# TABLE OF CONTENTS

1. EXPLANATION OF SYMBOLS ................................................................. 01
2. GENERAL SAFETY INSTRUCTIONS .................................................... 01
3. INTRODUCTION .............................................................................. 04
4. INSTALLATION ............................................................................... 04
5. IN USE .......................................................................................... 08
6. PROTECTIONS ............................................................................... 09
7. TROUBLE SHOOTING .................................................................... 10
8. ACCESSORIES ............................................................................... 12
9. MAINTENANCE ............................................................................... 12
10. WARRANTY AND SERVICE .............................................................. 12
**1. EXPLANATION OF SYMBOLS**

**DANGER!**
Safety instruction: Failure to observe this instruction will cause fatal or serious injury.

**WARNING!**
Safety instruction: Failure to observe this instruction can cause fatal or serious injury.

**NOTICE!**
Failure to observe this instruction can cause material damage and impair the function of the product.

**NOTE**
Supplementary information for operating the product.

**2. GENERAL SAFETY INSTRUCTIONS**

**2.1 General safety**

The manufacturer accepts no liability for damage in the following cases:
- Faulty assembly or connection.
- Damage to the product resulting from mechanical influences and incorrect connection voltage.
- Alterations to the product without express permission from the manufacturer.
- Use for purposes other than those described in the operating manual.

Note the following basic safety information when using electrical devices to protect against:
- Electric shock
- Fire hazards
- Injury

**2.2 General safety**

**DANGER!**
- In the event of fire, use a fire extinguisher which is suitable for electrical devices.

**WARNING!**
- Only use the device as intended.
- Ensure that the red and black terminals never come into contact.
- Disconnect the device from the power supply:
  - Before cleaning and maintenance
  - Before changing a fuse
- If you disassemble the device:
  - Detach all connections

Make sure that no voltage is present at any of the inputs and outputs:
- The device may not be used if the device itself or the connection cable are visibly damaged.
- If this power cable for this device is damaged, it must be replaced by the manufacturer, customer service or a similarly qualified person in order to prevent safety hazards.
- This device may only be repaired by qualified personnel. Inadequate repairs may cause serious hazards.
- This device can be used by children aged 8 years or over, as well as by persons with diminished physical, sensory or mental capacities or a lack of experience and/or knowledge, providing they are supervised or have been taught how to use the device safely and are aware of the resulting risks.
- Electrical devices are not toys.

Always keep and use the appliance out of the reach of children.
- Children must be supervised to ensure that they do not play with the device.

**NOTICE!**
- Before start-up, check that the voltage specification on the type plate is the same as that of the power supply.
- Ensure that other objects cannot cause a short circuit at the contacts of the device.
- Never pull the plug out of the socket by the connection cable.
- Store the device in a dry and cool place.

**2.3 Safety when installing the device**

**DANGER!**
- Never mount the device anywhere where there is a risk of gas or dust explosion.

**CAUTION!**
- Ensure that the device is standing firmly.
- The device must be set up and fastened in such a way that it cannot tip over or fall down.

**NOTICE!**
- Do not expose the device to a heat source (such as direct sunlight or heating). Avoid additional heating of the device in this way.
- Set up the device in a dry location where it is protected against splashing water.
- 2.4 Safety when connecting the device electronically

DANGER! Danger of electrocution

- If you are working on electrical systems, ensure that there is somebody close at hand who can help you in emergencies.

WARNING!

- Make sure that the lead has a sufficient cross-section.
- Lay the cables so that they cannot be damaged by the doors or the bonnet.
- Crushed cables can lead to serious injury.

CAUTION!

- Lay the cables so that they cannot be tripped over or damaged.

NOTICE!

- Use duct-work or cable ducts if it is necessary to lay cables though metal panels or other panels with sharp edges.
- Do not lay the 230 V mains cable and the 12 V DC cable in the same duct.
- Do not lay the cable so that it is loose or heavily kinked.
- Fasten the cables securely.
- Do not pull on the cables.

- 2.5 Operating the device safely

DANGER! Danger of electrocution

- Do not touch exposed cables with your bare hands.

WARNING!

- Only use the device in closed, well-ventilated rooms.

CAUTION!

- Do not operate the device
  - In saffy, wet or damp environments
  - In the vicinity of corrosive fumes
  - In the vicinity of combustible materials
  - In areas where there is a danger of explosions.
- Before starting the device, ensure that the power supply line and the plug are dry.
- Always disconnect the power supply when working on the device.
- Please observe that parts of the device may still conduct voltage even if the fuse has blown.
- Do not disconnect any cables when the device is still in use.

