Fronius Grid Isolation Transfer Panel

Three Phase

As assembled by

Westminster Controls Ltd
3 Pym Street
Leeds
LS10 1PG

Tel: 0113 288 4500
Email: info@westminstercontrols.com

Version 3.0/2025

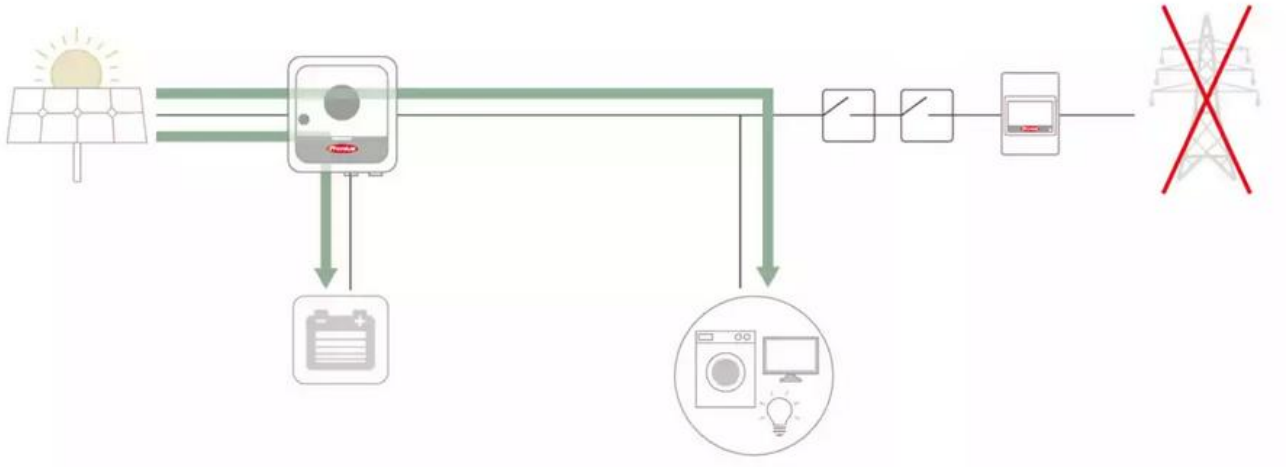
1. Issue Log

Issue	Comments	Date
1.0	Issued for Comment	15/01/2024
2.0	Technical Data added	27/03/2024
3.0	3 Phase variant	24/11/2025

2. Contents

3. Fronius Grid Isolation/Backup Power mode

If a power failure occurs with the Full Backup option, the inverter automatically disconnects the building from the public grid. The household is supplied with the available electricity by both the PV generator and the battery. In conjunction with the Fronius Smart Meter, the hybrid inverter ensures that the building remains disconnected from the public grid until the fault or failure has been rectified and normal grid operation is restored.



The Fronius Grid Isolation Transfer Switch allows the safe isolation (islanding) of the site until the grid supply has been restored and the required voltage and frequency has been stable for a pre-set period of time.

Islanding is performed by active and backup grid isolation contactors, with instant isolation on grid failure. Additional power monitoring is performed by the Fronius Smart Meter and Gen24 inverter to further interlock the grid isolation contactors.

Technical data:

The following technical data apply to the devices in the Symo GEN24 Plus series in backup power mode:

	Symo GEN24 6.0	Symo GEN24 8.0	Symo GEN24 10.0
Max. nominal power	6kW	8kW	10kW
Max. power per phase	3.68kW	3.68kW	3.68kW
Max. charging and discharging current	22A	22A	22A
Switch-over time	<90s	<90s	<90s

Discharge power of the battery:
The maximum continuous output also depends on the battery voltage and discharge power of the connected battery. The voltage and discharge power of the battery can be found on the data sheet.
Attention: the power can vary by up to +/- 20% depending on the state of charge.

Nominal voltage and overcurrent:
The nominal voltage is available immediately after the device has been switched on.
In the short term, a maximum peak power of up to 12.100VA is possible. This value is valid for all device variants.

Overload:
Short-term overloading is possible with all devices. This relates to the respective power per phase. In this overload scenario, the voltage is kept within the nominal voltage range, in contrast to overcurrent.

Backup power switchover (grid disconnection):
The purpose of the backup power switchover is to disconnect the household from the grid before stand-alone operation is activated. This ensures that maintenance personnel are not endangered by energy that is fed in accidentally.

