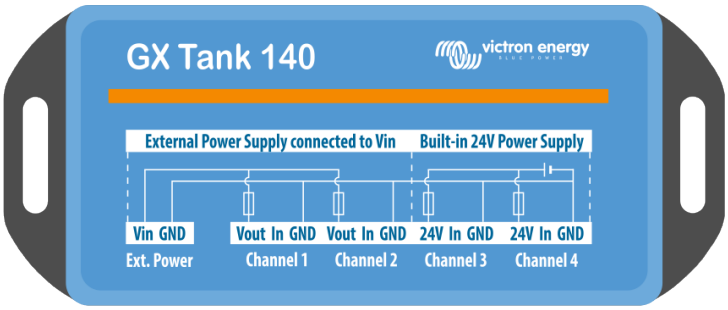
victron energy
BLUE POWER

ENGLISH



GX Tank 140

4 Channel | 4 to 20mA | 0 to 10VDC

Rev. 00 03/2021

This manual is also available in HTML5.

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1. Introduction

1.1. Overview

The GX Tank 140 is an accessory used with a Victron GX device, it enables up to four tank level sensors to be connected and monitored.

Features:

- Interfaces with either 4 to 20mA or 0 to 10V tank level sensors (including a combination of both).
- Connection to the GX Device via USB interface.
- Channel 1 and 2 use a fused power source from the V_{in} connection for sensor excitation.
- Channel 3 and 4 use an integrated 24V power source for sensor excitation, which is powered via the USB interface.
  The integrated 24V power source simplifies the installation/wiring process, as no additional power source is required.
- Configurable input range, for example to connect a 0 to 5V sensor.
- Configurable averaging filter (1 to 60 seconds) to dampen the effect of fluid movement.
- Sensor fault detection: an alarm is raised if the input signal is out of normal/acceptable operating range.
- Full integration with a GX device for configuration, monitoring and tank pump (relay) control.

Note that other sensor types or sensors that operate outside of the normal/acceptable operating range are not compatible and may result in permanent damage of the unit, particularly if the input voltage limit is exceeded.

1.2. What's in the box?

The following items are included in the package:

- GX Tank 140 unit with non-detachable 1.5m long USB cable

- 1x 2 way pluggable terminal block (for external power supply)

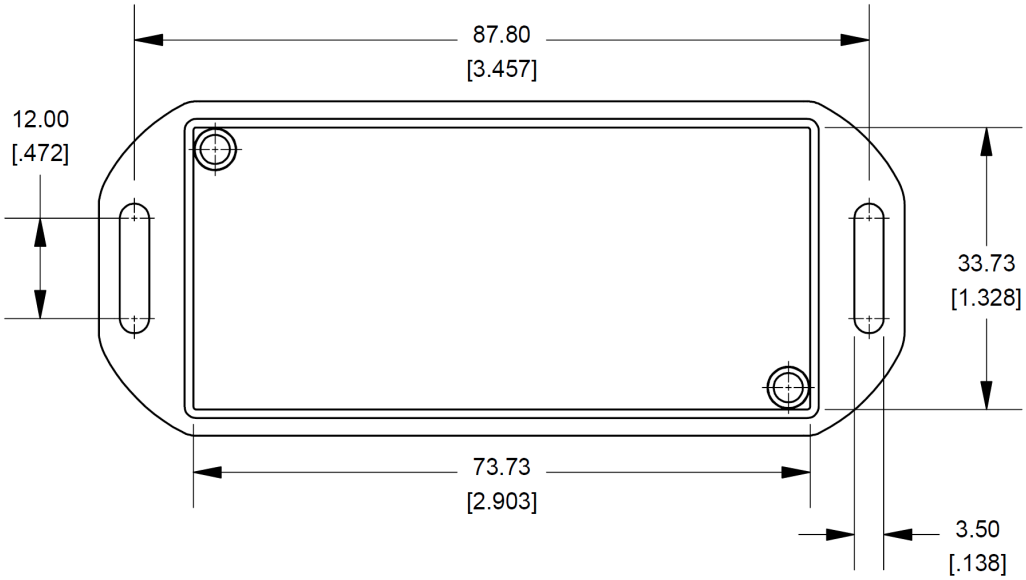
- 4x 3 way pluggable terminal block (for sensor connection)

2. Installation

2.1. Mounting

The GX Tank 140 enclosure is mounted using the slotted flanges which protrude from either side of the base.

