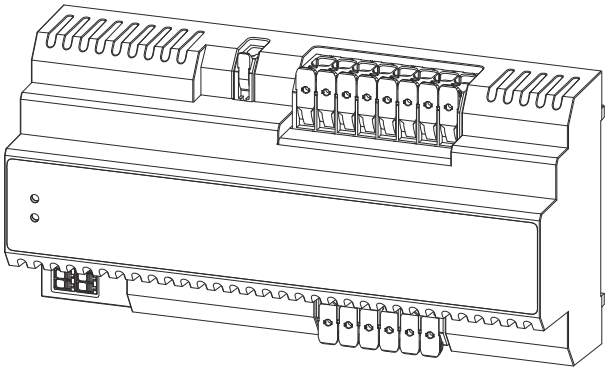
Operating Instructions

Fronius Backup Controller
3PN-35A



EN | Operating Instructions

42,0426,0569,EA 010-18022026

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General information

Safety information

Explanation of warnings and safety instructions

The warnings and safety instructions in these instructions are intended to protect people from possible injury and the product from damage.

⚠ DANGER!

Indicates an immediately dangerous situation
Serious injury or death will result if appropriate precautions are not taken.
▶ Action step to escape the situation

⚠ WARNING!

Indicates a potentially dangerous situation
Death or serious injury may result if appropriate precautions are not taken.
▶ Action step to escape the situation

⚠ CAUTION!

Indicates a potentially dangerous situation
Minor or moderate injury may result if appropriate precautions are not taken.
▶ Action step to escape the situation

NOTE!

Indicates impaired work results and/or damage to the device and components

The warnings and safety instructions are an integral part of these instructions and must always be observed to ensure the safe and proper use of the product.

Safety instructions and important information

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

⚠ WARNING!

Incorrect operation or misuse
Serious to fatal injuries to the operator or third parties as well as damage to the device and other property of the operator may result.
▶ All persons involved in the commissioning, maintenance, and servicing of the device must be appropriately qualified and have knowledge of working with electrical installations.
▶ Read these operating instructions in full and follow them carefully and precisely.
▶ The operating instructions must always be kept to hand wherever the device is being used.

IMPORTANT!
In addition to the operating instructions, observe the following general and local rules:
- Accident prevention
- Fire protection
- Environmental protection

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

IMPORTANT!
All safety and danger notices on the device:
- Must be kept in a legible state
- Must not be damaged/marked
- Must not be removed
- Must not be covered, have anything stuck on them, or painted over

⚠ WARNING!

Tampered-with and non-functioning protection devices
Serious to fatal injuries as well as damage to the device and other property of the operator may result.
- ▶ Never bypass or disable protection devices.
- ▶ Any protection devices that are not fully functional must be repaired by an authorized specialist before the device is switched on.

⚠ WARNING!

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

NOTE!

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

Environmental conditions

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

Electromagnetic fields

During operation, due to the high electrical voltages and currents, local electromagnetic fields (EMF) occur in the environment around the inverter and the Fronius system components as well as in the area of the PV modules including the supply lines.

In the case of exposure to humans, the required limit values are observed when the products are used in line with the intended use and the recommended distance of at least 20 cm is observed.

If these limit values are complied with, according to current scientific knowledge, no health-endangering effects from EMF exposure are to be expected. If wearers of prostheses (implants, metal parts in and on the body) as well as active physical aids (pacemakers, insulin pumps, hearing aids, etc.) are in the vicinity of components of the PV system, they must consult with the responsible doctor regarding possible health risks.

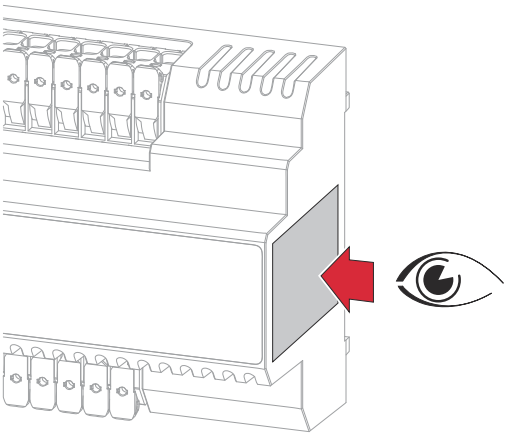
EMC measures

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.

General

Information on the device

Technical data and markings are located on the Fronius Backup Controller. This information must be kept in a legible condition and must not be removed, covered, pasted or painted over.



Labelling	
CE	CE label – confirms compliance with applicable EU directives and regulations.
	WEEE marking – waste electrical and electronic equipment must be collected separately and recycled in an environmentally sound manner in accordance with the European Directive and national law.
	RCM marking – tested according to the requirements of Australia and New Zealand.

How information is presented in the document

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

Application notes

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

Software

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

Example: Click **Save**.

Instructions for action

1 Action steps are displayed with consecutive numbering.

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

Target group

This document provides detailed information and instructions to ensure that all users can use the device safely and efficiently.

- The information is intended for the following groups of people:
  - **Technical specialists:** People with appropriate qualifications and fundamental electronic and mechanical knowledge, who are responsible for the installation, operation, and maintenance of the device.
  - **End users:** People that use the device in daily operation and want to understand its basic functions.
- Regardless of any qualifications, only perform the activities listed in this document.
- All persons involved in the commissioning, maintenance, and servicing of the device must be appropriately qualified and have knowledge of working with electrical installations.
- The definition of professional qualifications and their applicability are subject to national law.

Data security

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

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

NOTE!

Data security for network and Internet connection

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

▶ Operate inverters and system components on a private, secure network. A WiFi network is considered secure if security standard WPA 2 is satisfied as a minimum.

▶ Keep the network devices (e.g., WiFi routers) up to date with the latest technology.

▶ Keep the software and/or firmware updated.

▶ Use a wired network to ensure a stable data connection.

▶ For security reasons, do not make inverters and system components accessible from the Internet via port forwarding or Port Address Translation (PAT).

▶ Use the solutions provided by Fronius for monitoring and remote configuration.

▶ The optional communication protocol Modbus TCP/IP[1)] is an unsecured interface. Only use Modbus TCP/IP if no other secured data communication protocol (MQTT[2)]) is possible (e.g., compatibility with older Smart Meters).

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

[2)] MQTT - Message Queuing Telemetry Protocol

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.

