victron energy
BLUE POWER

Manual EN

Handleiding NL

Manuel FR

Anleitung DE

Manual ES

Appendix

Phoenix Inverter

12 | 250	12 | 375
24 | 250	24 | 375
48 | 250	48 | 375

1. Safety instructions

WARNING: ELECTRIC SHOCK HAZARD
The product is used in conjunction with a permanent energy source (battery). Input and/or output terminals may still be dangerously energized, even when the equipment is switched off. Always disconnect the battery before carrying out maintenance or servicing the product.

The product has no internal user-serviceable components. Do not remove the front plate or operate the product if any panels have been removed. All servicing must be undertaken by qualified personnel.

Please read the installation instructions in the installation manual before installing the equipment.

This is a Safety Class I product (supplied with a protective grounding terminal). The chassis must be grounded. A grounding point is located on the outside of the product. Whenever it is likely that the grounding protection has been damaged, the product must be turned off and secured against unintended operation; please contact qualified service staff.

The AC output is isolated from the DC input and the chassis. Local regulations may require a true neutral. In this case one of the AC output wires must be connected to the chassis, **and the chassis must be connected to a reliable ground**. Please note that a true neutral is needed to ensure correct operation of an earth leakage circuit breaker.

Ensure that the equipment is used under the correct ambient conditions.
Never operate the product in a wet or dusty environment.
Never use the product where there is a risk of gas or dust explosions.

Ensure there is adequate free space (10 cm) for ventilation around the product and check that the ventilation vents are not blocked.

2. Description

VE.Direct communication port
The VE.Direct port can be connected to:
- A computer (VE.Direct to USB interface cable needed)
- Apple and Android smartphones, tablets and other devices (VE.Direct to Buetooth Low Energy (BLE) dongle needed)

Fully configurable
- Low and high battery voltage alarm trip and reset levels
- Low and high battery voltage cut-off and restart levels
- Output voltage 220/230/240V
- Frequency 50 Hz or 60 Hz
- ECO mode on/off and ECO mode sense level

Monitoring
Battery voltage and current, AC Output voltage and current, alarms

Proven reliability
The full bridge with toroidal transformer topology has proven its reliability over many years.
The inverters are short circuit proof and protected against overheating, whether due to overload or high ambient temperature.

High start-up power
Needed to start loads such as power converters for LED lamps, filament lamps or electric tools.

ECO mode
When in ECO mode, the inverter will switch to standby when the load decreases below a preset value. It will switch on and check every few seconds, adjustable, if the load has increased again..

Remote on/off connector
A remote on/off switch can be connected to a two pole connecter or between battery plus and the left hand contact of the two pole connector.

LED diagnosis
A red and a green LED indicate inverter operation and status of the different protections.

Available with different output sockets
Schuko, UK (BS-1363), AU/NZ (3112) or IEC-320 (male plug included)

3. Installation

3.1 Connection to the battery

In order to utilize the full capacity of the product, batteries with sufficient capacity and battery cables with sufficient cross section should be used. See table:

	12/250	24/250	48/250
Minimum battery capacity	38 Ah	22 Ah	14 Ah
Internal DC fuse	60A	30A	25A
Recommended DC cable cross-section (mm^2)			
0 – 1,5 m	4 mm²	2,5 mm²	1,5 mm²
1,5 – 3 m	6 mm²	4 mm²	2,5 mm²

	12/375	24/375	48/375
Minimum battery capacity	66 Ah	38 Ah	22 Ah
Internal DC fuse	80A	40A	25A
Recommended DC cable cross-section (mm^2)			
0 – 1,5 m	6 mm²	4 mm²	2,5 mm²
1,5 -3 m	10 mm²	6 mm²	4 mm²

The inverters are fitted with an internal DC fuse (see table above for rating). If the DC cable length is increased to more than 1,5 m, an additional fuse or DC circuit breaker must be inserted close to the battery.

