

MPPT RS, Multi RS and Inverter RS safety information

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We have identified that under certain conditions, RS models have an increased risk of failure, electrical arcing and in the worst cases, the combustion of internal components. These failures have all been observed in conditions of excessive conductive fouling.

In most cases this occurred in installations close to the coast and installed such that the unit was exposed to condensing salty humidity. For example, in garages in coastal South Africa and Australia, where warm humid ocean air rolls in in the morning onto a cold unit, causing condensation and build-up of salt over time. In a few other cases, it was due to other conductive fouling, such as soot from genset exhaust gases.

We therefore recommend that installations be checked against the requirements laid out in the Appendix, as explained further below.

The RS product manuals will be updated with more details to emphasise the installation requirements, particularly in relation to the heat-resistant environment in which equipment should be installed.

Recommended action

1. Ensure that the installation meets the installation requirements in the Appendix:
 - This is particularly important for RS products installed in a location with an increased risk of excessive conductive fouling (condensation, dust, soot), especially units close to the coast with salty condensation.
2. Ensure that installation locations, especially below and above the RS products, are free of flammable materials, as further detailed in the updated manuals.

External PV disconnection

In addition, it is important that all MPPT RS units have an external PV disconnection device installed. During the investigation of these failures, we have identified several installations that do not have a proper PV disconnection device: a switch, breaker or fuse-disconnect rated and suitable to disconnect at least 450V DC. This does not apply to the Multi RS, as it has a built in PV disconnection switch.

Production and availability

We have temporarily stopped the production of all RS equipment while the design is adjusted. We expect supply to resume within 3-5 months. Also, as previously communicated, the MC4 models will be the only models available once supply resumes.

Applicability

Note that this document is intended for Victron distributors and installers. In case you are an end-user, then please contact your dealer.

Appendix 1. – Installation Requirements

This appendix serves to highlight installation requirements from the RS product manuals. Installers are expected to still reference the manuals in full and this document is provided as a high-level listing of the specific requirements.

The MPPT and Multi RS product manuals currently state:

- 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 -20°C and 40°C (humidity < 95% non-condensing).
- For safety purposes, this product should be installed in a heat-resistant environment.
- Never operate the product in a wet or dusty environment.
- Ensure there is adequate free space for ventilation above and below the product and check that the ventilation vents are not blocked.

In addition to this, the manuals will be updated to emphasise:

1. the need for a 450V-rated external disconnection switch on MPPT RS installations as required by the IEC and/or other local wiring codes;
2. the requirement to install the product on a heat-resistant (non-flammable) surface; and
3. the need to ensure that the installation area is free of flammable goods.

An English version of the updated sections of the manuals are attached to this document. Updated versions of the full manuals, including translations, will be available soon.

Appendix 2. – Updated manual chapters

The next pages contain the updated chapters in the manual of the MPPT RS and the Multi RS.

1. Safety Instructions



ELECTRIC SHOCK HAZARD

Please read this manual carefully before the product is installed and put into use.

This product is designed and tested in accordance with international standards. The equipment should be used for the designated application only.

Refer to the specifications provided by the manufacturer of the battery to ensure that the battery is suitable for use with this product. The battery manufacturer's safety instructions should always be observed.

Protect the solar modules from incident light during installation, e.g. cover them.

Never touch uninsulated cable ends.

Use only insulated tools.

Connections must always be made in the sequence described in the installation section of this manual.

The installer of the product must provide a means for cable strain relief to prevent the transmission of stress to the connections.

In addition to this manual, the system operation or service manual must include a battery maintenance manual applicable to the type of batteries used. The battery must be placed in a well-ventilated area.



SELECTION OF WIRE CONDUCTORS

Use flexible multistranded copper cable for the battery and PV connections.

The maximum diameter of the individual strands is 0,4mm/0,125mm² (0.016 inch/AWG26).

A 25mm² cable, for example, should have at least 196 strands (class 5 or higher stranding according to VDE 0295, IEC 60228 and BS6360).

An AWG2 gauge cable should have at least 259/26 stranding (259 strands of AWG26)

Maximum operating temperature: $\geq 90^{\circ}\text{C}$

Example of suitable cable: class 5 "Tri-rated" cable (it has three approvals: American (UL), Canadian (CSA) and British (BS)).

In case of thicker strands the contact area will be too small and the resulting high contact resistance will cause severe overheating, eventually resulting in fire.