Use pan/truss head screws with washers to secure the unit, ensure that the screw thread outer diameter is a clearance fit within the flange slots (3.0mm max OD) and do not over tighten.



2.2. Electrical connections

All electrical connections are located on the front face of the GX Tank 140 unit and made using the pluggable terminal blocks supplied.

A clearly labelled wiring schematic diagram is also conveniently printed on the top face of the unit.

2.2.1. Power supply

The GX Tank 140 unit is self powered from USB interface and does not require an external power source.

Sensors can be powered through the unit in two different ways, depending on the channel used:

- **Channels 1 and 2: External Power Supply**

  The connector labeled “Ext. Power” can be used to distribute power from an external source to sensors connected on channels 1 and 2.

  A self-resetting fuse (20mA) in this circuit prevents the unit from damage, even in case of a wiring short circuit or faulty sensor.

- **Channels 3 and 4: Internal 24VDC Power Supply**

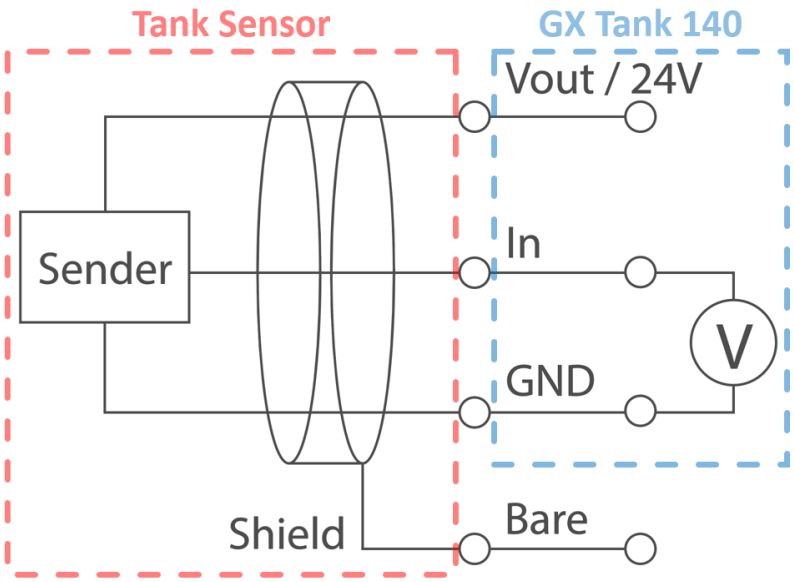
  Channels 3 and 4 are powered by an internal supply (isolated from USB) with a voltage of 24VDC.

  The outputs are equipped with a self-resetting fuse that limits the current to a maximum of 20mA per channel.

2.2.2. Voltage output sensors (0 to 10VDC)

Before connecting tank sensors that provide a voltage output signal, ensure that the manufacturers datasheet is reviewed to confirm compatibility, as well as wiring and configuration details specific to that sensor.

The wiring schematic diagram below depicts the wiring connections and how the voltage signal is measured by the GX Tank 140: between “In” (+) and “GND” (-).



The table below shows the wiring connections in a tabular format, including the tank sensor connection names and common wiring colours.

GX Tank 140	Tank Sensor	
	Connection name	Common wiring colours**
V_{out} / 24V*	Excitation (+), Vs+	Red
In	Signal (0 to 10V or 0 to 5V), Output	Varies
GND	Excitation (-), Vs-	Black/Blue

