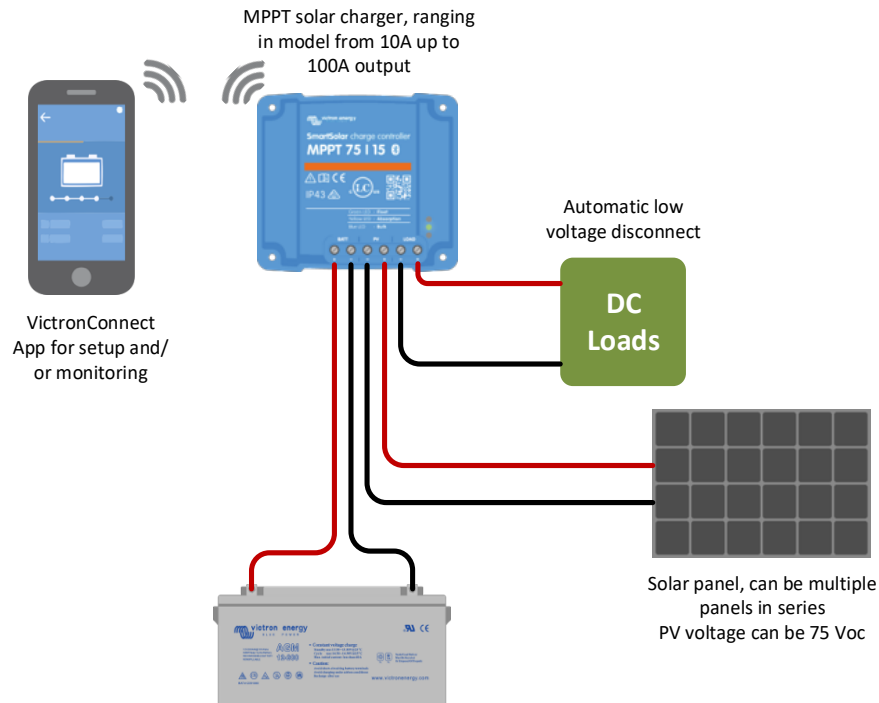




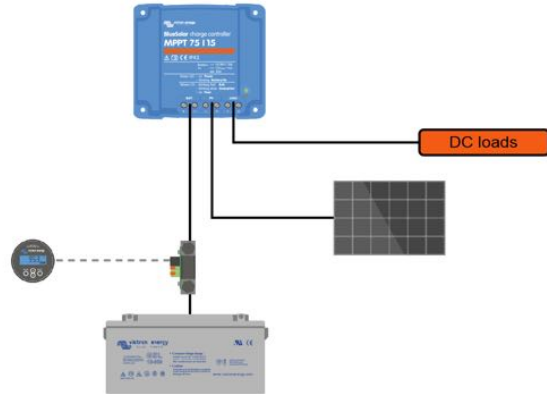
Training
Victron MPPTs

MPPT Solar charge controllers

MPPT with load output



Small solar system Examples



- Security camera systems
- Electronic traffic signs
- And so on

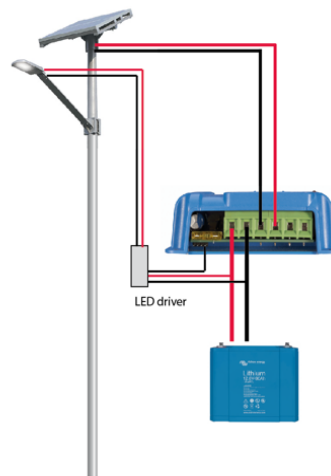


Streetlight systems

- Our MPPTs have day/night sensing



- Programmable load output



- LED driver control through VE direct port (PWM signal) via special cable




Solar streetlights in Kuwait



MPPT controllers with load output

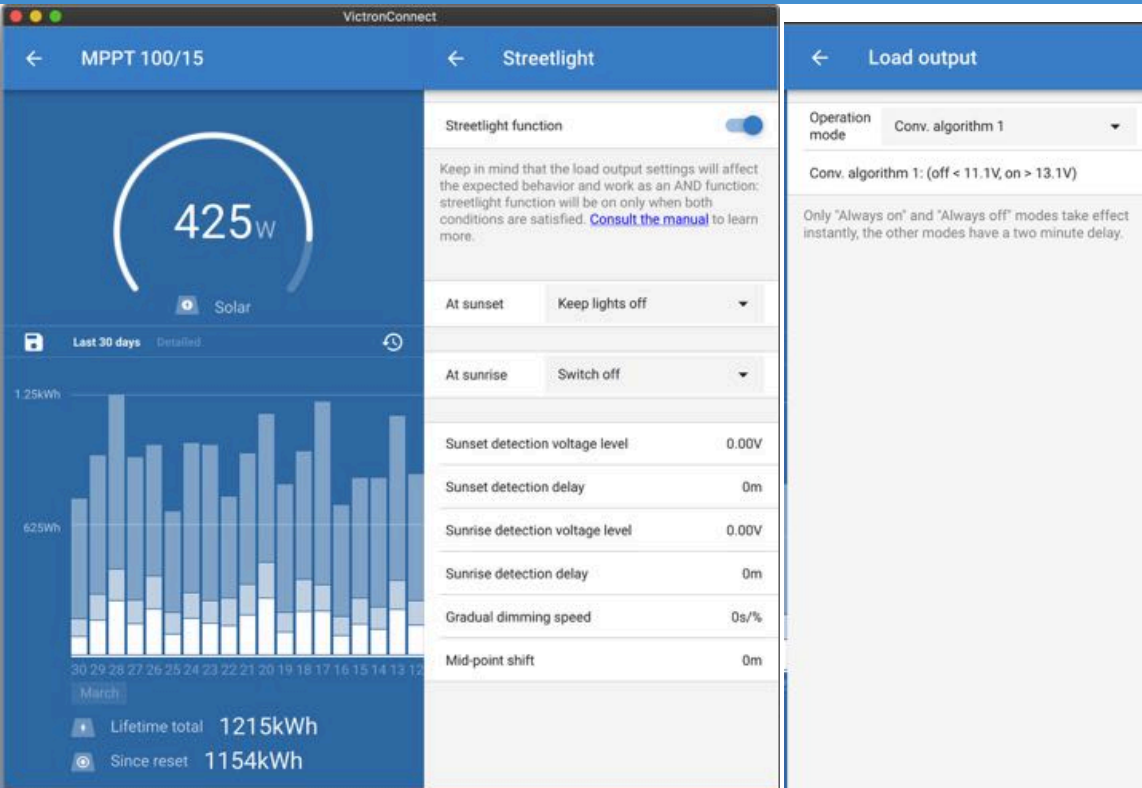
- Ultra fast Maximum Power Point Tracking (MPPT)
- Advanced detection during partial shading conditions
- Outstanding conversion efficiency 98% efficiency
- Load Output
- Automatically adjust to 12V or 24V battery voltage
- Two 20A models , one for 12 or 24V the other for 48V
- VE.Direct port and with or without Bluetooth