RISK OF INJURY OR DEATH

The internals can carry a 400-500V DC voltage even when the product is off!

Input and/or output terminals may still be dangerously energized, even when the equipment is switched off. Always disconnect all power connections (e.g. the battery, DC solar isolator, etc) and wait at least 5 minutes before carrying out work on 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. 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.

Non-isolated inverters shall be provided with installation instructions that require PV modules that have an IEC 61730 Class A rating.

If the maximum AC mains operating voltage is higher than the PV array maximum system voltage, then the instructions shall require PV modules that have a maximum system voltage rating based upon the AC mains voltage.

Environment and Access

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 for ventilation above and below the product and check that the ventilation vents are not blocked.

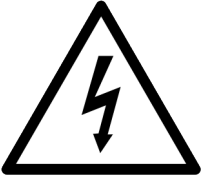


Ensure that the unit is installed on a non-flammable surface and that surrounding construction materials are also made of non-flammable materials.

Installation of this product must in a location that restricts access by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.


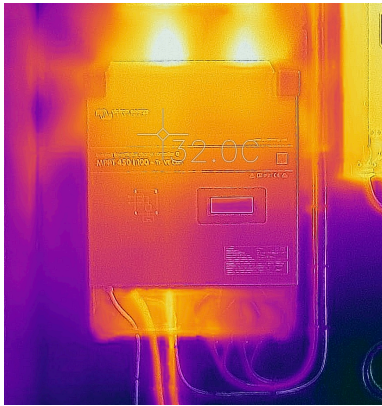




The connections to live parts should be covered after installation.

Ensure that no flammable materials or objects will be stored close to the installation after it has been commissioned.

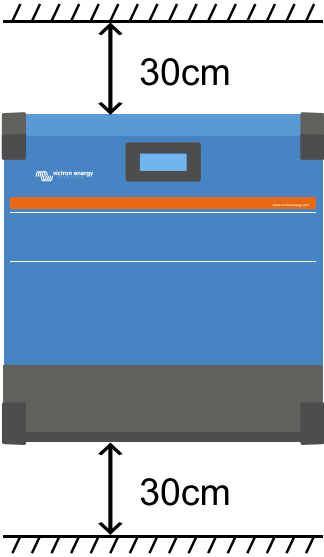



Enclosure Symbols

Symbol on the enclosure	
	<p>Caution, risk of electric shock</p>
	<p>Refer to the operating instructions</p>
<p>IP21</p>	<p>IP21 Protected from touch by fingers and objects greater than 12 millimetres. Protected from condensation.</p>
<p>CE</p>	<p>European conformity</p>
	<p>Regulatory compliance mark for Australia & New Zealand</p>

1. Location of the MPPT

 <p>The diagram shows a blue Victron SmartSolar MPPT RS unit mounted vertically. Above and below the unit, there are hatched lines representing a surface, with double-headed arrows indicating a 300 mm clearance zone.</p>	<p>To ensure a trouble free operation of the SmartSolar MPPT RS, it must be used in locations that meet the following requirements:</p> <ol style="list-style-type: none"> Avoid any contact with water. Do not expose the product to rain or moisture. Install the SmartSolar MPPT RS upright and vertical. Ensure 30cm clearance above and below it. The SmartSolar MPPT RS must be installed on a non-flammable surface and the construction materials surrounding the installation should also be non-flammable. Do not place the unit in direct sunlight. Ambient air temperature should be between -20°C and 40°C (humidity < 95% non-condensing). Do not install the SmartSolar MPPT RS in an environment where the air could be contaminated with particulate matter such as soot, dust or salt. For example conductive soot from the exhaust of a diesel generator could be drawn into the unit and cause short circuits inside it. Do not install the SmartSolar MPPT RS where flammable or corrosive gases or vapours could come near the installation. Do not obstruct the airflow around the SmartSolar MPPT RS. If the SmartSolar MPPT RS is installed in an area used for general storage, ensure that no flammable materials such a cardboard boxes are stored close to the installation. Ensure that the end user is aware of these requirements. <p>Figure 1. Thermal image of MPPT RS heat zones required for clearance.</p>  <p>The thermal image shows the MPPT RS unit with a color scale from purple (cooler) to yellow/red (warmer). The top and bottom edges of the unit are highlighted in yellow, indicating heat zones. A digital display on the unit shows '32.00'.</p>
	<p>This product contains potentially dangerous voltages. It should only be installed under the supervision of a suitable qualified installer with the appropriate training, and subject to local requirements. Please contact Victron Energy for further information or necessary training.</p>
	<p>Excessively high ambient temperature will result in the following:</p> <ul style="list-style-type: none"> Reduced service life. Reduced charging current. Reduced peak capacity, or shutdown of the MPPT. <p>Never position the appliance directly above lead-acid batteries. The MPPT RS is suitable for wall mounting. For mounting purposes, a hook and two holes are provided at the back of the casing. The device must be fitted vertically for optimal cooling.</p>
	<p>For safety purposes, this product should be installed in a heat-resistant environment. You should prevent the presence of e.g. chemicals, synthetic components, curtains or other textiles, etc., in the immediate vicinity.</p>
<p> Try and keep the distance between the product and the battery to a minimum in order to minimise cable voltage losses</p>	

