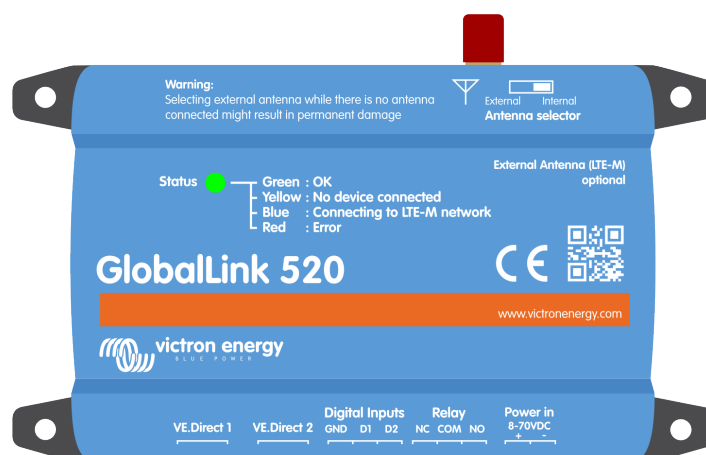




GlobalLink 520

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1. Introduction



Thank you for purchasing a GlobalLink 520. It allows you to connect other Victron equipment (VE.Direct), such as your Battery Monitor (BMV); SmartShunt; Solar Charger; IP43 Charger; or Phoenix Inverter, to the Victron Remote Management (VRM) portal. The portal is available to use free of charge, and from it you can view the status of your installation from anywhere in the world using your desktop device or mobile phone. Here are some examples of the kind of information you will be able to view:

- [Inverter demo](#)
- [MPPT Solar Charger demo](#)

The first five years of cellular connectivity is included in the purchase price. The unit will come pre-configured and ready for use out of the box. No need to change any settings.

Make sure you have LTE-M coverage in your country before purchasing this device: <https://1nce.com/en/coverage/>

1.1. Supported countries at 9th of March 2021 (This list will change over time)

- Argentina
- Austria
- Australia
- Belgium
- Canada
- Denmark
- Finland
- France
- Germany
- Great Britain
- Korea, Republic of
- Latvia
- Netherlands
- Norway
- Poland
- Romania (Bucharest area only, pending further roll-out LTE-M)
- Spain

- Sweden
- Switzerland
- Taiwan
- USA

2. Installation

2.1. What's in the box?

- GlobalLink 520
- 1.5m power cable with 1A inline fuse and M10 eyelets and power connector
- 2 pluggable terminal blocks

What's not in the box

- VE.Direct cables

2.2. Assembly instructions

1. Make note of the VRM Portal ID denoted on the sticker on the GlobalLink 520.
2. Mount the GlobalLink 520 close to the device you wish to monitor.
3. Connect VE.Direct cables between your devices and the GlobalLink 520.
4. Connect the DC Power (8V - 70V).
5. The LED will start blinking blue while it is trying to connect to the network (this could take up to 5 minutes).
6. The LED will blink green and yellow when one VE.Direct device is connected, or only green when two VE.Direct devices are connected.
7. Visit to the [VRM portal](#) to 'add' your installation to your account using the Portal ID you wrote down in step 1. You can only add your device to VRM once it has connected to the network (blinking yellow and/or green).

3. The status LED

LED state	Meaning
Blinking blue	Connecting to VRM. If the LED keeps blinking blue, check the network coverage for your region.
Blinking green	Everything is OK: A connection has been made both to the VRM and to two VE.Direct devices.
Blinking green and yellow	The device is connected to VRM, but only to one VE.Direct device: Check the cable and power to the second VE.Direct device.
Blinking yellow	The device is connected to VRM, but not to a VE.Direct device: Check the cable and power to the VE.Direct device.
Continuous red	The device detected a problem and will automatically reboot to try and rectify it. This process usually takes a few minutes.
Blinking purple	The device is updating its software. This process usually takes a few minutes.

4. Cellular connectivity

The GlobalLink 520 is a cellular device which connects to LTE-M compatible 4G networks. The cellular provider of the included SIM card is '1nce'. Their global network of operators is constantly expanding and you can check LTE-M coverage in your area here: <https://1nce.com/en/coverage/>.

