Application Guide

Fronius Verto Plus Full Backup

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Gender-specific wording refers equally to female and male form.

Change Log

DATE	VERSION	COMMENTS	AUTHOR
26/08/2026	1.0	Document Created	Markus Schmid
24/09/2026	1.1	Added more contactors, small correction	Markus Schmid

Scope

This document describes the process how to setup, wire and commission the "Full Backup" functionality for the Fronius Verto Plus series.

Full Backup works in combination with a Fronius compatible energy storage system as stated in this document and supplies electrical loads whenever sufficient energy is available.

This application guide does **not** cover **instant backup** capabilities and **parallel backup**. Further details for each specific function can be found in the inverter operation instructions and for instant backup in the backup controller operation instructions.

General

Key features are:

- Supply electrical loads in grid outage (1-phase and 3-phase loads).
- Automatic switch over to backup power in the event of grid failure.
- The battery can be charged/discharged during a grid failure to supply essential loads.

Having PV installed is optional but recommended as it can charge the battery in backup mode during sun hours (if sufficient power is available) which makes this solution more self-sustainable.

Components

The following components are **required** to ensure the full backup solution functions as intended:

- **Fronius Verto Plus inverter**
  - Fronius Verto Plus 15.0//20.0/25.0/30.0/33.3 Plus,

- **Fronius Smart Meter**
  - Fronius Smart Meter 63A-3,
  - OR Smart Meter IP, 50kA-3, WR, 480V/UL

- **Backup control and switchover components.**
  - External switchover components (ie. External Components)
  - OR Fronius Backup Controller (3P-35A).
  - OR third party "backup box" with compatible switchover components as defined in this Application Guide.

- **Compatible battery**
  - **Fronius Reserva Pro**
    - **Nominal DC-charge/discharge**

	Reserva Pro 12.0	Reserva Pro 16.0	Reserva Pro 20.0
Verto 15.0 Plus	10.63 kW	14.7 kW	17.71 kW
Verto 17.5 Plus	10.63 kW	14.17 kW	17.71 kW
Verto 20.0 Plus	10.63 kW	14.17 kW	17.71 kW
Verto 25.0 Plus	10.63 kW	14.17 kW	17.71 kW
Verto 30.0 Plus	10.63 kW	14.17 kW	17.71 kW
Verto 33.3 Plus	10.63 kW	14.17 kW	17.71 kW

	Reserva Pro 24.0	Reserva Pro 28.0	Reserva Pro 32.0
Verto 15.0 Plus	21.25 kW	22.50 kW	22.50 kW
Verto 17.5 Plus	21.25 kW	24.79 kW	26.25 kW
Verto 20.0 Plus	21.25 kW	24.79 kW	28.34 kW
Verto 25.0 Plus	21.25 kW	24.79 kW	28.34 kW
Verto 30.0 Plus	21.25 kW	24.79 kW	28.34 kW
Verto 33.3 Plus	21.25 kW	24.79 kW	28.34 kW

    - **Parallel Operation**

Note: The size (capacity) per tower in a multi-tower setup must be the same.

	Fronius Reserva Pro: Parallel operation of up to 4 batteries *		
	Reserva Pro 12.0	Reserva Pro 16.0	Reserva Pro 20.0
Verto Plus	✓	✓	✓
	Reserva Pro 24.0	Reserva Pro 28.0	Reserva Pro 32.0
Verto Plus	✓	✓	✓

  - **Fronius Reserva**
    - **Nominal DC-charge/discharge**

	Reserva 6.3	Reserva 9.5	Reserva 12.6**	Reserva 15.8
Verto 15.0 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW
Verto 17.5 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW
Verto 20.0 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW
Verto 25.0 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW
Verto 30.0 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW
Verto 33.3 Plus	6.55 kW	9.83 kW	13.11 kW	16.38 kW

** The discharge power is limited by the maximum inverter power. For specific performance details, refer to the Verto Plus datasheet.

- **Parallel Operation**

Note: The size (capacity) per tower in a multi-tower setup must be the same.

	Fronius Reserva: Parallel operation of up to 4 batteries *			
	Reserva 6.3	Reserva 9.5	Reserva 12.6	Reserva 15.8
Verto Plus	✓	✓	✓	✓

- **BYD Battery-Box Premium**
  - BYD Battery-Box HVS/HVS+, HVM/HVM+

Nominal DC charge/ discharge power [kW] *	BYD Battery-Box								
	HVS / HVS+				HVM / HVM+				
	5.1	7.7	10.2	12.8	11.0	13.8	16.6	19.3	22.1
Verto 15.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 17.5 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 20.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 25.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 30.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 33.3 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48

**The discharge power is limited by the maximum inverter power. For specific performance details, refer to the Verto Plus datasheet.

Note: The size (capacity) per tower in a multi-tower setup must be the same.

	BYD Battery-Box									
	HVS / HVS+				HVM / HVM+ **					
	2x / 3x 5.1	2x / 3x 7.7	2x / 3x 10.2	2x / 3x 12.8	2x / 3x 11.0	2x / 3x 13.8	2x / 3x 16.6	2x / 3x 19.3	2x HVM/ HVM+ 22.1***	3x HVM+ 22.1
Verto Plus*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Technical Information

Fronius Verto Plus charging/discharging, backup and peak output power capabilities.