BlueSolar	
75 V	100 V
10A	
15 A	15 A
	20 A

SmartSolar 	
75 V	100 V
10A	
15 A	15 A
	20 A

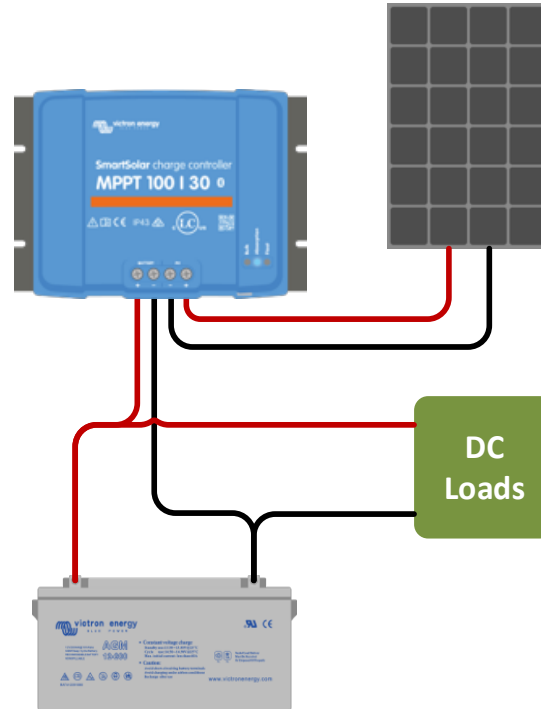


VictronConnect options for load terminal




Test in
VictronConnect
Demo Device Mode

MPPT without load output



MPPT controllers 100V input


- Ultra fast Maximum Power Point Tracking (MPPT)
- Advanced detection during partial shading conditions
- Outstanding conversion efficiency 98% efficiency
- Automatically adjust to 12V or 24V battery voltage (on first start up).
- VE.Direct port and either with or without Bluetooth

BlueSolar	SmartSolar 
100 V	100 V
30 A	30 A
50 A	50 A



MPPT controllers 150V and 250V input

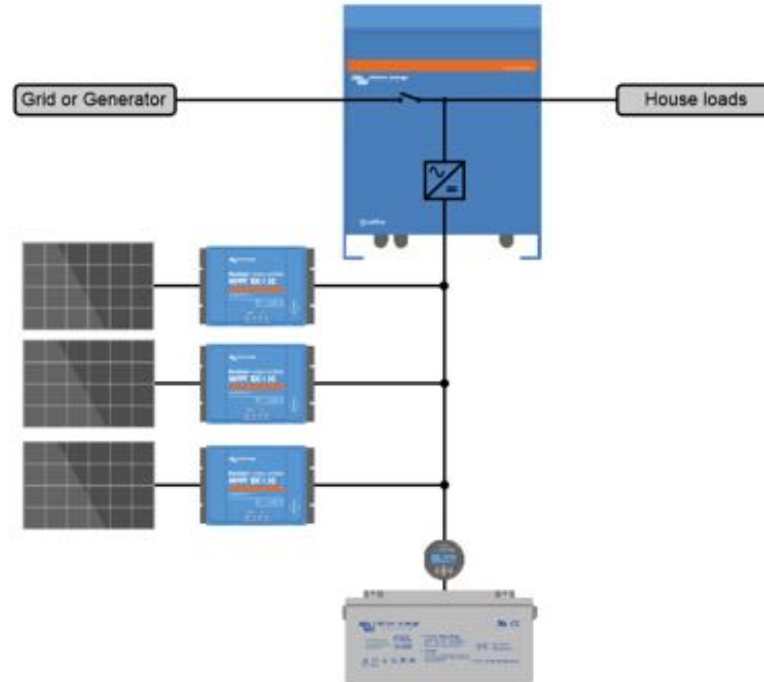
- Automatically adjust to 12, 24, 36* and 48V battery voltage
- Ultra fast Maximum Power Point Tracking (MPPT)
- Advanced detection during partial shading conditions
- Outstanding 98% efficiency
- Available with screw terminals (TR) or MC4 terminals
- Optional pluggable display

BlueSolar	SmartSolar 	
150 V	150 V	250 V
35 A	45 A	45 A
45 A	60 A	60 A
60 A	70 A	70 A
70 A	85 A	85 A
	100 A	100 A

* 36 volt not automatic, but will need to be set




Multiple MPPTs can be used



MPPT VE.Can Series

- Use in large systems
- Replaces the old 150/70 & 150/85 VE.Can chargers *
- VE.Can allows daisy-chain wiring resulting in less clutter
- VE.Direct port and VE.can Port
- Models with or without Bluetooth
- Each charger will be displayed individually on GX device
- Supports ESS and managed (CAN BMS) batteries, just like today's VE.Direct models.

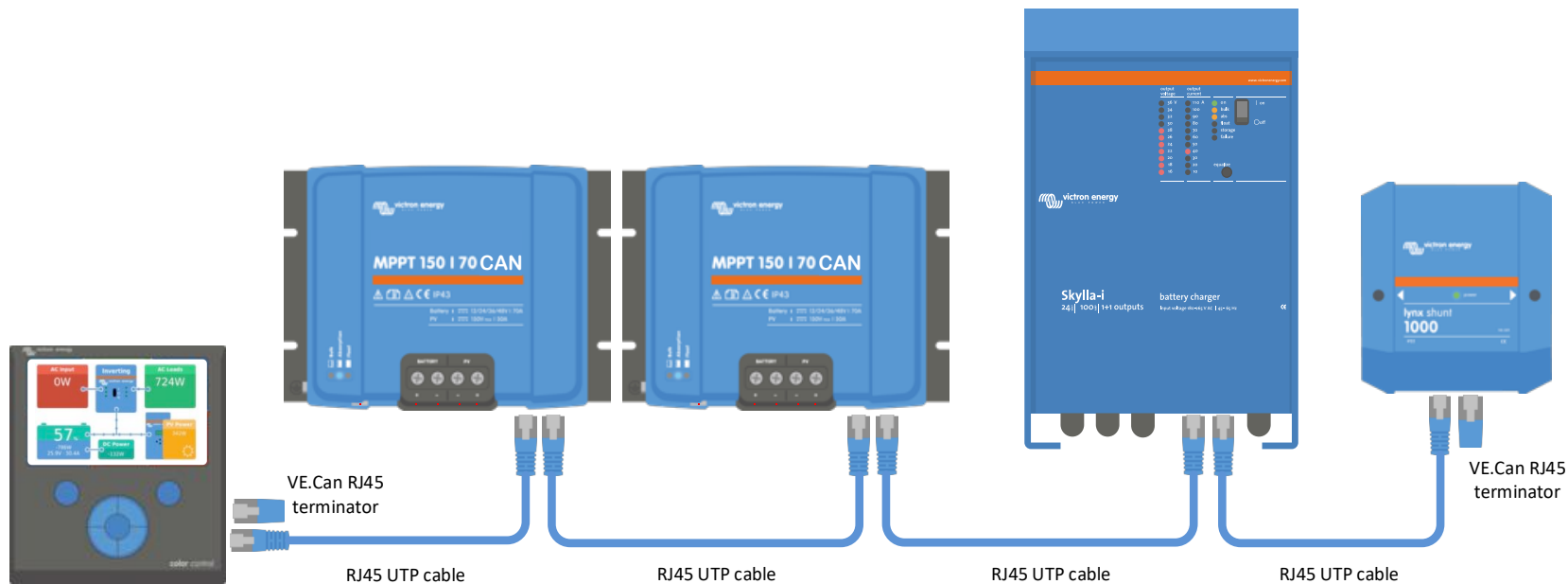
SmartSolar 	
150 V	250 V
70 A	70 A
85 A	85 A
100 A**	100 A