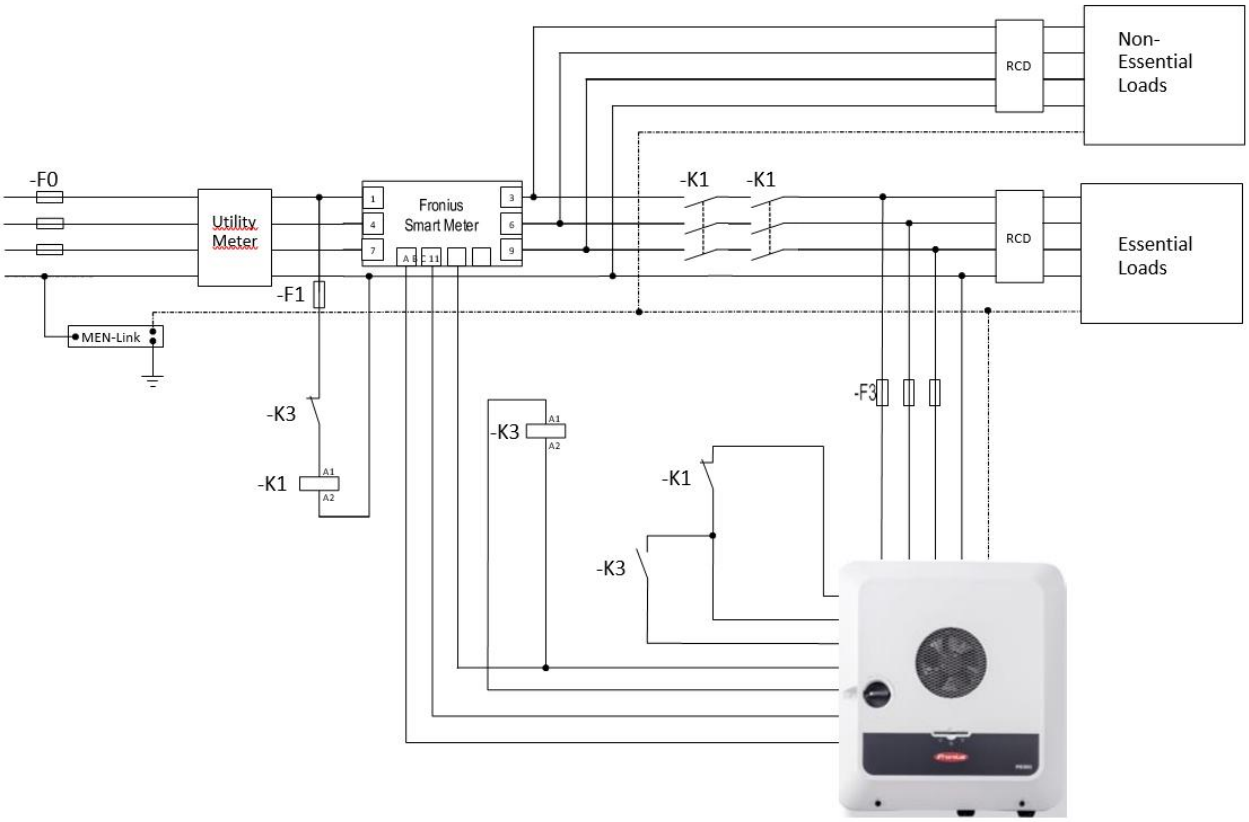
Depending on the grid operator, the demands on backup power switchover can vary. The exact nature of the backup power switchover itself is the responsibility of the installation company and must be agreed with the grid operator. Fronius provides some examples of circuit diagrams.

Recommendations for backup power installations.

- Combine important devices onto one “essential” backup power distribution board
- Combine non-essential circuits onto one or more “non-essential” power distribution boards
- Distribute loads evenly over all phases
- When using backup power, connect devices in a time-delayed sequence, if possible.
- Ensure that the inverter maximum output is not exceeded on the essential PDU.