Power Class	15.0	20.0	25.0	30.0	33.3
Nominal output power Full Backup [VA]	15 000	20 000	25 000	30 000	33 300
Peak output power (10sec) [VA]*	30 000	30 000	50 000	50 000	50 000

Max power that can be utilized in parallel for output power (AC) and battery charging power (DC).

Any active power demand from the loads will be supplied by the inverter using energy from the battery and photovoltaic (PV) system, if available.

Any reactive power demand from the loads will be handled by the inverter without discharging the battery or using energy from the PV system, if available.

Example: Verto 20.0 Plus + Reserva 15.8

- The max. battery discharge capability is 16.38kW. The max. inverter discharge capacity of 20kVA can only be reached if additional PV-generation is present.

Operation Modes

There are two main operational modes, *Grid* and *Backup* as well as one standby mode called E*nergy Saving* mode, discussed in detail below.

Grid Mode

In this mode, the inverter works in grid parallel operation and is therefore AC coupled with the local grid, the backup control logic is turned off and backup loads supplied from the grid.

Grid-To-Backup Transition

Successful transition to backup mode requires the following conditions to occur in sequence:

1) The inverter is in normal grid tied mode (via the AC port of the inverter) and is monitored by the inverter's internal protection unit and Fronius Smart Meter.
2) Grid fails (blackout).
3) The inverter performs measurements according to the set local grid code and initiates a shut down.
   If the inverter measures less than 45% of the nominal voltage on either of the phases AND the smart meter measurements are less than 45% of the nominal voltage or the smart meter communication is lost or inverter internal grid relay is open.
4) The inverter starts backup mode after a short time.
5) Backup control logic is switched on and loads connected to the backup circuit are supplied by the inverter.

Backup Mode

Operation in backup mode usually means the grid is not available, and the inverter is supplying backup loads. The interlocking mechanism from the backup control components is on/activated.

In backup mode the inverter's AC output acts as a voltage source with AC voltage set at 230/400 V AC (L-N; L-L) and the frequency is set to **53 Hz** (by default – this can be changed in the settings). The frequency is purposely increased with the intention of disconnecting other inverters connected to the backup circuit.

Backup-To-Grid Transition

Successful transition to grid mode requires the following conditions to be met in sequence:

1) Inverter operating in backup power mode.
2) The grid is detected by the inverter and stable (for at least 30s and within the local grid code parameters).
3) Fronius Smart Meter monitors grid voltage values and passes this information to the inverter.
4) Inverter checks if the grid voltage is within the correct local grid code parameters.
   The measured voltage on the smart meter is greater than 80% of the nominal voltage.
5) Inverter ends backup power mode.
6) Backup control logic is turned off and AC loads are reconnected to the grid.
7) The inverter checks if the grid is within specified parameters (as per relevant standard) and if successful starts producing energy.

Energy Saving Mode

Energy Saving mode means that the battery is running at or below the minimum state of charge while no sufficient charging sources are available (PV or Grid).

The inverter enters this mode if either of the following is true:

1) The battery is discharged completely, and no energy is coming from the PV modules
   a. If “System preservation during night” is set in the configuration, the battery will reserve energy for energy saving mode to prevent a shutdown of the battery.
2) The inverter/battery is set to Energy Saving mode (standby mode) for up to 12h.

If battery and inverter are in Energy Saving mode, the system could be reactivated by one of the following:

1) Enough energy is available from the solar PV modules.
2) Grid is functioning again.
3) The battery is switched off and then on again (see operation instructions for further details).

Hardware Setup

There are 3 general options to set up the Full Backup Functionality. Each of them is described further in a separate section apart from the 3rd party option. For 3rd party options, contact your local wholesaler to check if they sell Fronius compatible backup boxes. These 3rd party backup boxes are not produced/designed by Fronius, therefore Fronius can't guarantee the functionality.

External Contactors

Backup Controller

3rd party backup boxes

External Contactors

Required Components – Backup Control

For successful battery backup setup, external components **K1 (main)** and **K3 (interface)** are required, and not supplied with the unit.

They will need to be purchased separately from your electrical wholesaler or electrical supplier.

Some compatible options for K1 are shown below. Options two and three require two devices ie. *Main* and *Auxiliary* components, while option one requires the Main component only.

Option	1	2		3	4
Manufacturer	Finder	Schneider		IMO	Noark
Type/Part No.	22.64.0.230.4710	Acti9 iCT	Acti9	HC63-31230	Ex9CH63 31
Component description	Main & Auxiliary	Main	Auxiliary	Main & Auxiliary	Main & Auxiliary
Control Coil Rated Voltage	230 Vac @ 50 Hz	230 Vac @ 50 Hz	Mechanical interlock	230 Vac @ 50 Hz	230 Vac @ 50 Hz
Control Coil Power Consumption	5 VA	13 VA	N/A	6-8 VA	2.09W
Pole Configuration	3 NO + 1 NC	4 NO	1 NO + 1 NC	3 NO + 1 NC	3 NO + 1 NC
Rated Voltage	230/400 Vac @ 50 Hz	230/400 Vac @ 50 Hz	230 Vac @ 50 Hz	230 Vac @ 50 Hz	230/400 V AC
Rated Current	63 A	100 A	5 A	63 A	63 A
Max. Peak current	240A	106VA	-	240A	
Image					

Compatible devices for K3 are shown in the table below.