1. Location of the Multi RS Solar

 <p>The diagram shows a blue and black Multi RS Solar unit mounted vertically. Above the unit, a double-headed arrow indicates a 30cm clearance to a hatched ceiling. Below the unit, another double-headed arrow indicates a 30cm clearance to a hatched floor.</p>	<p>To ensure a trouble free operation of the Multi RS Solar, it must be used in locations that meet the following requirements:</p> <ol style="list-style-type: none"> Avoid any contact with water. Do not expose the product to rain or moisture. Install the Multi RS Solar upright and vertical. Ensure 30cm clearance above and below it. The Multi RS Solar must be installed on a non-flammable surface and the construction materials surrounding the installation should also be non-flammable. Do not place the unit in direct sunlight. Ambient air temperature should be between -20°C and 40°C (humidity $< 95\%$ non-condensing). Do not install the Multi RS Solar in an environment where the air could be contaminated with particulate matter such as soot, dust or salt. For example conductive soot from the exhaust of a diesel generator could be drawn into the unit and cause short circuits inside it. Do not install the Multi RS Solar where flammable or corrosive gases or vapours could come near the installation. Do not obstruct the airflow around the Multi RS Solar. If the Multi RS Solar is installed in an area used for general storage, ensure that no flammable materials such as cardboard boxes are stored close to the installation. Ensure that the end user is aware of these requirements.
	<p>This product contains potentially dangerous voltages. It should only be installed under the supervision of a suitable qualified installer with the appropriate training, and subject to local requirements. Please contact Victron Energy for further information or necessary training.</p>
	<p>Excessively high ambient temperature will result in the following:</p> <ul style="list-style-type: none"> Reduced service life. Reduced charging current. Reduced peak capacity, or shutdown of the inverter. <p>Never position the appliance directly above lead-acid batteries. The unit is suitable for wall mounting. For mounting purposes, a hook and two holes are provided at the back of the casing. The device must be fitted vertically for optimal cooling.</p>
	<p>For safety purposes, this product should be installed in a heat-resistant environment. You should prevent the presence of e.g. chemicals, synthetic components, curtains or other textiles, etc., in the immediate vicinity.</p>

Try and keep the distance between the product and the battery to a minimum in order to minimise cable voltage losses

1. Solar input wiring

The SmartSolar MPPT RS is not fitted with a PV disconnect switch. An appropriately rated DC disconnection switch must be installed between the PV array and the SmartSolar MPPT RS.

Mount the PV disconnection switch in a readily accessible location.



Ensure that the DC disconnection switch is properly rated for at least 450V DC. The disconnect switch **MUST** be rated for DC applications and be rated for at least the expected PV array current.

Do not use switches that are only rated for AC circuits.

The MPPT RS 450/100 and the MPPT RS 450/200 Solar charge controllers are available with two different options for PV cable connection methods.

- The "- Tr" version has screw terminal blocks inside. The PV cables pass through glands on the bottom of the unit and the lower cover must be removed to access the terminal blocks inside.
- The "- MC4" version has MC4 connectors presented on the bottom of the unit. The bottom cover does not need to be removed to connect the PV cables.