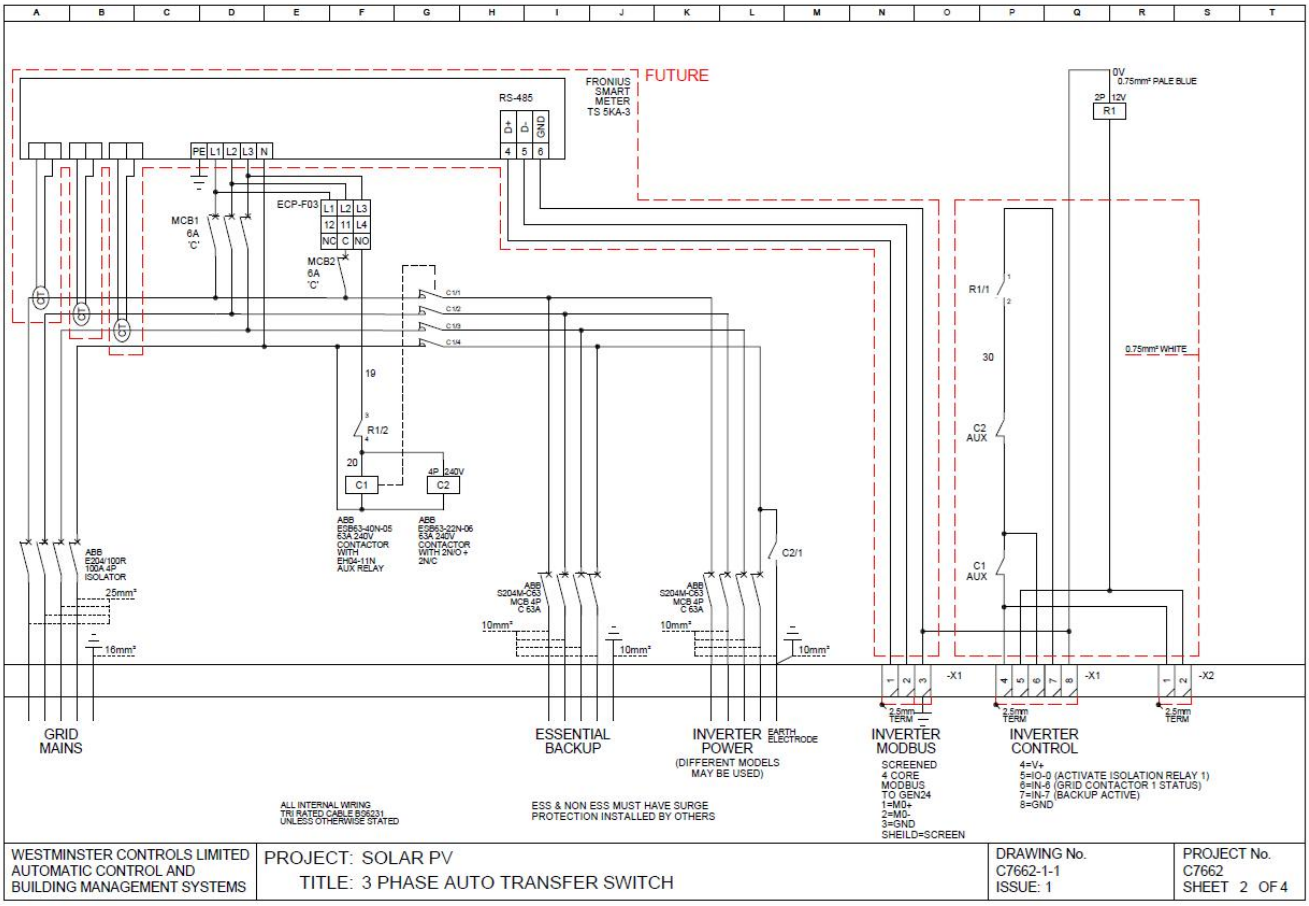
4. Schematics and Operation

Below is the main circuit diagram for backup power switchover.
The appropriate design and circuitry for your system should always be agreed with your local grid operator.
K1 consists of two redundantly connected contactors.



4.1. Grid Isolation/Backup Power Switch-Over Controls

4.1.1. Grid Connected Operation (NORMAL)



During **grid-connected operation**, the output IO-0 is **OFF** and the inputs I6 and I7 are **OFF**

No current flows through the coil of backup power control relays R1 from the GEN24.

This keeps the N/C contacts of R1/2 **CLOSED** and means that current is able to flow though the coils of contactor C1 and the N/O contacts are therefore **CLOSED**.

Contactor C2 is also energised and the N/C contacts are therefore **OPEN**.

The N/O GEN24 feedback contacts R1/1 remain open.

Input 7 is therefore **OFF**.

The N/C GEN24 feedback contacts of C1/AUX are **OPEN** and so **Input 6** is also **OFF**.

The system is in grid-connected operation.

Grid power is supplied from the Grid to the essential DB and the GEN24.

NB. If the PV array or any PV connected Battery systems are generating excess power, then this will be used to supply any essential systems.