Reverse polarity connection of the battery wires will blow the internal fuse and can damage the inverter. The internal fuse it not replacable.

3.2 Connection to the load

Never connect the output of the inverter to another AC source, such as a household AC wall outlet or a generator.

3.3 Remote on/off connector

A remote on/off switch can be connected to the two pole connecter. Alternatively, the left hand contact of the connector can be switched to battery positive: useful in automotive applications, wire it to the ignition contact.

Note that also the front switch needs to set to either On or ECO for the inverter to start.

3.4 Configuration

The inverter is ready for use with the factory settings (see specifications), and can be configured with a computer (VE.Direct to USB interface cable needed), Apple and Android smartphones, tablets and other devices (VE.Direct to Buetooth Low Energy (BLE) dongle needed).

4. Operation

4.1 LED definitions

Green LED	Status	Trouble shooting
●●●●●●●● Solid on	Inverter on	**Red LED Off** status OK **Red LED On or blinking:** The Inverter is still on and but will shut down when the condition gets worse. See red LED table for warning reason
●●------ Slow single pulse	ECO mode	If the inverter keeps switching on and off, while there is a load connected, the load may be too small compared to the actual ECO mode settings. Increase the load or change ECO mode settings.
●-●------ Fast double pulse	Off and waiting	Inverter did shut down because of a protection. The inverter will restart automatically as soon as all alarm conditions are cleared. See red LED state for the shutdown reason.
-------- Off	Inverter off	**Red LED Off** Check the On/Off/ECO switch: it should be in On position or in ECO position. Check Remote on/off connector. Check DC cable connections and fuses. Inverter fuse blown: the inverter has to be returned for service. **Red LED On or blinking** The inverter did shut down because of a protection. It will no longer automatically restart. The red LED indicates the reason for shutdown. Remove the cause and then restart the inverter by switching it Off, and then back On.

Red LED	Definition	Trouble shooting
●●●●●●●● Solid on	Overload	Reduce load
●●●●---- Slow blink	Low batt.	Recharge or replace battery Check DC cable connections Check cable cross section as it may be insufficient. See section 4.3 Protections and automatic restarts for manual and automatic restart behavior.
●-●-●-●-●- Fast blink	High batt.	Reduce DC input voltage, check for faulty charger
●-●------ Double pulse	High temp.	Reduce load and/or move inverter to better ventilated area
●---●--- Fast single pulse	High DC ripple	Check DC cable connections and cable cross section.

4.2 ECO Mode

Set the front switch to ECO mode to reduce the power consumption in no-load operation. The inverter will automatically switch off as soon as it detects that there is no load connected. It then switches on, briefly, every 2,5 seconds to detect a load. If the output power exceeds the set level, the inverter will continue to operate.

The default ECO mode wake-up minimum power is 25 Watt
The default ECO mode search interval is 2.5 seconds

Note that the required ECO mode settings are heavily dependent on the type of load: inductive, capacitive, non-linear. Adjustment may be needed.

4.3 Protections and automatic restarts

Overload

Some loads like motors or pumps draw large inrush currents in a start-up situation. In such circumstances, it is possible that the start-up current exceeds the over current trip level of the inverter. In this case the output voltage will quickly decrease to limit the output current of the inverter. If the over current trip level is continuously exceeded, the inverter will shut down: wait 30 seconds and then restart.

After three restarts followed by another overload within 30 seconds of restarting, the inverter will shutdown and remain off. The LEDs will signal shutdown due to overload. To restart the inverter, switch it Off, then On.

Low battery voltage (adjustable)

The inverter will shut down when the DC input voltage drops below the low battery shutdown level. After a minimum delay of 30 seconds, the inverter will restart if the voltages rises above the low battery restart level.