* Not possible to synchronise with the “old” VE.Can MPPTs

** also available without Bluetooth



Example of a VE.Can system



MPPT Solar Charger range



BlueSolar

75 V	10	15									
100 V		15	20	30			50				
150 V					35	45		60	70		100 VE.can



SmartSolar

75 V	10	15									
100 V			20	30			50				
150 V					35	45		60	70	85	100
250 V					35	45		60	70	85	100

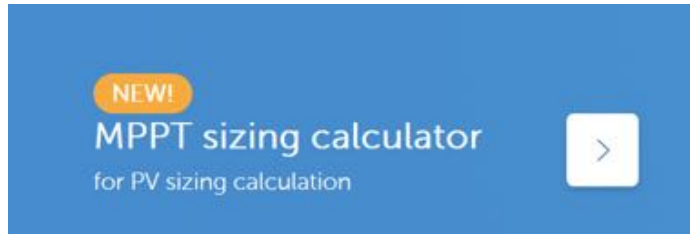


SmartSolar VE.Can

150 V									70		100
250V									70		100

MPPT - Sizing calculator

- mppt.victronenergy.com
- Can also be found on the Solar charge controller product page
- For Victron panels or custom panels

A screenshot of the Victron Energy website's MPPT sizing calculator. The page has a dark blue header with the Victron Energy logo and navigation links. The main content area is titled "Solar charge controllers" and features a "MPPT sizing calculator" button. Below this, there is a detailed calculator interface with a "Victron module" tab selected. The calculator shows input fields for "Victron solar modules" (520W-24V Poly), "Series" (2), and "Parallel" (2), resulting in a "Total pv power: 1280 Watt peak". It also has fields for "PV Module temperature (°C)" (Min: -10, Max: 70) and "System voltage (V)" (24). On the right, two results are shown: "BlueSolar MPPT 150/45 MC4" and "BlueSolar MPPT 150/45 T". At the bottom, there are four tabs for different power/voltage ranges: 100/15, 100/20, 100/50, and 150/100.

VictronConnect and MPPTs

VictronConnect

- Connects to **VE.Direct**, VE.Bus and GX products
- Connects via **Bluetooth** or via **USB** to **VE.Direct** or MK3
- For monitoring products
- For configuring products
- For firmware updating
- Multi-lingual
- Demo product library
- Saving and loading settings
- Help in context




Device that can run VictronConnect


- Android phone and tables
- Apple phone and tables
- Apple Mac
- Windows





	Android	iOS	MAC	Windows
Bluetooth	yes	yes	yes	no
USB	Yes*	no	yes	yes


* Requires a USB On-The-Go cable


 (v5.8) - Windows


 Download for Android from Play Store


 Download for Mac from App Store

 Download for iOS from App Store

 (v5.8) - Android .apk (armv7)

 (v5.8) - Android .apk (x86)

 (v2.12.16) - VE.Direct USB drivers

 (v3.3) - Windows installer (Windows XP and Vista)

Connect via Bluetooth

Monitoring and configuring for MPPTs

VictronConnect App
ios or Android



VictronConnect App
ios or Android



VE.Direct
Bluetooth Smart
Dongle



Product with
VE.Direct port



System monitoring

Via Bluetooth

VictronConnect
App

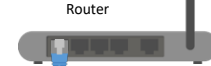


GX device via Wi-Fi

WiFi



VictronConnect
App
Remote console



Ethernet Cable

VE.Can RJ45
terminator

RJ45 UTP cable

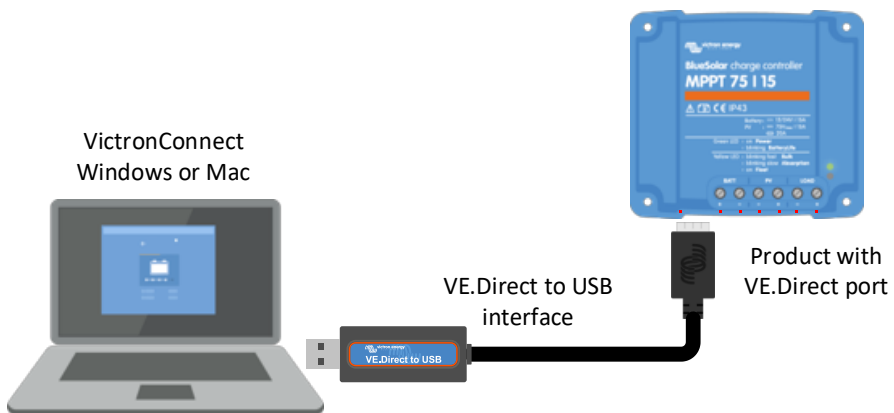
VE.Can RJ45
terminator

VE.Direct cable

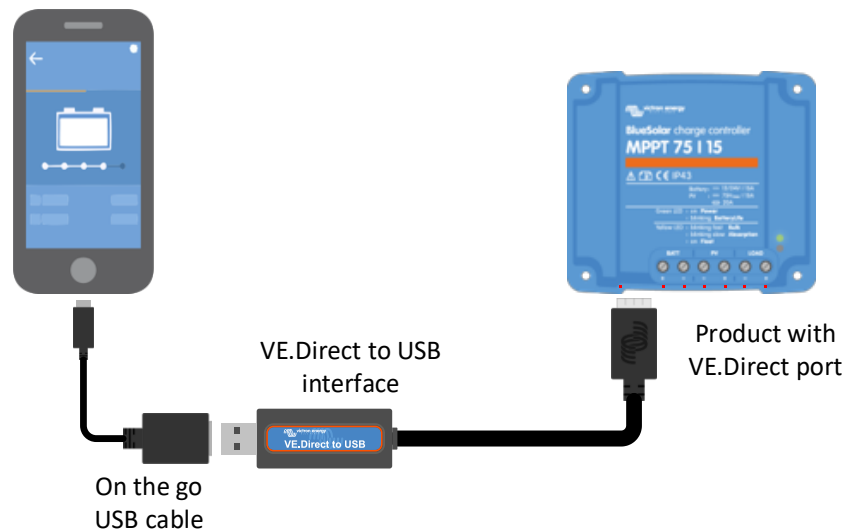


Connecting via USB

VictronConnect
Windows or Mac



Android
VictronConnect App



VE.Smart Network

VE.Smart network

VE.Smart Network allows Victron products to exchange information via Bluetooth
Product that can communicate with the VE.Smart Network are:

- Smart Battery Sense
- BMVs
- MPPTs



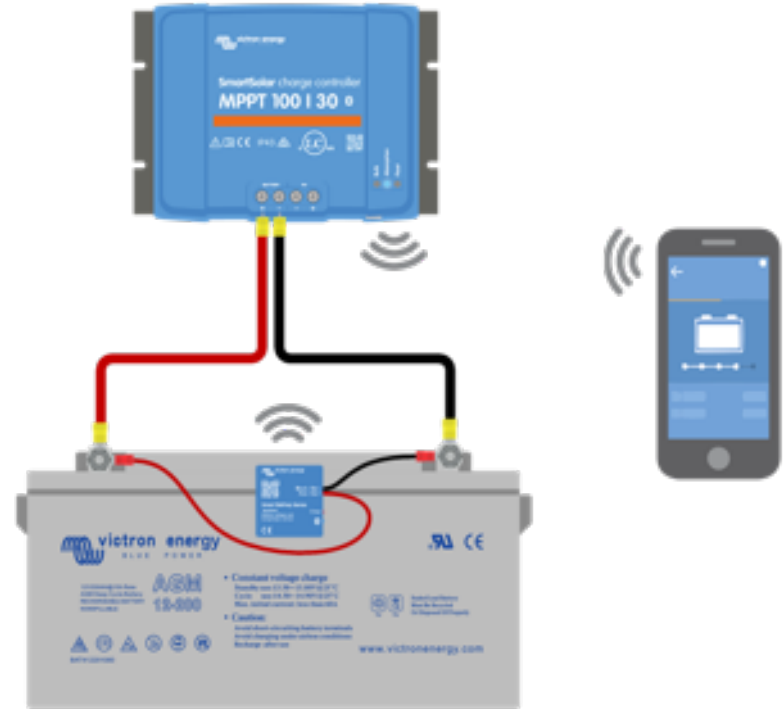
For non-smart models, use the VE.Direct Bluetooth dongle