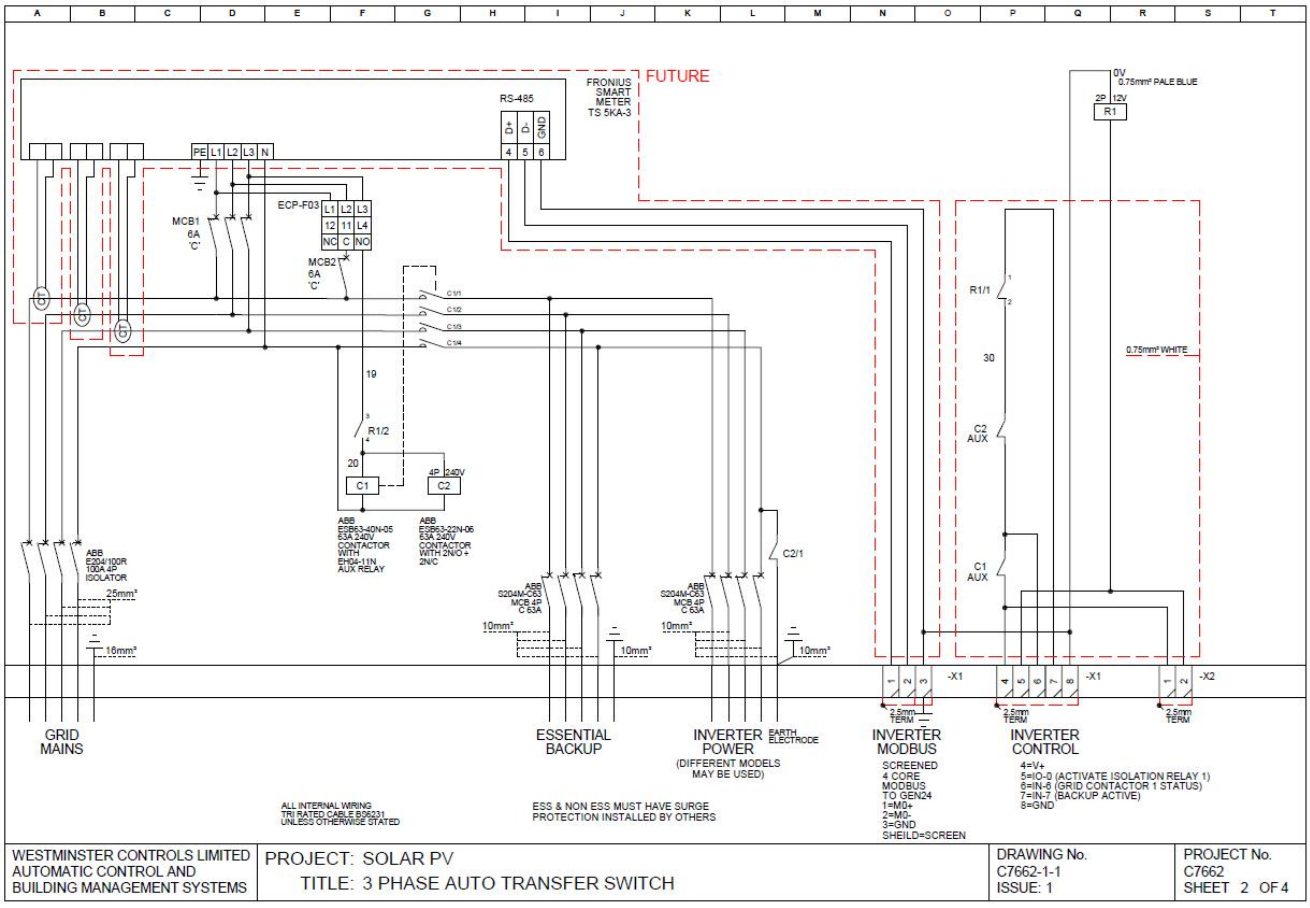
Any excess power will be exported to the grid (depending on the export limitations set within the GEN24 or as

mandated by the local DNO).

Any failure of grid isolation Contactor C1 will isolate the Essential backup supply from the grid connection.

Any failure of grid power to grid isolation Contactor C1 will isolate the Essential backup supply from the grid connection.

4.1.2. Grid Disconnected (Backup Power) Mode (GRID FAILURE)



During **grid isolation/backup power mode**, the output IO-0 is **ON** and the inputs I6 and I7 are **ON** (+12VDC).

In the event of a grid power outage, the 230VAC supply to the coils of C1 and C2 is automatically interrupted.

This **OPENS** the N/O contacts of C1 and disconnects the system from the public grid completely.

This **CLOSES** the N/C contacts of C2 and connects the system Earth to the local Earth Electrode.

The N/C GEN24 feedback contacts of C1/AUX and C2/AUX are now **CLOSED**, changing **Input 6** to **ON**.

The output **IO-0** is now set to **ON** to interlock the grid isolation contactors C1 and C2, preventing them from automatically re-connecting the grid once grid power is restored.

Current is now able to flow through the coil of backup power relay R1. The N/C contacts of R1/2 are **OPEN** and further isolate the coils of both contactors C1 and C2 from the grid.

The N/O GEN24 feedback contacts R1/1 are now **CLOSED**. This ensures that in grid isolation/backup power mode, the system does not reconnect to the grid automatically until instructed to do so by the GEN24.

Any failure of grid isolation Contactor C1 will isolate the Essential backup supply from the grid connection.

Any failure of grid power to either grid isolation Contactor C1 or C2 will isolate the Essential backup supply from the grid connection.

5 Cabling of the Components

To connect the inverter to switchover components an 8-pole CAT5-7 shielded communication cable is required (CAT 5 cable 8x0,5mm2).

On the inverter the 16-pole plug (see figure 1 and 2 below) is used to connect the relays and contactors.

The Fronius Smart Meter will be connected on the 10-pole plug (see figure 1 and 2 below – middle positioned plug) use therefore the Pins M0+,M0- and GND. A termination resistor is required on both ends of the Modbus communication.