4.1. 4G LTE-M

LTE-M is the abbreviation for LTE Cat-M1 or Long Term Evolution (4G), category M1. This cellular technology is designed to connect Internet of Things devices to existing 4G towers while using low energy. LTE-M does support handovers and roaming so it is possible to use this device in a moving vehicle like a campervan (with an external antenna).

4.2. Antenna

The GlobalLink 520 has an internal antenna and an SMA connector for an optional external antenna. A switch on the top of the device determines which antenna is used. If the switch is set away from the SMA connector the internal antenna is used, when set towards the connector the external antenna is used.



Do not set the switch to "external" if there is no external antenna connected, as this can permanently damage your device.

The GlobalLink 520 is not rated for outdoor use. You can however connect your own outdoor antenna to the device to improve your signal strength if the internal antenna does not have good enough reception (note: you can find the signal strength in VRM). LTE-M uses the following frequencies: 703-803 and 2520-2620 MHz.

RSSI	Signal strength	Description
>= -65 dBm	Excellent	Strong signal with maximum data speeds
-65 dBm to -75 dBm	Good	Strong signal with good data speeds
-75 dBm to -85 dBm	Fair	Fair but useful, fast and reliable data speeds may be attained, but marginal data with drop-outs is possibly
-85 dBm to -95 dBm	Poor	Performance will drop drastically
<= -100 dBm	No signal	Disconnection

4.3. Internal SIM card

Inside the device is a nano SIM card which is used for connectivity. This SIM is locked and can only be used in combination with this specific GlobalLink device. It has a limited data bundle for the device to operate and receive updates over the air.

5. Product compatibility

This device has two VE.Direct ports and is compatible with:

- All MPPT Solar Charge Controllers which have a VE.Direct Port
- BMV Battery Monitor 700 series
- BMV Battery Monitor 710 Smart series
- Phoenix Inverter VE.Direct models
- SmartShunt
- IP43 Chargers

The device is not compatible with our Peak Power Packs.

More information is also available on our website: <https://www.victronenergy.com/panel-systems-remotemonitoring/globalink520>

6. Power

The GlobalLink 520 can be powered directly from your battery bank and operates between 8V and 70V.

	Average Current with relay open	Average Current with relay closed
12 V	20 mA	40 mA
24 V	10 mA	20 mA
48 V	5 mA	10 mA

7. Data transmission to VRM

After power-up, the GlobalLink 520 will connect to the LTE-M network. Once connected, it will gather information from the connected VE.Direct device(s), and transmit it to the VRM portal.

Every 24 hours, all available data is transmitted. In between, it will transmit the most important data every 15 minutes:

BMV Battery Monitor

- Battery Voltage
- Battery Current
- Battery Power
- State of Charge
- Alarm status & reason

SmartShunt

- Battery Voltage
- Battery Current
- Battery Power
- State of Charge
- Alarm status & reason

MPPT Solar Charger

- Solar Power
- Battery Voltage
- Battery Current
- Battery Power
- Error code
- Charge state (Off, Bulk, Absorption, Equalize, Float)

IP43 Charger

- Output Voltage
- Output Current
- Error code
- Charger (on/off)
- Charge state
- Relay on the charger state

Phoenix VE.Direct Inverters

- Input Voltage
- Output Voltage
- Output Current
- Inverter state (Off, Bulk, Absorption, Equalize, Float)
- Mode (On/Off/Eco)

8. Digital inputs

The GlobalLink 520 comes with two digital inputs which also act as pulse counters; you can view their current state and the number of detected pulses (rising edge, 1000Hz max) in VRM. The GlobalLink 520 resets the pulse counters on a reboot, the module also reboots when there is no network.

Pinout	Input
pin1	input1
pin2	input2
pin3	gnd

The inputs are non-isolated. They operate at 3V3 levels, and can withstand up to 5V input. Each input has an internal 10k pull-up resistor to 3V3.

We recommend wiring it to a potential free relay that switches the input between free floating and shorted to ground. Or otherwise an open collector/optocoupler output, which also switches the signal between free floating and shorted to ground.