*V_{out}: Channels 1 and 2, 24V: Channels 3 and 4

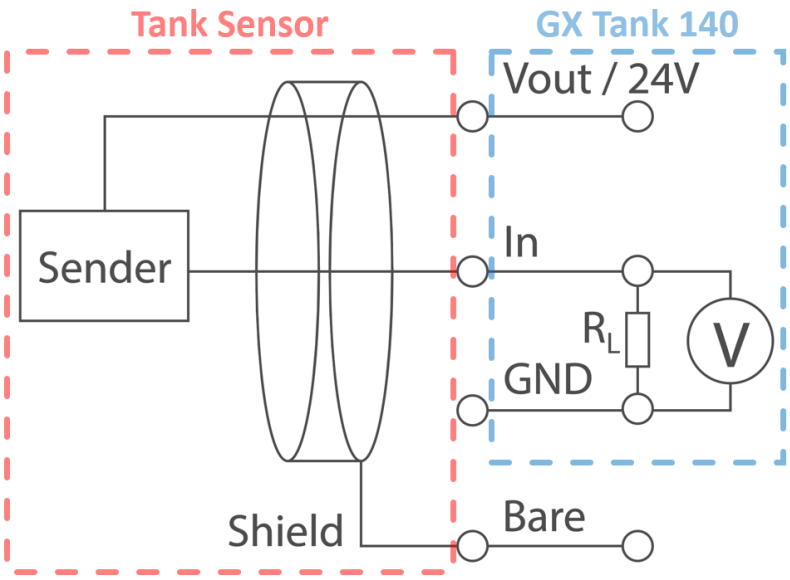
** Confirm wiring colours with the tank sensor datasheet before connection

2.2.3. Current output sensors (4 to 20mA)

Before connecting tank sensors that provide a current output signal, ensure that the manufacturers datasheet is reviewed to confirm compatibility, as well as wiring and configuration details specific to that sensor.

The wiring schematic diagram below depicts the wiring connections and how the current signal is measured by the GX Tank 140: there is a load (RL) between “In” and “GND” which is used as a shunt to establish the current flow (based on the voltage drop across RL and the known resistance).

Accordingly, the sensor must be connected to “Vout/24V” and “In”, while “GND” can be left unconnected.



The table below shows the wiring connections in a tabular format, including the tank sensor connection names and common wiring colours.

GX Tank 140	Tank Sensor	
	Connection name	Common wire colours**
V_{out} / 24V*	Excitation (+), Vs+	Red
In	Excitation (-), Vs-	Black/Blue
GND	Not connected	N/A

*V_{out}: Channels 1 and 2, 24V: Channels 3 and 4

** Confirm wiring colours with the tank sensor datasheet before connection

2.2.4. Terminal blocks

To physically connect the tank sensor wiring to the pluggable terminal blocks, it is advised to use a crimped bootlace ferrule. Bootlace ferrules can be inserted directly into the spring loaded terminals on the pluggable terminal blocks and reduce the risk of wiring issues.

Bare stranded copper wire can be used (without a bootlace ferrule), however care must be taken during the installation process; strip the insulation to reveal at least 10mm of bare copper wiring, then fully depress the orange tab on the pluggable terminal block with a precision screwdriver while the wiring is carefully inserted (ensure that there are no stray strands).

Once the wiring is properly installed/seated within the spring loaded terminals on the pluggable terminal blocks, the orange tab must be fully depressed with a precision screwdriver in order to remove the secured wiring/bootlace ferrule (if ever necessary).

The pluggable terminal blocks can be easily connected and disconnected to/from the mating sockets on the GX Tank 140 unit as required, for installations in space constraint locations it can be easier to connect the wiring to the pluggable terminal blocks independently, before they are plugged in.

2.2.5. Sensor cable

It is recommended to use shielded twisted core cabling between the tank sensor and the GX Tank 140 unit, in order to prevent electrical interference/noise from the external environment from falsifying/effecting the measurements.

Most sensors are already equipped with shielded cabling and may be directly connected if there is sufficient length.

It is also recommended to route the tank sensor cabling as far as practical away from DC and AC power cabling and to ground the cable shield on bare metal of the vehicle or boat.