Fronius Backup Controller

Intended use

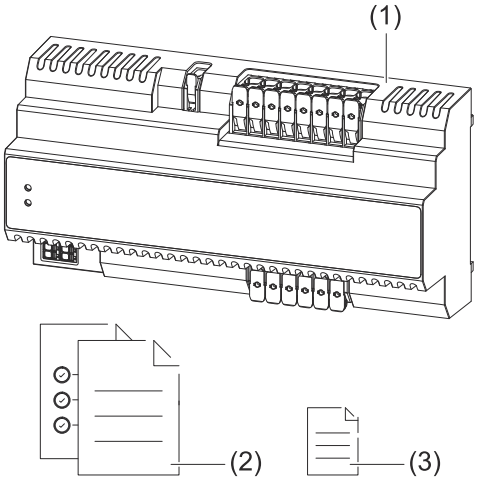
The Fronius Backup Controller is a fixed piece of equipment designed for use in public grids with TT-/TN-S-/TN-C-S systems. Its main function is to automatically and securely disconnect all connected loads and generators from the public grid in the event of a grid failure or grid malfunction in accordance with the specifications of the grid operator. As soon as grid stability has been restored, the loads and generators are automatically reconnected to the public grid.

1. **Application:** The Fronius Backup Controller is required for systems with storage batteries to enable automatic backup power switching.
2. **Installation:** The Fronius Backup Controller is installed either on an indoor DIN rail or in special enclosures with corresponding IP protection, depending on the environmental conditions.
3. **Safety precautions:** In conjunction with a Fronius Smart Meter, corresponding back-up fuses must be selected to suit the cable cross-sections of the copper conductors and the maximum current of the Fronius Backup Controller (see Fronius Backup Controller 3PN-35A on page 35).
4. **Intended use:** The Fronius Backup Controller must only be operated in accordance with the specifications in the enclosed documentation and in accordance with local laws, regulations, provisions, standards, and within the limits of technical possibilities. Any use of the product other than as described under intended use shall be deemed to be not in accordance with intended use.
5. **Documentation:** The available documentation forms part of the product and must be read, observed, and kept in good condition. It must also be accessible at all times at the place of installation. The available documents do not replace regional, state, provincial, or national laws, or regulations or standards that apply to the installation, electrical safety, and use of the product. Fronius International GmbH assumes no responsibility for compliance with or non-compliance with these laws or regulations in connection with the installation of the product.
6. **Interventions and modifications:** Interventions in the Fronius Backup Controller, e.g., modifications and alterations, are not permitted. Unauthorized interventions will void the warranty and warranty claims and, as a rule, void the user's authority to operate the equipment.

Foreseeable misuse

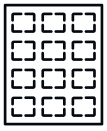
Backup power switching is not suitable to supply loads that require an uninterruptible power supply or increased availability (e.g., IT networks, life-sustaining medical devices).

Scope of supply



(1) Fronius Backup Controller
(2) Quick Start Guide
(3) Backup power warning notice

Explanation of symbols

	**PV module** Generates direct current.
	Fronius Hybrid inverter Converts the direct current into alternating current and charges the battery.
	Fronius Backup Controller Automatically and securely disconnects all connected loads and generators from the public grid in the event of a grid failure or grid malfunction in accordance with the specifications of the grid operator. As soon as grid stability has been restored, the loads and generators are automatically reconnected to the public grid.
	Inverter in the system e.g., Fronius Primo, Fronius Symo
	Primary meter Records the load curve of the system and makes the measured data available for energy profiling in Fronius Solar.web. The primary meter also controls the dynamic power of feeding in.
	Utility meter Measures the measurement data relevant for billing amounts of energy (in particular kilowatt hours of energy sourced from the grid and energy fed into the grid). Based on the relevant billing data, the electricity retailer will invoice for the energy sourced from the grid and the purchaser of the surplus energy will reimburse the energy fed into the grid.
	Grid Supplies the loads in the system if insufficient power is being generated by the PV modules or supplied by the battery.
	Battery Is coupled to the inverter on the direct current side, and stores electrical energy.

Loads in the system
e.g., washing machine, lamps, TV

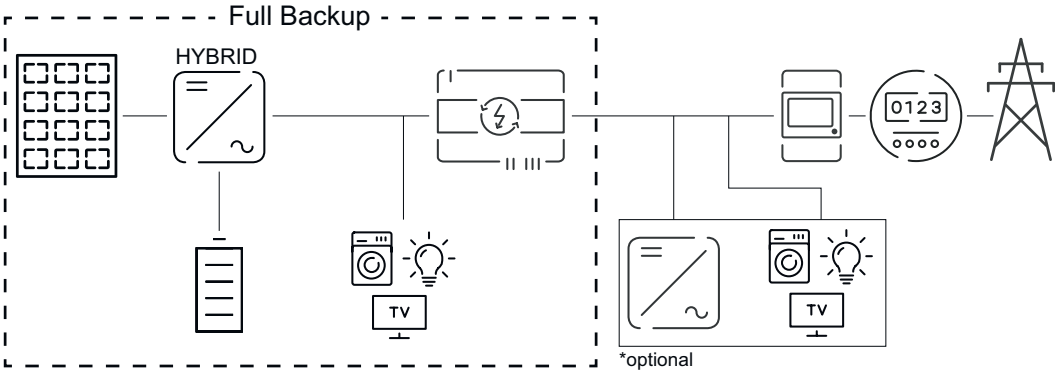
Positioning

The Fronius Backup Controller must be installed in the backup power circuit of the photovoltaic system.

NOTE!

Other inverters/generators in the house
Only one hybrid inverter may be installed in the backup power circuit of the photovoltaic system. Failure to follow this specification may result in damage to the photovoltaic system.

- ▶ Install other inverters/generators outside the backup power circuit.
- ▶ Alternatively, install a dedicated backup power circuit for these devices.



System component compatibility

All components in the backup power circuit of the photovoltaic system must be compatible and must not impair the function of the photovoltaic system.

NOTE!

Incompatible components in the backup power circuit of the photovoltaic system
Incompatible components can interfere with or restrict the operation and function of the photovoltaic system when in backup power mode.