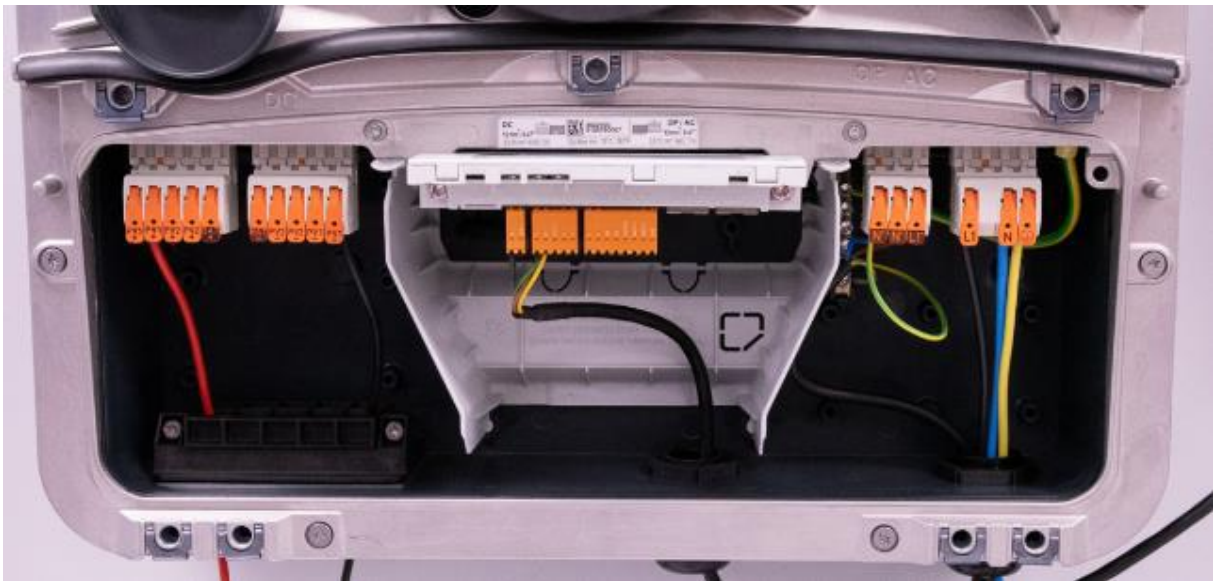
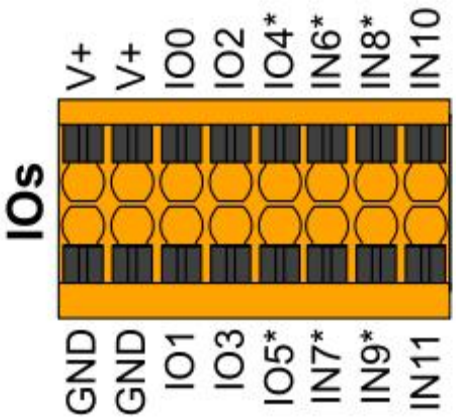


Figure 1: Communication interface on GEN24 in the centre

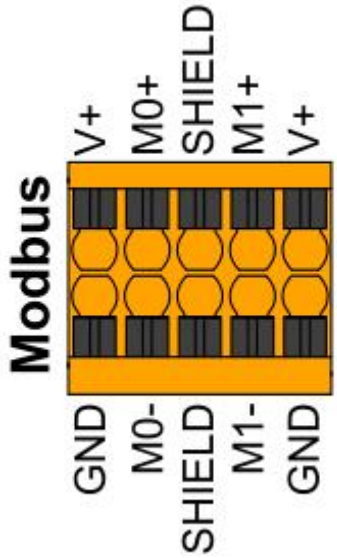
Figure 2: Communication interface module (10 and 16 pole plugs)

5.1. Wiring Connections & Terminals

5.1.1 GEN24 Connector Blocks

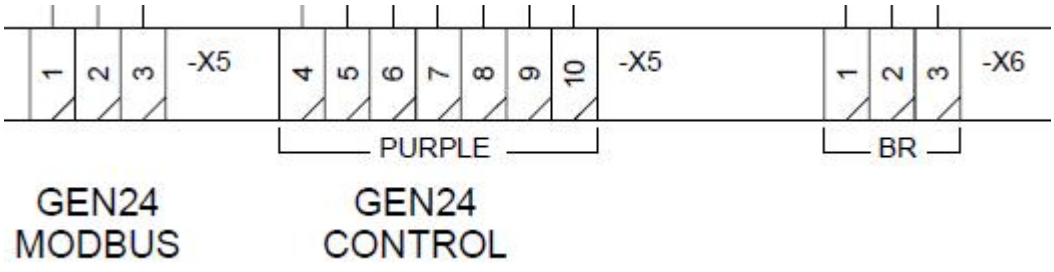


GEN24 Digital IO Connections



GEN24 MODBUS Connections

5.1.2 Transfer Switch Terminal Connections



5.1.3 Transfer Switch Data and Control Connection Details

Wiring Box	GEN24	
X4-L	AC	L
X4-N	AC	N
X4-E	AC	Earth
X5-1	MODBUS	MO+
X5-2	MODBUS	MO-
X5-3	MODBUS	GND
X5-4	IO	V+
X5-5	IO	IO-0
X5-6	IO	IN6
X5-7	IO	IN7
X5-8	IO	IO-1
X5-9	IO	IN9
X5-10	IO	GND
X6-1	Grid Isolation Override Switch Power	
X6-2	Grid Isolation Override Switch 1	
X6-3	Grid Isolation Override Switch 2	