2.2.6. Electrical Isolation

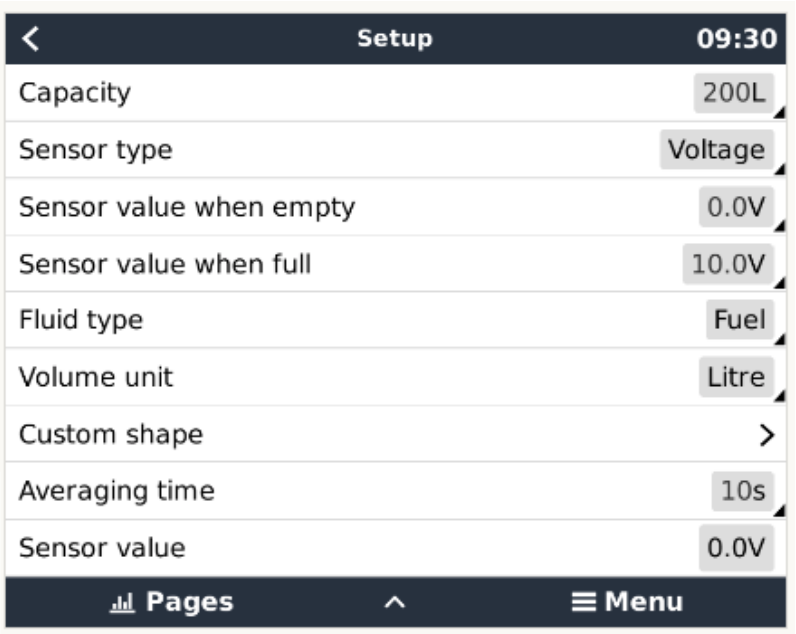
The USB cable is electrically isolated from the sensors, as such there is no risk of ground loops occurring between the sensors and the USB socket of the GX device.

The "GND" connections of all four channels are internally connected, they are **not** individually isolated from each other.

3. Configuration

After initial connection, the GX Tank 140 requires some basic configuration through the 'Settings' menu of the GX Device, which can be accessed via the display of the GX device, or via Remote Console on LAN or VRM.

3.1. Setup menu



Sensor type - Voltage or Current

The GX Tank 140 can be used with either voltage or current output tank sensors; select the 'Sensor type' being used.

A combination of both sensor types can be used with the same GX Tank 140 unit, and configured independently (Voltage is the default 'Sensor type' setting).

Setting the wrong 'Sensor type' will not damage the GX Tank 140.

Sensor value when empty / full

Used to configure the functional operating range of the sensor.

Fluid type

Select from Fuel, Fresh water, Waste water, Live well, Oil and Black water. The selection automatically determines the icons and colors used in the display.

In case no specific tank 'Name' is configured, the 'Fluid type' is shown instead.

Volume unit

Select from Litre, Cubic meter, Imperial gallon and U.S. gallon.

Custom shape

It is possible to configure custom shapes for non-linear shaped tanks using this setting.

For example: if a tank that is wider up top, the tank shape can be configured so that a sensor reading of 50% equals only 25% of volume.

Up to 10 positions can be set to accurately describe the relationship between sensor reading and tank shape, even for highly irregular tanks. The tank volume is linearly interpolated between positions.

Averaging time

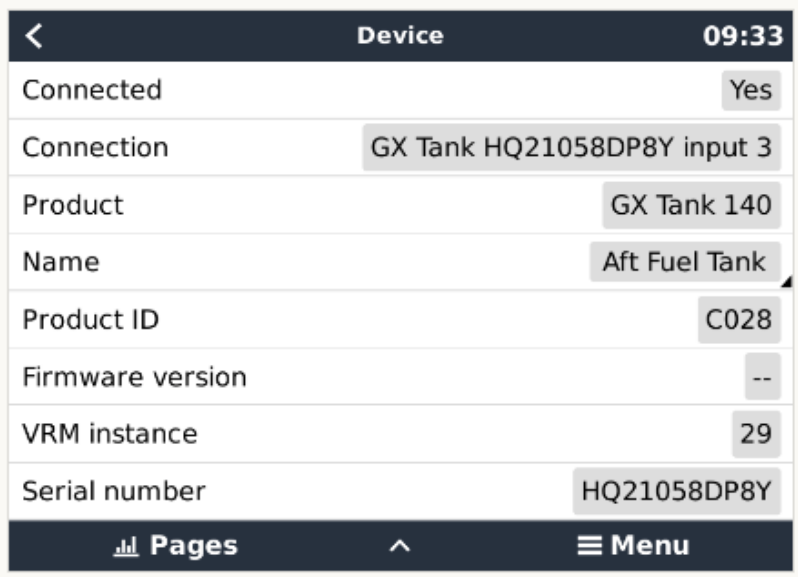
The averaging time setting is used to dampen the effect of dynamic fluid movement within the tank.

