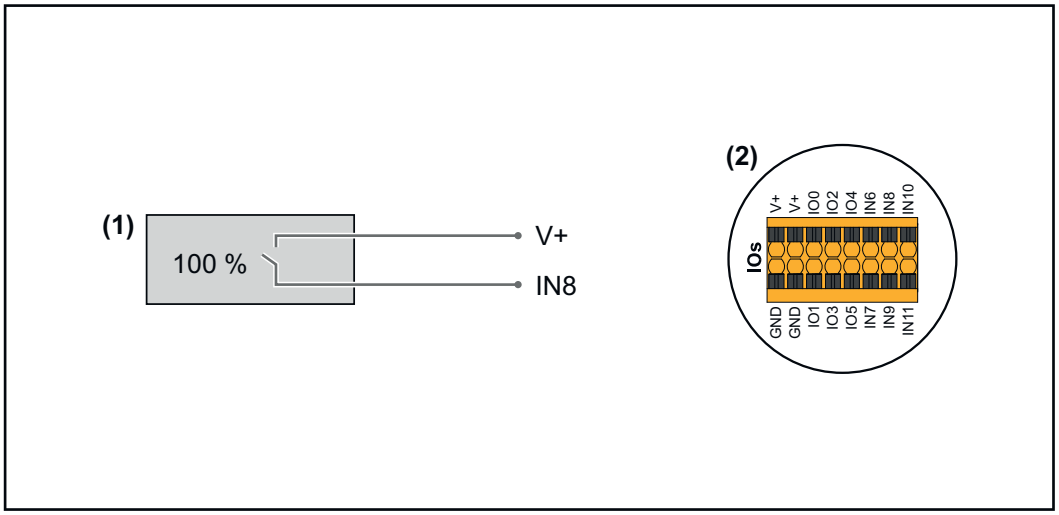
The settings for 2-relay operation are saved.

I/O power management settings - 2 relays



Connection diagram - 1 relay

The ripple control signal receiver and the I/O terminal of the inverter can be connected to one another as shown in the connection diagram.
For distances of over 10 m between the inverter and the ripple control signal receiver, a CAT 5 cable is recommended as a minimum and the shielding must be connected on one side at the push-in terminal of the data communication area (SHIELD).



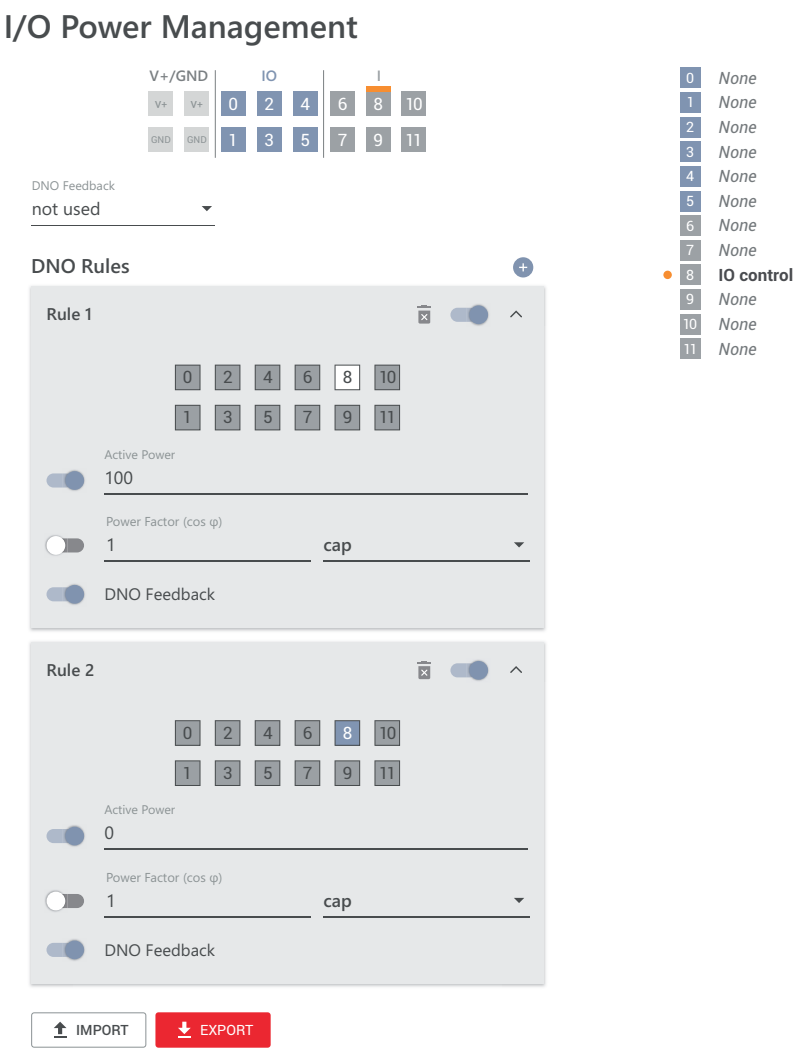
(1) Ripple control signal receiver with 1 relay for effective power limitation.
(2) I/Os of the data communication area.

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 field by clicking the **"Import"** button.
3. Click **"Save"**.

The settings for 1-relay operation are saved.

I/O power management settings - 1 relay



Appendix

Service, maintenance and disposal

General

The inverter is designed so that it does not require additional maintenance work. Nevertheless, a few points must be considered during operation to ensure that the inverter works perfectly.

Cleaning

Wipe the inverter, if necessary, with a damp cloth.
Do not use cleaning agents, scouring agents, solvents, or similar products to clean the inverter.

