



victron energy

**USER MANUAL
GEBRUIKSAANWIJZING
MODE D'EMPLOI
BEDIENUNGSANLEITUNG**

Phoenix 12/150

Phoenix 24/150

Phoenix 12/301

Phoenix 24/301



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INTRODUCTION

Victron Energy has established an international reputation as a leading designer and manufacturer of energy systems. Our R&D department is the driving force behind this reputation. It is continually seeking new ways of incorporating the latest technology in our products. Each step forward results in value-added technical and economical features.

Our proven philosophy has resulted in a full range of state-of-the-art equipment for the supply of electrical power. All our equipment meets the most stringent requirements.

Victron Energy energy systems provide you with high quality AC supplies at places where there are no permanent sources of mains power.

An automatic stand-alone power system can be created with a configuration comprising of a Victron Energy inverter, battery charger and last but not least, batteries with sufficient capacity.

Our equipment is suitable for countless situations in the field, on ships or other places where a mobile 230 or 115 Volt_{AC} power supply is indispensable.

Victron Energy has the ideal power source for all kinds of electrical appliances used for household, technical and industrial purposes, including instruments susceptible to interference. All of these applications require a high quality power supply in order to function properly.

Victron Energy Phoenix sine wave inverter

This manual contains instructions for installing the Ph 12/150, Ph 24/150, Ph 12/301 and Ph 24/301 sine wave inverters. It describes the functionality and operation of the Phoenix inverter, including its protective devices and other technical features.

Note: where the abbreviation 'Ph' is used please read 'Phoenix' instead.

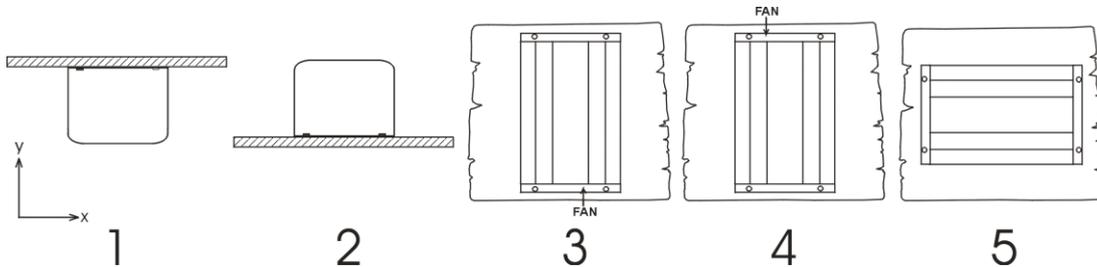
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1. INSTALLATION

1.1 Location of the inverter



- | | | |
|----|--|--|
| 1 | Ceiling mounting (inverted). | <i>Not recommended</i> |
| 2. | Base mounting. | OK |
| 3 | Vertical wall mounting, fan at bottom. | OK (beware of small objects falling through the ventilation openings on top). |
| 4 | Vertical wall mounting, fan on top. | <i>Not recommended</i> |
| 5 | Horizontal wall mounting. | OK |

For best operating results, the inverter should be placed on a flat surface. To ensure a trouble free operation of the inverter, it must be used in locations that meet the following requirements:

- Avoid any contact with water. Do not expose the inverter to rain or moisture.
- Do not place the unit in direct sunlight. Ambient air temperature should be between 0 °C and 40 °C (humidity < 95% non condensing). Note that in extreme situations the inverter's case temperature can exceed 70 °C.
- Do not obstruct the airflow around the inverter. Leave at least 10 centimetres clearance around the inverter. When the inverter is running too hot, it will shut down. When the inverter has reached a safe temperature level the unit will automatically restart again.

1.2 Battery requirements

For correct operation, the battery voltage should be between $0.88 \times V_{nom}$ and $1.25 \times V_{nom}$ where V_{nom} is 12V or 24V depending on the model, and must be able to supply sufficient current to your inverter. The following table displays the recommended battery capacity per inverter type :

Inverter type :	Iin at Pnom :	Recommended battery capacity:
Ph 12/150	15 A _{dc}	≥ 60Ah
Ph 24/150	7,5 A _{dc}	≥ 30Ah
Ph 12/301	30 A _{dc}	≥ 100Ah
Ph 24/301	15 A _{dc}	≥ 60Ah

The inverter shuts down when the battery voltage is below $0.88 \times V_{nom}$ or above $1.3 \times V_{nom}$.

