victron energie

USER MANUAL
GEBRUIKSAANWIJZING
GEBRAUCHSANWEISUNG

Victron Atlas 24/2500
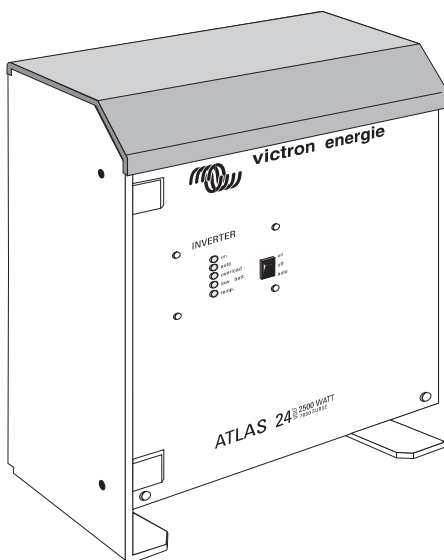
INVERTER

ATLAS 24 2500 WATT

victron energie

CE

SECTIONS

victron energie   CE

This page intentionally left blank.

INTRODUCTION

Victron Energie has established an international reputation as a leading designer and manufacturer of power 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-adding technical and economical features.

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

Victron Energie systems provide you with high-quality AC supplies in places where there are no permanent sources of mains power.

An automatic stand-alone power system can be created with a configuration comprising a Victron Energie inverter, battery charger, mains manager (if required) 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-Volt AC power supply is indispensable.

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

The ATLAS 24/2500 inverter
This manual contains directions for installing the Atlas 24/2500 inverter. It describes the functionality and operation of the inverter, including its protective devices and other technical features.

This page intentionally left blank.

CONTENTS

1. DESCRIPTION

1.1 General

All Victron Atlas 24/2500 inverters are tested to ensure correct functioning before leaving the factory. They are packed in shock-absorbing polystyrene and packed in sturdy cardboard boxes for secure transportation.

The Victron Atlas 24/2500 is housed in a robust aluminium cabinet (IP21) suitable for floor or wall mounting. The AC output terminals, the DC battery terminals and the terminals for a remote control switch (if used) must be connected to the underside of the inverter.

IP21=
protection against solid matter larger than 12 mm (e.g. a finger) and protection against vertically descending waterdrops (condensation).

1.2 Atlas inverter

These directions apply to the Atlas 24/2500. "Atlas" designates an inverter, "24" stands for 24 V and "2500" refers to a continuous output power of 2500 W.

The Atlas inverter converts a direct current of 24 V into an alternating current of 230 V_{rms} (5%), 50 Hz.

A full-load efficiency of 92% has been achieved through the use of low frequency switching techniques and FET transistors. The inverter's own power consumption (no-load consumption) is only 5 W in the AES mode.

Almost any electric or electronic device may be connected to the Atlas inverter.

Watt =
unit of power

Volt =
unit of voltage

Volt$_{rms}$ =
root mean square (effective value of alternating wave)

Hertz =
a unit of frequency

FET transistoren=
switching semiconductors

AES =
Automatic Economy Switch: energy-saving mode

This page intentionally left blank.

user manual CE victron energie

2. PROTECTIVE DEVICES

The Atlas 24/2500 inverter is extremely reliable thanks to numerous built-in protective devices. Descriptions of these devices are given below.
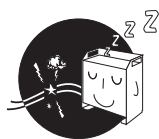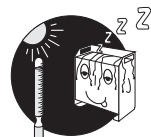
2.1 Short-circuits

The inverter's output is protected against short-circuiting. The short-circuit current is approximately 30 amps. In this condition the output voltage approaches 0 V. Once the short-circuit has been rectified the inverter immediately resumes normal operation. This eliminates the need to fit a fuse in the inverter's output circuit.

2.2 Maximum power

The inverter delivers a maximum power of 7000 W. This level is limited electronically and can be delivered for approximately one second.

2.3 Temperature

The temperature of the electronics is measured continuously. The inverter switches off before the temperature reaches an unacceptably high level due to short-circuiting, overloading or excessive ambient temperatures. The red "temperature" LED lights up when this situation occurs and the inverter restarts automatically once the temperature has dropped to an acceptable level.
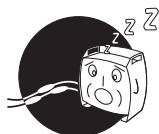
2.4 Overload

Overload protection is activated whenever a load greater than 4000 W is connected to the inverter.
(p.t.o. for continuation)

This takes place in the following way:

❐ The red "overload" LED flashes to indicate an over-load. The inverter switches off after a few seconds (the exact time depends on the magnitude of the overload) and the LED lights continuously.