Set the averaging time as required between 1 and 60 seconds (10 seconds is the default 'Averaging time' setting).

Sensor value

This field entry shows the current/raw sensor reading, without any averaging; used mainly for troubleshooting.

3.2. Device menu



The 'Device menu' includes identification information in relation to the GX Tank 140 device and also each particular channel/tank.

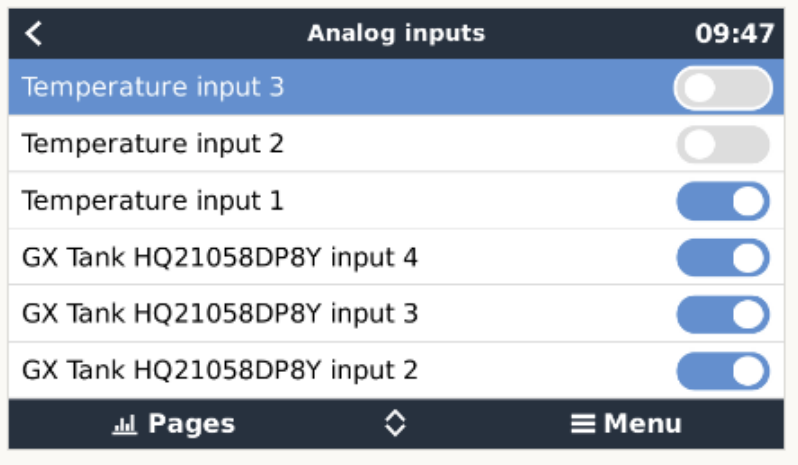
Name

The 'Name' setting is used to allocate a custom tank name to each tank for easy identification while monitoring.

VRM Instance

The 'VRM instance' number is mapped to the instance on the VRM Portal.

3.3. Analog inputs menu



Each of the four tank channel inputs can be enabled and disabled via the 'Settings' > 'I/O' > 'Analog Inputs' menu.

By default all four tank channels are enabled. Disable the tank channel inputs that are not in use, to remove unnecessary clutter from the 'Device list'.

After disabling, use the 'Remove disconnected devices' option at the bottom of the 'Device list' to complete the removal, without the need to reboot the GX device.

3.4. Tank pump menu

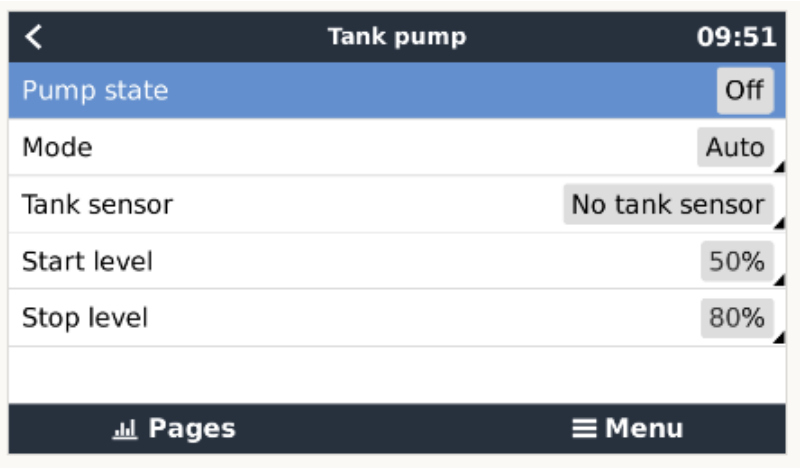
The tank level can be used to automatically run a pump (for example to automatically replenish a day-tank), this functionality is configured within the 'Tank pump' menu.

First the relay function must be set to 'Tank pump', this is changed in the 'Settings' > 'Relay' menu.