Shut down and restart voltages:

Model	DC over voltage		DC under voltage	
	Shut down	Restart	Shut down	Restart
12 V models	15.3	14.8	10.5	12.5
24 V models	30.6	29.6	21.0	25.0

1.3 Connection to the battery

The Ph 12/150, Ph 24/150, Ph 12/301 and Ph 24/301 are equipped with two wires with a length of 1.5 meters. If it is unavoidable to extend these wires, use a wire gauge of at least 1.5 times larger than the ones supplied with the inverter. Maximum recommended battery wire length is approx. 3 meters.

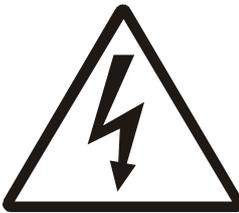
1.3.1 General precautions when working with batteries

1. Working in vicinity of a lead acid battery is dangerous. Batteries can generate explosive gases during operation. Never smoke or allow a spark or flame in the vicinity of a battery. Provide sufficient ventilation around the battery.
2. Wear eye and clothing protection. Avoid touching eyes while working near batteries. Wash your hands when done.
3. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 15 minutes and get medical attention immediately.
4. Be careful when using metal tools in vicinity of batteries. Dropping a metal tool onto a battery might cause a short-circuit battery and, possibly an explosion.
5. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery can produce a short-circuit current high enough to melt a ring or the like to metal, causing severe burns.

 <p>CAUTION</p>	<p>THE RED WIRE MUST BE CONNECTED TO THE POSITIVE (+) TERMINAL AND THE BLACK WIRE TO THE NEGATIVE (-) TERMINAL OF THE BATTERY.</p> <p>Reverse polarity connection of the battery wires can damage the inverter!</p> <p>Damage caused by reversed polarity is <u>not</u> covered by the warranty. Make sure the power switch is in the OFF '0' position before connecting the battery.</p>
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1.4 Connecting the load

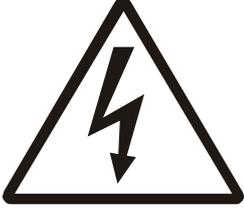
Before you connect your appliance(s) to the inverter, always check it's maximum power consumption. Do not connect appliances to the inverter needing more than the nominal power rating of the inverter continuously. Some appliances like motors or pumps, draw large inrush currents in a start-up situation. 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 and restart within 18 seconds. In this case it is advisable to disconnect the appliance from the inverter, since it requires too much power to be driven by this inverter. Note that at higher ambient temperature levels, the overload capacity of the inverter is reduced.

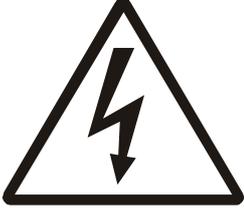
 <p>WARNING</p>	<p>WHEN CONNECTING MORE THAN ONE APPLIANCE TO THE INVERTER, IN COMBINATION WITH A COMPUTER, NOTE THAT IF ONE OF THE APPLIANCES DRAWS A HIGH START CURRENT, IT CAN CAUSE YOUR COMPUTER TO REBOOT DUE TO A SUDDEN VOLTAGE DROP.</p>
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 <p>CAUTION</p>	<p>NEVER CONNECT THE INVERTER'S OUTPUT TO THE AC DISTRIBUTION GRID, SUCH AS YOUR HOUSEHOLD AC WALL OUTLET. IT WILL DAMAGE THE INVERTER.</p>
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1.5 Turning the inverter on

When all the above requirements are checked and satisfied and all connections are made, it's time to turn on your Phoenix inverter by pushing the power switch to the ' On ' position.

	<p>IF THE INVERTER SWITCHES TO AN 'ERROR MODE' (SEE CHAPTER 2.1) DUE TO AN OVERLOAD OR SHORT CIRCUIT, THE INVERTER WILL AUTOMATICALLY RESTART AFTER ABOUT 18 SECONDS.</p> <p>In case of an over-temperature error, the inverter will automatically restart after it has reached an acceptable temperature</p> <p>NEVER TOUCH THE AC CONNECTIONS WHEN THE INVERTER IS STILL RUNNING IN AN ERROR MODE!</p>
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	<p>THE BUILT IN LARGE ELECTROLYTIC CAPACITORS CAN HOLD SIGNIFICANT DC VOLTAGE WHEN THE BATTERIES ARE DISCONNECTED.</p> <p>To avoid sparks or short inverter operation, it is advisable to switch on the inverter for 10 seconds after battery disconnection, before you transport the inverter.</p>
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2. TROUBLESHOOTING

2.1 The flash sequence table

Your Phoenix inverter is equipped with a self-diagnosis system, to inform you about the cause of inverter shut down
In the table below you can find out what kind of flashing sequence belongs to which error.