Share system values

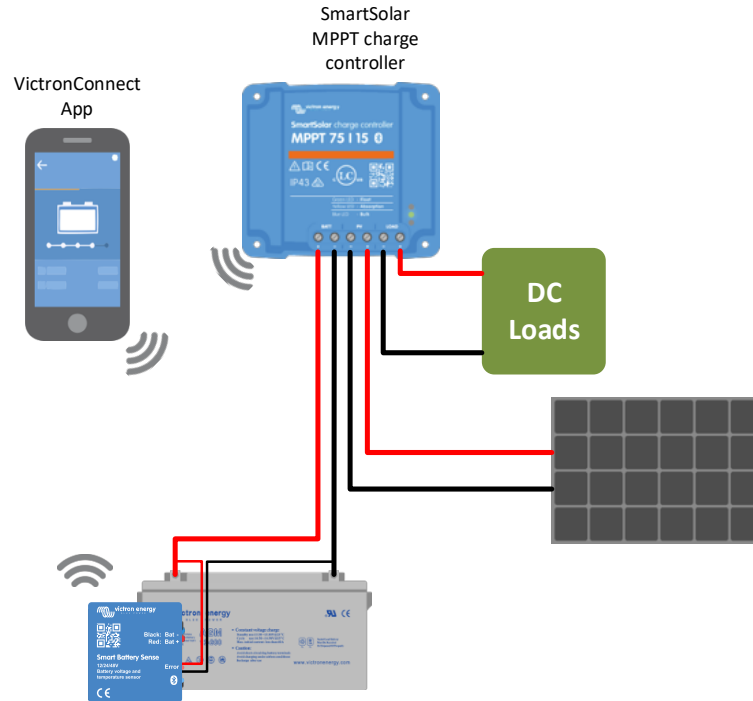
- Shared **battery voltage** sense value
- Sharing of **battery temperature** value
- Battery chargers **synchronizing** their charge stages

More info:

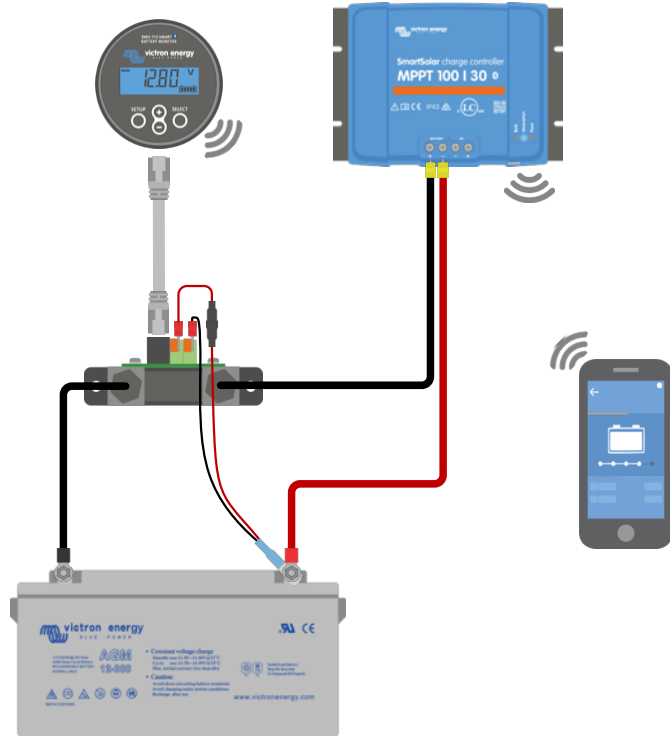
<https://www.victronenergy.com/live/victron-connect:ve-smart-networking>



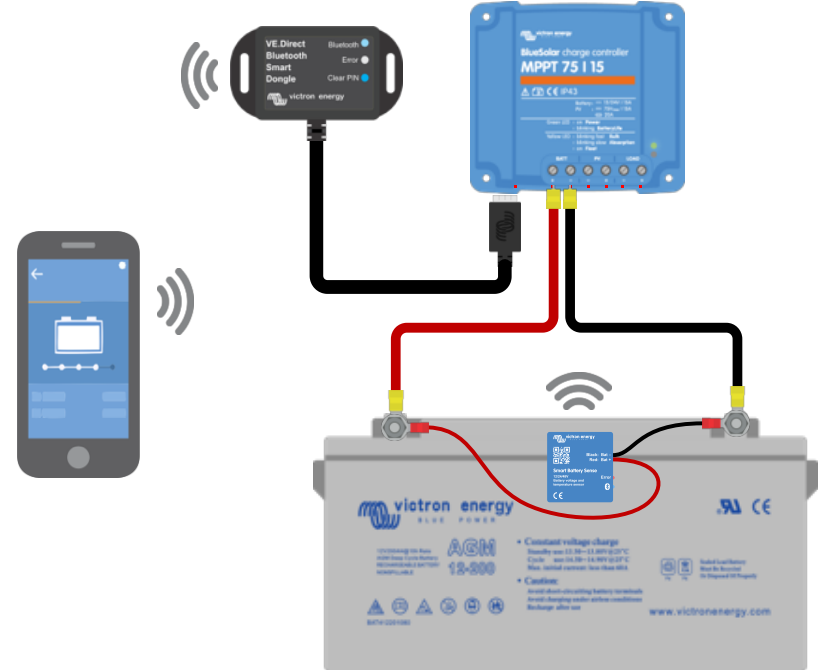
Smart battery sense for temperature compensated charging



With BMV



Without BMV



Is voltage and temperature sense needed?

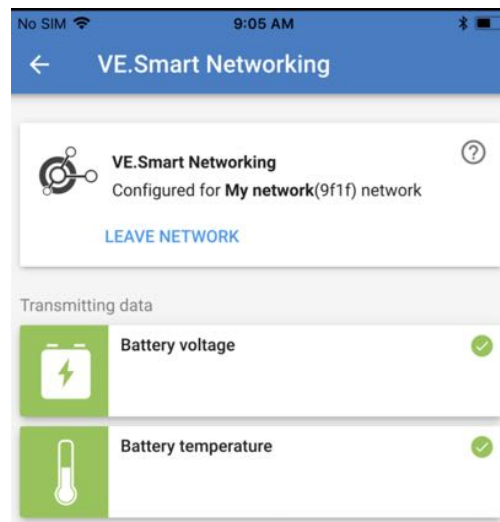
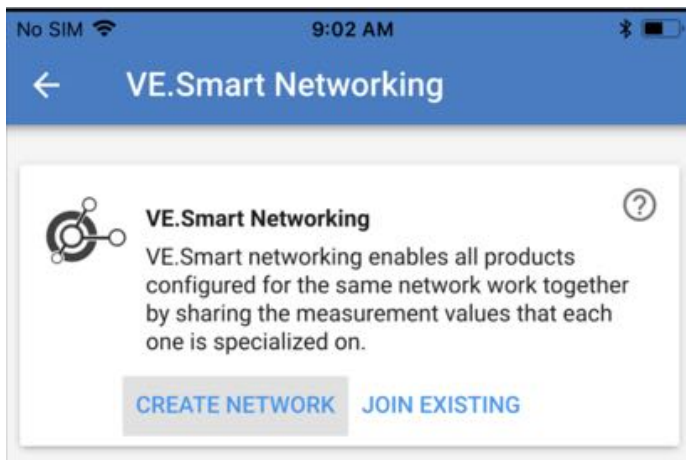
- The battery voltage data **compensates for voltage-drop** over the battery cables. This ensures that the battery is charged with the exact voltage as configured in the charger - instead of a lower voltage due to resistance in the wiring.
- For **lead-acid batteries the battery temperature data is used to adjust the charge voltages**. When cold, a lead/acid battery needs a higher charge-voltage and when it's hot it needs a lower charge-voltage
- For lithium batteries the battery temperature data is used to **prevent charging Lithium batteries below 5C** to prevent them from being damaged .