Option	1	2	3
Manufacturer	Finder	IMO	IMO
Type/Part No.	22.23.9.012.4000	HME-2 1-PN/12DC	HC20-11=12
Control Coil Rated Voltage	12 Vdc	12 Vdc	12 Vdc
Control Coil Power Consumption	1.25 W*	0.53 W*	2-3 W*
Pole configuration	1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC
Rated Voltage	230 Vac @ 50 Hz	230 Vac @ 50 Hz	230 Vac @ 50 Hz
Rated Output	20 A	8 A	20 A
Image			

* The Pilot card is limited to 6W output power, if exceeded the power supply will be switched off.

Control Wiring

Installation considerations and checks to be done before installation of the components:

- Fronius Smart Meter installed at the feed-in point of the installation to be able to measure the whole site consumption.
- The Main contactor K1 needs to be wired in the following locations.
    - NO – Load side of the Fronius Smart meter to K1 and Verto Plus AC terminals towards the backup loads to K1 (for each phase).

- NC – Auxiliary contact from V+ of the Pilot board to K1 (Auxiliary) and from (K1 (Auxiliary) to K3 NO and to IN 6 of the Pilot board. From the NO of K3 to IN7 of the Pilot board.
- The Coil of K1 needs to be connected from K3 to NC (which is the live conductor) and A2 is directly connected to the Neutral conductor.

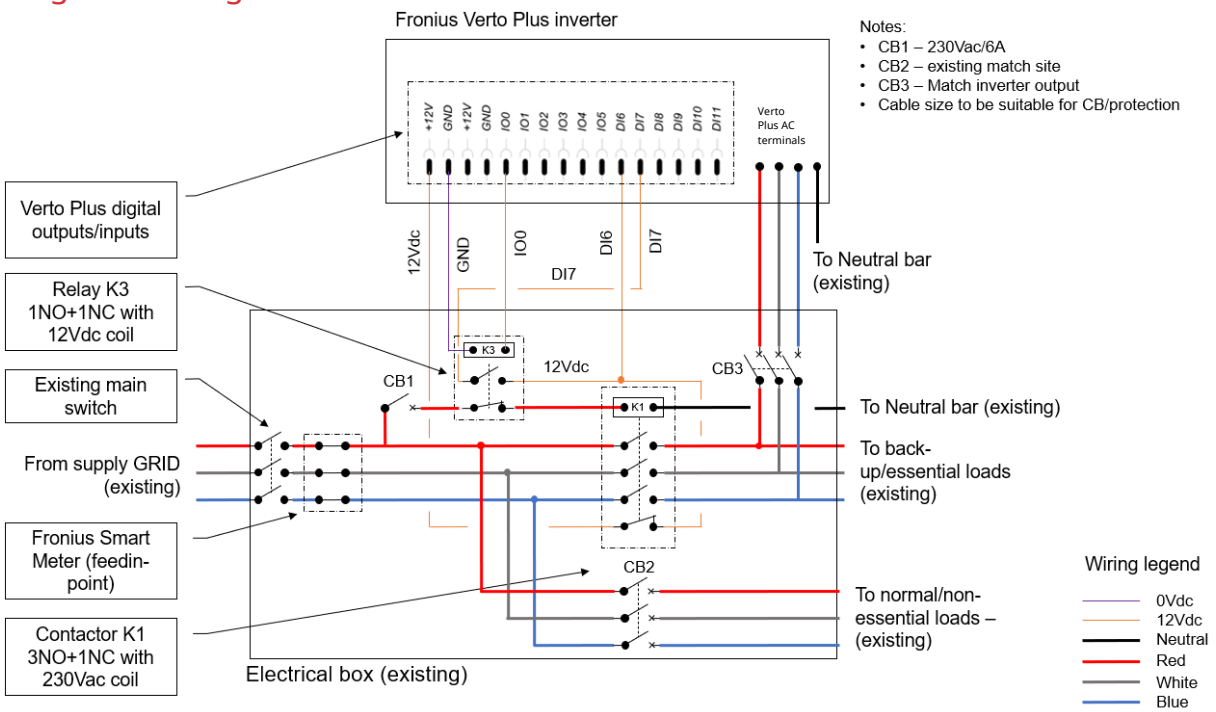
- The Control Wiring contactor (K3) needs to be wired on the following locations.
  - Pilot board IN 7 to K3 NO and from K3 NO to K1 NC **and** IN 6.
  - NC from the Fuse (CB1) to K3 NC and from K3 NC to K1- A1.
  - The Coil of K3 (A1) needs to be connected to IO 0 and from K3- (A2) to D- / GND or the Fronius Smart Meter / Pilot Board.