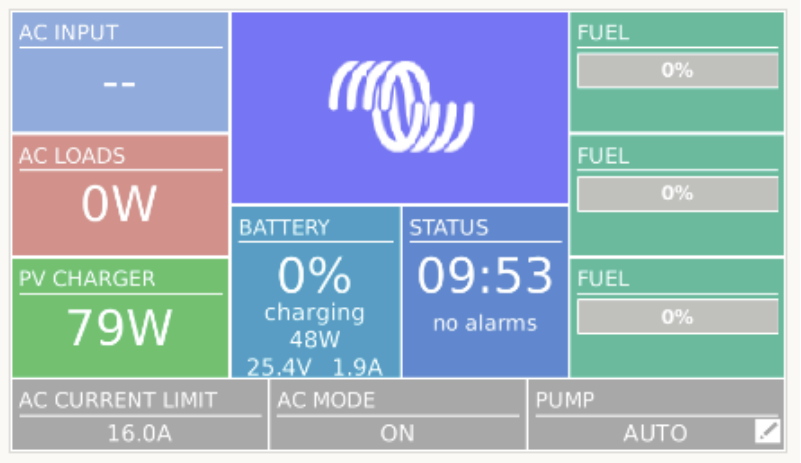
Then access the 'Settings' > 'Tank pump' menu, select the desired sensor and configure the desired start/stop levels.

When set to 'Auto' mode, the pump will run automatically once the tank volume % falls below the configured 'Start level' and stop automatically once the tank level increases above the configured 'Stop level'.

The pump 'Mode' can be easily toggled between 'Auto', 'On' and 'Off' as required.



Tank levels and Tank pump status is also available on the 'Boat and motorhome overview' page (which needs to be enabled in the 'Settings' > 'Display and language' menu):



It is also possible to change the pump 'Mode' (between 'Auto', 'On' and 'Off') directly via the 'Boat and motorhome overview' page.

4. Monitoring

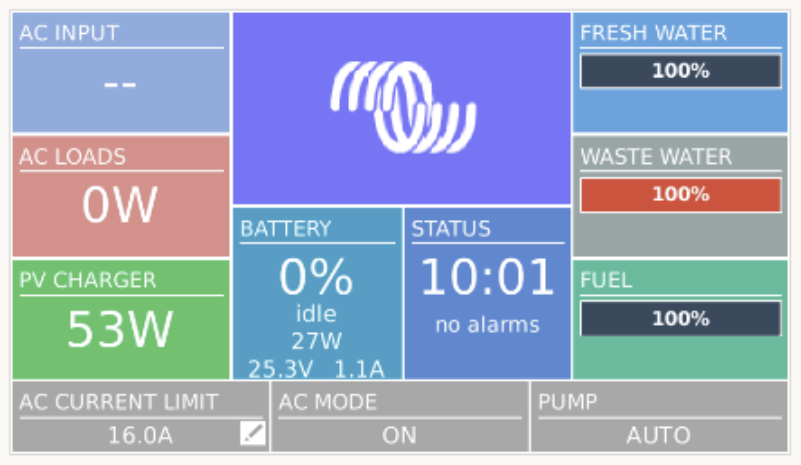
Tank level data is accessible on the GX Device screen (ie. on a GX Touch or CCGX), as well as through 'Remote Console' on LAN and remotely via the VRM Portal.

4.1. Boat and motorhome overview

The tank level values can be displayed on the home screen of the GX device by using the 'Boat and motorhome overview' page (which needs to be enabled in the 'Settings' > 'Display and language' menu).

Once the 'Boat and motorhome overview' is activated, that additional page becomes available for selection as the home screen. To cycle through the available home screen options, simply swipe across the home page.

The 'Boat and motorhome overview' page enables the entire system and tank levels to all be monitored from a single screen, including the ability to change the 'Tank pump' mode.