Maintenance

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

Safety

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

⚠ WARNING!

Danger from mains voltage and DC voltage from PV modules.
This can result in severe personal injury and damage to property.
- ▶ The connection area must only be opened by an authorized electrician.
- ▶ The separate power stage set area must only be opened by Fronius-trained service technicians.
- ▶ Prior to any connection work, ensure that the inverter is de-energized on the AC side and the DC side.

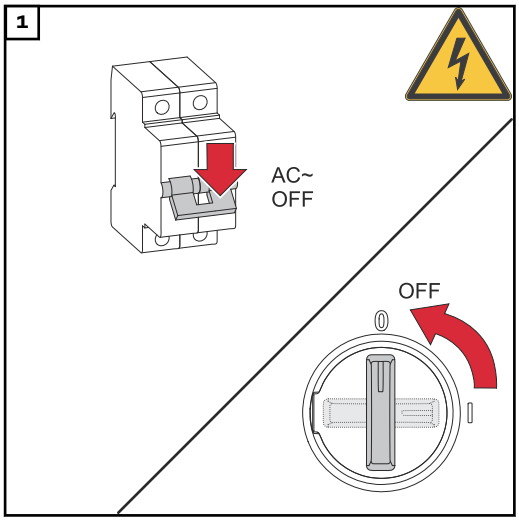
⚠ WARNING!

Danger of residual voltage from capacitors.
This can result in severe personal injury and damage to property.
- ▶ Allow the capacitors of the inverter to discharge (2 minutes).

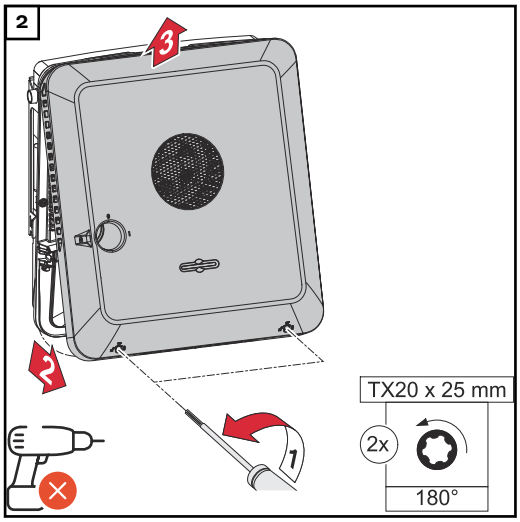
Operation in dusty environments

NOTE!

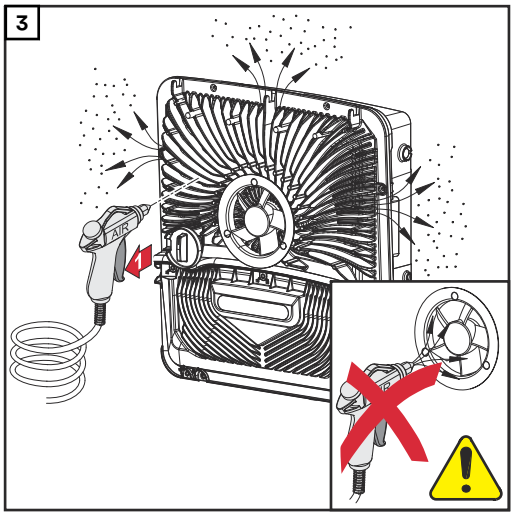
If the inverter is operated in dusty environments, dirt may build up on the heat sink and fan.
This may result in a loss of power due to insufficient cooling of the inverter.
- ▶ Make sure that the ambient air can always flow through the inverter's ventilation slots unimpeded.
- ▶ Remove any build-ups of dirt from the heat sink and the fan.



Switch off power to the inverter and wait for the specified time until the capacitors have discharged and the fan has shut down.
Turn the DC disconnector to the "Off" switch setting.



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



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

NOTE!

Risk due to damage to the fan bearing in the event of incorrect cleaning.
Excessive speeds and the application of pressure to the fan bearing can cause damage.

- ▶ Block the fan and clean with compressed air.
- ▶ When using a cloth or brush, clean the fan without applying any pressure.

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

Disposal

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. Used equipment must be returned to the distributor or through a local authorized collection and disposal system. Proper disposal of the

used device promotes sustainable recycling of resources and prevents negative effects on health and the environment.

Packaging materials
- Collect separately
- Observe local regulations
- Crush cardboard boxes

Warranty provisions

Fronius manufacturer's warranty

Detailed, country-specific warranty conditions are available at www.fronius.com/solar/warranty.

To obtain the full warranty period for your newly installed Fronius product, please register at www.solarweb.com.

Status codes and remedy

Display

Status codes are displayed on the user interface of the inverter in the **System** > **Event Log** menu area or in the user menu under **Notifications** and in Fronius Solar.web*.

* If configured accordingly, see chapter Fronius Solar.web on page 14.

Status codes

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 master).

⚠ WARNING!

Danger from work that is not carried out properly.
This can result in severe personal 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.

1191 – AfciDataTransfer (operating LED: flashes yellow)

Cause: An electric arc has been identified on the PV system.

Remedy: No action required.