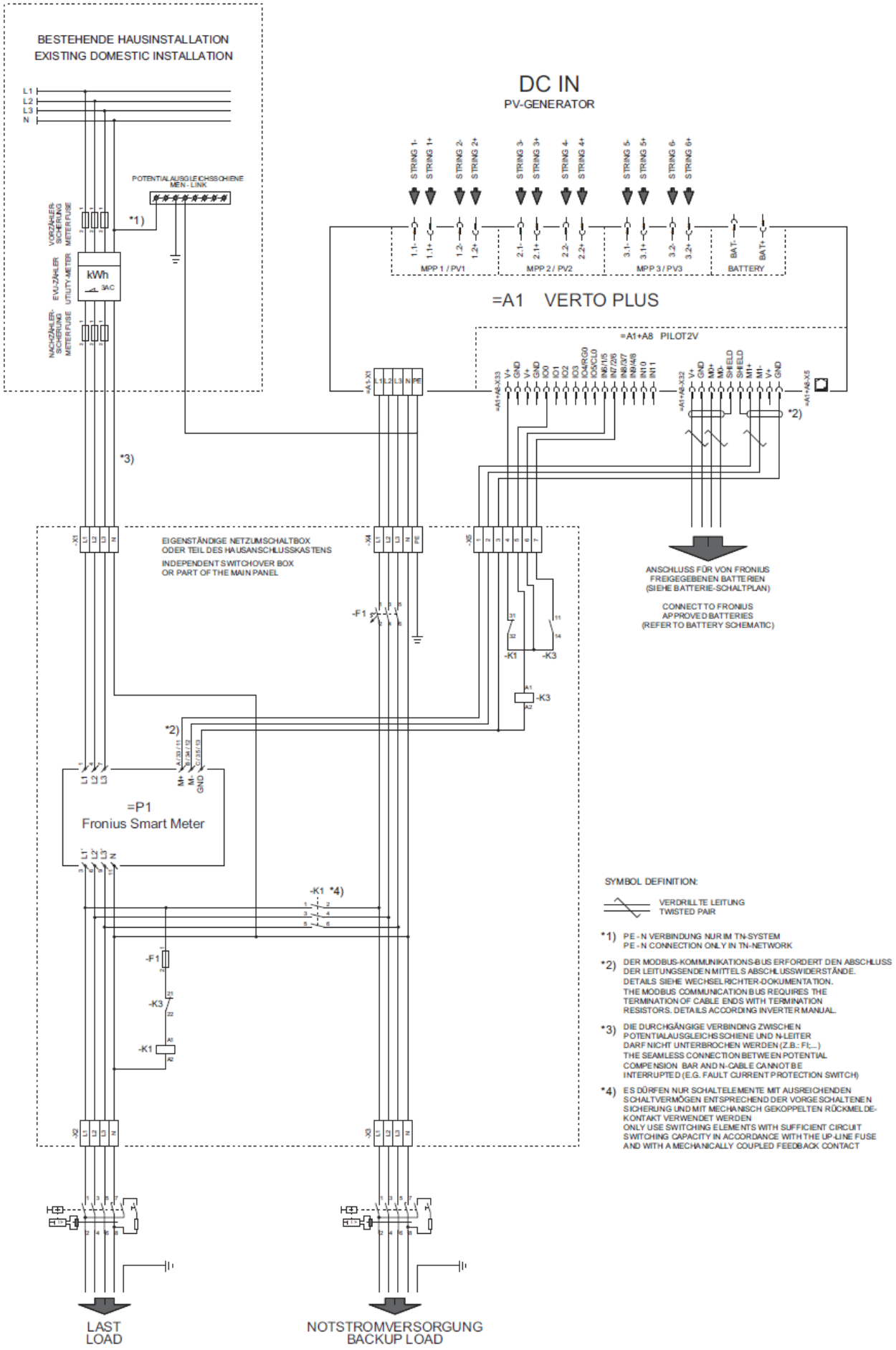
The below single line diagram will reflect the description above.

Important:

- The Pilot Board I/O terminals need to be adjusted as per software settings for correct functionality (refer to Software setup section below).
- CB 1-3 in the diagram below are recommended fuse wiring locations. Check local standards for the applicable type and sizing.
- Additional PV inverters can be installed on the backup circuit wiring, see inverter operation instructions for further details. The needed relay max current throughput might change when adding multiple inverters.

Single Line Diagrams




BESTEHENDE HAUSINSTALLATION
EXISTING DOMESTIC INSTALLATION
L1
L2
L3
N
POTENTIALAUSGLEICHSSCHIENE
MEN - LINK
VORZÄHLER-SICHERUNG
METER FUSE
*1)
EVU-ZÄHLER
UTILITY-METER
kWh
3AC
NACHZÄHLER-SICHERUNG
METER FUSE
*3)
DC IN
PV-GENERATOR
STRING 1-
STRING 1+
STRING 2-
STRING 2+
STRING 3-
STRING 3+
STRING 4-
STRING 4+
STRING 5-
STRING 5+
STRING 6-
STRING 6+
1.1-
1.1+
1.2-
1.2+
2.1-
2.1+
2.2-
2.2+
3.1-
3.1+
3.2-
3.2+
BAT-
BAT+
MPP 1 / PV1
MPP 2 / PV2
MPP 3 / PV3
BATTERY
=A1 VERTO PLUS
=A1+A8 PILOT2V
*2)
ANSCHLUSS FÜR VON FRONIUS FREIGEGEBENEN BATTERIEN (SIEHE BATTERIE-SCHALTPLAN)
CONNECT TO FRONIUS APPROVED BATTERIES (REFER TO BATTERY SCHEMATIC)
EIGENSTÄNDIGE NETZUMSCHALTBOX ODER TEIL DES HAUSANSCHLUSSKASTENS
INDEPENDENT SWITCHOVER BOX OR PART OF THE MAIN PANEL
-F1
-K1
-K3
*2)
=P1
Fronius Smart Meter
-K1 *4)
-F1
-K3
-K1
LAST LOAD
NOTSTROMVERSORGUNG BACKUP LOAD
SYMBOL DEFINITION:
VERDRILLTE LEITUNG
TWISTED PAIR
*1) PE - N VERBINDUNG NUR IM TN-SYSTEM
PE - N CONNECTION ONLY IN TN-NETWORK
*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) DIE DURCHGÄNGIGE VERBINDING ZWISCHEN POTENTIALAUSGLEICHSSCHIENE UND N-LEITER DARF NICHT UNTERBROCHEN WERDEN (Z.B.: FI;...)
THE SEAMLESS CONNECTION BETWEEN POTENTIAL COMPENSION BAR AND N-CABLE CANNOT BE INTERRUPTED (E.G. FAULT CURRENT PROTECTION SWITCH)
*4) ES DÜRFEN NUR SCHALTELEMENTE MIT AUSREICHENDEN SCHALTVERMÖGEN ENTSPRECHEND DER VORGESCHALTETEN SICHERUNG UND MIT MECHANISCH GEKOPPELTEN RÜCKMELDE-KONTAKT VERWENDET WERDEN
ONLY USE SWITCHING ELEMENTS WITH SUFFICIENT CIRCUIT SWITCHING CAPACITY IN ACCORDANCE WITH THE UP-LINE FUSE AND WITH A MECHANICALLY COUPLED FEEDBACK CONTACT