8.1. Digital input alarm

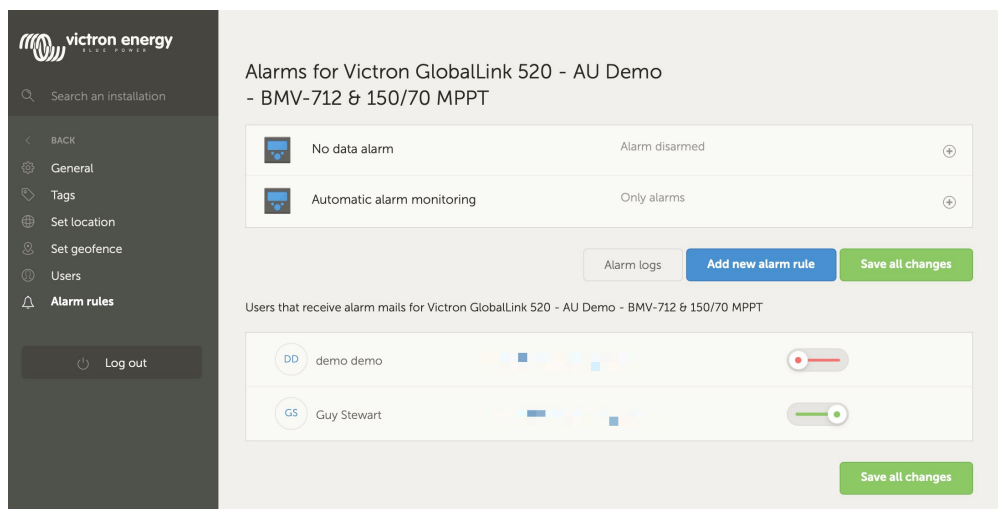
It is possible for the digital inputs to trigger an alarm notification in VRM, and send an email to selected users if desired.

The GlobalLink product is intended to be a low data consumer, and sends cloud updates every 15 minutes.

It is therefore normal that there is some latency delay between the change of the digital input state, and the signal to the VRM and any subsequent alarm. So it may not be suitable for applications where a near real-time alarm is essential.

Alarm options are set in the VRM Site -> Settings -> Alarm rules menu.

Once in that menu, you will see the default alarms that are pre-configured.



No data alarm

The "No data alarm" will be triggered if the site loses connection to the network. It is disabled by default.

For a fail safe notification system, the user should enable the "No data" alarm.

If enabled for the GlobalLink 520 the number entered is in addition to the normal reporting interval (to help prevent false no-data alarms), this reporting interval is 15 minute/900 second by default.

It would be normal to enter at least 900 seconds to this in case of a single dropped connection.

Entering 900 seconds would equal a total of 1800 seconds or 30 minutes without contact before the alarm was triggered.

Automatic alarm monitoring

There is a preconfigured list of parameters for connected products (for example BMV, or MPPT Solar Charger) that will automatically trigger this alarm, they are typically system critical and enabled by default.

Adding a new alarm using the digital inputs

It is possible to add a new alarm rule by clicking the 'Add new alarm rule' button.

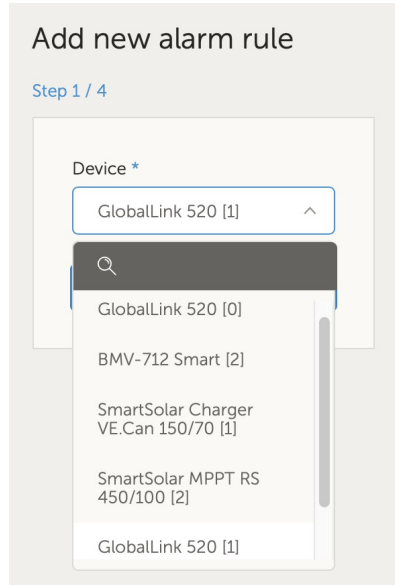
The Digital inputs are displayed as separate devices to the other Global Link parameters when creating a new alarm rule.