Technical data

Fronius Primo GEN24 7.7 208 - 240 / 7.7 208 - 240 Plus

DC input data		
MPP voltage range		260 - 480 V
Max. input voltage at 1000 W/m²/14 °F in an open circuit		600 V
Min. input voltage		65 V
Start-up input voltage		80 V
Nominal PV power	at 208 V at 220 V at 240 V	7960 W 7960 W 7920 W
Nominal input voltage	at 208 V at 220 V at 240 V	365 V 365 V 385 V
Max. PV array power	at 208 V at 220 V at 240 V	11520 W 11520 W 11520 W
Nominal input current	at 208 V at 220 V at 240 V	21.8 A 21.8 A 20.6 A
Max. input current PV 1 PV 2		 22 A 22 A
Max. short circuit current for module array ($I_{SC\ PV}$) PV 1 PV 2		 41.25 A 36 A
Max. total short circuit current for module array ($I_{SC\ PV1} + I_{SC\ PV2} = I_{SC\ max}$)		77.25 A
Max. continuous utility backfeed current [1)]		0.0 A

AC output data		
Max. output power	at 208 V at 220 V at 240 V	7680 W 7680 W 7680 W
Max. output power at +140 °F (60 °C) V min / V max	at 208 V at 220 V at 240 V	5060 W / 5940 W 6230 W / 5510 W 5490 W / 6810 W
Nominal AC voltage		208 V/220 V/240 V
Voltage trip limit accuracy		1% of nominal value
Max. continuous output current at V_{nom}	at 208 V at 220 V at 240 V	36.9 A 34.9 A 32.0 A
Output overcurrent protection	at 208 V at 220 V at 240 V	50.0 A 45.0 A 40.0 A
Phases		1

AC output data		
Max. output fault current per duration (peak / rms over duration)	at 208 V at 220 V at 240 V	682 A / 20.1 A over 396 ms 676 A / 35.4 A over 120 ms 698 A / 20.4 A over 339 ms
Nominal output frequency		60 Hz
Setting range for mains frequency		45.0 - 66.0 Hz
Frequency trip limit accuracy		0.05 Hz
Total harmonic distortion		< 3.0%
Power factor (cos phi)		0.8 - 1 ind./cap.[2)]
Max. permitted mains impedance Zmax at PCC (mOhm)[3)]		None

General data		
Maximum efficiency	at 208 V at 220 V at 240 V	97.2 % 97.2 % 97.5 %
CEC efficiency	at 208 V at 220 V at 240 V	96.5 % 96.5 % 97.0 %
Night tare loss	at 208 V at 220 V at 240 V	9.2 W 9.2 W 9.2 W
Cooling		Controlled forced-air ventilation
Protection class		Type 4X
Dimensions H × W × D		23.0 × 20.8 × 7.1 inches (583 x 529 x 180 mm)
Weight		49.05 lbs. (22.25 kg)
Shipping dimensions H × W × D		25.8 × 23.5 × 10.4 inches (654 x 598 x 263 mm)
Shipping weight		57.10 lbs.(25.9 kg)
Inverter topology		non-isolated, no transformer
Permitted ambient temperature		-40 °F - +140 °F (-40 °C - +60 °C)
Permissible humidity		0 - 100% (incl. condensation)
EMC emission class		B
DC/AC overvoltage (according to UL1741 3rd Edition, CSA-C22.2 No.107.1-16)		2/4
Pollution degree		2
Safety class (according to IEC 62103)		1

Protection devices	
DC isolation measurement	Error/shutdown at RISO < 500 kOhm
DC overload performance	Operating point shift, power limiter
DC disconnector	Integrated
DC reverse polarity protection	Integrated
Arc Fault Circuit Interrupter	AFCI type 1 integrated, according to UL1699B:2024 and F-I-AFPE-1-4-1 according to IEC63027:2023
Rapid shutdown	Integrated, in accordance with UL1741 and CSA C22.2 No.330-23
RCMU	Integrated
Active anti-islanding method	Integrated
Behavior in the event of overheating	Power limiter, active cooling

Output data PV Point		
Nominal AC voltage PV Point		1~NPE 120 V
Nominal output power PV Point	at 120 V	1560 W
Max. continuous output current	at 120 V	13.0 A
Nominal output frequency		63 Hz
Power factor		0 - 1 ind. / cap.[2)]
Switching time		<22 s.

Data communication	
WLAN SMA-RP connection (**FCC ID:** QKWPILOT1 / **IC ID:** 12270-PILOT1 / **IFETEL:**RCPFRTP20-1349) (**FCC ID:** QKWPILOT2 / **IC ID:** 12270-PILOT2)	802.11b/g/n (WPA, WPA2)
Ethernet (LAN)	RJ 45, 10/100 Mbit
Wired shutdown (WSD)	max. 28 devices/WSD chain max. distance master → slave = 109 yd / 100 m slave → slave = 109 yd /100 m
Modbus RTU SunSpec (2x)	RS485 2-wire

Data communication	
Voltage level of digital inputs	low: min. 0 V - max. 1.8 V high: min. 4.5 V - max. 28.8 V
Input currents of digital inputs	depending on the input voltage; input resistance = 70 kOhm
Total power for digital output (internal supply)	6 W at 12 V (USB not connected)
Power per digital output (external supply)	1 A at >12.5 V - 24 V (max. 3 A in total)

DC Input data battery[4)]	
Min. voltage	150 V
Max. voltage	455 V
Max. current	22 A
Max. input	7680 W
DC Inputs	1

Output data Essential Backup[5)]		
Nominal output power Essential Backup	at 120 V at 220 V at 240 V	7680 W 7680 W 7680 W
Max. continuous output current	at 120 V at 220 V at 240 V	36.9 A 34.9 A 32.0 A
Nominal output frequency		63 Hz
Power factor		0.8 - 1 ind. / cap.[2)]
Switching time		<17 s.