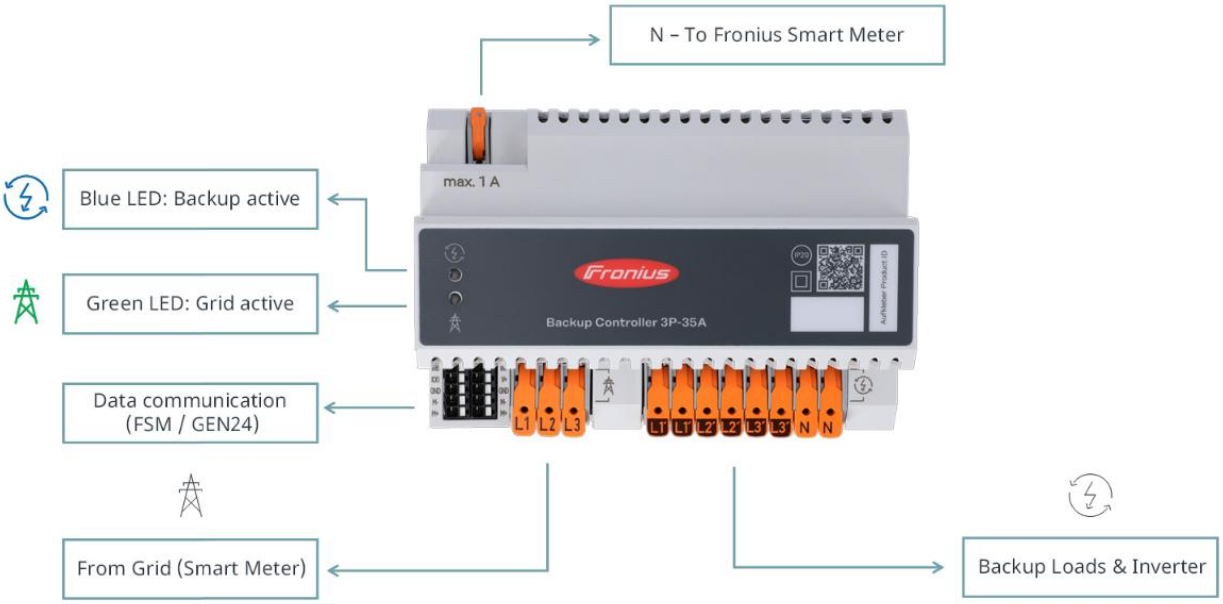
Fronius Backup Controller

General

The Fronius Backup Controller (3P-35A) be used for a Verto Plus application with the following conditions:

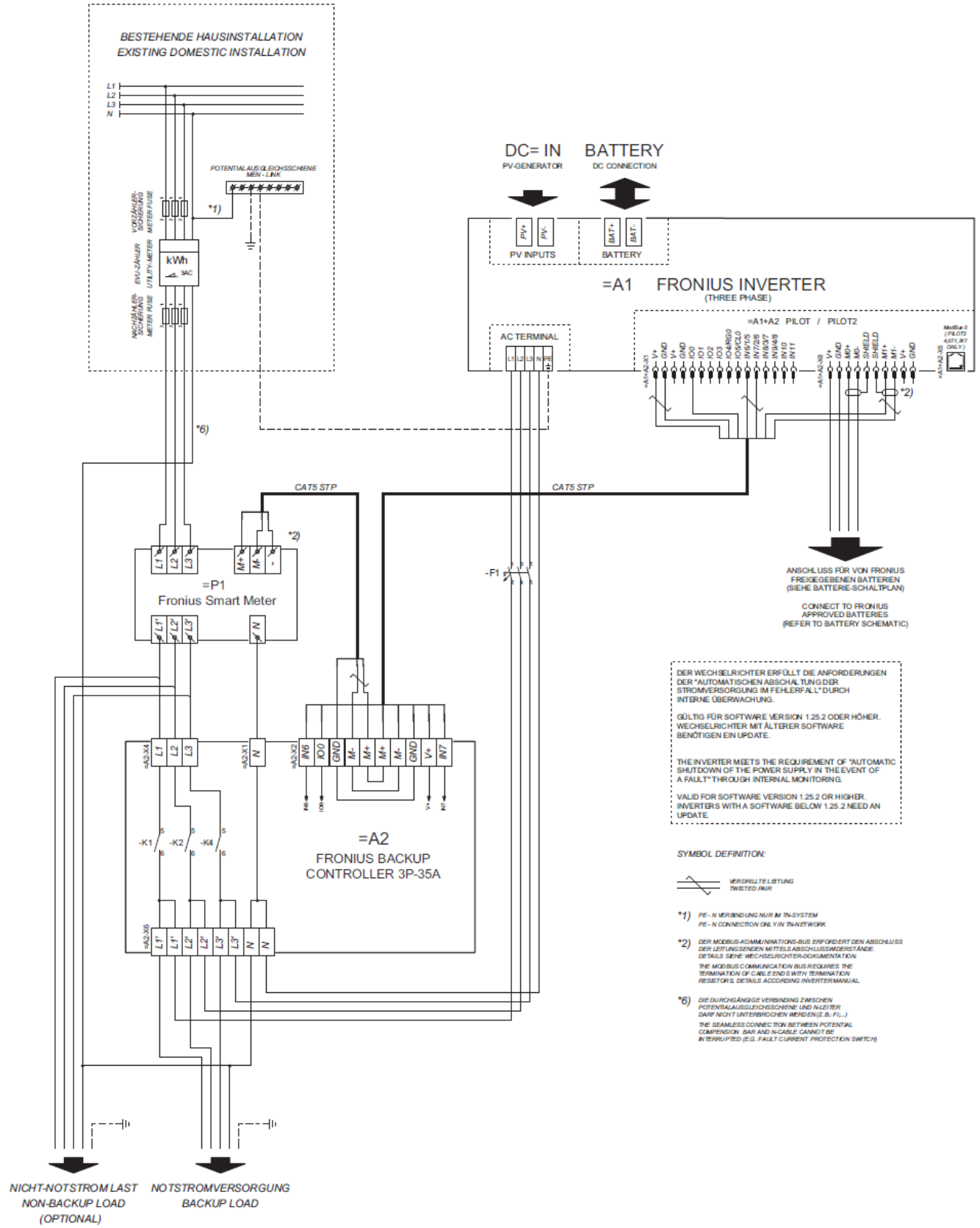
- Only usable up to the Verto 20.0 Plus
- The maximum current of 35A per terminal must not be exceeded*.

Further product specifications can be found in the instructions- Backup Controller Operation Manual



* The use of a higher power class than **Verto 20.0 Plus** with the **3P-35A backup controller** is **not recommended**, as these inverters may exceed the controller's current limits especially when operating in GRID Mode.

Single Line Diagram



3rd Party Backup Boxes

These boxes can be purchased from various electrical wholesalers in different sizes and designs.

Fronius is not able to warrant the 3rd party equipment nor guarantee it´s functionality.

Software Setup

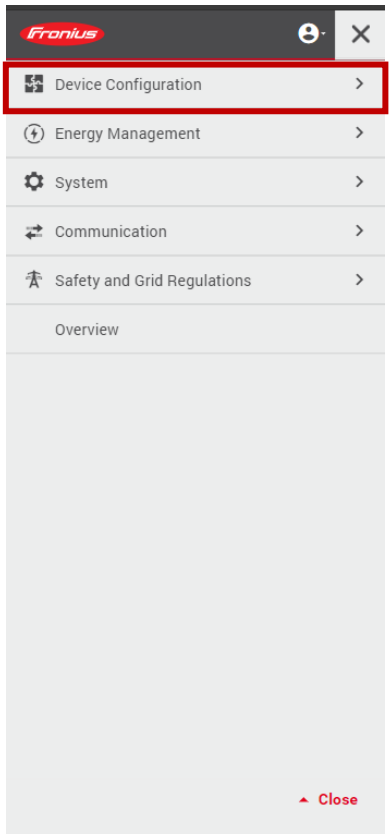
It is highly recommended to finish the standard commissioning and registration process for the Verto Plus, Battery and Smart Meter before proceeding with the Full Backup setup.

Verto Plus installation instructions - Verto Plus Operation manual,

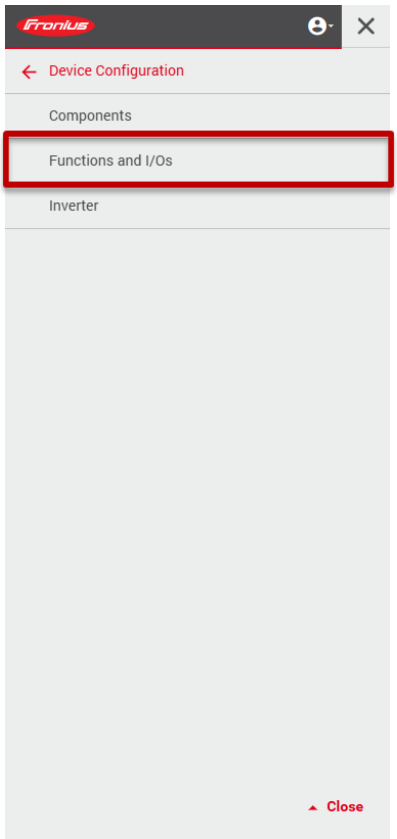
Verto commissioning → Fronius Solar.Start from your phone/tablet/pc.

1. Access Fronius WebUI via web browser **192.168.250.181**.
   Or Solar.Start app recommended.
2. Login as **Technician**.