GlobalLink 520 [0] - Internal data

GlobalLink 520 [1] - Digital input 1 (labeled D1 on device)

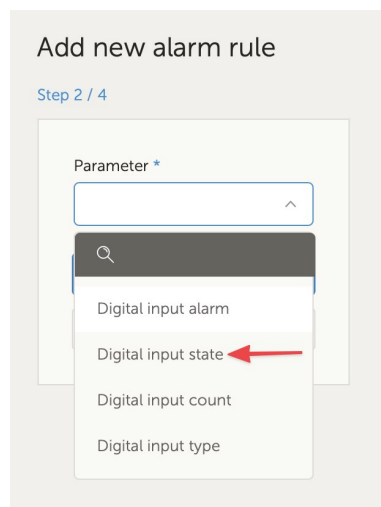
GlobalLink 520 [2] - Digital input 2 (D2)

You will also see other connected devices separately in this list.



Once you have selected the digital input device you wish to use to trigger an alarm, click next.

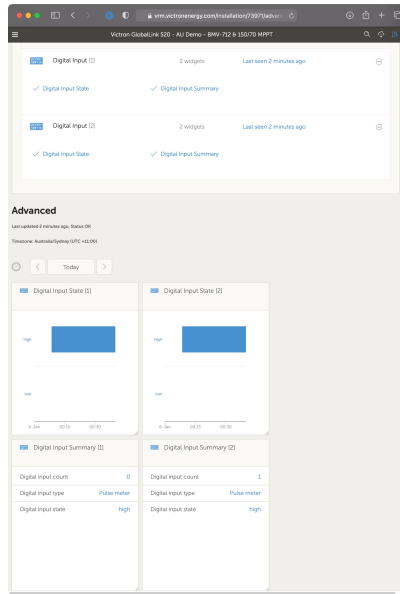
Then select the parameter;



Digital input state, and click next.

Then enable either the 'High', or 'Low' value, depending on the alarm behaviour you would like. This may take some testing with your specific digital input wiring, and the results shown in VRM to get the results you want.

It can be useful to enable the Digital input state widgets in the advanced tab of VRM to get a sense of the behaviour and the reading that you should configure for the alarm.

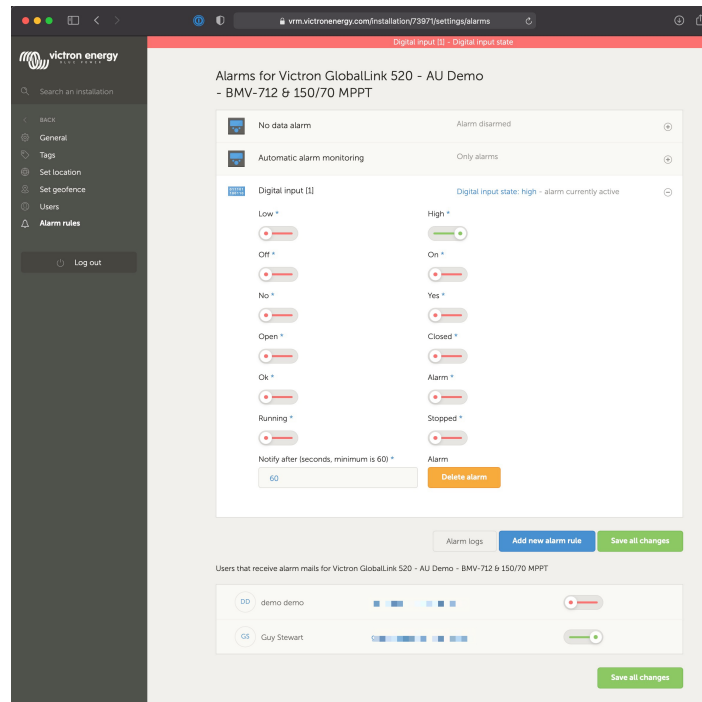


Then set the minimum time that the condition is active for before an alarm notification is created.