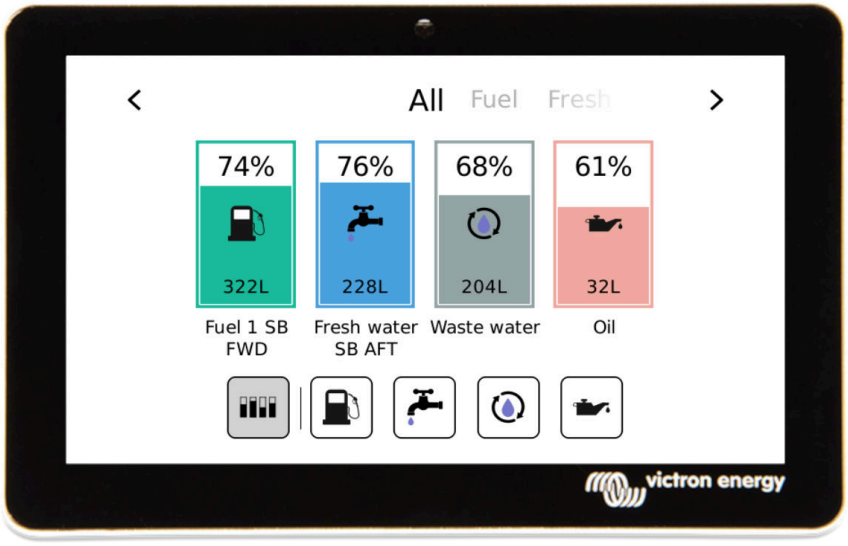


4.2. Tank overview

The tank level values can also be displayed on the home screen of the GX device by using the 'Tank overview' page (which needs to be enabled under 'Settings' > 'Display and language' menu).

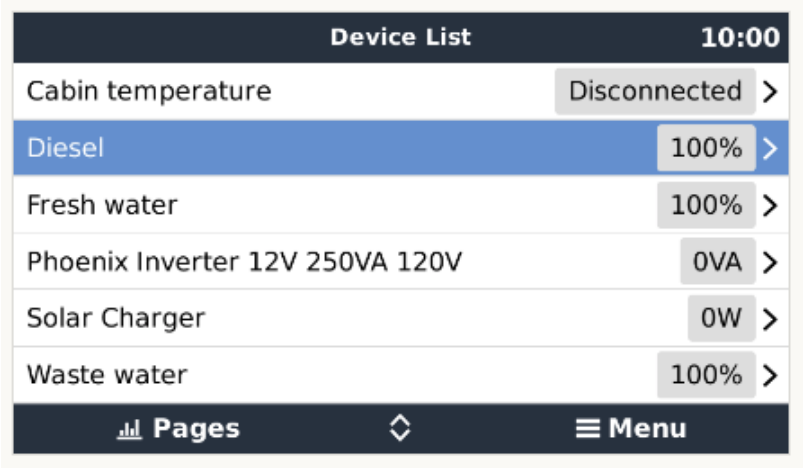
Once the 'Tank overview' is activated, that additional page becomes available for selection as the home screen. To cycle through the available home screen options simply swipe across the home page.

The 'Tank overview' page provides a neat way to organise and monitor a large quantity of tanks via the GX device or 'Remote console'.



4.3. Device list

The tank volume level of each enabled tank sensor is also shown beside the tank name (or type if no name is allocated) in the 'Device List' page.