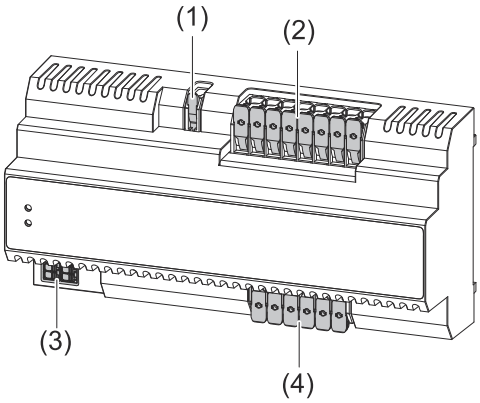
- ▶ Only use compatible components recommended by the manufacturer.

Recommended Fronius Smart Meter

Device name	Item number
Fronius Smart Meter IP 5kA-3	42,0411,0347
Fronius Smart Meter 63A-3	43,0001,1473
Fronius Smart Meter TS 65A-3	43,0001,0044

Operating controls and connections

Connection area



(1) 1-pin push-in terminal for the neutral conductor connection to the Fronius Smart Meter (max. 1 A).

(2) 8-pin push-in terminal for loads/generators in the backup power circuit.

(3) Push-in terminal for digital inputs/outputs (I/Os).

(4) 6-pin push-in terminal for the supply from the public grid.

Description of digital inputs/ outputs (I/Os)

I/O pin	Parameter	Description
IO 0	Enable backup power locking	Before the inverter switches to backup power mode, the pin IO 0 must be active (value = 1).
IN 6	Grid relay open feedback	If the mains voltage is too low or the pin IO 0 is active (value = 1), relay K1 is open and relay K2 is closed. The auxiliary contacts of the mains isolation relays are closed and the pin IN 6 is active (value = 1).
IN 7	Locking feedback	When IO 0 and IN 6 are active, the auxiliary contact closes and pin IN 7 is active (value = 1). The inverter receives a feedback signal and switches to backup power mode.

LED status indicators

The LED status indicator shows the operating status.

Symbol	LED status	Description
	Lights up green	The "Grid" LED indicates that all connected loads and inverters in the backup power circuit are being supplied by or are connected to the public grid.
	Lights up blue	The "Full Backup" LED indicates that all connected loads and inverters in the backup power circuit are safely disconnected from the public grid and that the Full Backup power supply is active.

Installation and Startup

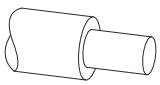
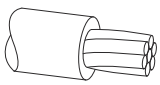
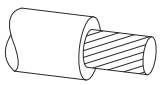
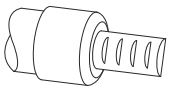
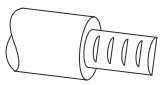
Prerequisites for connecting

Requirements

The following components must be installed in the switch cabinet to permit the safe operation of the Fronius Backup Controller:

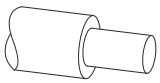
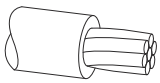
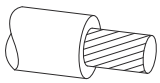
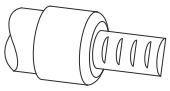
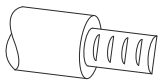
- Upstream overcurrent protection as specified in chapter Fronius Backup Controller 3PN-35A on page 35.
- A surge protection device (SPD) as specified in chapter Fronius Backup Controller 3PN-35A on page 35.

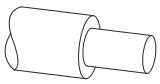
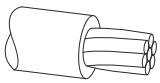
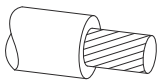
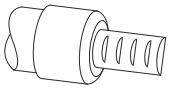
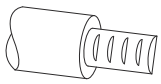
Different cable types

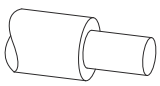
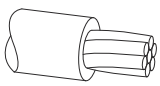
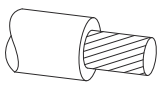
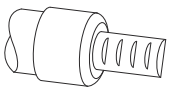
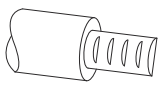
Single-core	Multi-stranded	Fine-stranded	Fine-stranded with ferrule and collar	Fine-stranded with ferrule without collar
				

Permitted cables for the electrical connection

Round copper conductors can be connected to the terminals as described below.

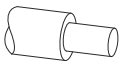
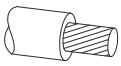
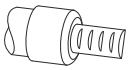
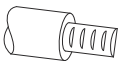
Push-in terminals for the supply from the public grid.* Select a sufficiently large cable cross-section based on the actual connected output.				
				
2.5 - 10 mm^2	2.5 - 10 mm^2	2.5 - 10 mm^2	2.5 - 6 mm^2	2.5 - 6 mm^2

Push-in terminals for the loads/generators in the backup power circuit.* Select a sufficiently large cable cross-section based on the actual connected output.				
				
2.5 - 10 mm^2	2.5 - 10 mm^2	2.5 - 10 mm^2	2.5 - 6 mm^2	2.5 - 6 mm^2

Push-in terminal for the neutral conductor connection to the Fronius Smart Meter (max. 1 A)				
				
1 - 4 mm^2	1 - 4 mm^2	1 - 4 mm^2	1 - 2.5 mm^2	1 - 2.5 mm^2

Permitted cables for digital inputs/outputs

Round copper conductors can be connected to the push-in terminals for digital inputs/outputs (I/Os) as described below.

IO connections with push-in terminal						
Max. distance	Stripping length					Cable recommendation
30 m * 32 yd *	10 mm 0.39 inch	0.14 - 1.5 mm^2 AWG 26 - 16	0.14 - 1.5 mm^2 AWG 26 - 16	0.14 - 1 mm^2 AWG 26 - 18	0.14 - 1.5 mm^2 AWG 26 - 16	Single conductors possible

* The maximum cable length between the inverter and the Backup Controller must not exceed 30 m (32 yd). Fronius recommends using at least CAT 5 STP (shielded twisted pair) cables.

Installation

Safety

⚠ WARNING!

Danger from short circuits due to foreign bodies in the housing.
An electric shock can lead to serious injury or death.
- ▶ Cover vents during installation.

⚠ WARNING!

Danger due to incorrect operation and incorrectly performed work.
This can result in serious injury and damage to property.
- ▶ Only trained service technicians who have received training from the respective inverter or battery manufacturer are authorized to perform commissioning, maintenance, and service activities for inverters and batteries, and only within the scope of the technical regulations.
- ▶ Read the installation instructions and operating instructions from the respective manufacturer before installing and commissioning the equipment.