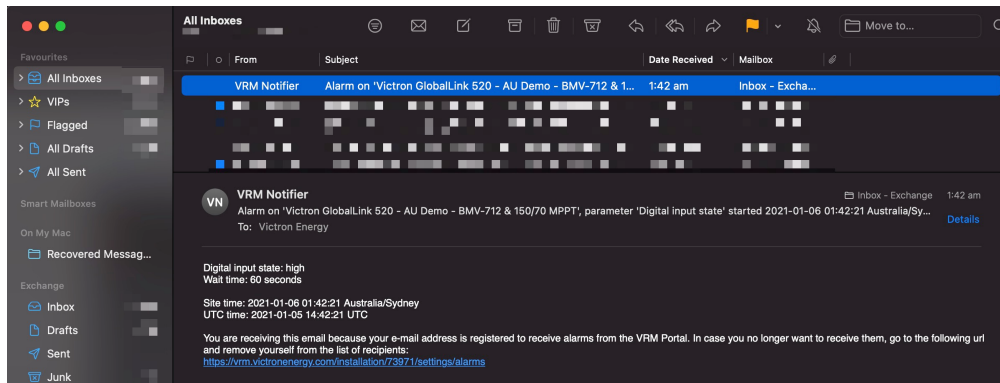
Note that the time set is the amount of time the high or low condition is active before an alarm is generated. It can then take an additional amount of time (up to 15 minutes) before that alarm is sent to VRM and email notification is sent.

Once the new alarm rule has been added, review the email notifications, enable or disable email alerts for registered users of the site.

Then click 'Save all changes'



Example of the email alarm notification;



Alarm Log

There is a shortcut from the alarm settings to the VRM alarm log. The history of your digital input alarms will be recorded here.

9. Relay switch

The GlobalLink 520 comes with one relay which can be operated from VRM from the device list page.

Pinout	
pin1	NO
pin2	COM
pin3	NC

You can queue changes to the relay state in VRM. Changes will be propagated the next time the device connects and transmits its data, and can thus take up to 15 minutes to take effect (or longer if the device has no connection).

RELAY 1 STATE

Current reported value: Closed

Last requested value: Open

Requested by Mindhash, on 2020-09-28 11:38

Open

Save

10. Input Voltage Measurement

The GlobalLink measures the voltage on its own power connector. If none of the connected VE.Direct devices is able to measure voltage, this value is used instead in VRM.

Note that this measurement is not very accurate. At 14V it's $\pm 0.2V$, at 24V it's $\pm 0.5V$ and at 48V it's $\pm 1V$.

11. Firmware updates

The GlobalLink automatically checks and updates its firmware to the latest stable version. When the unit starts updating the LED will blink purple. This can take up to 10 minutes. Do not power down the unit even if the LED stops blinking for a while.

All updates are currently rolled out automatically, it is not yet possible to manually update the device.

12. Settings and Diagnostics

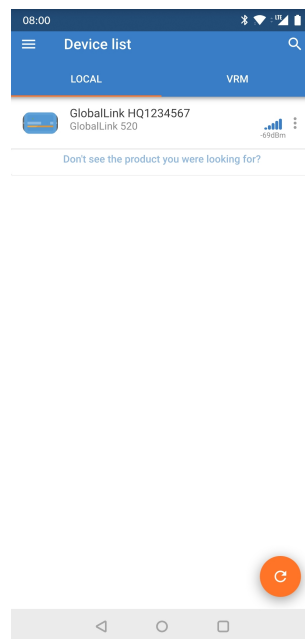


Support for VictronConnect in the GlobalLink 520 is still in a Beta state which may cause some instabilities while VictronConnect is connected to GlobalLink 520. Not all Android devices are able to connect to the GlobalLink 520. These issues are known and under active development.

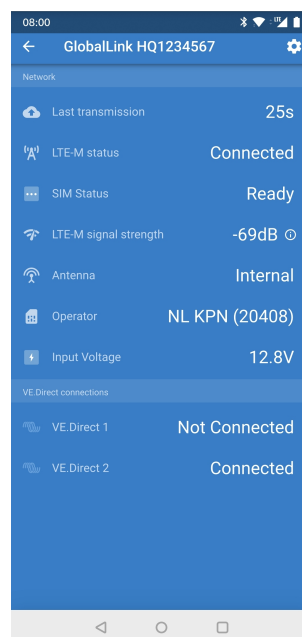
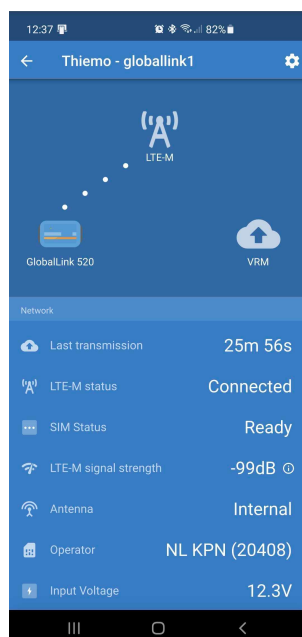
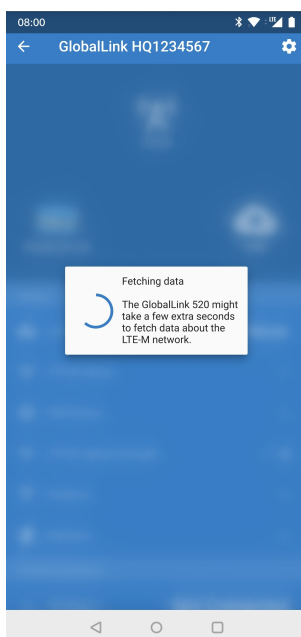
12.1. VictronConnect