After three restarts followed by a low battery shutdown within 30 seconds of restarting, the inverter will shutdown and stop retrying. The LEDs will signal low battery shutdown. To restart the inverter, switch it Off, and then On, or recharge the battery: as soon as the battery has risen and then stayed above the Charge detect level for 30 seconds, it will switch on.

See the Technical Data table for default low battery shutdown and restart levels. They can be changed with the VictronConnect App.

High battery voltage

Reduce DC input voltage and/or check for a faulty battery- or solar-charger in the system. After shutting down due to a high battery voltage, the inverter will first wait 30 seconds and then retry operation as soon as the battery voltage has dropped to acceptable level. The inverter will not stay off after multiple retries.

High temperature

A high ambient temperature or enduring high load may result in shut down to over temperature. The inverter will restart after 30 seconds. The inverter will not stay off after multiple retries. Reduce load and/or move inverter to better ventilated area.

High DC ripple

High DC ripple is usually caused by loose DC cable connections and/or too thin DC wiring. After the inverter has switched off due to high DC ripple voltage, it waits 30 seconds and then restarts.

After three restarts followed by a shutdown due to high DC ripple within 30 seconds of restarting, the inverter will shutdown and stops retrying. To restart the inverter, switch it Off and then On.

Continuous high DC ripple reduces the inverter life expectancy.

5. Technical data

Phoenix Inverter 12 Volt / 24 Volt / 48 Volt	12/250 24/250 48/250	12/375 24/375 48/375
Cont. power at 25 °C (1)	250 VA	375 VA
Cont. power at 25 °C / 40 °C	200 / 150 W	300 / 250 W
Peak power	350 W	700 W
Output AC voltage / frequency (adjustable)	230 VAC +/- 3% 50Hz or 60Hz +/- 0,1%	
Input voltage range	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0 VDC	
Low battery shut down (adjustable)	9,3 / 18,6 / 37,2 VDC	
Low battery restart & alarm (adjustable)	10,9 / 21,8 / 43,6 VDC	
Battery charged detect (adjustable)	14,0 / 28,0 / 56,0 VDC	
Max. efficiency	87 / 88 / 88 %	89 / 89 / 90 %
Zero-load power	4,2 / 5,2 / 7,9 W	5,6 / 6,1 / 8,5 W
Default zero-load power in ECO mode (default search interval: 2,5 s, adjustable)	0,8 / 1,3 / 2,5 W	0,9 / 1,4 / 2,6 W
ECO mode stop and start power setting	25 W	
Protection (2)	a - f	
Operating temperature range	-40 to +60°C (fan assisted cooling) (derate 3% per °C above 40°C)	
Humidity (non condensing)	max 95%	
ENCLOSURE		
Material & Colour	Steel chassis and plastic cover (blue Ral 5012)	
Battery-connection	Screw terminals	
Maximum cable cross-section	10 mm² / AWG8	10 mm² / AWG8
Standard AC outlets	Schuko (CEE 7/4), IEC-320 (male plug included) UK (BS 1363), AU/NZ (AS/NZS 3112)	
Protection category	IP 21	
Weight	2,4 kg / 5,3 lbs	3,0 kg / 6,6 lbs
Dimensions (hxwxd, mm) (hxwxd, inch)	86 x 165 x 260 3,4 x 6,5 x 10,2	86 x 165 x 260 3,4 x 6,5 x 10,2
ACCESSORIES		
Remote on-off	Yes	
Automatic transfer switch	Filax	
STANDARDS		
Safety	EN/IEC 60335-1 / EN/IEC 62109-1	
EMC	EN55014-1 / EN 55014-2 IEC 61000-6-1 / IEC 61000-6-3	
Automotive Directive	2004/104/EC EN 50498	

1) Nonlinear load, crest factor 3:1
2) Protection key:
   a) output short circuit
   b) overload
   c) battery voltage too high
   d) battery voltage too low
   e) temperature too high
   f) DC ripple too high

Fig 1: Front and rear view

Victron Energy Blue Power

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