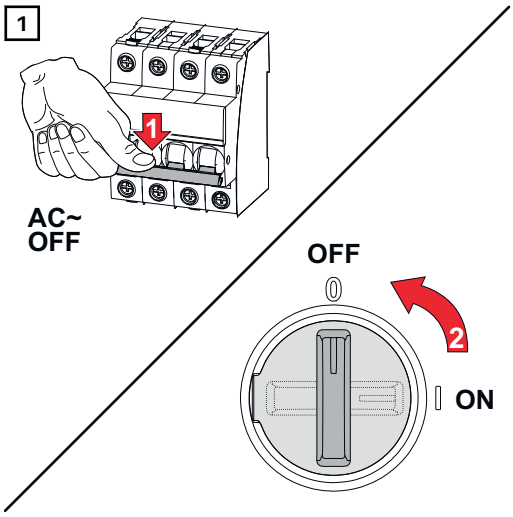
⚠ WARNING!

Danger from mains voltage and DC voltage from PV modules that are exposed to light, as well as batteries.
This can result in serious 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 battery, and are de-energized.
- ▶ Only an authorized electrical engineer is permitted to connect this equipment to the public grid.

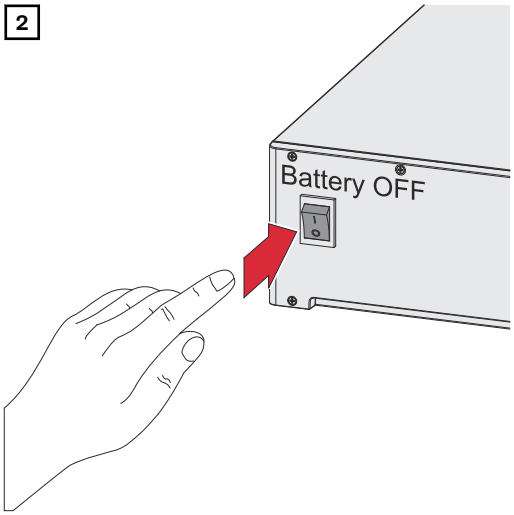
⚠ WARNING!

Danger from damaged and/or contaminated terminals.
This can result in serious 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 repaired by an authorized specialist.

De-energizing all sides of the PV system



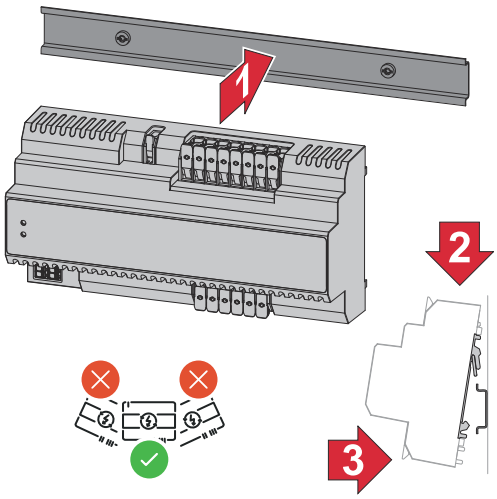
Switch off the house connection fuse and the automatic circuit breaker. Set the DC disconnector to the "off" switch position.



Switch off the battery connected to the inverter.

Wait for the capacitors of the inverter to discharge (2 minutes).

Installation



The Fronius Backup Controller can be mounted on a 35 mm DIN rail. The housing comprises 11 modules according to DIN 43880 and conforms to unit size 2.

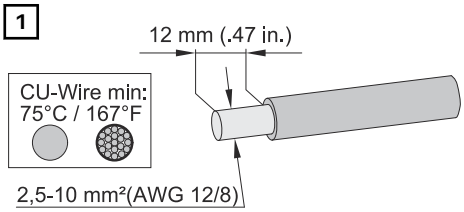
Connecting to the public grid

WARNING!

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

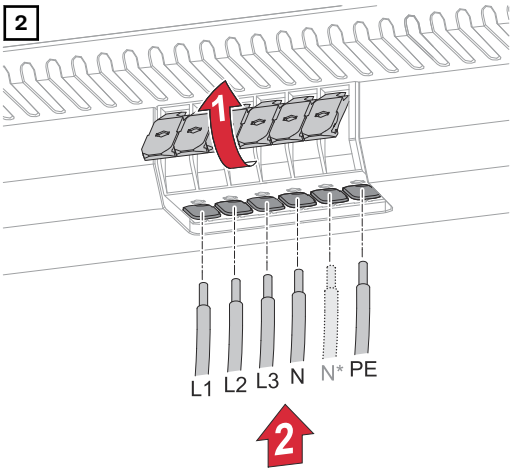
- ▶ Only connect one single conductor in the slot provided for each terminal.
- ▶ Check that the single conductors are secure in the terminal.
- ▶ Make sure that the single conductor has been fully inserted into the terminal and that no single wires are protruding out of the terminal.

1



Strip the insulation of the single conductors by 12 mm.
Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 19.

2

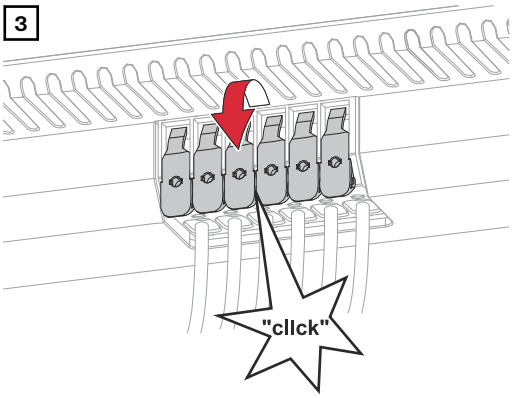


**The second neutral conductor terminal is optional.*

Lift the operating levers of the terminals to open. Insert the stripped single conductors into the slot provided in the terminal, in each case as far as it will go.

IMPORTANT!
The neutral conductor must be connected to the public grid.

3



Close the terminal operating levers until they engage.

Connecting loads in the backup power circuit

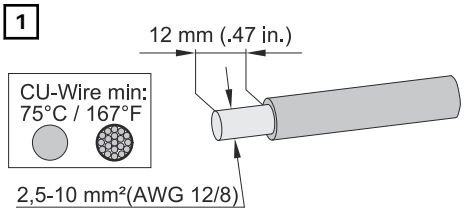
⚠ WARNING!

Danger from loose and/or incorrectly clamped single conductors in the terminal.

This can result in serious injury and damage to property.