The status of the GlobalLink 520 with firmware v2.05 or newer can be monitored live with a Bluetooth enabled device (such as a mobile phone or tablet) using the VictronConnect App.

When you open the VictronConnect App you can select a GlobalLink 520 from the overview which shows the serial number and the BLE signal strength.



When successfully connected the status screen will load. This can take longer than you are used to with other devices due to the fact that the GlobalLink 520 needs to wait for information from the LTE-M network this should be less than 30 seconds.



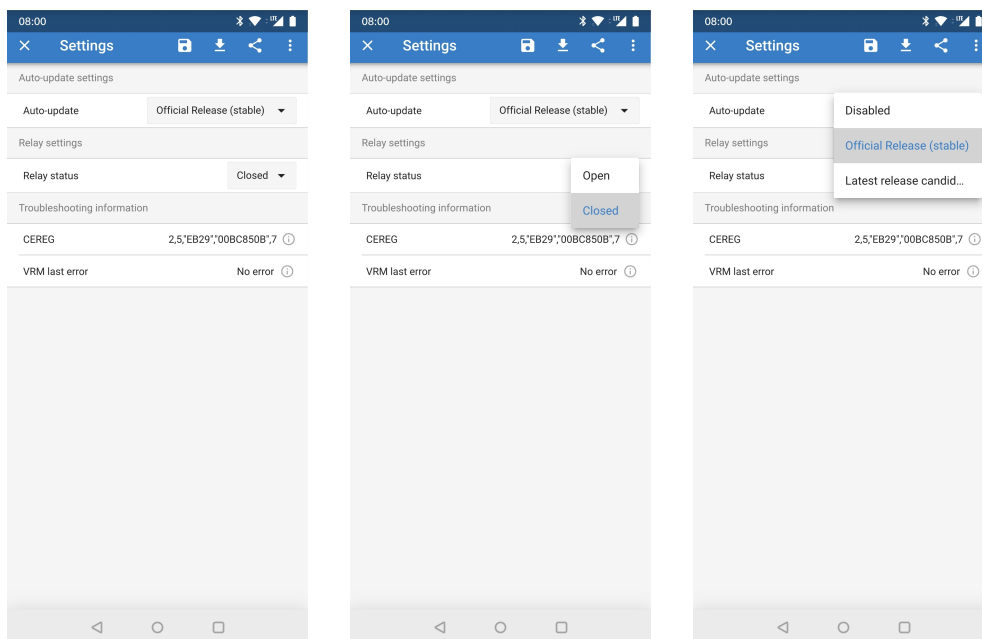
On the status screen there is information about the connectivity to the LTE-M network and the Victron Remote Management portal. For the device to work properly the SIM status should be Ready and the LTE-M status must be Connected. You can also check if the correct antenna is selected and the current signal strength. The status screen also shows the operator name and number, it is not possible to select one yourself even if more than one network is available in your region.

In the status screen it is also possible to see the status of both VE.Direct ports and if a device has been detected.

Note: if you connect to the GlobalLink 520 very early during power up it is possible that it will show an error for the SIM Status please power cycle the device and wait for the device to be fully booted before connecting. The device does not reboot automatically when detecting a failure when there is an active connection via BLE (VictronConnect).