Setting up the VE.Smart Network

Step 1: Setup the Smart Battery Sense or the BMV

In Victron connect navigate to Smart Networking and create network



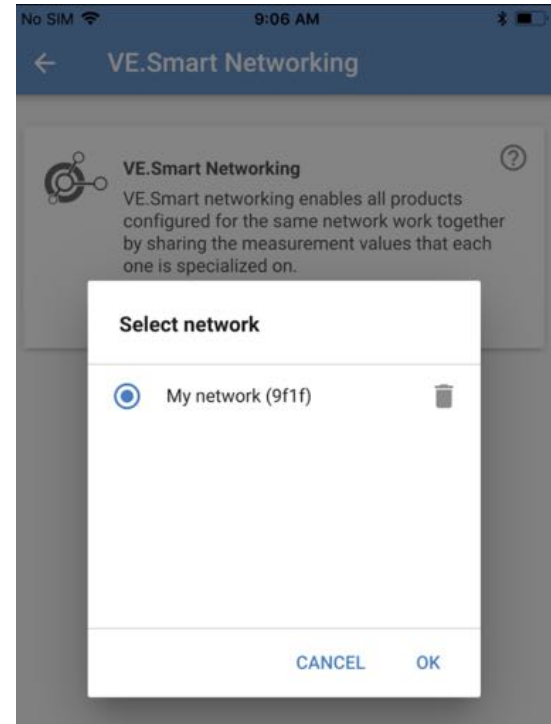
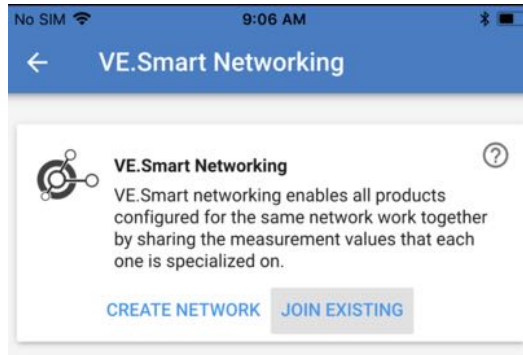
Setting up the VE.Smart Network

Step 1: Setup the Smart Battery Sense or the BMV

In Victron connect navigate to Smart Networking and create network

Step 2: Join Solar Chargers to the network

In Victron connect navigate to Smart Networking and join existing network



Setting up the VE.Smart Network

Step 1: Setup the Smart Battery Sense or the BMV

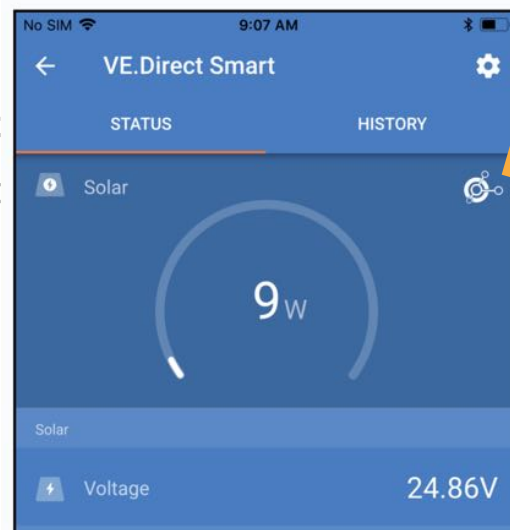
In Victron connect navigate to Smart Networking and create network

Step 2: Join Solar Chargers to

In Victron connect navigate to existing network

Step 3: Verify operation

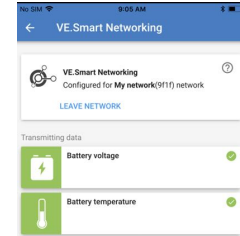
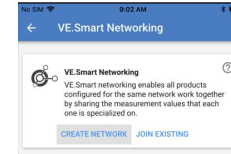
Check for network icon



Setting up the VE.Smart Network

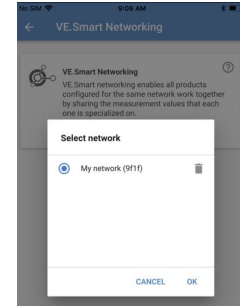
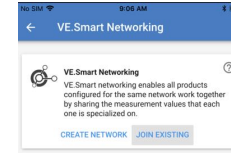
Step 1: Setup the Smart Battery Sense or the BMV

In Victron connect navigate to Smart Networking and create network



Step 2: Join Solar Chargers to the network

In Victron connect navigate to Smart Networking and join existing network

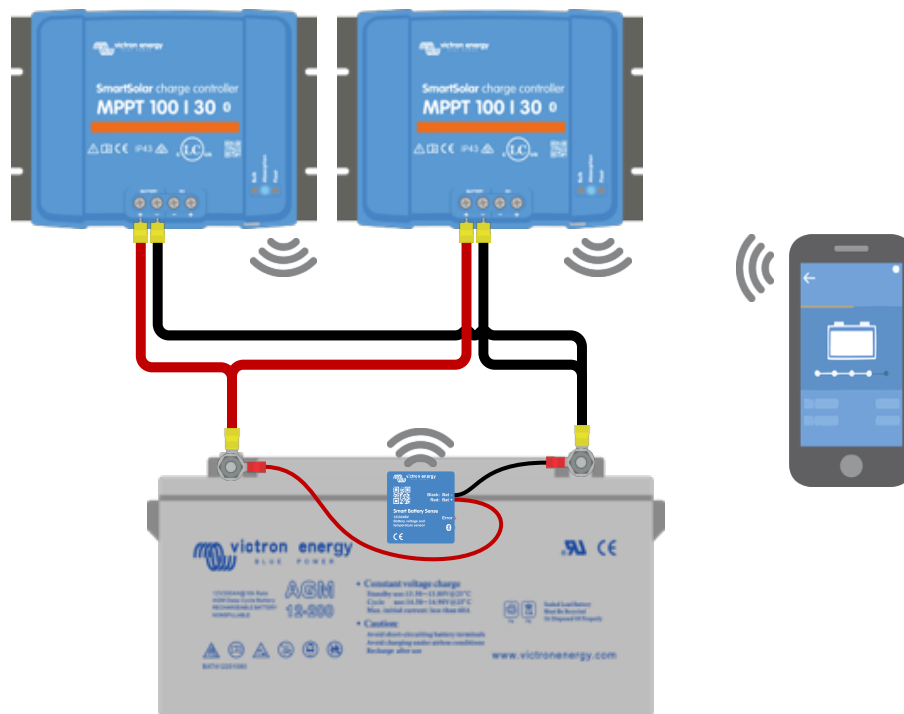


Step 3: Verify operation

Check for network icon



Multiple devices



Synchronising MPPTs

- SmartSolar MPPTs (also VE.Can models) can synchronize via Bluetooth (maximum 10 units)
- SmartSolar VE.Can chargers via VE.Can can synchronize via CANbus.
- BlueSolar chargers do not have the synchronise-feature