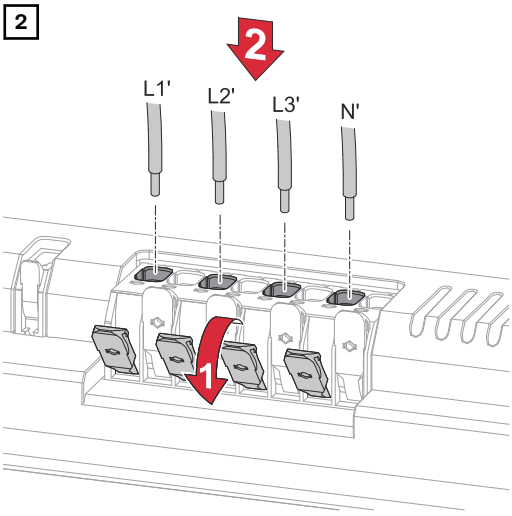
- ▶ Only connect one single conductor in the slot provided for each terminal.
- ▶ Check that the single conductors are secure in the terminal.
- ▶ Make sure that the single conductor has been fully inserted into the terminal and that no single wires are protruding out of the terminal.

1



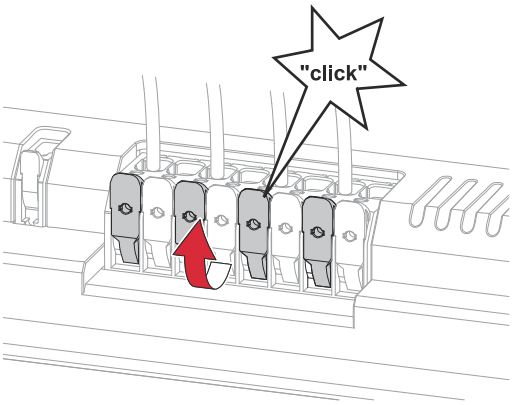
Strip the insulation of the single conductors by 12 mm.
Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 19.

2



Lift the operating levers of the terminals to open. Insert the stripped single conductors into the slot provided in the terminal, in each case as far as it will go.

3



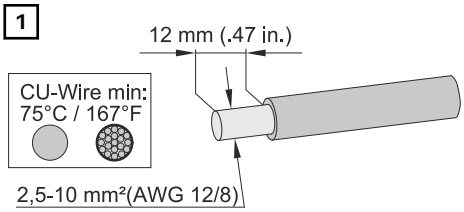
Close the terminal operating levers until they engage.

Connecting the inverter in the backup power circuit

⚠ WARNING!

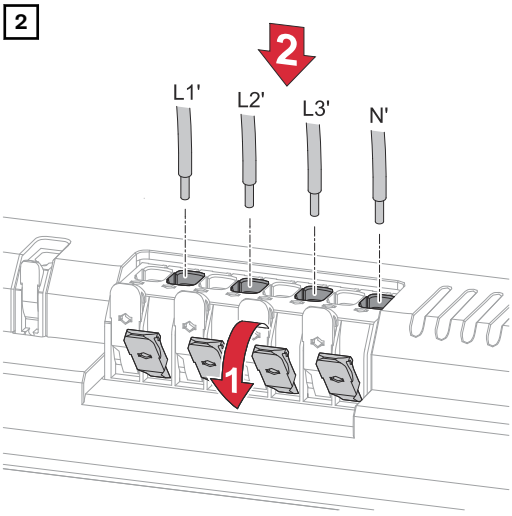
Danger from loose and/or incorrectly clamped single conductors in the terminal.
This can result in serious injury and damage to property.
- ▶ Only connect one single conductor in the slot provided for each terminal.
- ▶ Check that the single conductors are secure in the terminal.
- ▶ Make sure that the single conductor has been fully inserted into the terminal and that no single wires are protruding out of the terminal.

1



Strip the insulation of the single conductors by 12 mm.
Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 19.

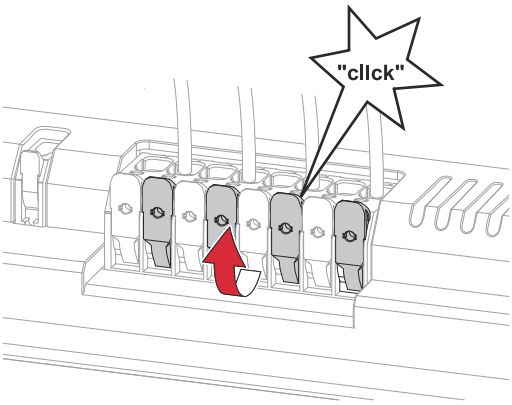
2



Lift the operating levers of the terminals to open. Insert the stripped single conductors into the slot provided in the terminal, in each case as far as it will go.

IMPORTANT!
The neutral conductor must be connected to the public grid.

3



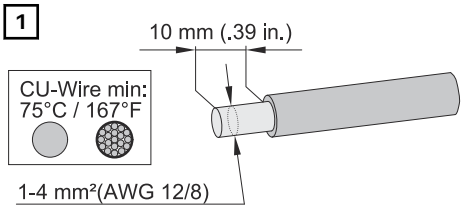
Close the terminal operating levers until they engage.

Connecting the neutral conductor for the Fronius Smart Meter (optional)

WARNING!

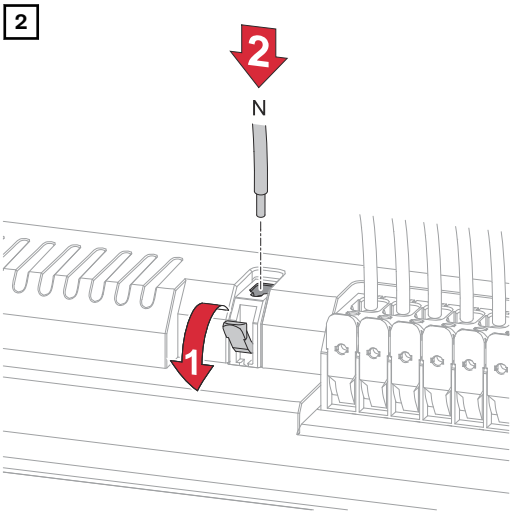
Danger from loose and/or incorrectly clamped single conductors in the terminal.
This can result in serious injury and damage to property.
- ▶ Only connect one single conductor in the slot provided for each terminal.
- ▶ Check that the single conductors are secure in the terminal.
- ▶ Make sure that the single conductor has been fully inserted into the terminal and that no single wires are protruding out of the terminal.