5.1.4 Transfer Switch Power Connection Details

X1-L	Grid Live
X1-N	Grid Neutral
X1-E	Earth
X2-L	Non-essential (grid supplied only) DB Live
X2-N	Non-essential (grid supplied only) DB Neutral
X2-E	Earth
X3-L	Essential (grid or island supply) DB Live
X3-N	Essential (grid or island supply) DB Neutral
X3-E	Earth
X4-L	GEN24 Live
X4-N	GEN24 Neutral
X4-E	Earth & Separate Earth Electrode[#1]

#1 Earth electrode to be installed to current IEE wiring regs in case of grid isolation to replace Grid Earth.

6 Commissioning GEN24 Backup Power Switchover

6.1. Using the Fronius Start APP

See the FRONIUS Commissioning Guide for specific details, however the basic options are as follows:

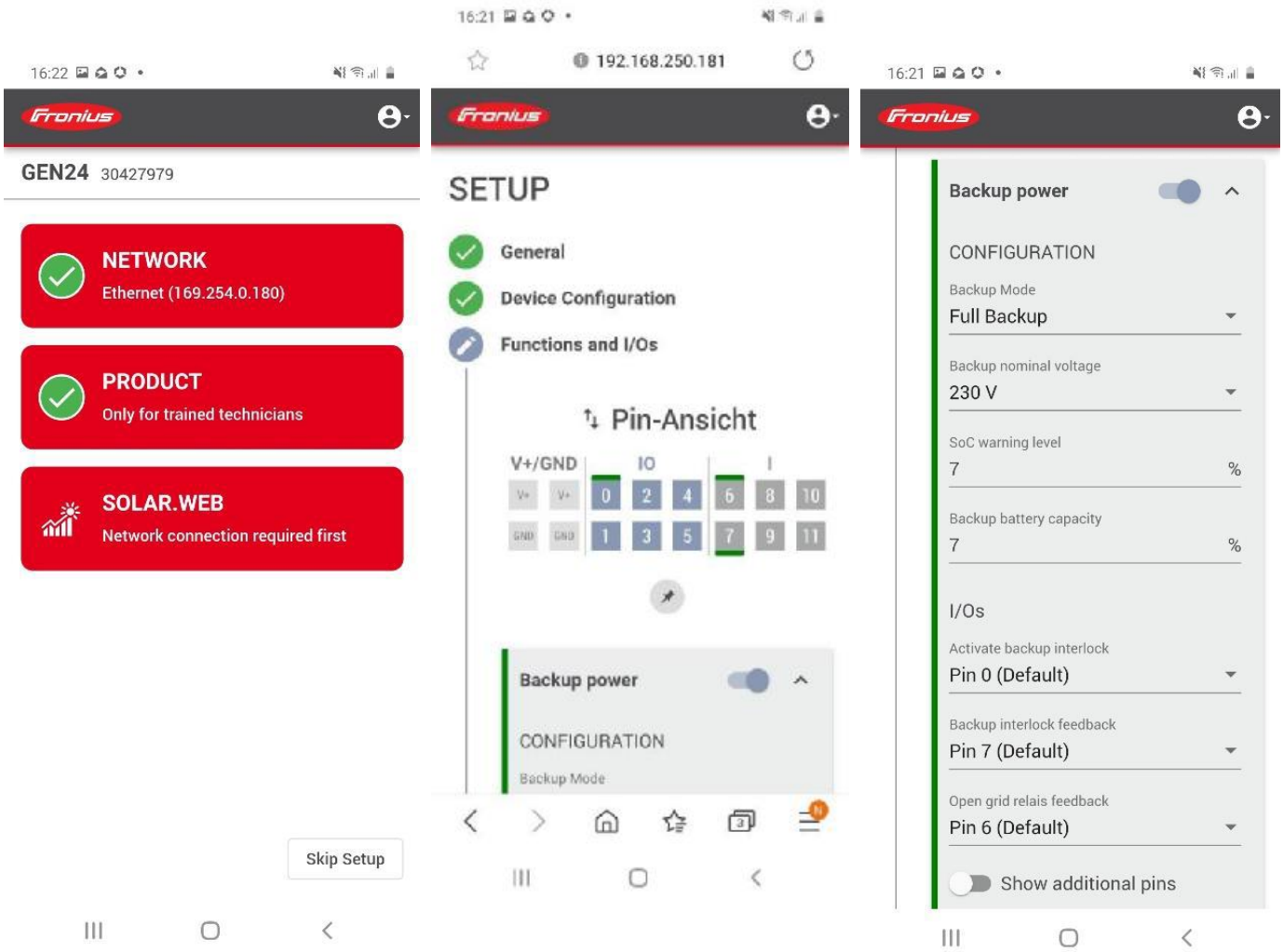
Download Fronius Solar.start App

- Select inverter Fronius GEN24 and start the Wifi acces point

- Connect to inverter – see picture below

- Follow Setup Wizard – Product commissioning

- Activate “Full Backup” under Functions and I/Os.



6.2. Standard commissioning with a Laptop

- Activate the Wifi Access Point of the inverter
- Connect to the hot spot via laptop, smartphone or tablet
- Search for the network "FRONIUS xxxx" on the device; default password is: 12345678
- Enter into the web browser: the IP address http://192.168.250.181
- Commission the inverter by using the Wizard on the inverter's built in web page

A detailed explanation of the commissioning can be found in the operation manual of the inverter

7. Notes and Technical Data

All down stream Essential and Non-Essential DB's must be install to the current Wiring Regulations.

A suitable Earthing rod should be installed and tested to the current Wiring Regulations, for Earthing requirements during Island operation.

The Transfer Switch shall:

i. Inhibit connection of Power Generating Modules to the system unless that phase of the DNO's Distribution Network is present;

ii. Disconnect the Power Generating Module from the system in the event of the loss of that phase of the DNO's Distribution Network;

The GEN24 Invertor shall detect:

i. Under Voltage (1 stage);

ii. Over Voltage (2 stages);

iii. Under Frequency (2 stages);

iv. Over Frequency (1 stage);

v. Loss of Mains (LoM).

	Type A, Type B and Type C Power Generating Modules			