Technical data for Fronius Primo GEN24 10.0 208 - 240 / 10.0 208 - 240 Plus

DC input data		
MPP voltage range		260 - 480 V
Max. input voltage at 1000 W/m²/14 °F in an open circuit		600 V
Min. input voltage		65 V
Start-up input voltage		80 V
Nominal PV power	at 208 V at 220 V at 240 V	9790 W 10360 W 10310 W
Max. PV array power	at 208 V at 220 V at 240 V	13500 W 13000 W 15000 W

DC input data		
Nominal input voltage	at 208 V at 220 V at 240 V	365 V 365 V 385 V
Nominal input current	at 208 V at 220 V at 240 V	26.8 A 28.4 A 26.8 A
Max. input current PV 1 PV 2		 22 A 22 A
Max. short circuit current for module array ($I_{SC\ PV}$) PV 1 PV 2		 41.25 A 36 A
Max. total short circuit current for module array ($I_{SC\ PV1} + I_{SC\ PV2} = I_{SC\ max}$)		77.25 A
Max. continuous utility backfeed current [1)]		0.0 A

AC output data		
Max. output power	at 208 V at 220 V at 240 V	9450 W 10,000 W 10,000 W
Max. output power at +140 °F (60 °C) V min / V max	at 208 V at 220 V at 240 V	5060 W / 5940 W 6230 W / 5510 W 5490 W / 6810 W
Nominal AC voltage		208 V/220 V/240 V
Voltage trip limit accuracy		1% of nominal value
Max. continuous output current at V_{nom}	at 208 V at 220 V at 240 V	45.45 A 45.45 A 41.7 A
Output overcurrent protection	at 208 V at 220 V at 240 V	60 A 60 A 55 A
Phases		1
Max. output fault current per duration (peak / rms over duration)	at 208 V at 220 V at 240 V	682 A/ 20.1 A over 396 ms 676 A/ 35.4 A over 120 ms 698 A/ 20.4 A over 339 ms
Nominal output frequency		60 Hz
Setting range for mains frequency		45.0 - 66.0 Hz
Frequency trip limit accuracy		0.05 Hz
Total harmonic distortion		< 3.0%
Power factor (cos phi)		0.8 - 1 ind./cap.[2)]
Max. permitted mains impedance Zmax at PCC (mOhm)[3)]		None

General data		
Maximum efficiency	at 208 V at 220 V at 240 V	97.2 % 97.2 % 97.5 %
CEC efficiency	at 208 V at 220 V at 240 V	96.5% 96.5% 97.0%
Night tare loss	at 208 V at 220 V at 240 V	8.4 W 8.4 W 8.5 W
Cooling		Controlled forced-air ventilation
Protection class		Type 4X
Dimensions H × W × D		23.0 × 20.8 × 7.1 inches (583 x 529 x 180 mm)
Weight		49.05 lbs. (22.25 kg)
Shipping dimensions W × H × D		25.8 × 23.5 × 10.4 inches (654 x 598 x 264 mm)
Shipping weight		57.10 lbs. (25.9 kg)
Inverter topology		non-isolated, no transformer
Permitted ambient temperature		-40 °F - +140 °F(-40 °C - +60 °C)
Permissible humidity		0 - 100% (incl. condensation)
EMC emission class		B
DC/AC overvoltage (according to UL1741 3rd Edition, CSA-C22.2 No.107.1-16)		2/4
Pollution degree		2
Safety class (according to IEC 62103)		1

Protection devices	
DC isolation measurement	Error/shutdown at RISO < 500 kOhm
DC overload performance	Operating point shift, power limiter
DC disconnector	Integrated
DC reverse polarity protection	Integrated
Arc Fault Circuit Interrupter	AFCI type 1 integrated, according to UL1699B:2024 and F-I-AFPE-1-4-1 according to IEC63027:2023
Rapid shutdown	Integrated, in accordance with UL1741 and CSA C22.2 No.330-23
RCMU	Integrated

Protection devices	
Active anti-islanding method	Integrated
Behavior in the event of overheating	Power limiter, active cooling

Output data PV Point		
Nominal AC voltage PV Point		1~NPE 120 V
Nominal output power PV Point	at 120 V	1560 W
Max. continuous output current	at 120 V	13.0 A
Nominal output frequency		63 Hz
Power factor		0 - 1 ind. / cap.[2)]
Switching time		<22 s.

Data communication	
WLAN SMA-RP connection (**FCC ID:** QKWPILOT1 / **IC ID:** 12270-PILOT1 / **IFETEL:**RCPFRTP20-1349) (**FCC ID:** QKWPILOT2 / **IC ID:** 12270-PILOT2)	802.11b/g/n (WPA, WPA2)
Ethernet (LAN)	RJ 45, 10/100 Mbit
Wired shutdown (WSD)	max. 28 devices/WSD chain max. distance master → slave = 109 yd / 100 m slave → slave = 109 yd / 100 m
Modbus RTU SunSpec (2x)	RS485 2-wire
Voltage level of digital inputs	low: min. 0 V - max. 1.8 V high: min. 4.5 V - max. 28.8 V
Input currents of digital inputs	depending on the input voltage; input resistance = 70 kOhm
Total power for digital output (internal supply)	6 W at 12 V (USB not connected)
Power per digital output (external supply)	1 A at >12.5 V - 24 V (max. 3 A in total)

DC Input data battery[4)]	
Min. voltage	150 V
Max. voltage	455 V
Max. current	22 A
Max. input	10000 W

DC Input data battery[4)]	
DC Inputs	1

Output data Essential Backup [5)]		
Nominal output power Essential Backup	at 120 V at 220 V at 240 V	9450 W 10000 W 10000 W
Max. continuous output current	at 120 V at 220 V at 240 V	45.5 A 45.5 A 41.7 A
Nominal output frequency		63 Hz
Power factor		0.8 - 1 ind. / cap.[2)]
Switching time		<17 s.