1



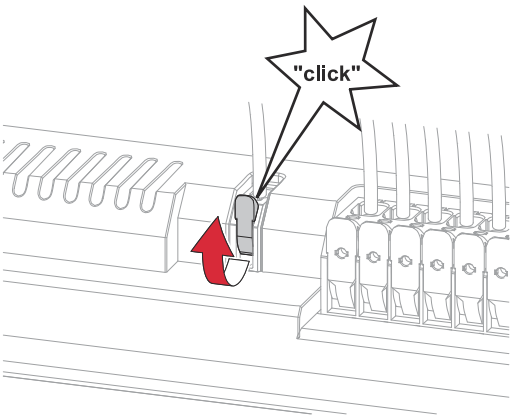
Strip the insulation of the single conductors by 10 mm.
Select the cable cross-section in accordance with the instructions in Permitted cables for the electrical connection from page 19.

2



Lift the operating levers of the terminals to open. Insert the stripped single conductor into the slot provided in the terminal as far as it will go.

3



Close the operating lever of the terminal until it engages.

Connecting the data communication line (Fronius GEN24 / Verto Plus)

⚠ WARNING!

Danger due to a short circuit between the single conductor of the shielding and live components.
This can result in serious injury and damage to property.
▶ Insulate unused single conductors of the shielding with a shrink sleeve.

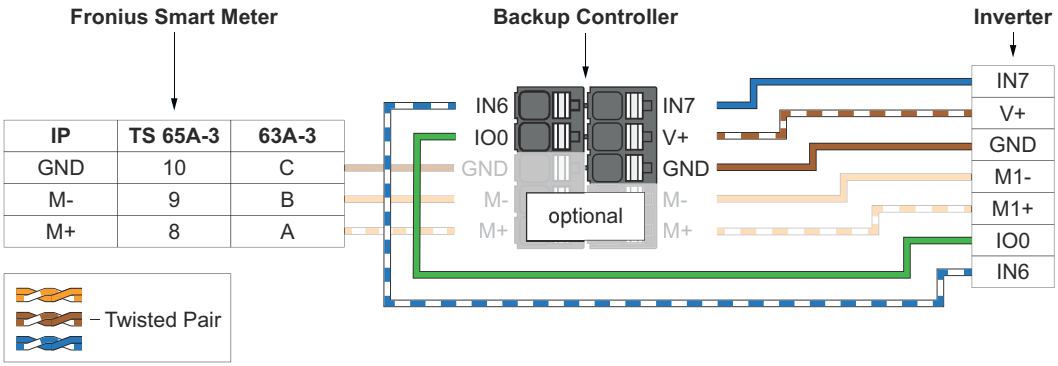
NOTE!

Danger from external power supply
If the data communication area of the inverter is connected to a powerful external power supply, the Backup Controller may be damaged.
▶ The external supply must not exceed a voltage of 12 V (+/- 10%).

NOTE!

Power requirements of the Backup Controller and battery
If additional loads are connected to the data communication area of the inverter, e.g., to the digital I/Os, the power requirements of the Backup Controller and battery may no longer be met. The function of the automatic backup power switching may be impaired.

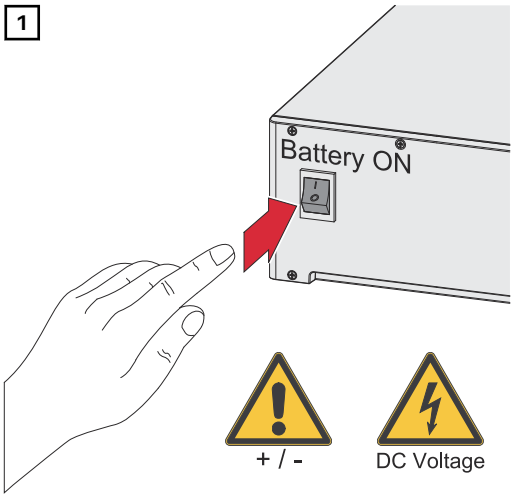
Observe the following points when connecting the data communication cable.
- Use network cables of type CAT5 STP or higher.
- Use a twisted cable pair for corresponding data cables.
- Use double insulated or sheathed data cables when they are near to bare conductors.
- Use shielded twisted pair cables to avoid interference.



Commissioning

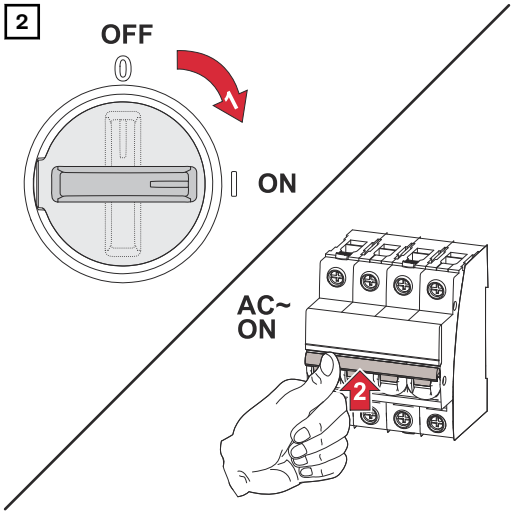
Putting the PV system into operation

1



Switch on the battery connected to the inverter.

2



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

General

IMPORTANT!
Settings in the **Device configuration** > **Functions and I/Os** menu item may only be implemented by a trained technician! The service password must be entered for the **Device configuration** menu item.

Backup power - Configuring Full Backup

1 Call up the user interface of the inverter.
- Open web browser.
- In the address bar of the browser, enter the IP address (**WiFi:** 192.168.250.181, **LAN:** 169.254.0.180) or enter and confirm the host and domain name of the inverter.

✓ *The user interface of the inverter is displayed.*

2 Log in to the login area with user **Technician** and the technician password.

3 Activate the **Backup Power** function in the **Device Configuration** > **Functions and I/Os** menu area.

4 Select **Full Backup** mode in the **Backup power mode** drop-down list.

5 Click the **Save** button to save the settings.

✓ *The Full Backup power mode has been configured.*

Testing backup power mode

Testing backup power mode is recommended:
- during first-time installation and configuration
- after working on the switch cabinet
- during ongoing operation (recommendation: at least every 6 months)

A battery charge of min. 30% is recommended for test mode.

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

Appendix

Care, maintenance, and disposal

Cleaning

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

Maintenance

Maintenance and service work may only be carried out by a trained technician.

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 warranty conditions specific to your country can be found at www.fronius.com/solar/garantie .