	LV Protection(1)		HV Protection(1)	
Protection Function	Trip Setting	Time Delay Setting	Trip Setting	Time Delay Setting
Under Voltage	Vφ-n† - 20%	2.5 s*	Vφ-φ‡ - 20%	2.5 s*
Over Voltage Stage 1	Vφ-n† + 14%	1.0 s	Vφ-φ‡ + 10%	1.0 s
Over Voltage Stage 2	Vφ-n†+ 19%$	0.5 s	Vφ-φ‡ + 13%	0.5 s
Under Frequency Stage 1	47.5 Hz	20 s	47.5 Hz	20 s
Under Frequency Stage 2	47.0 Hz	0.5 s	47.0 Hz	0.5 s
Over Frequency	52.0 Hz	0.5 s	52.0 Hz	0.5 s
Loss of Mains	1 Hzs^{-1}	0.5 s	1 Hzs^{-1}	0.5 s

†A value of 230 V shall be used in all cases for Power Generating Facilities connected to a DNO's LV Distribution Network ie the U/V LV trip setting is 184 V, the O/V stage 1 setting is 262.2 V and the O/V stage 2 setting is 273.7 V.

‡A value to suit the nominal voltage of the HV Connection Point.

* Might need to be reduced if auto-reclose times are <3 s. (see 10.2.1).

Intertripping may be considered as an alternative to the use of a LoM relay.

$ For voltages greater than 230 V +19% which are present for periods of<0.5 s the Power Generating Module is permitted to reduce/cease exporting in order to protect the Power Generating Module.

Note:

Table replicated from the ENA Engineering Recommendation G99, Issue1, Amendment 6.

The above Type Tested Interface Protection settings are coded into the GEN24 inverter at manufacture, but can be adjusted by an manufacturer approved and authorized engineer via a laptop, subject to the correct credentials being entered. The settings shall only be adjusted after commissioning upon agreement between the DNO and the generator.

The above settings are able to be interrogated via a laptop. The identification number of the Invertor is permanently fixed to the device and visible on the electronic device screen at the same time as the settings to ensure the correct device is viewed.

In exceptional circumstances additional protection may be required by the DNO to protect the Distribution Network and its Customers from the Power Generating Module.

Note that where the Generator installs an export limitation scheme in accordance with EREC G100 the installation will also need to comply with the requirements of that EREC.

Please refer to ENA Engineering Recommendation G98/G99/G100.