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 maximum current from the inverter to the PV module if an error occurs in the inverter. Guaranteed by the electrical design of the inverter.
2) Depending on the country setup or device-specific settings (ind. = inductive; cap. = capacitive).
3) Assured by the electrical design of the inverter.
4) The inverter can be upgraded to a GEN24 Plus Hybrid device in the future through the UP.storage software upgrade. This upgrade activates battery functionality, enabling the possibility of a Essential Backup power solution. However, external grid switching devices are required for this functionality. The technical specifications for battery operation and Essential Backup operation are detailed below.
5) For Essential Backup, additional external components are required for grid separation.

Integrated DC disconnector

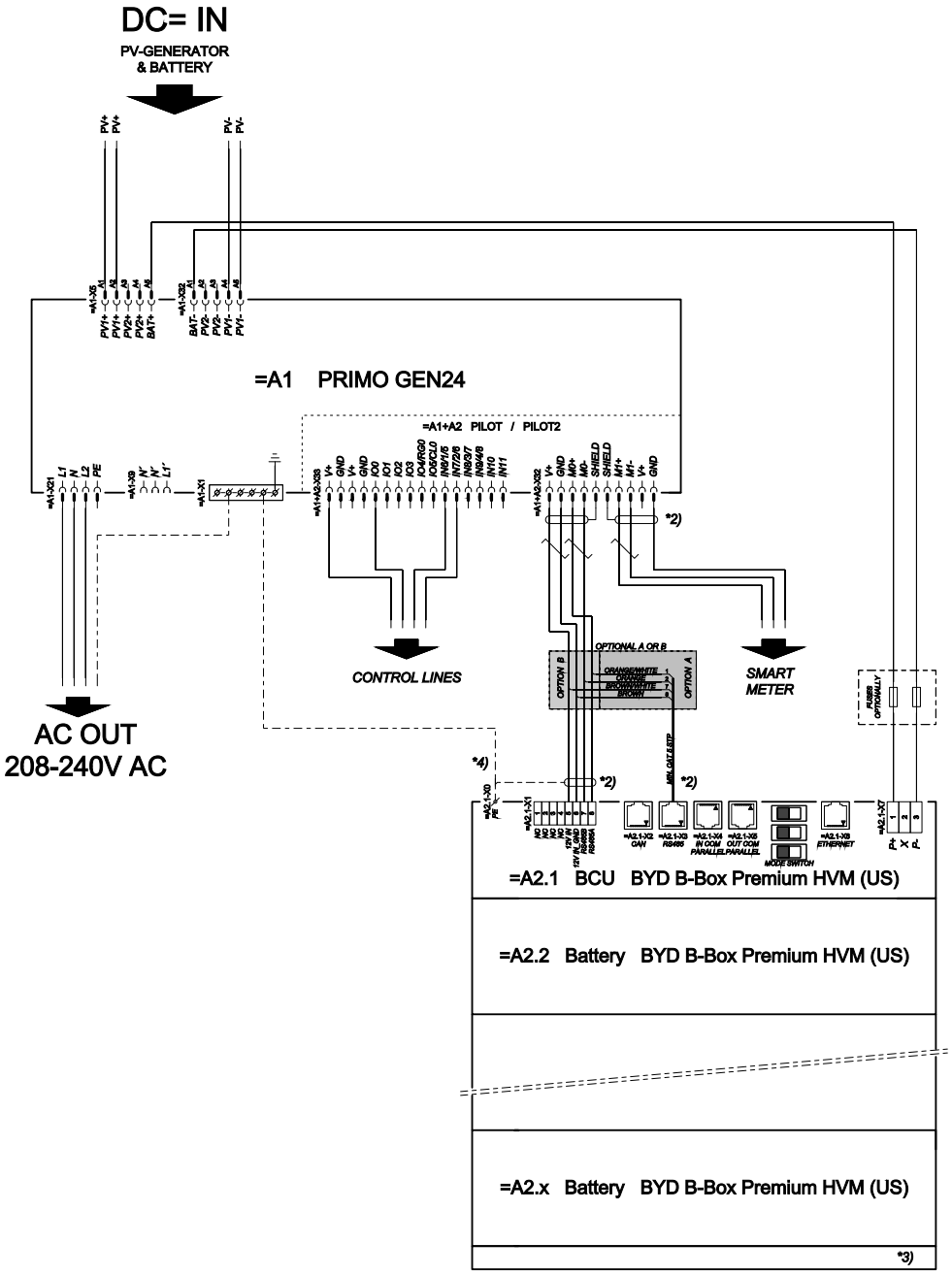
General data	
Product name	Benedict LS32 E 7905

General data	
Rated insulation voltage	1000 V_{DC}
Rated impulse withstand voltage	8 kV
Suitability for insulation	Yes, DC only
Utilization category and/or PV utilization category	according to IEC/EN 60947-3 utilization category DC-PV2
Rated short-time withstand current (I_{cw})	Rated short-time withstand current (I_{cw}): 1000 A
Rated short-circuit capacity (I_{cm})	Rated short-circuit capacity (I_{cm}): 1000 A

