

Pre-RMA / Technical Support Testing Requirements



1. Introduction

Before requesting Technical support or submitting a warranty claim, repair request or replacement request (RMA), Master Instruments requires that the unit in question is tested to assess for functionality. This will expedite technical support information and also prevent RMA's being submitted for non-faulty units, or warranty being claimed for units with non-warrantable faults.

This document describes the setup and equipment needed to perform a successful bench test and is to be read in conjunction with the testing forms for the required Victron Energy product group. These forms need to be completed before technical support or an RMA claim is submitted.

The aim of these test forms is to test basic product functionality. To keep the testing form as short as possible, some lesser product features are not tested, like programmable relays, communication ports, remote on/off terminals and so on. Should these lesser features be faulty, then please use the remark section on the test form.

1.1. Warranty duration

Our warranty duration to end-users is:

- Lead-acid batteries: 2 years.
- Lithium batteries: 3 years.
- All other products: 5 years. An extended warranty of 10 years can be purchased for these products.

1.2. Safety

The cover of our products may only be removed by a qualified technician with electronic or electromechanical training who is aware of the local safety guidelines and requirements.



Before testing a Victron Energy product, always refer to the safety instructions listed in its product manual. Product manuals are available from the product pages on the [Victron Energy website](#).

Some basic safety guidelines:

- AC voltage is dangerous and harmful. Use fused circuit breakers and RCDs.
- DC voltage is dangerous and harmful.
- Do not short circuit batteries.
- When working with batteries, make sure all DC loads are sufficiently fused.
- Be aware that lead-acid battery charging can create explosive gasses.
- Always use electrically insulated tools.

1.3. Testing equipment, test bench and tools

To be able to confirm if a Victron Energy product is faulty, it needs to be individually tested. These tests are performed on a dedicated test bench. The test bench contains all equipment needed for the test.

Ideally, this test bench is permanently set up in your workshop and readily accessible.

The test bench is one of your own design. It contains all relevant equipment that is needed for testing a Victron Energy product.

A test bench generally contains the following items:

- Battery bank and DC power supply.
- DC loads and AC loads.
- DC and AC circuit breakers and automatic fuses.
- DC and AC electrical cables with a variety of core thicknesses.
- Tools.
- Electrical measuring equipment.
- Computer and a tablet or smartphone.
- Interfaces and data cables.

1.3.1. Tools

Always use insulated tools:

Working with electricity and batteries is dangerous. Avoid shorting battery terminals or the DC terminals inside our products. Use insulated nut drivers or spanners to prevent accidental short circuits.



Wiha insulated tool set with screwdrivers, nut drivers, pliers, cutters and so on.

Use appropriately sized tools and tighten correctly:

Almost all nuts, screws and bolts used in Victron Energy units are metric. Please use the appropriately sized tools.

Most connection bolts and screws are made of brass, as such, avoid over-tightening. A brass bolt or screw can easily snap. Use a torque spanner to prevent this. The appropriate torque settings are listed in the product manual.

If the torque moment is unknown, use this as a guide:

- M6 bolts, screws and nuts = 6Nm.
- M8 bolts, screws and nuts = 11Nm.

Avoid over-tightening cabinet screws. You can use automatic screwdrivers but check that you use a middle torque setting.

Crimping tools:

Ensure that the electrical cables have terminals suitable for the electrical connections that need to be made.

Use the correct crimping tool when crimping cable terminals onto cables.

1.3.2. DC source

A DC power supply or a set of batteries able to supply 12V, 24V or 48V.

DC Power supply:

Use a regulated DC power supply that is adjustable between 0-60V and 0-40A, like the DeltaElektronika SM3300 series. A power supply is the preferred option because it is capable of current limiting, thus eliminating the need for DC fusing.

Batteries:

If a power supply is not available, use batteries instead. Use four 12V batteries to create a 12V, 24V or 48V battery bank. But be aware that a battery short circuit should be prevented at all times, so DC fuses need to be used as well. For ease of use, use automatic fuses.

1.3.3. DC loads

Some examples of DC loads:

- A DC load bank.
- An inverter is running an AC load.
- DC incandescent lamps.

1.3.4. AC source

Use the grid (mains) as an AC source. Do not use a generator as they often have an inferior sine wave.

If another AC voltage is needed, use a variable transformer (Variac) or a Victron isolation transformer to convert the grid voltage to another voltage. This so 110V equipment can be tested in a 230V country or vice versa.

1.3.5. AC loads

Some examples of AC loads:

- Electric heaters.
- Incandescent AC lamps.

Note: Do not use heat guns (paint strippers). These are not suitable for load testing because they are non-linear loads, they do not load the whole sine wave equally.

1.3.6. Cables and interfaces

DC and AC cabling need to have the thicknesses recommended in the product manual of the tested unit.

Note that the DC cables and connectors between the DC supply and the to-be-tested device must be able to deal with the large DC currents that are common in low voltage systems. If too thin cables are used, this will lead to potential voltage drops and will interfere with the test results.

Required interfaces and data cables for bench testing Victron products:

- VE.Direct to USB interface: Use this to communicate with a computer to the VE.Direct port. This is handy when the Windows version of the VictronConnect app is used.
- VE.Direct Bluetooth Smart dongle: Use this to communicate with Bluetooth via the VE.Direct port to bypass its built-in Bluetooth interface. This is handy in case the PIN of the product is unknown.
- VE.Direct cable: Use this to connect a GX device to a VE.Direct port.
- Interface MK3-USB: Use this to communicate with a computer via VE.Bus using the VictronConnect app or the VEConfigure software.
- RJ45 UTP cable: Use this to connect an interface or a GX device to a VE.Bus or VE.Can port.
- VE.Can RJ45 terminator: Use this for VE.Can communication.
- RJ12 UTP cable: Use this between the BMV head unit and the BMV shunt. This is handy in case the BMV RJ12 UTP cable is missing or to rule out a cable issue.

1.3.7. Measurement equipment and software

The following measuring equipment and software are needed:

- A true RMS multimeter, such as a Fluke 87 multimeter.
- A DC current clamp. For example, the Fluke i1010 AC/DC Current Clamp i1010 AC/DC can be used together with the Fluke 87 multimeter.
- The VictronConnect app to monitor, configure or update the firmware.
- The VE.Configuration tools package. Note that in most cases the VictronConnect app should be used instead. The only exception is to set or reset grid codes or to change or remove assistants.
- A Cerbo GX with a GX touch screen and a VRM account. The Cerbo GX can be used to monitor a unit, readout errors, configure, update the firmware or provide remote access.
- A simple design oscilloscope (optional). If using an oscilloscope, be aware that a probe suitable for measuring 110Vac and 230Vac is also needed.