LED		Status
Solid green	—————	OK
Red, blinking fast	-----	Over voltage
Red, blinking slow	— — — —	Under voltage
Red, intermittent blinking	-- -- --	Over temperature
Solid red	—————	Overload

2.2 Troubleshooting guidelines

PROBLEM : Inverter is not working (LED OFF)	
<i>Possible cause :</i>	<i>Remedy :</i>
Power switch in OFF position.	Push the power switch to the ON position.
Poor contact between the inverter's battery wires and the battery terminals.	Clean battery terminals or inverter wire contacts. Tighten battery terminal screws.
Blown inverter fuse.	The inverter has to be returned for service.
Very poor battery condition.	Replace battery.

PROBLEM : ‘Battery voltage too low or too high’ error keeps on appearing

<i>Possible cause :</i>	<i>Remedy :</i>
Poor battery condition.	Replace battery or charge it first.
Poor connection or inadequate wiring between battery and inverter, resulting in too much voltage drop.	When extending the battery wires of the inverter make sure you use the correct wire gauge (≥ 1.5 times larger than the fixed battery wires). It's not advisable to extend the battery wires to more than 3 meters.
General failure in your electrical system (in case of no direct battery connection).	Check your electrical system or consult an electrical engineer to check it for you.

PROBLEM : ‘Overloaded or shorted output’ error keeps on appearing

<i>Possible cause :</i>	<i>Remedy :</i>
Inverter is overloaded.	Make sure that the total power rating of the connected equipment is lower than the nominal inverter power rating.
Connected equipment features a bad power factor	Reduce the required power consumption of the load. Please note that, for example, a computer load features a bad power factor, which causes a reduction of the maximum output power of the inverter by approx. 20%.
Connected equipment causes a short circuit at the inverter's output.	Make sure that the connected equipment is not broken or malfunctioning. Check if the AC power cord between the inverter and the connected equipment is OK. Any physical damage on the power cord can produce a short circuit. <i>Be careful!</i>

PROBLEM : ‘Inverter temperature too high. Cooling down’ error keeps on appearing

<i>Possible cause :</i>	<i>Remedy :</i>
Airflow around the inverter is obstructed.	Make sure there is at least 10 centimetres of clearance around the inverter. Remove any items placed on or over the inverter. Keep the inverter away from direct sunlight or heat producing equipment.
Too high ambient temperature.	Move the inverter to a cooler place or provide additional cooling by an external fan.

Note: Don't turn-off the inverter when it's operating in an 'Inverter temperature too high. Cooling down' error. The inverter needs this error time to cool down.

If none of the above remedies helps to solve the problem you encounter, contact your local Victron Energy distributor for further help and/or possible repair of your inverter. Do not open the inverter yourself, there are dangerous high voltages present inside. Opening the inverter will directly void your 12 months warranty period.

3. TECHNICAL DATA

Phoenix inverter	12/150	12/301	24/150	24/301
Input voltage range (V DC)	10,5 - 15,0	10,5 - 15,0	21,0 - 30,0	21,0 - 30,0
DC start voltage	12,5	12,5	25,0	25,0
Output voltage	230 V ± 5%			
Output frequency	50 Hz ± 0,3%			
Cont. power at 40 °C (W)	150	300	150	300
Peak power (W)	200	400	200	400
Max. efficiency (%)	91	92	92	93
Zero-load power (W)	2,2	2,8	3,8	3,8
Fan assisted cooling	Yes, temperature controlled			
Protection (3)	a - e			
Operating temperature range	-20 - 50°C			
Humidity (non condensing)	max 95%			
ENCLOSURE				
Material & Colour	aluminium (blue Ral 5012)			
Battery-connection	Battery cables of 1.5 meter			
230 V AC-connection	Schuko			
Protection category	IP 20			
Weight (kg)	2,7	3,5	2,7	3,5
Dimensions (hxwx d in mm)	72x132x200	72x155x237	72x132x200	72x155x237
ACCESSOIRES				
Remote on-off switch	Yes, connector available			
Recommended automatic transfer switch	Filax			
STANDARDS				
Safety	EN 60950			
Emission / Immunity	EN 50081-1, EN55014 / EN 55014-2			

1) 115 V AC on request
2) 60 Hz on request

3) Protection
a. Output short circuit
b. Overload
c. Battery voltage too high
d. Battery voltage too low
e. Over temperature

Stock number:

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