NOTICE!

- Make sure the air inlets and outlets of the device are not covered.
- Ensure good ventilation.

---

3. Introduction

Read this user manual completely before using the device. In the appendices you will find the technical specifications of the pure sine wave power inverters.

This DC-AC inverter converts a 12 or a 24 Volts DC voltage into a AC voltage with a pure sine wave (100-127V/220-240VAC). With this device it is possible, with use of the right battery, to supply equipment that normally requires a mains supply.

Important

Always check the actual power rating of the equipment (power consumption). In addition, bear in mind the surge powers. These (start-up) peaks can be as much as 5-7 times the continuous power consumption. Check whether these values are within the capacity limits of the inverter. Equipment with high surge power are for example: air conditioning, vacuum cleaner, tools and pumps. If you want to use multiple equipment at the same time, then add up the power consumption.

4. Installation

- 4.1 Mounting

The inverter must be mounted in a space that complies with the following:

- Mount the inverter in a dry place where there is no chance of it being affected by moisture or dirt. Also be aware of moisture or dirt that can be sucked in by the fan.
- Leave enough space on all sides of the inverter (min. 10cm) for air circulation. Make sure that there are ventilation vents.
- The ambient temperature must be between 0ºC and 40ºC. Ideal is between 15ºC and 25ºC.
- Keep the inverter out of the reach of children.
- A working inverter produces a dangerous voltage.
- Do not use the inverter in places where gases are released or flammable materials are stored.
- The distance between inverter and battery should be as short as possible, but place the inverter in a separate room.
- Place the inverter on a stable underground and prevent (heavy) vibrations and shocks.

- 4.2 Connection with the battery

Important

- Before connecting to the battery, make sure that the inverter is turned off.
- When the battery is connected a spark may be generated due to the internal capacitor being loaded.

Preferably use the supplied battery cable set. If you want this inverter to have a permanent connection to the battery, we recommend replacing the clamps with terminal rings. For the other models, the connections to the battery already consist of terminal rings. With the models RS-2000PS and RS-3000PS two red and two black cables are included. In this case, always connect both cables on the + and - side!
4.INSTALLATION

If you wish to use an own cable set, keep the cables as short as possible and ensure the connections make good contact. Below formula indicates the required cable thickness:

\[(\text{Watt/voltage}) \times \text{length in meters} \times 0.2 = \text{cable in mmq}\]

Example: \((1500W/12V) \times 2 \text{ meters} \times 0.2 = 50\text{mmq}\)

Working method:

1. Connect the cables to the inverter first:
   - the red cable to the red + input connection. The black cable to the black – input connection. Tighten the connections firmly.
2. Connect the other side of the cable to the battery:
   - The red cable to the + pole of the battery. The black cable to the – pole of the battery.

**Important**

Make sure that you connect the correct cable to the correct pole! The inverter can become broken in this case. The repair costs are not covered by the guarantee.

**Grounding**

The AC output ground wire should be connected with the grounding point for the connected equipment. Also wire the ‘ground’ connection on the inverter with the chassis of the vehicle or the minus (6mmq wire).

4.3 Connection with the equipment

All inverters from the series have a socket for the connection of the 110/230VAC equipment. The models from 1500Watt have double sockets. When connecting multiple users it is important that the total load (Watts) and surge powers fall within the capacity specifications of the inverter.

**Important**

- If the surge power is exceeded, the inverter will become heavily damaged. Repair costs will not be covered by warranty.
- Don’t mount the cables against the housing of the inverter.

---

4.INSTALLATION

-4.4 The inverter in combination with other AC power supplies

In many situations it is desirable that the equipment will work on the mains supply (or generator) when this is available. The inverter and mains supply (or generator) then become one circuit. Pay attention to the following:

**Important**

At the presence of a second power supply (mains, generator) this 110/230VAC will be parallel on the output of the inverter. This will damage the inverter heavily. The repair costs are not covered by warranty. If you want the equipment to work on both an inverter and a second power source, then mount the power transfer switch. Important feature is that this power transfer switch is bipolar.

The power transfer box takes care of automatic switch between the two 110/230VAC circuits, without any intervention for the connected equipment. A back-up system also can be created this way.