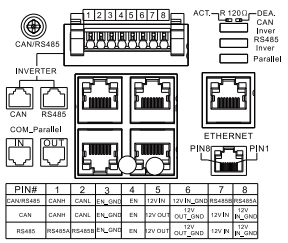
Rated operating current and rated breaking capacity				
Rated operating voltage (U_e)	Rated operating current (I_e)	$I_{(make)}$ / $I_{(break)}$	Rated operating current (I_e)	$I_{(make)}$ / $I_{(break)}$
≤ 500 V_{DC}	14 A	56 A	36 A	144 A
600 V_{DC}	8 A	32 A	30 A	120 A
Number of pins	1	1	2	2

Circuit Diagrams

Fronius Primo GEN24 and BYD Battery-Box Premium HVM-US



connection area at BCU:



PIN#	1	2	3	4	5	6	7	8
CAN/RS485	CANH	CANL	EN_GND	EN	12V IN	12V IN_GND	RS485B	RS485A
CAN	CANH	CANL	EN_GND	EN	12V OUT	12V OUT_GND	12V IN	12V IN_GND
RS485	RS485A	RS485B	EN_GND	EN	12V OUT	12V OUT_GND	12V IN	12V IN_GND

SYMBOL DEFINITION:

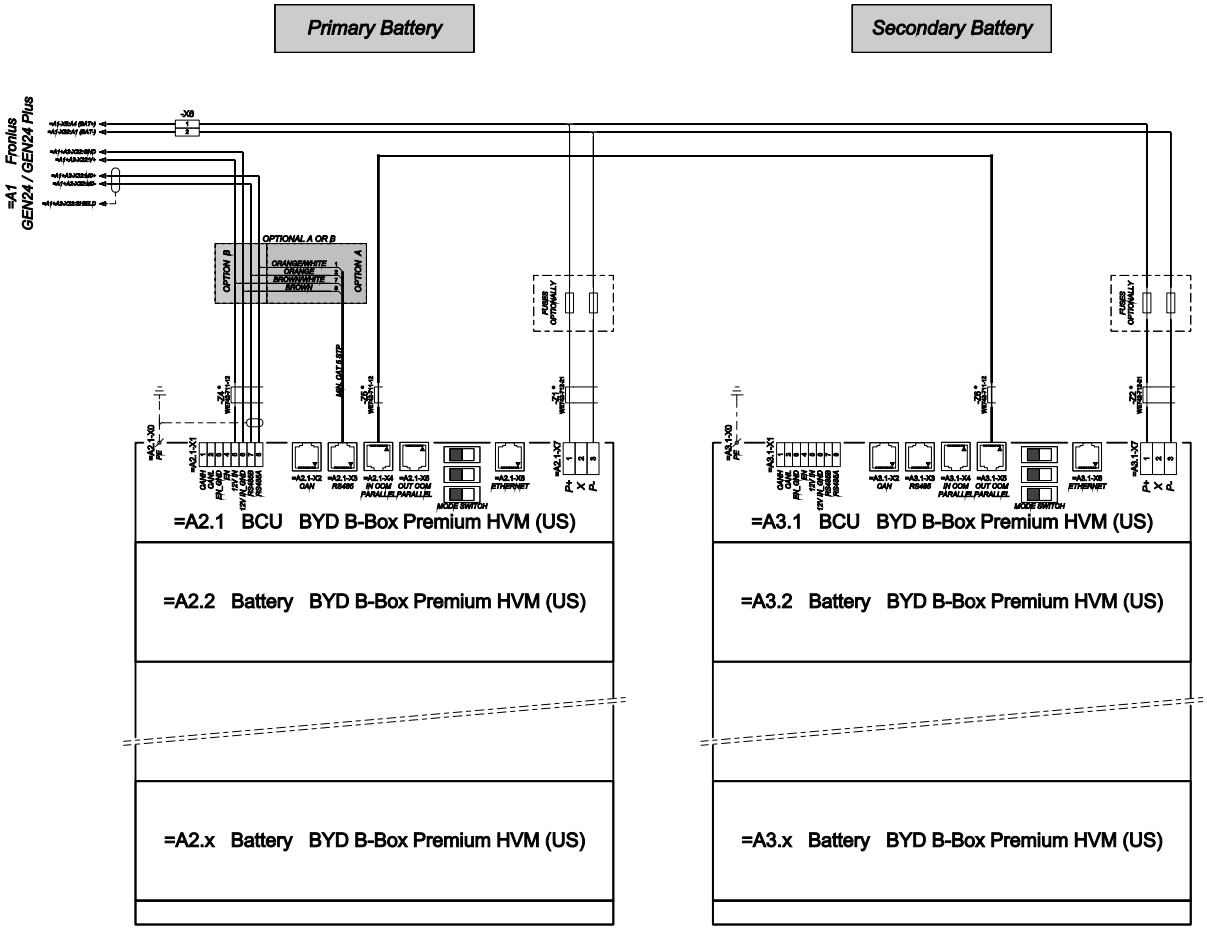
VERDRILLTE LEITUNG
TWISTED PAIR

**2) DER MODBUS-KOMMUNIKATIONS-BUS ERFORDERT DEN ABSCHLUSS DER LEITUNGSENDEN MITTELS ABSCHLUSSWIDERSTÄNDE. DETAILS SIEHE WECHSELRICHTER-DOKUMENTATION.*
THE MODBUS COMMUNICATION BUS REQUIRES THE TERMINATION OF CABLE ENDS WITH TERMINATION RESISTORS. DETAILS ACCORDING INVERTER MANUAL.