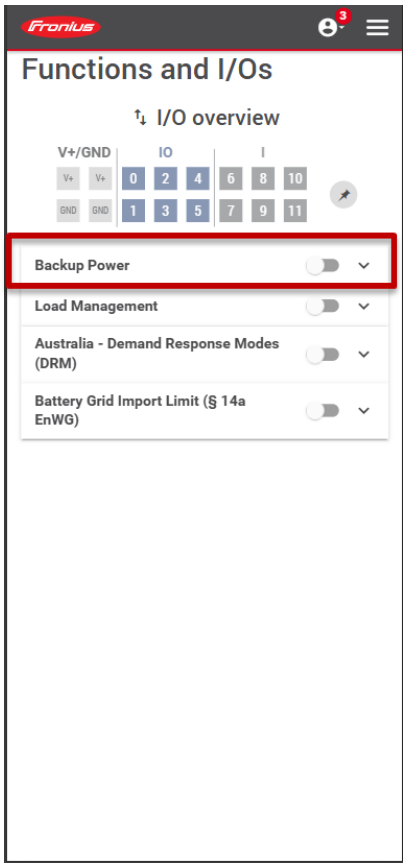
Device Configuration



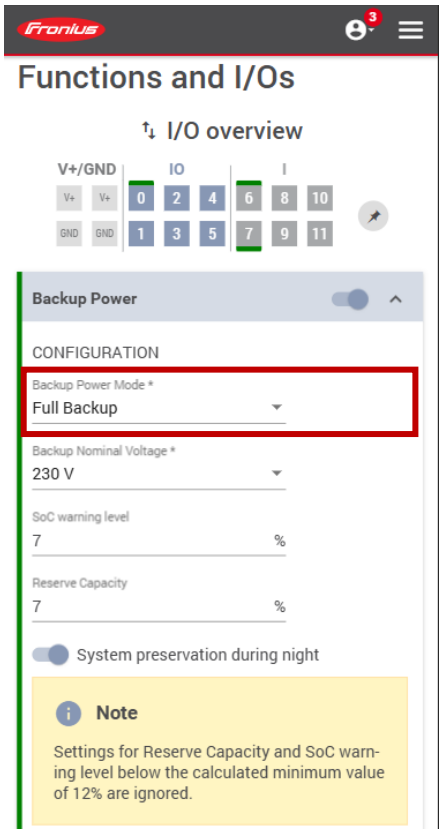
Functions and I/Os



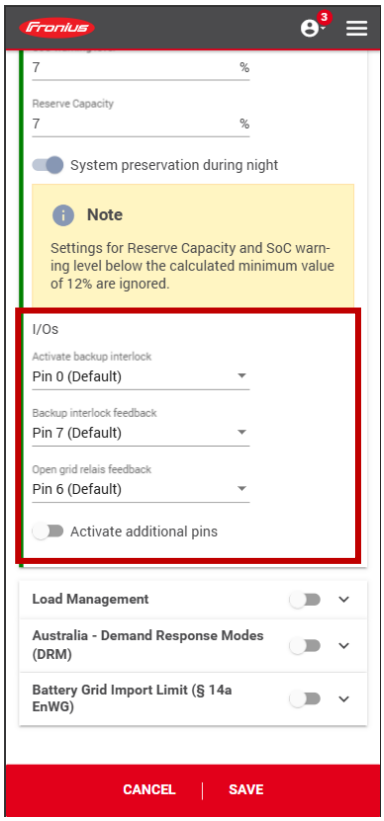
Activate **"Backup Power"**



Choose **“Full Backup”**



Check **I/Os**



Testing & Troubleshooting

To test the functionality of Full Backup, the battery should have a minimum state of charge of 30%.

The table below can be used for troubleshooting or determining if components are faulty.

Option	Grid	IO0	IN6	IN7	K3	K1	Backuploads	Non-backuploads
Grid	On	Off	Off	Off	Disengaged	Engaged	On	On
Backup	Off	On	On	On	Engaged	Disengaged	On	Off

Additional information related to the control logic, used contacts and the functionality/action can be seen below.

Function	Contact	Purpose & clarification
Activate feedback	K3 COIL/IO0	When the inverter wants to turn on Backup Mode IO0 is energized (12Vdc), which in turn engages K3 -> disengages K1
Grid Isolation	K3 NC	Supplies 230Vac to K1 coil which in turn connect or disconnect backup loads and inverter to the grid
Backup interlock feedback	K3 NO	Signals the state of the backup mechanism
Open grid relay feedback	K1 NC	Signals the state of the grid to the inverter

System not going into Backup

State Code 1255 - Grid disconnection contactor(s) – no feedback to the inverter
State Code 1256 - No feedback of the interlock relay. This happens when Pin 7 doesn't receive the 12V signal coming out of V+

Test full back-up by turning the mains off (**WARNING**: as the inverter is ON, this board can become live)

If system isn't going into backup there are distinct points on the contactors that you can test to check you're getting the right voltage in the right spots. You may also see one of the above state codes reported.