12.2. Settings

The settings page is accessed by clicking on the Cog icon at the top right of the Home page. The settings page provides access to view or change the settings of the GlobalLink 520. From this page you can also view Product information such as the Firmware versions installed or toggle the on-board relay of the GlobalLink 520 or change or disable the update channel. The release candidate software is not intended to be used normally. And especially not intended to be used in critical and/or unattended systems: an accidental bug by us may, for example, render the system inaccessible remotely, or even cause a system reset or shutdown.



12.3. Troubleshooting

For troubleshooting you can also find the CEREG output on the settings page. This information can help us to debug any issue that you might encounter regarding connectivity of the LTE-M modem.

13. Troubleshooting

Step 1: Check the device has power.

The LED on the device should be blinking in some color. If it is not blinking, check if the power cable is connected correctly and supplies sufficient power. If you're using the included cable, be sure to also check its inline fuse which may be blown if the power pins were accidentally reversed.

Step 2: Check for cellular (LTE-M) coverage.

Verify that the LED is blinking either green or yellow. After powerup, the LED will first blink blue, indicating that it is establishing communication with the LTE-M network and VRM. Once connected, it will start blinking green (when there is a VE.Direct device) or yellow (when there is no VE.Direct device). In case it keeps blinking blue the unit will keep trying to establish a connection until there is a timeout (+/- 15 min) and then automatically reboot the device.



You can check the signal strength in VRM on the advanced page where you can activate the RSSI graph. The signal RSSI should be between -50dB (best connection) and -100dB (bad connection). Below -100dB the connection will no longer work. You can also find the latest RSSI in the device list.



Check and make sure there is coverage in your country (<https://1nce.com/en/coverage/>). If there should be coverage but you have no signal you can consider purchasing an external antenna.

Step 3: Check the connected VE.Direct devices.

Make sure the LED is blinking green or green & yellow which indicates that only one VE.Direct device is connected. In case its only blinking yellow, check the cable to the VE.Direct device, and power to the VE.Direct device.

Step 4: Find the device in the VRM portal

[Login to VRM](#), and add the module by going through the "Add installation" wizard. Only after the module has made an active connection to the cellular network it is available in VRM.

14. FAQ

Q1: Will the device store data and send it out later when the gateway is in range?

No.

Q2: Can the firmware of the device be updated?

Yes, it will automatically update. It is not possible to do a manual update.

Q3: How can I connect multiple VE.Direct devices to the device?

You can connect up to two VE.Direct devices.

Q4: Can I connect both this module and something else to the VE.Direct port at the same time?

No.

Q5: Can the module be used to remotely switch the load output of an MPPT?

No.

Q6: Can the module be used to remotely update firmware of the BMV, MPPT, or Inverter?

No.

Q7: Can the module be used to remotely change the configuration of the BMV, MPPT or Inverter?

No.

Q8: Can the module be used to remotely perform any other action?

Yes, you can switch the onboard relay switch from VRM.

Q9: Can I use the GlobalLink with a GX device (e.g Cerbo GX)

No, it is impossible to use a GlobalLink with a GX device.

The GlobalLink is intended to be used instead of a GX device to connect one or two supported VE.Direct devices directly to VRM via the built in LTE-M connection. Data will be sent straight to the VRM portal, no GX device is required.

You cannot connect the GlobalLink directly to a GX device, it is designed to connect to the supported VE.Direct devices (such as BMV or MPPT) directly. If you would like to connect your GX device to a 4G network use the [GX LTE 4G instead](#).

Q10: The Peak Power Pack has a VE.Direct port, will the device work with that?

No.

Q11: Can I use my own SIM card in the device?

This is not officially supported. It might work, depending on if your operator supports a random APN setting and if has LTE-M (Cat M1) support.

Q12: Can I use the SIM card for other devices?

No, the SIM card is locked, has a strict data limit, and will not work in other devices.

Q13: Can I factory reset the device?

No. You can however delete the corresponding installation in VRM, removing all historic data.

Q14: Does the device have GPS

No.

Q15: Can I use the device over WiFi?

No.

Q16: What happens after the 5th year? Do I have to buy a new device?

If 4G LTE-M networks are still operational you will be able to a) purchase an additional 5 years from Victron or b) insert your own sim card.

Q17: Does the GlobalLink support NB-IoT networks?

No.

15. Appendix

15.1. Enclosure Dimensions