❐ Once the load drops below 4000 W, the inverter resumes normal operation and the "overload" LED goes out.

❐ If the inverter is switched off and the load drops below 4000 W, the inverter restarts after about 30 seconds and full power can be delivered.

2.5 Low input voltage

The inverter switches off if the input voltage drops below 18 V_{DC} and restarts once the input voltage has risen to 22 V_{DC}.
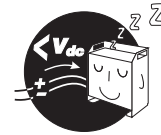
2.6 High input voltage

The inverter switches off if the input voltage rises above 33 V_{DC} and restarts once the input voltage has dropped to 31 V_{DC}.
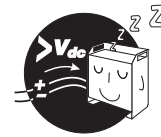
2.7 Reversed polarity

The Atlas 24/2500 is not protected against reversed polarity (i.e. "+" connected to "-" and "-" connected to "+"). The inverter will be damaged if polarity has been reversed at the input. This dmage does not fall within the guarantee conditions.

AC =
Alternating Current.

DC =
Direct Current.

user manual   CE   victron energie
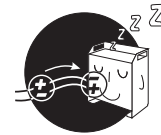
3. INSTALLATION

3.1 Materials

The following materials are needed to install the Atlas inverter:
❒   two cables, 35 mm, maximum length 6 m, fitted with battery clamps.

3.2 Location

Install the inverter in a dry area with good ventilation.
Note: High ambient temperatures will reduce output power, impair efficiency and shorten working life (see specifications).
The Atlas 24/2500 may be fitted to a wall or any horizontal surface. Ensure ventilation is adequate for the forced cooling and the heat generated by the continuous power. Make sure you will have easy access to the inside of the inverter after it has been installed.Keep the distance between the inverter and the battery as short as possible.

3.3 Connections

3.3.1 Earth

Underside Atlas inverter

Earth connection (M5)
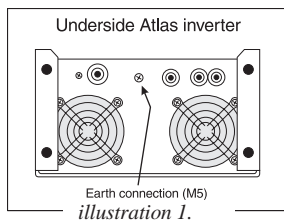*illustration 1.*

Connect the mains earth wire to the earth of the AC output terminal block. This circuit is functional only if the cabinet is connected to earth.
In the bottom of the cabinet there is an M5 earth screw (see illustration 1). Connect the cabinet earth terminal to earth. The earth for vessels is the hull or earth plate; for motor vehicles it is the chassis.

> **The inverter will be damaged if another alternating current (e.g. from a generator) is connected to the 230 V output.**

3.3.2 230 V$_{AC}$
A three-wire cable may be used to connect the equipment at the 230 V output. Use a cable with a flexible core. A wire diameter of 6 mm is sufficient. The output current is limited to approximately 30 amp. This eliminates the need to fit a fuse in the 220 V output circuit.

3.3.3 Battery

The functioning and working life of equipment and batteries depends on the battery connections being made correctly. The terminals for the 24 V$_{DC}$ input are located at the bottom of the cabinet, see illustration 2.

Between the battery and inverter there is a circuit with a low voltage and high current. Resistance decreases accordingly as cables become shorter and thicker. The combined resistance of the two cables must not exceed 4 milliohms.
Distances to batteries:

length of cables	
shorter than 1.5 m	25 mm
longer than 1.5 m	35 mm

3.3.4 Connection of the battery cables

Before the battery is connected make sure that the bridge is removed which is located on the PCB (see drawing 2). Connect the battery cables correctly, i.e. with the positive pole (red or "+") to the left and the negative pole (black or "-") to the right. Make sure these connections are tight. If the Atlas inverter has been incorrectly connected, the red

230 Volt connection
remote control connection
battery connection
bridge

illustration 2. Connections of Atlas 24/2500

"wrong" LED on the PCB will immediately light up. If this occurs, change around the cables of the positive and negative poles. The inverter has been connected to the battery correctly if the green "right" LED lights up after a few seconds.
After both battery cables have been connected correctly (and the green LED lights), you can fit the bridge, which can be found in the bag with connection material.

> **Warning: the inverter will be damaged if the battery cables are connected incorrectly and the bridge is fitted. This damage will not be covered by the guarantee**

3.3.5 Protection of battery cables

The battery cables are not protected by fuses and it is advisable to fit a 200 amp delayed-action fuse in the cables. Avoid contact resistances by connecting the battery cables by means of the cable lugs supplied with the equipment.

4.1 Operation

INVERTER

○ on
○ auto
○ overload   on
○ low batt.   off
○ temp.   auto

illustration 3. Location of LEDs and switches on the front

The switches and LEDs of the Atlas 24/2500 are located on the front of the inverter (see illustration 3).