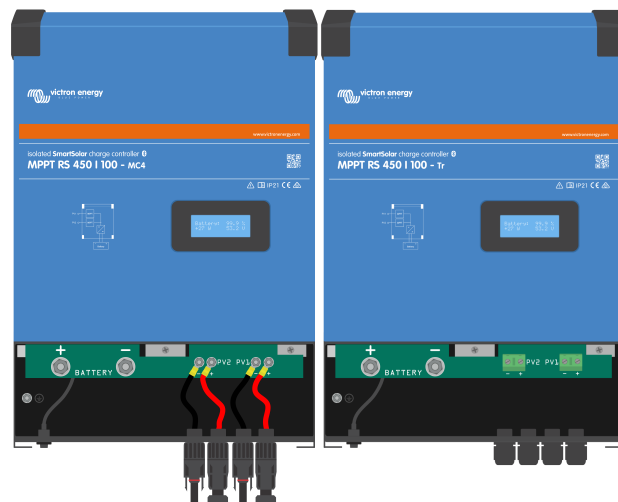


For the "- Tr" version, the terminal block screws should be tightened to a torque of 1.2Nm.

The MPPT 450/100 - MC4 version has two male and female pairs of MC4 connectors - one pair per tracker.

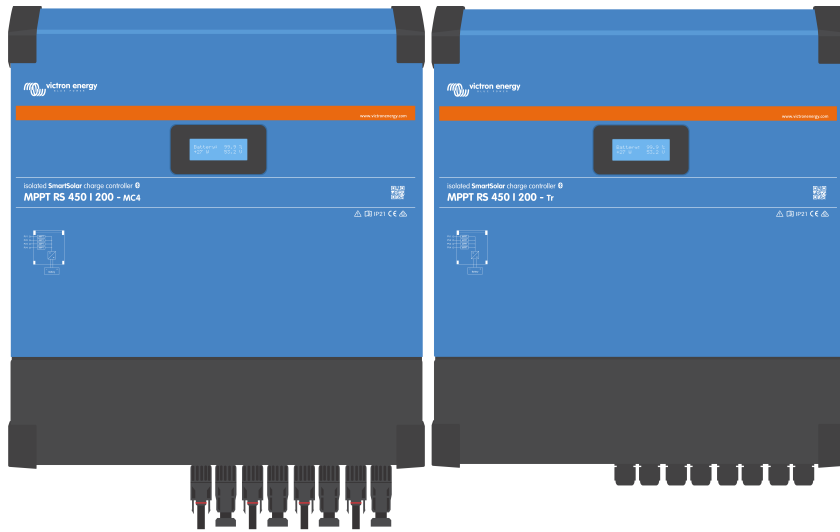


Side-by-side comparison of the MPPT RS 450/100 - MC4 (left) and MPPT RS 450/100 - Tr (right).

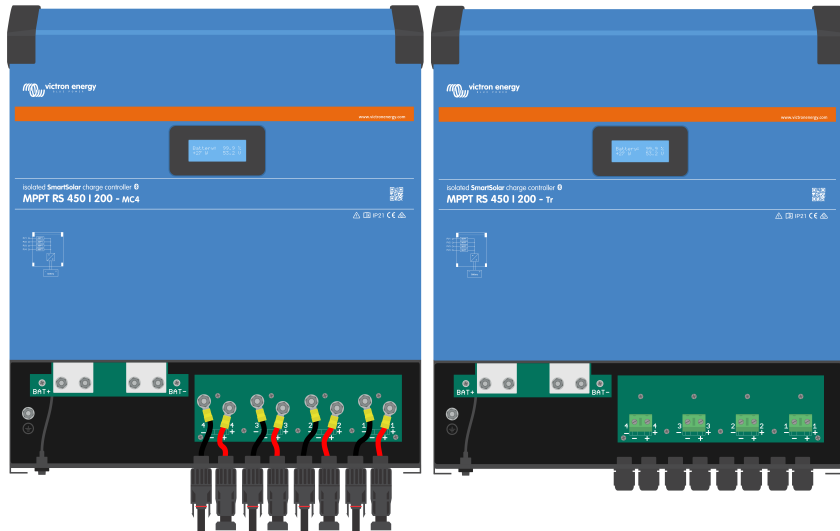


The MC4 connectors are pre-wired, whereas the "- Tr" version has screw terminal blocks, PV wires pass through cable glands at the bottom of the unit.

The MPPT 450/200 - MC4 version has four male and female pairs of MC4 connectors - one pair per tracker.



Side-by-side comparison of the MPPT RS 450/200 - MC4 (left) and MPPT RS 450/200 - Tr (right).



The MC4 connectors are pre-wired whereas the "- Tr" version has screw terminal blocks, PV wires pass through cable glands at the bottom of the unit.