Use in standard systems with lead batteries or with managed batteries:

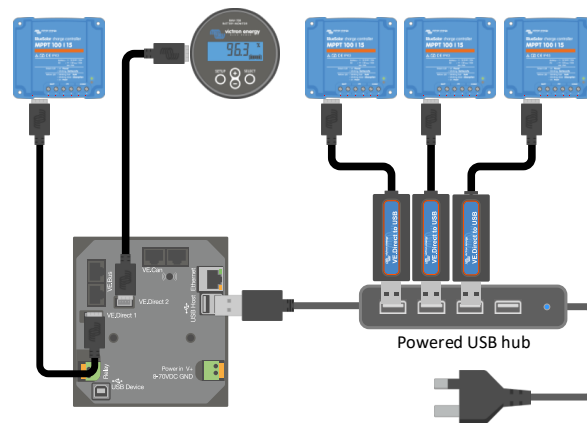
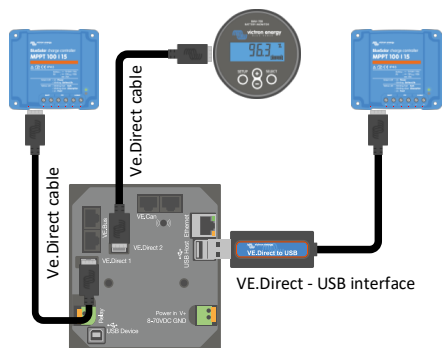
- In case of a managed battery the battery is in control
- For ESS with lead acid or non managed batteries, the Multi or Quattro is in control



MPPT with a GX device (e.g. Cerbo GX)

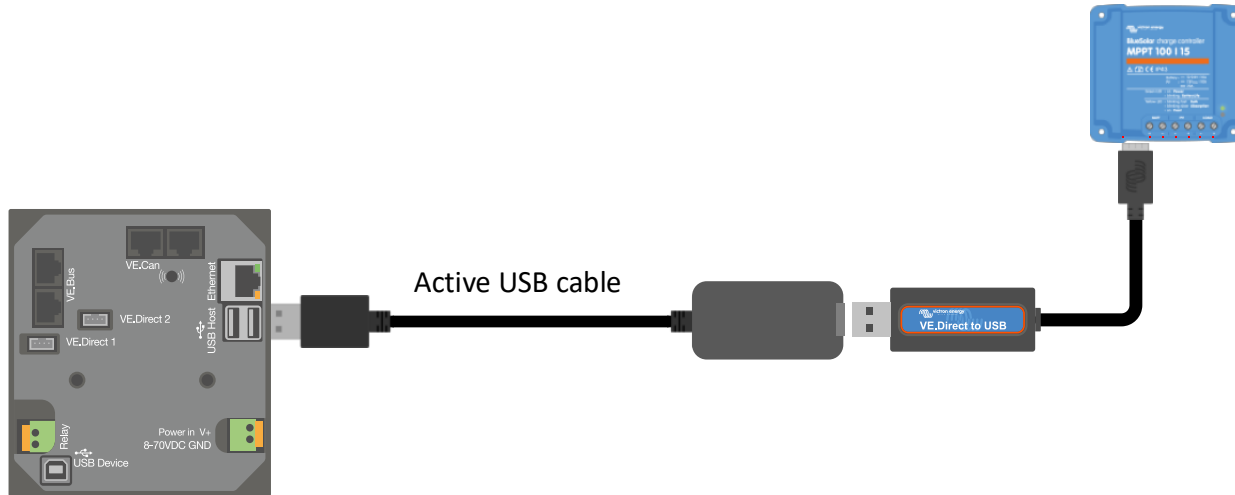
VE.Direct connections

- VE direct is a point to point protocol, maximum distance is 10 meters
- Use a VE.Direct-USB interface if more VE.Direct connections are needed
- If more connections are needed use a powered USB (or use VE.Can MPPTs)
- Maximum VE.Direct devices: Cerbo = ~10, CCGX = 5, Venus= 6, Octo= 10, Maxi=25



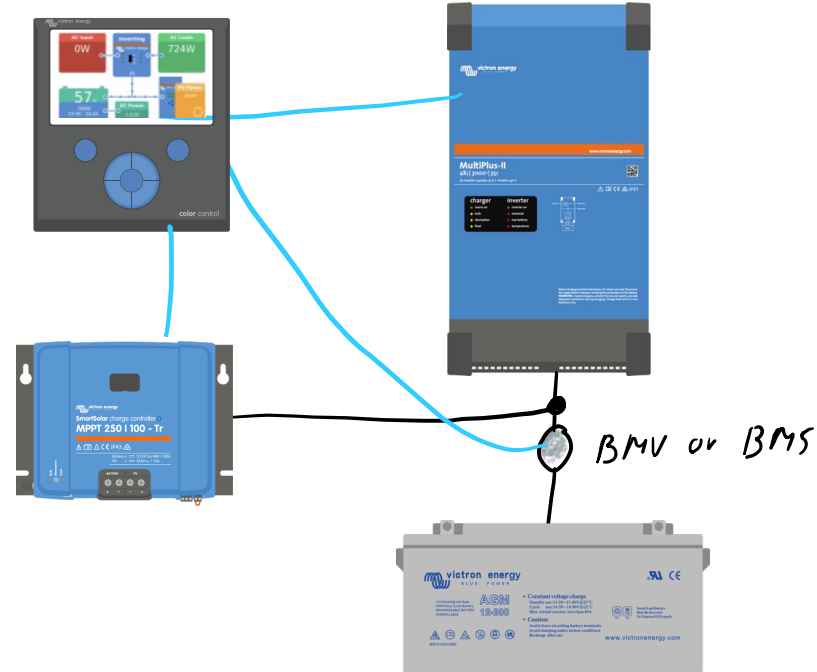
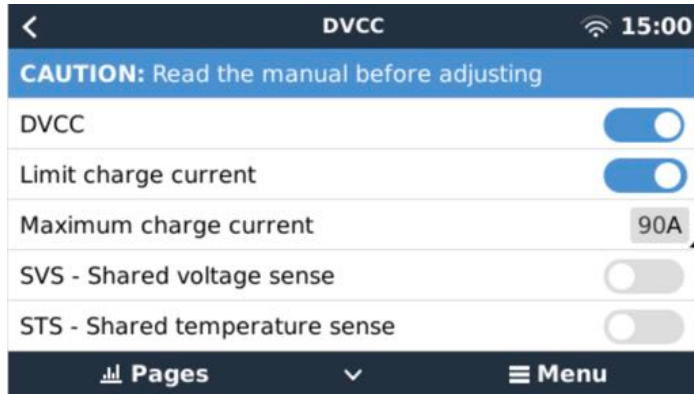
VE.Direct connections

- Use active USB cable and a VE.Direct-USB interface for distances beyond 10 meter