If you follow the 12V signal coming out of V+, it feeds IN6 (Pin 6) and IN7 (Pin 7) when the system is in backup mode. Hence all the points circled you should be able to measure 12V

Green to Blue 1

a. If 12Vdc, go to next check
b. If 0Vdc, check wiring (IO0 and GND)
c. If 0Vdc, check the "ACTIVATE BACKUP INTERLOCK" pin is selected correctly in the backup power setting (*refer to below screenshot)*

Green to Blue 2

a. If 12Vdc, go to next check
b. If 0Vdc, check wiring (V+ and GND)

Green to Blue 3

a. If 12Vdc, go to next check
b. If 0Vdc, check that the contactor has 0Vac across the coil, and that the contact being used is normally closed

Green to Blue 4

a. If 12Vdc and no error, go to next check
b. If 12Vdc and the inverter shows error 1255, check wiring (IN6)

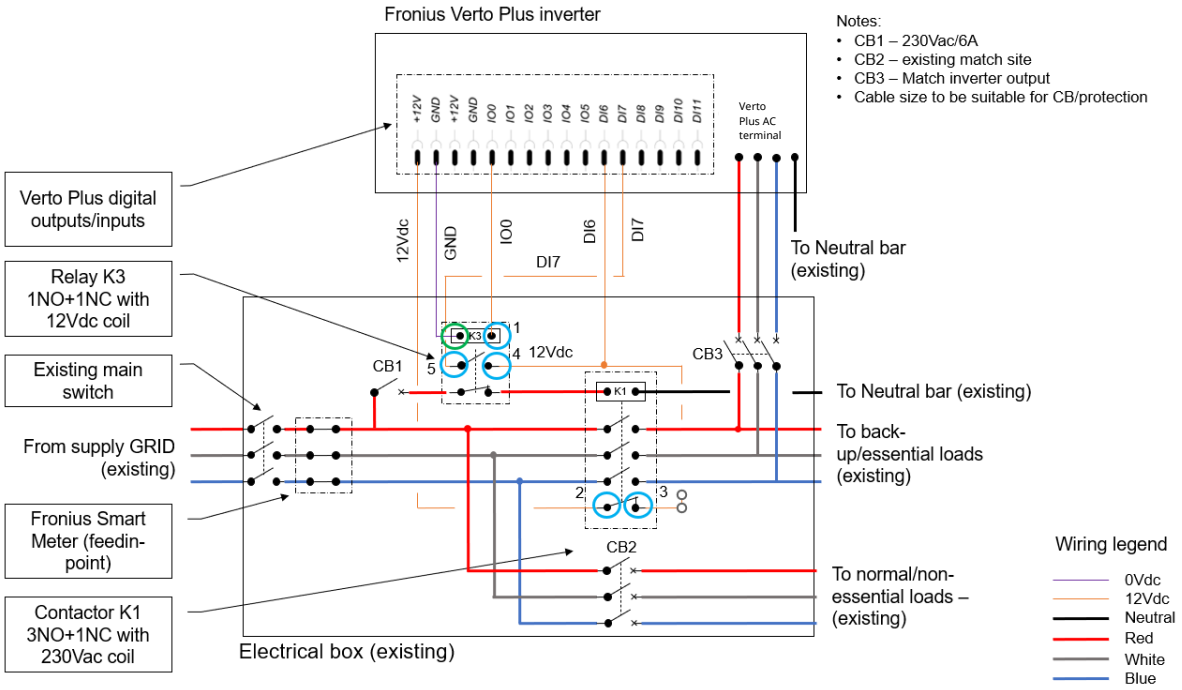
c. If 12Vdc and the inverter shows error 1255, check the "OPEN GRID RELAIS FEEDBACK" pin is selected correctly in the backup power settings *(refer to below screenshot).*

d. If 0Vdc, check the continuity of the loop cable between Blue 3 and Blue 4 Green to Blue 5

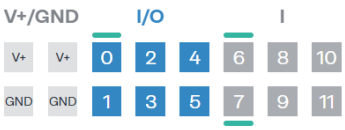
a. If 12Vdc and the inverter shows error 1256, check wiring (IN7)

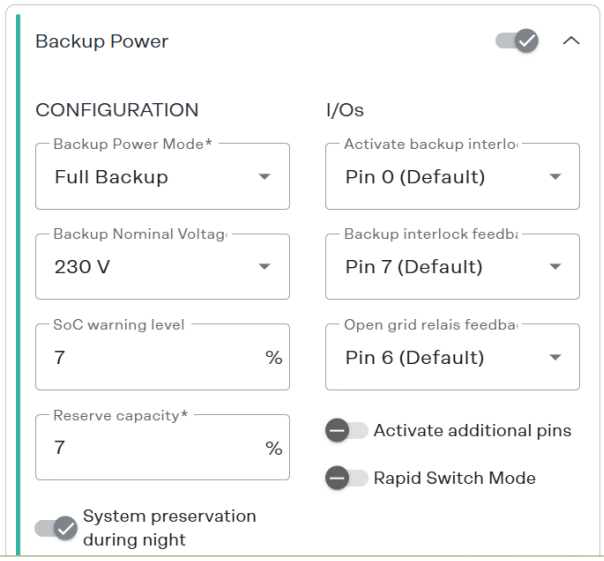
b. If 12Vdc and the inverter shows error 1256, check the "BACKUP INTERLOCK FEEDBACK" pin is selected correctly in the backup power settings *(refer to below screenshot).*

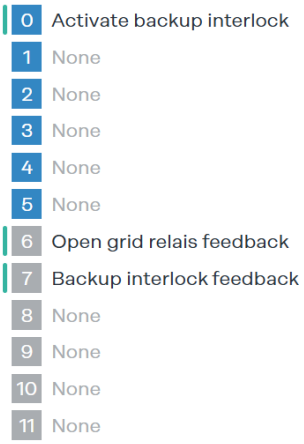
c. If 0Vdc, check that the contactor has 0Vac across the coil, and that the contact being used



Functions and I/Os







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