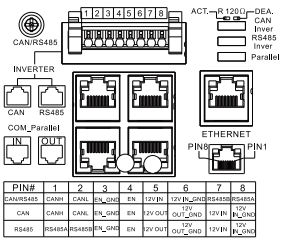
**3) MIN/MAX ZULÄSSIGE MODULANZAHL LAUT WECHSELRICHTER-DOKUMENTATION*
MIN/MAX POSSIBLE NUMBER OF MODULES ACCORDING INVERTER MANUAL

**4) DEN QUERSCHNITT DER ERDUNGSLEITUNG AUS DER DOKUMENTATION DER BYD BATTERY-BOX PREMIUM ENTNEHMEN (-> 10 MM²)*
REFER PE CABLE CROSS-SECTION ACCORDING TO BYD BATTERY-BOX PREMIUM MANUAL (-> 10 MM² / AWG7)

Fronius Primo GEN24 with two BYD Battery-Box Premium HVM-US connected in parallel

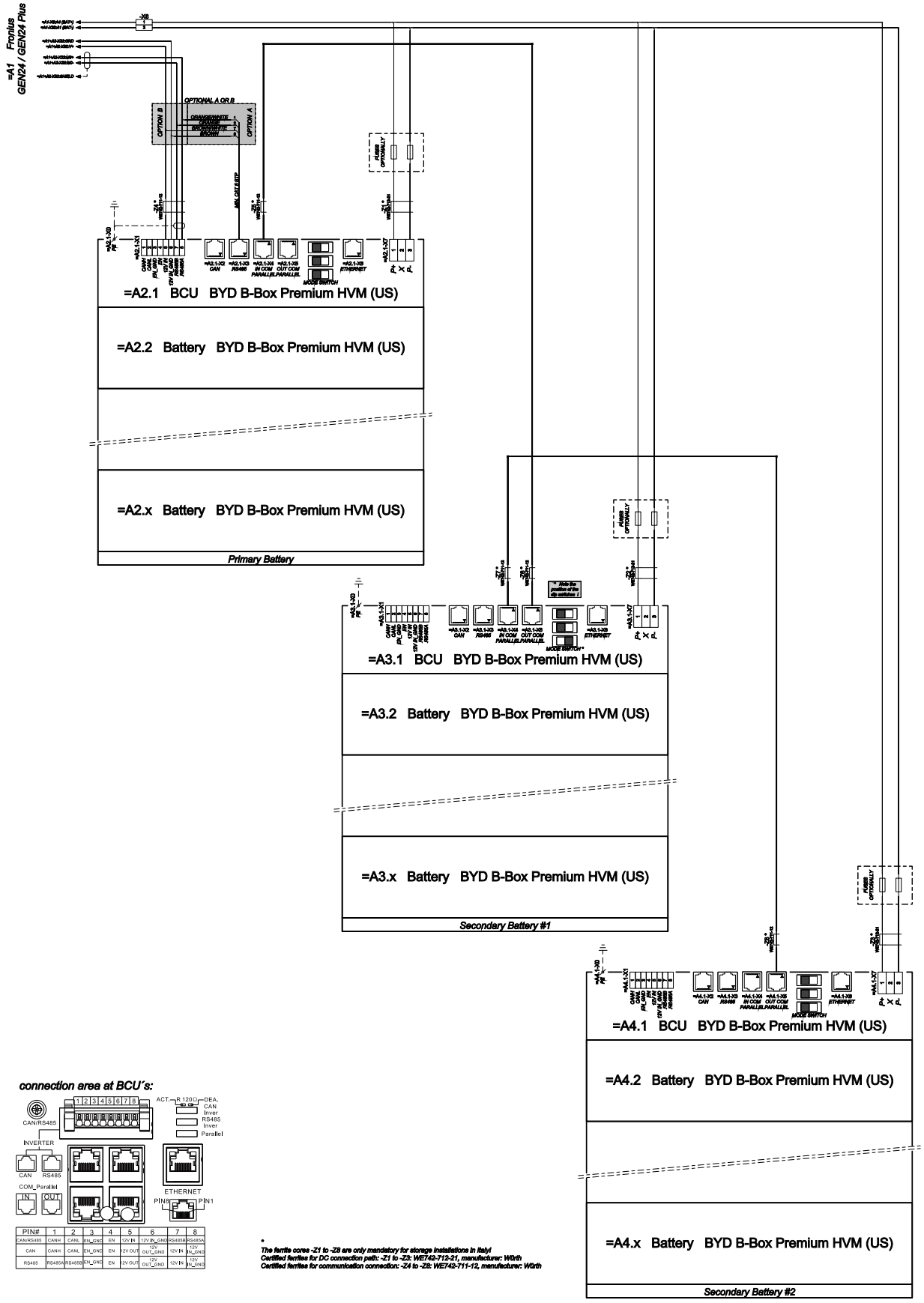


connection area at BCU´s:

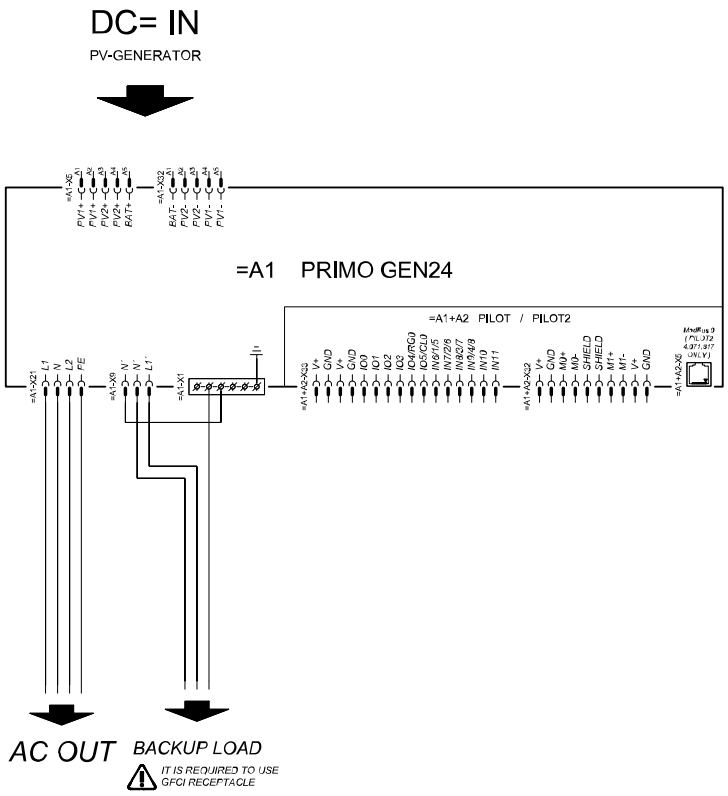


The ferrite cores -Z1 to -Z8 are only mandatory for storage installations in Italy!
Certified ferrites for DC connection path: -Z1 and -Z2: WE742-712-21, manufacturer: Würth

Fronius Primo GEN24 with three BYD Battery-Box Premium HVM-US connected in parallel

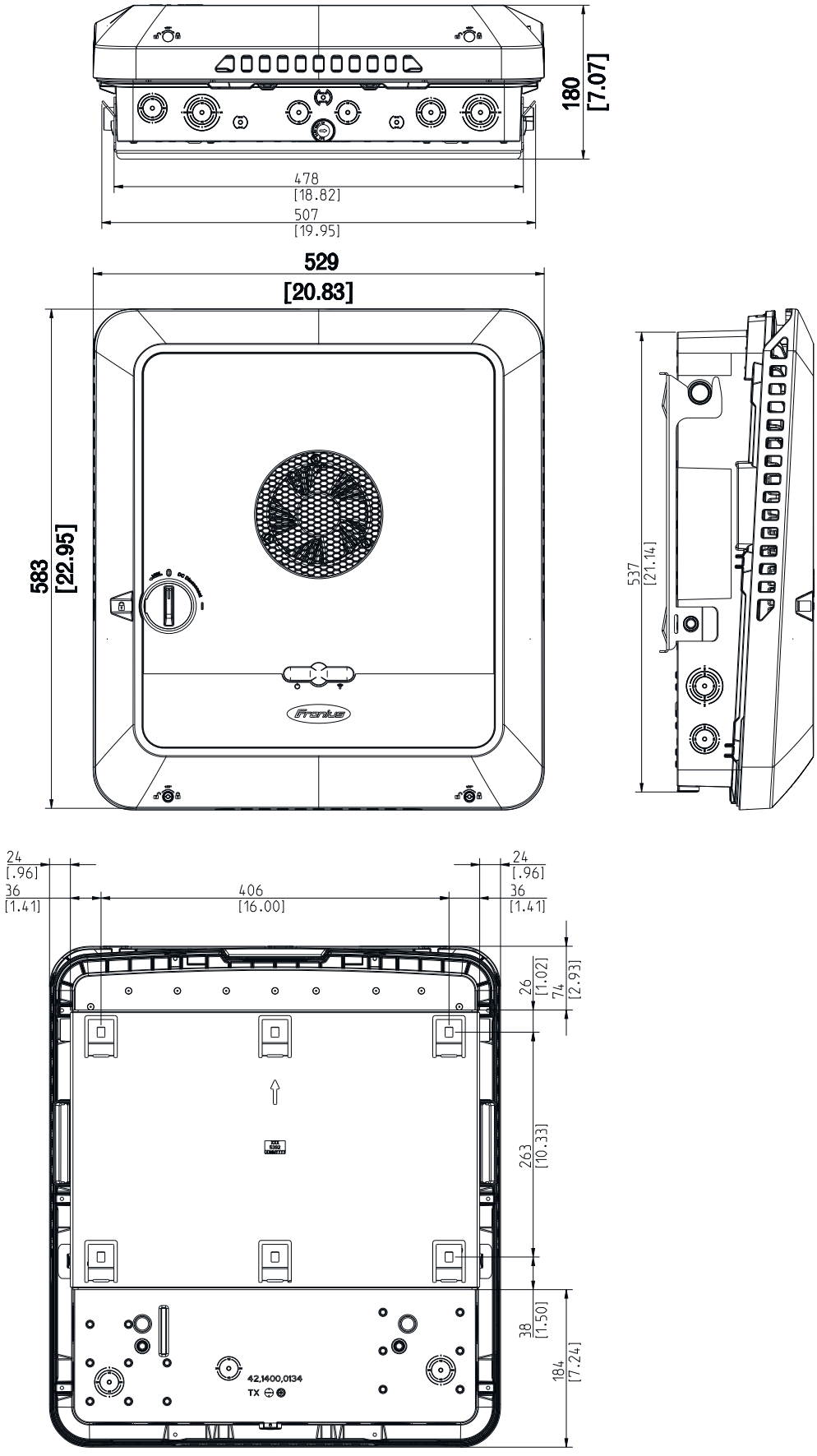


Emergency power terminal—PV Point (OP)



Dimensions of the inverter

Fronius Primo GEN24 7.7 - 10.0 208-240



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At www.fronius.com/contact you will find the contact details of all Fronius subsidiaries and Sales & Service Partners.