4.2 "On" position

Start the inverter by setting the "inverter" switch to the "on" position. The "on" LED lights up if an output voltage is present.

4.3 "Auto" position

***LED =*
Light Emitting Diode

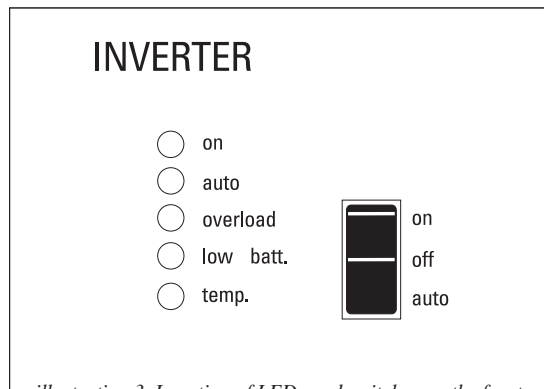If the "inverter" switch is set to "auto", the "auto" LED lights up if no load is connected to the inverter. The inverter starts as soon as the load at the output rises above approximately 10 W. The "auto" LED goes out and "on" lights up. If the load is switched off, the inverter automatically returns to the "auto" mode and the "auto" LED lights up again.

4.4 High temperature

The "temperature" LED lights up if the FETs become too hot as a result of a short-circuit at the output, unacceptably high ambient temperatures or prolonged overloading. The inverter switches off under these conditions. It restarts once the temperature has dropped to an acceptable level.

4.5 Overload

The "overload" LED flashes if the inverter is subjected to unacceptable overloading. The inverter switches off under these conditions. It restarts once the load has dropped to an acceptable level and the electronics have cooled down.

4.6 Low battery voltage

The battery voltage is too low if the "low batt" LED lights up after the inverter has been started. The low voltage may be due to circumstances such as:

❐   a discharged battery;
❐   a low battery capacity with an extremely high battery load which results in a sharp drop in terminal voltage;
❐   a low battery capacity whereby the delivered power is too high;
❐   poor batteries with different acidities.

Under these conditions the inverter switches off. It restarts once the input voltage has risen to an acceptable level. Also refer to sections 2.5 and 2.6.

4.7 Remote control

A remote control may be fitted to switch the inverter on and off and to read out the LEDs. A multi-wire cable must be connected to the "remote connector" for this purpose (see illustration 4).
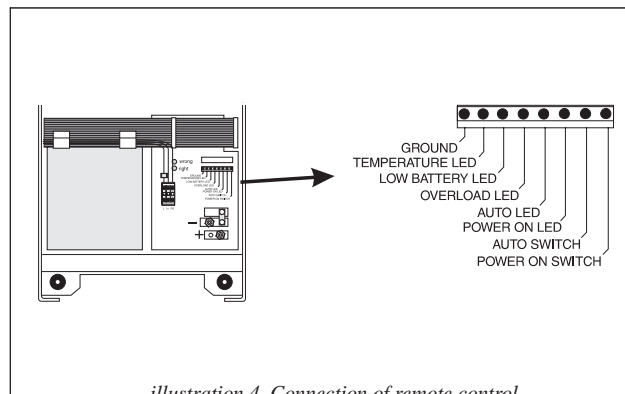
illustration 4. Connection of remote control

4.8 Adjustments

Open the cabinet by removing the four outer screws on the front (see illustration 5). The terminals can be reached through the hinged door which opens to the left.

illustration 5. Opening the cabinet
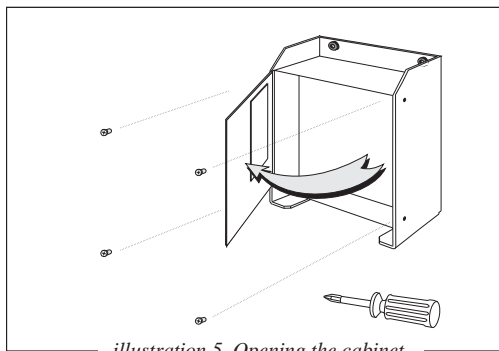
The adjustment points for frequency, output voltage and switching sensitivity (of the "auto" mode) are on the PCB of the inverter. They are situated inside to the right of the door (see illustration 6).