To secure the full warranty period for the newly installed Fronius product, it is necessary to register at www.solarweb.com .

Technical data

Fronius Backup Controller 3PN-35A

General data	
Grid configuration	TT/TN-S/TN-C-S
Housing	11 modules according to DIN 43880
Mounting	35 mm DIN rail
Weight	856 g
Protection class	IP20
Fault Ride Through (FRT)	According to EN 50549-10
Short-circuit breaking capacity	Class PC
Short-circuit current resistance	2600 A
Self-consumption	<5 W

Environmental conditions	
Permitted ambient temperature	-20 to +50 °C
Permissible humidity	50% relative humidity at 40 °C
Max. altitude	2000 m
Vibrations	Not permitted

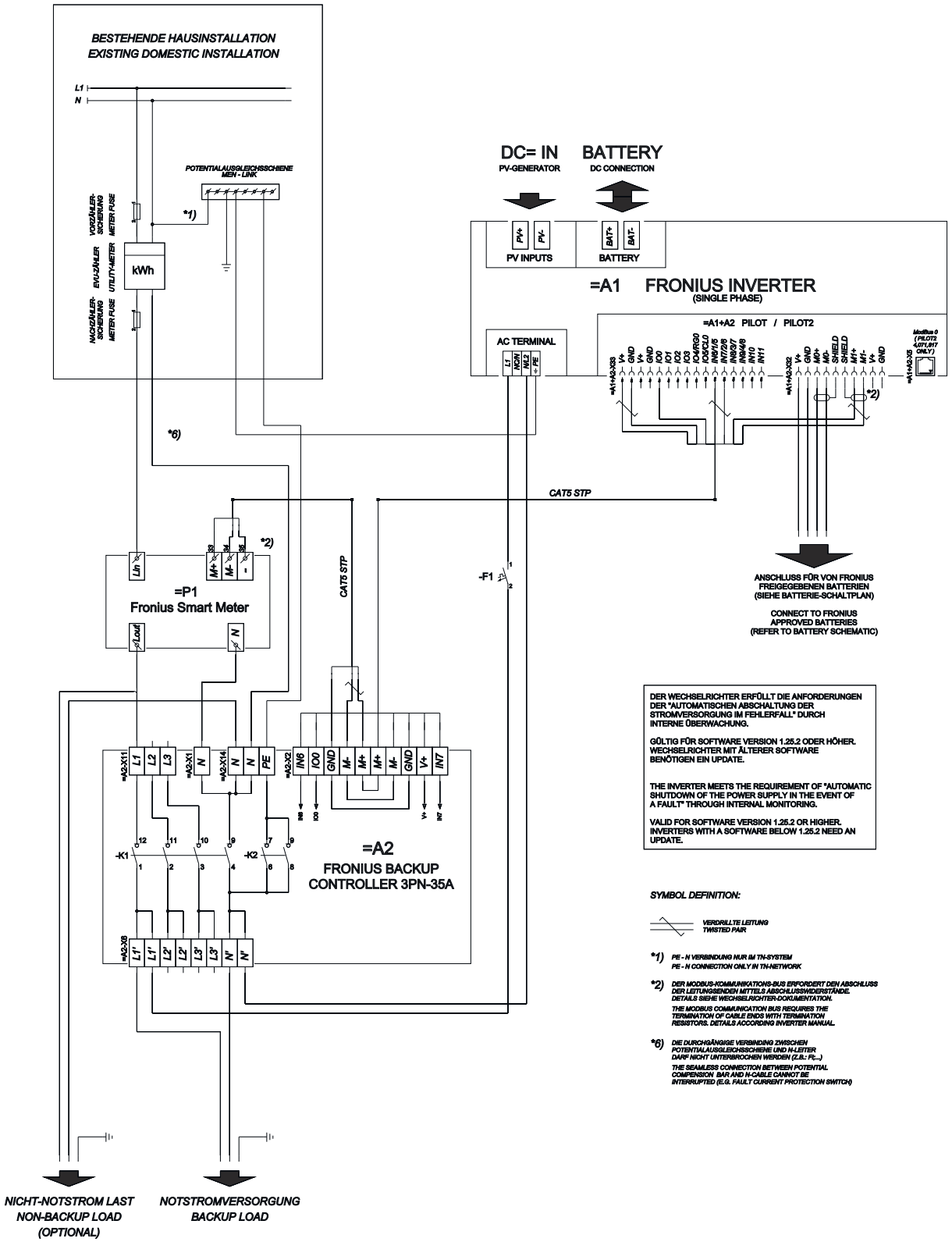
Rated values	
Nominal voltage	230/400 V 3-pole or 3-pole + N
Nominal current	35 A
Max. permissible fuses	35 A gG fuse 35 A automatic circuit breaker
Duty cycle	100% at AC-32
Rated power	24 kVA
Grid frequency	50 Hz
Power loss (at nominal current)	15 W
Overvoltage category	III

Electromagnetic compatibility	
Interference immunity	According to EN 61000-6-2 2019-12-01
Emissions	According to EN 61000-6-3 2020-07