8. Isolation Panel Technical Data

Item	Description	Part No.	Terminals	Terminal Screw Size	Driver Size	Torque	Cable Size: Solid Core	Cable Size: Stranded	Cable Size: Ferrule	Cable Strip Length	IP Rating	Operating Temp	Power Loss (W)
Consumer Unit	32 way Enclosure	EPP-R2032											148.54
Surge Protector Grid Supply	1 Phase Type 2 Surge Protector	DEHN 952205	Contacts				1.5…35mm^2	1.5…35mm^2	1.5…35mm^2	12mm	IP20/IP40 (in DB)	-40…+80°C	0.035
Surge Protector Gen24 Supply	1 Phase Type 2 Surge Protector	DEHN 952205	Contacts				1.5…35mm^2	1.5…35mm^2	1.5…35mm^2	12mm	IP20/IP40 (in DB)	-40…+80°C	0.035
Mains Incommer Supply Isolation	100A Switch disconnect isolator	E202/100R	Contacts		PZ2	2.5Nm	2.5…50mm^2	2.5…50mm^2	2.5…50mm^2		IP20/IP40 (in DB)	-25…+55°C	7.9
Non ESS Supply Isolation	100A Switch disconnect isolator	E202/100R	Contacts		PZ2	2.5Nm	2.5…50mm^2	2.5…50mm^2	2.5…50mm^2		IP20/IP40 (in DB)	-25…+55°C	7.9
ESS Backup Supply Isolation	50A MCB	S202M-B50	Contacts		PZ2	2.8Nm	0.75…35mm^2	0.75…35mm^2	0.75…25mm^2		IP20/IP40 (in DB)	-25…+55°C	6.5
Gen24 Supply Isolation	50A MCB	S202M-B50	Contacts		PZ2	2.8Nm	0.75…35mm^2	0.75…35mm^2	0.75…25mm^2		IP20/IP40 (in DB)	-25…+55°C	6.5
Grid Contactor 1	63A Contactor	ESB63-22N-06	Contacts	7.5mmØ	PZ2	2.5Nm	1x1.5…25mm^2; 2x1.5…10mm^2	1x1.5…16mm^2; 2x1.5…10mm^2	1x1.5…16mm^2; 2x1.5…10mm^2	13mm	IP20/IP40 (in DB)	-25…+55°C	19.2
			Coil	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…2.5mm^2	1x1…4mm^2; 2x1…2.5mm^2	1x0.75….2.5mm^2; 2x0.75…1mm^2	7mm			
	Grid Contactor 1 Status Relay	EH04-11N	Contacts	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…1.5mm^2	1x1…4mm^2	---	<1.5mm^2 =7mm; >1.5mm^2 =9-17mm	IP20/IP40 (in DB)	-25…+55°C	
Grid Contactor 2	63A Contactor	ESB63-22N-06	Contacts	7.5mmØ	PZ2	2.5Nm	1x1.5…25mm^2; 2x1.5…10mm^2	1x1.5…16mm^2; 2x1.5…10mm^2	1x1.5…16mm^2; 2x1.5…10mm^2	13mm	IP20/IP40 (in DB)	-25…+55°C	19.2
			Coil	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…2.5mm^2	1x1…4mm^2; 2x1…2.5mm^2	1x0.75….2.5mm^2; 2x0.75…1mm^2	7mm			
	Grid Contactor 2 Status Relay	EH04-11N	Contacts	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…1.5mm^2	1x1…4mm^2	---	<1.5mm^2 =7mm; >1.5mm^2 =9-17mm	IP20/IP40 (in DB)	-25…+55°C	
MCB1	6A 3Ph B MCB	S201M-B6	Contacts		PZ2	2.8Nm	0.75…35mm^2	0.75…35mm^2	0.75…25mm^2		IP20/IP40 (in DB)	-25…+55°C	2
Relay R1	12V Backup Relay	ESB16-11N-14	Contacts	5.0mmØ	PZ1	1.2Nm	1x1…10mm^2; 2x1…4mm^2	1x1…6mm^2; 2x1…4mm^2	1x1…6mm^2; 2x1…1.5mm^2	10mm	IP20/IP40 (in DB)	-25…+55°C	2
			Coil	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…2.5mm^2	1x1…2.5mm^2; 2x1…1.5mm^2	1x0.75….2.5mm^2; 2x0.75…1mm^2	7mm			
Relay R2	12V Backup Relay	ESB16-11N-14	Contacts	5.0mmØ	PZ1	1.2Nm	1x1…10mm^2; 2x1…4mm^2	1x1…6mm^2; 2x1…4mm^2	1x1…6mm^2; 2x1…1.5mm^2	10mm	IP20/IP40 (in DB)	-25…+55°C	2
			Coil	5.0mmØ	PZ1	0.9Nm	1x1…4mm^2; 2x1…2.5mm^2	1x1…2.5mm^2; 2x1…1.5mm^2	1x0.75….2.5mm^2; 2x0.75…1mm^2	7mm			
Elec Meter	Fronius 1 phase Smart Meter	TS 100A-1	Conductors				1…25mm^2	1…25mm^2	1…25mm^2		IP20/IP51 (in DB)	-25…+65°C	1
			Comms				0.05…1.5mm^2	0.05…1.5mm^2	0.05…1.5mm^2				