---

**Diagram:**

- DC SIDE
- AC SIDE

**User**

**Mains or Generator**

**Battery**

**Power Inverter**

**Fuse or Circuit breaker**

** Batteries Charging from Commercial AC-DC, Engine, Solar, etc... **

---

**Diagram:**

- BM-01: DC Side
- BM-02: AC Side
5. IN USE

Check that the cables are mounted correctly. Never use the inverter when the cables are damaged. Set the power switch to “ON” position.

A warm housing is normal when the inverter is operating.

If you will not be using the inverter for a significant period (during winter storage for example), we recommend disconnecting it from the battery.

5.1 LED indications

- ‘power’ (green) Battery connected and the on/off switch is in ‘on’ position
- ‘fault’ (red) Fault occurred on the input side or internal temperature
- ‘fault’ (red, blinking) Fault occurred on the output side.

In case of a fault, consult the chapter ‘protections’ and the trouble shooter.

5.2 LCD Remote control

If the remote controller CRD99 is connected, it is important that the main switch of the inverter is in the ‘off’ position. After this, the inverter can be switched on and off by using the remote control.

It displays the battery voltage(V), output power(W), battery capacity(Ah), lower voltage protection, over voltage protection, over load protection, over temperature protection.

5.3 Fan

The fan is both temperature- and load controlled. At a certain load level, depending per model, the fan will switch on automatically. Also at an internal high temperature the fan will switch on automatically.

5.4 AC output terminals (3000W up)

Please need to pay attention that the max. Current do not exceed 20A.
6. PROTECTIONS

-6.1 Pre-warning (buzzer)
If the input voltage is becoming low, the inverter will emit an acoustic signal as a warning.

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Activation</th>
<th>De-activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>12Volt models</td>
<td>10.5Vdc+/-.5</td>
<td>11.5Vdc+/-.2</td>
</tr>
<tr>
<td>24Volt models</td>
<td>21Vdc+/-.5</td>
<td>23Vdc+/-.2</td>
</tr>
<tr>
<td>48Volt models</td>
<td>42Vdc+/-.5</td>
<td>46Vdc+/-.2</td>
</tr>
</tbody>
</table>

-6.2 Low voltage protection.
If, after the pre-warning, the input voltage still drops further, the low voltage protection will eventually take effect. The 230VAC output is shut down and the red indicator ‘fault’ will light. The buzzer will also continue to sound. If the input voltage has risen again sufficiently, the inverter will automatically restart.

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Shut down</th>
<th>Auto-restart</th>
</tr>
</thead>
<tbody>
<tr>
<td>12Volt models</td>
<td>10.0Vdc+/-.5</td>
<td>12.6Vdc+/-.2</td>
</tr>
<tr>
<td>24Volt models</td>
<td>20Vdc+/-.5</td>
<td>25.2Vdc+/-.2</td>
</tr>
<tr>
<td>48Volt models</td>
<td>40.0Vdc+/-.5</td>
<td>50.4Vdc+/-.2</td>
</tr>
</tbody>
</table>

-6.3 Over voltage protection
If the input voltage rises too high, the overvoltage protection will come into effect. The 230VAC output is shut down and the red ‘fault’ LED lights up. If the input voltage has dropped sufficiently, the inverter will automatically restart.

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Shut down</th>
<th>Auto-restart</th>
</tr>
</thead>
<tbody>
<tr>
<td>12Volt models</td>
<td>15.5Vdc+/-.5</td>
<td>12.6Vdc+/-.2</td>
</tr>
<tr>
<td>24Volt models</td>
<td>31Vdc+/-.5</td>
<td>25.2Vdc+/-.2</td>
</tr>
<tr>
<td>48Volt models</td>
<td>62Vdc+/-.5</td>
<td>50.4Vdc+/-.2</td>
</tr>
</tbody>
</table>

Important
The maximum input voltage that the inverter can tolerate is 16 Volts/32Volts. If the voltage that is supplied is higher than this, then the inverter will break. In this case the repair costs are not covered by warranty.

-6.4 Temperature protection
If the cooling provided by the fan is insufficient, the temperature protection will be activated. The inverter will shut down the 110/230VAC output and the red ‘fault’ indicator will light. Once the inverter has cooled down sufficiently, it will restart automatically.

7. TROUBLE SHOOTING

-6.5 Short-circuit on the output
The inverter will switch off the 110/230VAC output voltage if there is a short-circuit of the output. During this protection, the red ‘fault’ led will flash slowly. The inverter will restart automatically, once the problem has been resolved.