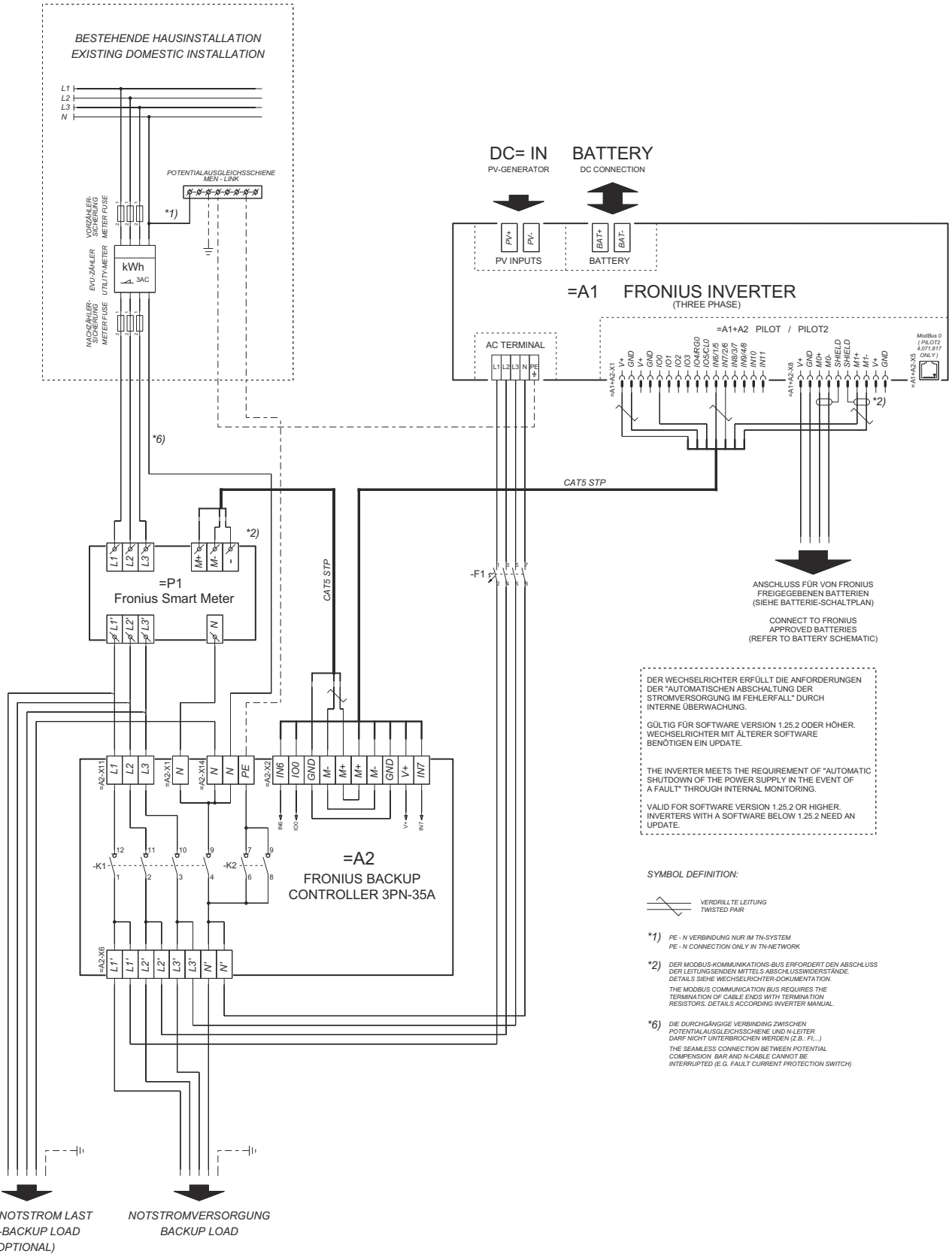
Compatible inverters
Fronius Primo GEN24 3.0 - 6.0 kW Plus
Fronius Symo GEN24 6.0 - 10.0 kW Plus
Fronius Symo GEN24 6.0 - 12.0 kW Plus SC
Fronius Verto 15.0 - 20.0 kW Plus

Circuit Diagrams

Fronius Backup Controller 2-pin separation, e.g., Germany

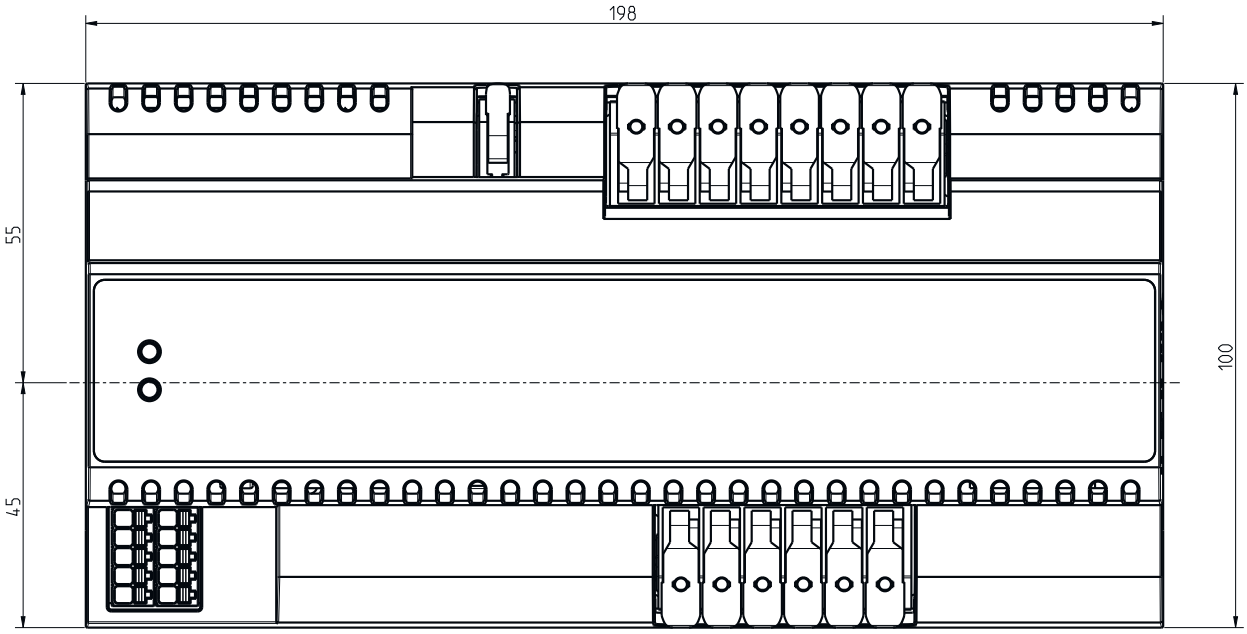


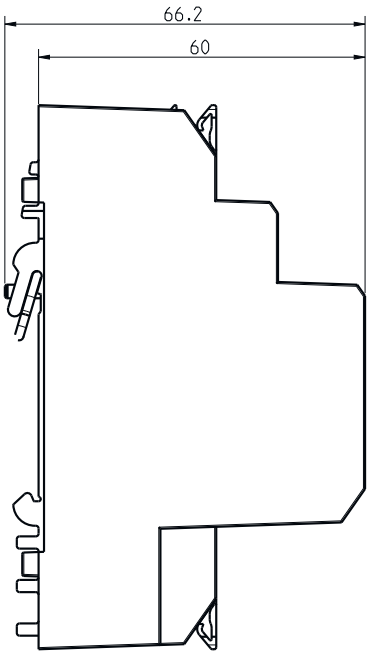
Fronius Backup Controller 4-pin separation, e.g., Germany



Dimensions

Fronius Backup Controller 3PN-35A





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

MONITORING &
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