See section 4.10 for general information about potentiometers

4.8.1 Frequency

The frequency is set to a standard value of 50 Hz. The output frequency may be adjusted by turning potentiometer R4 to the left ("-") or right ("+"). See illustration 6 for the location of potentiometer R4.

illustration 6. Adjustment points on PCB of inverter
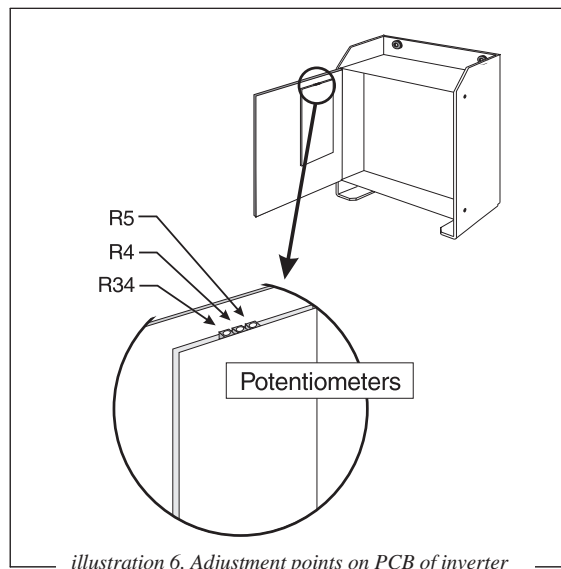
4.8.2 Output voltage

The output voltage is set to a standard value of 230 V_{rms} at a load of 2500 W and an input voltage of 24 V. The unloaded output voltage is approximately 235 V_{rms}. The output voltage may be adjusted by turning potentiometer R5 to the left ("-") or right ("+"). See illustration 6 for the location of potentiometer R5.

4.8.3 Switch-on sensitivity on "auto"

If the Atlas inverter fails to start when a connected appliance requests power, the AES sensitivity may be increased by turning potentiometer R34 (see illustration 6) to the right ("+"). Check whether the inverter returns to "auto" when the appliance stops drawing power.

4.9 Maintenance

The Atlas 24/2500 does not require any special maintenance. It is advisable to check the electrical connections periodically (once a year). Keep the inverter as dry and clean as possible.

4.10 Potentiometers

Potentiometers are adjustable resistors. Turning the screw increases or reduces the values associated within the potentiometer.

These values may concern matters such as voltage, frequency or switch-on sensitivity. The screw must be turned by means of a screwdriver (No. 0) and sealed with Tipex or nail polish. See also illustration 7.
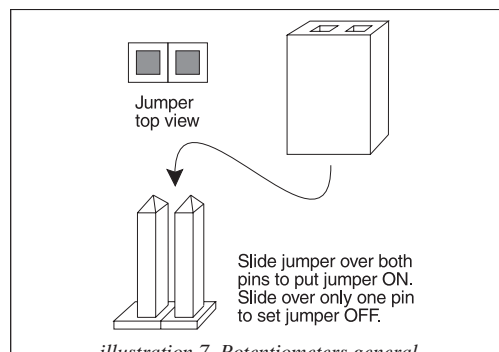

Jumper
top view

Slide jumper over both pins to put jumper ON. Slide over only one pin to set jumper OFF.

illustration 7. Potentiometers general

5. FAULT TRACING LIST

5.1 General

This list will facilitate the rapid tracing of the most common types of faults.

Before performing checks on the Atlas 24/2500 you must:

❒ disconnect all 24 V external equipment from the batteries;

❒ bear in mind that some equipment (such as certain TV sets, video recorders, audio equipment, measuring instruments and navigation equipment) requires sine-wave voltage in order to function correctly. Victron Energie supplies its series of Phoenix sinusoidal inverters with powers of 350 W to 1500 W for this type of equipment.

Two fault situations are described below:

❒ The inverter fails to start.

❒ The AC output voltage is too low.

5.2 The inverter fails to start.

Step 1   Set the "inverter" switch to "on" and check whether the green "on" LED lights up.
Go to step 2.

Step 2   The following events may occur:
❒ the green "on" LED does NOT light up.
❒ the "overload" LED starts to flash and after a few seconds goes out.
❒ the inverter produces only a humming sound.
If so, remove the load from the inverter and go to step 3.

Step 3   Check whether the "on" LED now lights. If so, the problem has been solved. The cause of the problem was:
an unacceptably high load that was connected to the output of the inverter.
If the green "on" LED does not light and the inverter does not start without a load, go to step 4.

Step 4	Check the input voltage of the batteries on the terminals of the Atlas inverter. The input voltage should be between 18 Volt and 33 Volt. Go to step 5 if the input voltage does not fall between these minimum and maximum values. If the input voltage is correct, go to step 7.
Step 5	Check the 24 V connecting cables are properly connected and the wires are of a sufficient diameter. Rectify the situation if the connecting cables are not properly connected or the wire diameters are not in conformity with the specifications. If this action does not solve the problem, go to step 6.
Step 6	The batteries must be charged. Go to step 7 if the batteries have been sufficiently charged or recharged but the inverter does not start.
Step 7	Check whether the plus ("+") and minus ("-") of the batteries and inverter correspond. Go to step 8.
Step 8	Take the following action if the plus ("+") and minus ("-") of the batteries and inverter do not correspond:

❏ Switch off the inverter.
❏ Connect up the correct poles of the batteries and inverter.
❏ If installed, check the input fuse(s) and replace if necessary.