-6.6 Overload protection
The inverter will shut down the 110/230VAC output if the requested power on the output is higher than the continuous power of the inverter. The red ‘fault’ indicator will flash slowly. The inverter will restart automatically, once the problem has been resolved.

Important
The overload protection only works with the maximum power and not with the surge power. If the surge power of the inverter is exceeded then the inverter will break! In this case the repair costs are not covered by warranty.

<table>
<thead>
<tr>
<th>Problem</th>
<th>(Possible) Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>A buzzer sounds</td>
<td>The input voltage is becoming too low</td>
<td>Charge the battery.</td>
</tr>
<tr>
<td>Red indicator ‘fault’ lights</td>
<td>Problem at the input side. Battery voltage too low or too high. The 230VAC output is shut down.</td>
<td>Check the input voltage. Make sure that this value falls between specifications of the inverter. The inverter will re-start automatically when the input voltage is between the limits again.</td>
</tr>
</tbody>
</table>
| Red indicator ‘fault’ blinks slowly | Temperature protection active | - check that the fan is working and that the inverter has sufficient ventilation possibilities
- inverter is located in a location with a high ambient temperature. Place the inverter in a cooler environment.
- reduce the load. |

Important
There is a short-circuit or overload. Check the consumers on faults and the height of the total load. When the problem has been resolved, the inverter will restart automatically.
7. TROUBLE SHOOTING

<table>
<thead>
<tr>
<th>Problem</th>
<th>(Possible) Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery capacity too low to supply the requested power.</td>
<td></td>
<td>Connect a higher capacity battery (set).</td>
</tr>
<tr>
<td>Weak connection between battery and inverter.</td>
<td></td>
<td>Check all connections and cables.</td>
</tr>
<tr>
<td>The cables used are too thin.</td>
<td></td>
<td>Mount cables matching the length and capacity.</td>
</tr>
<tr>
<td>The requested power is more than the inverter can deliver.</td>
<td></td>
<td>Check the consumption of the connected equipment. Make sure that this falls within the specifications of the inverter.</td>
</tr>
<tr>
<td>No input voltage present.</td>
<td></td>
<td>Check the connections between battery and inverter.</td>
</tr>
<tr>
<td>External fuses in battery cable defective.</td>
<td></td>
<td>Replace the fuses (only equivalent values)</td>
</tr>
<tr>
<td>Input voltage below the minimal value.</td>
<td></td>
<td>Battery voltage too low or battery defective.</td>
</tr>
</tbody>
</table>
| Input voltage higher than the maximum value. | | - Check if the system-voltage matches with the inverter. 
- Check the system on DC power supplies that give a too high voltage. |
| Internal defect | | When after checking the total system the inverter still doesn't work, it can be send back for repair. |
| Connected equipment gives disturbance. | | When after checking the total system the inverter still doesn't work, it can be send back for repair. |
| 'Power' led lights, but the connected equipment does not work | | Check the connections between battery and inverter. |
| 'Ground' not connected | | Connect the 'ground' connection of the inverter to the chassis of the vehicle or the minus. |
| Cabling is against the housing of the inverter. | | Make sure that the cables do not touch the housing of the inverter. |

8. ACCESSORIES

CRD99
Plug and play remote control with:
On/ off switch; working status LCD and error display

9. MAINTENANCE

To keep your inverter operating properly, there is very little maintenance required. You should clean the exterior periodically with a damp cloth to prevent accumulation of dust and dirt. Also check periodically:
- all wires and connections. Replace damaged wires immediately.
- the ventilation vents
ATTENTION: turn off the inverter before you start the maintenance activities!

10. WARRANTY AND SERVICE

Before sending back the inverter, always advice the Trouble Shooter and other information in this manual firstly. If a problem could have been solved by means of this manual, we are obligated to charge the repair/research costs. In case of a malfunction, the inverter can be send to us directly or you can choose to arrange the return with your dealer. Always include your contact details and description of the problem. The inverter must be send prepaid. Inverters carry a two-year warranty from selling date. The warranty period is only valid when the (copy) purchase ticket is handed over with the repair. The warranty only covers the costs of parts and labor for the repair. The warranty will lapse when a third party has attempted to repair the inverter or when the inverter is not installed or used in accordance with the instructions. Do not attempt to repair the inverter yourselves.

The use of this inverter is the responsibility of the customer. The manufacturer and importer cannot be held responsible for any damage resulting from use of the inverter.