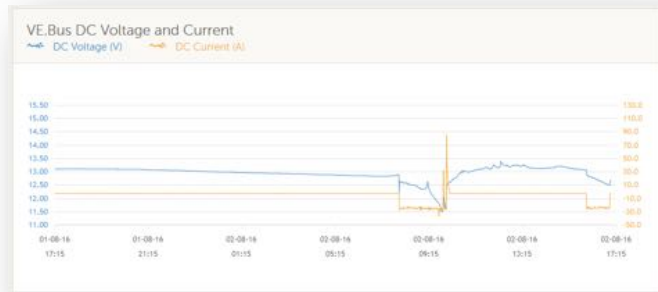
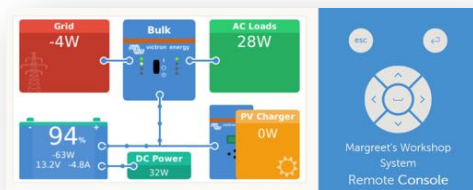
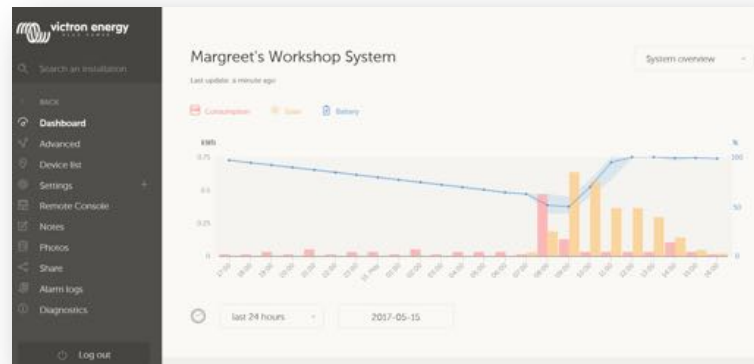
DVCC - Distributed Voltage Current Control

- For systems with or without ESS
- Set a system maximum charge current
- Priorities solar charge over grid charge
- Set a system voltage
- Allows a for BMS to control charge current



VRM - Victron Remote Monitoring

- Real time data
- System overview
- Detailed data logging
- Diagnostics
- Remote console
- and much more.....
- Try the demo!



Firmware updating

When to update firmware

Always update on first install

After that only update:

- If update fixes a major bug and your system is suffering from this bug
- If update adds functionality that you want to also need in your system
- Before seeking support

Updating VE.Direct products

- Via VictronConnect (Local)
- Via VRM (Remote)

Firmware update for Margreet test ccgx

Device description	Id	Installed version	Latest version	Updatable
SmartSolar Charger MPPT 250/100	/dev/ttyO0	v1.22	v1.36	<button>Update Device</button>

You can use this page to update the firmware of devices connected to your Venus device. For detailed instructions about the update process visit: [Remote Firmware Update Manual](#).

Rescan

Product info



Product
SmartSolar Charger MPPT 100/20 48V

Serial number
HQ17477SBXZ

Custom name
SmartSolar HQ17477SBXZ [EDIT](#)

Firmware
v1.40
v1.42 available to update [UPDATE](#)

Bluetooth
Bluetooth enabled ☒

VictronConnect – History

30 Day History



30 Day History

[illegible]

VictronConnect – Trends display

09:00



SmartSolar 150/70



STATUS

HISTORY

TRENDS



Solar



55_W



Solar



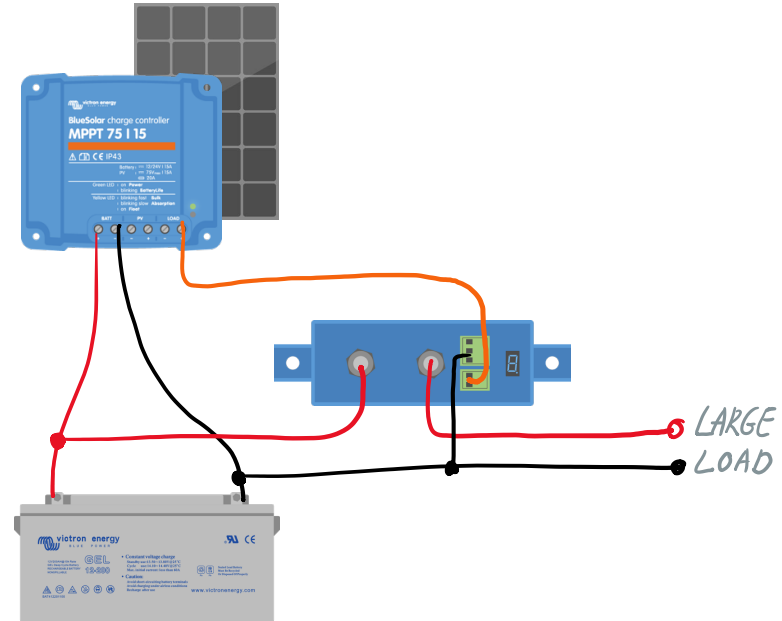
Voltage

104.69V

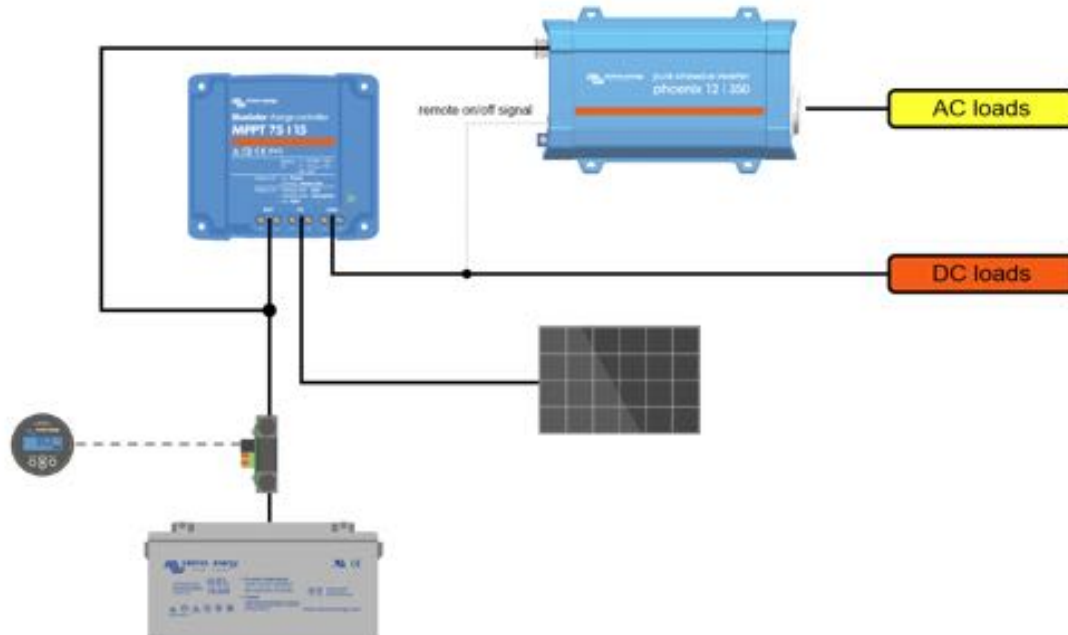
MPPT with load output limitations

Getting around the load output

- The load output is rated to 15A or 20A
- If the load exceeds this, the load output will shut down. (is short circuit proof)
- If the load is bigger, then use a battery protect, and drive the remote connector of the BatteryProtect by a signal from the load output.
- The BP needs to be set to Li-ion mode. The BP will connect the load 30 seconds after the remote input is high.