The problem has been solved if the inverter now starts. Go to step 9 if the inverter fails to start.

Step 9	Contact your Victron dealer to have the inverter repaired.

5.3 The AC output voltage is too low.

Step 1	Measure the AC output voltage with an RMS voltmeter. Go to step 2 if the output voltage is too low.
Step 2	Turn potentiometer P1 (see 4.7, "Adjustments") to the left and check whether the voltage returns to the normal value. If not, go to step 3.
Step 3	Contact your Victron dealer to have the inverter repaired.

C€   ⦿⦿ **victron energie**

6. SPECIFICATIONS

6.1 Input

Nominal input voltage:	24	V_{DC}
Input voltage range:	18-33	V_{DC}
Switch-on voltage:		
low :	22	V_{DC}
high:	31	V_{DC}
Switch-off voltage:		
low :	18	V_{DC}
high:	33	V_{DC}
Voltage ripple:	maximum 5% rms	
Nominal input current:	120	amp
Maximum input current:	420	amp
No-load in "on" mode:	55	W

6.2 Output

Output voltage:	230 $V_{AC} \pm 5\%$
Frequency:	50 Hz; $\pm$ 1 Hz
Waveform of output voltage:	trapezoidal (modified sine-wave)
Power factor:	0.9 capacitive to 0.6 inductive
Nominal power:	2500 W (power factor = 1.0) -10°C / +25°C. At high ambient temperatures the power is readjusted automatically.
Temporary maximum power:	5000 W for approx. 3 sec 3500 W for approx. 10 min (power factor = 1.0)
Switch-on behaviour:	The inverter can start under any load conditions. The nominal output voltage is reached in 50 msec.
Efficiency:	92% at a nominal power of 50% to 100%.
Dynamic stability:	Maximum surges of 10% when switching on and off at 50% nominal load. Recovery time is $\frac{1}{2}$ period.
Overload protection:	The delivered power is limited electronically to 280% of the continuous power at the nominal input voltage.

Short-circuit protection:	The output is short-circuit proof. The short-circuit current is 30 amp.
Ambient temperature protection:	Sensors measure the temperature of critical components. The sensors switch off the inverter if the temperature on the FETs rises above 80°C and/or the transformer temperature rises above 110°C. The inverter restarts automatically after the components have cooled down.
High/low input voltage protection:	The inverter switches off automatically at values above 33 V_{DC} and below 18 V_{DC}.
Insulation voltage of output to earth:	no breakdown at 2.5 kV_{AC}

Insulation resistance:

input and output to earth:	500 M ohm with 500 V_{DC}
input and output mutually:	500 M ohm with 500 V_{DC}

EMC: Electro-magnetic compatability according Council Directive 89/336 EEC:

Emission	EN 55014 (1993)
	EN 60555-2 (1986)
Immunity	EN 50082-1 (1991)

6.3 Mechanical data

Cabinet:	luminium, seawater resistant
Protection class:	IP 21
Colour:	blue (RAL 5012), epoxy
Dimensions (H x W x D):	420 x 300 x 240 mm
Weight:	30 kg

Connecting points:

output 220 V_{AC}:	AC output on connecting PCB
input 12/24 V_{DC}:	M8 bolts on connecting PCB
remote control:	connector of connecting PCB
earth:	M5 screw

Cooling:	aluminium cooling body
Noise level:	40 dB(A)
Relative humidity:	maximum 95%

7. Drawings

starter batteries

engine

service batteries

victron energie

INVERTER

ATLAS 24 2500 WATT SURGE

Victron Atlas inverter

SKYLLA

victron energie

Victron Skylla
battery charger

24 V dc
on-board
system

ORION

victron energie

12 V dc
on-board
system

Victron Orion
dc-dc inverter

VICTRON MAINS MANAGER

victron energie

Victron
Mains Manager

220 V generator

shore

computer

television set

lighting

© victron energie b.v.	complete VICTRON ENERGIE system with Atlas 24/2500 inverter	drawing no.: CE310 date : 040893

© victron energie b.v.	Victron Atlas 24/2500 cabinet dimensions

drawing no.: CE311
date : 040893

This page intentionally left blank.

user manual CE victron energie