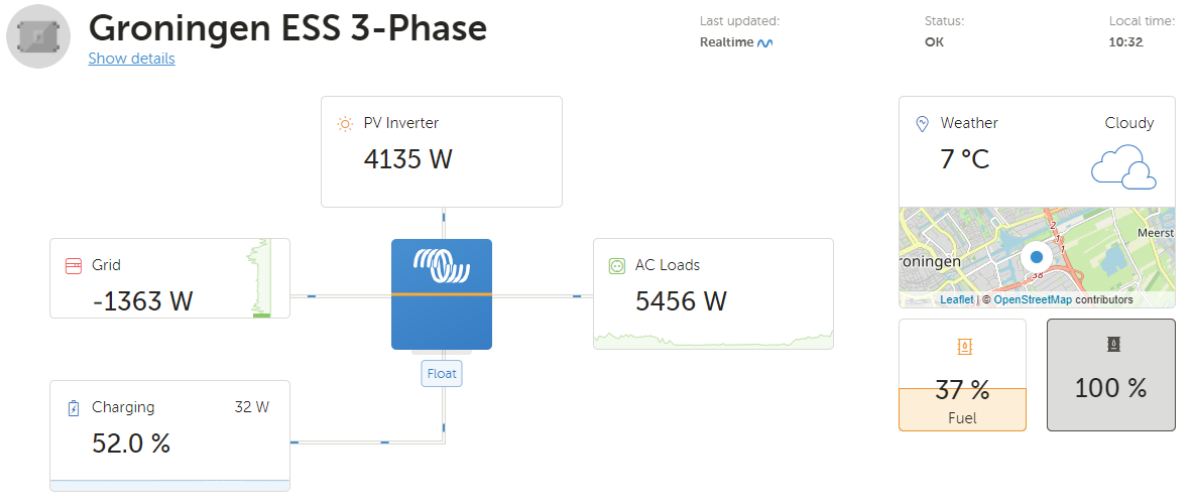


4.4. VRM Portal

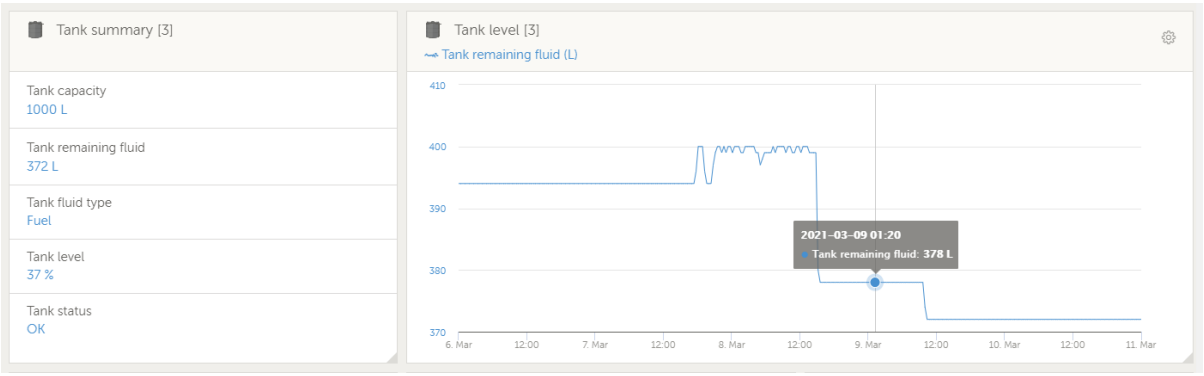
If enabled, the tank values are also reported to the VRM (Victron Remote Management) Online Portal and logged.

This data can be viewed remotely in 'realtime' via the 'VRM Dashboard' page, and historical data can be visualised over any given time period via the 'VRM advanced' page, by simply enabling the related widget.

Dashboard page



Advanced page - 'Tank summary' and 'Tank level'



Please refer to the VRM Manual for further details about VRM.

5. Troubleshooting

5.1. Error

In case the measured voltage/currents exceeds the limits (voltage: >10V, current: <4mA or >20mA) an error will be triggered.

Check that the tank sensor type and specification is compatible, that the tank sensor is functioning correctly (within the acceptable range) and the cabling/connections for any issues.

5.2. Tank level stuck (at ~40 to 55%)

In a setup with a current output sensor, a permanently fixed reading of ~40 to 55% can be caused by a tripped internal fuse.

The internal self-resetting fuse has a permanent current flow of ~11 to 13mA when tripped and the GX Tank 140 cannot detect this state as a fault.

Check the cabling and connections for a short circuit or any other issue.

6. Warranty

Five year limited warranty

This limited warranty covers defects in materials and workmanship in this product, and lasts for five years from the date of original purchase of this product.

The customer must return the product together with the receipt of purchase to the point of purchase.

This limited warranty does not cover damage, deterioration or malfunction resulting from alteration, modification, improper or unreasonable use or misuse, neglect, exposure to excess moisture, fire, improper packing, lightning, power surges, or other acts of nature.

This limited warranty does not cover damage, deterioration or malfunction resulting from repairs attempted by anyone unauthorized by Victron Energy to make such repairs.

Victron Energy is not liable for any consequential damages arising from the use of this product.

The maximum liability of Victron Energy under this limited warranty shall not exceed the actual purchase price of the product.