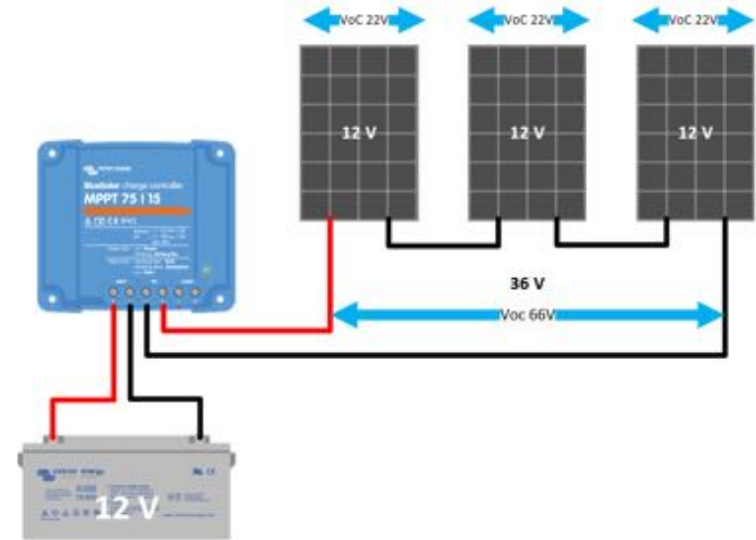
Small inverter DC off-grid system



MPPT Behavior

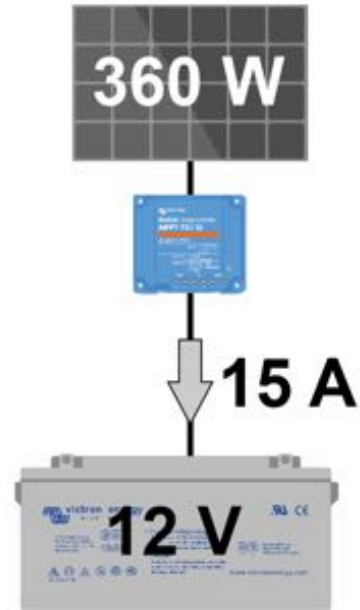
MPPT - Large PV voltages

- If you look at the specs of a 12 V solar panel, open circuit Voltage (Voc) is around 22 V.
- For a 75/15 MPPT the solar voltage can be as high as 75 V.
- This will allow you to connect up to 3 x 12 V panels in series.
- MPPTs must have a PV voltage 5V higher than battery voltage to start

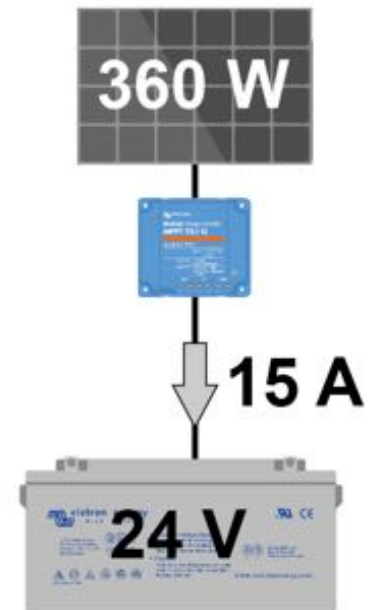


MPPT - Current limiting

- For a 75/15 MPPT the current rating is 15 A. This is the current going into the battery.
- This means that with a 12 V battery you will get less power into your battery than with a 24V battery.



$$15 \text{ A} \times 12 \text{ V} = 180 \text{ W}$$



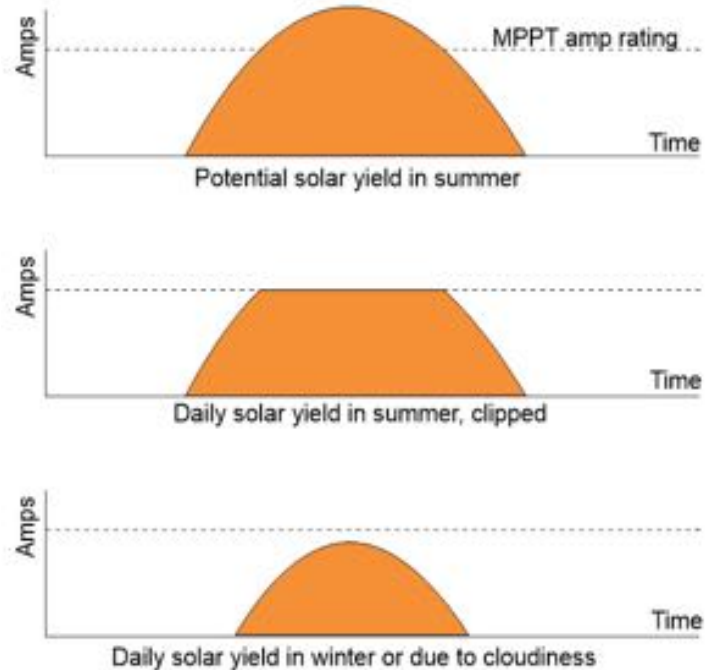
$$15 \text{ A} \times 24 \text{ V} = 360 \text{ W}$$

MPPT - Current limiting

The MPPT solar chargers are current limited. Over current will not cause damage (within spec).

This means that it is okay to oversize the solar panels.

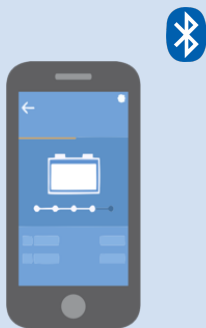
- During cloudy weather, or winter, you will benefit from larger solar panels.
- But in summer you will get less than maximum, but that will easily be compensated by the longer daylight hours.



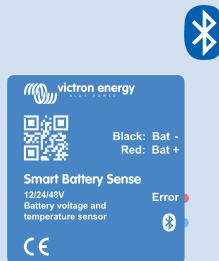
Accessories

MPPT Accessories

VictronConnect



Smart Battery
Sense



VE.Direct display
Pluggable display

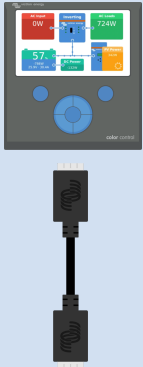


Wire boxes
S, M, L and XL



VE.Direct Accessories

VE.Direct cables
0.3 - 10 meter



Smart dongle




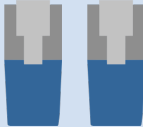

VE.Direct - USB
interface



TX cable
Non inverting
cable



VE.Can accessories

RJ 45 cables 0.3 - 30 meter	Terminators	VE.Can to NMEA2000 Micro-C male*
		 <p data-bbox="1155 885 1505 928">* For NMEA2000, it is now recommended to go via GX device</p>

Solar panels, cables and connectors

- Mono and poly crystalline solar panels
- Ranging from 20W up to 360W
- 12V & 24V nominal



- Solar cables with MC4 connectors, 4 and 6 mm²
- Ranging from 1 to 20 meters



- Adapter cables MC4 to MC3
- Connector pair and spitter pair

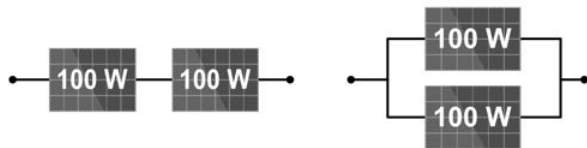


A bit of theory...

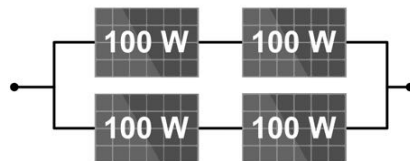
Power

To determine the total power you will have to add the power of each module no matter if they are connected in parallel or in series

These are both 200 W arrays



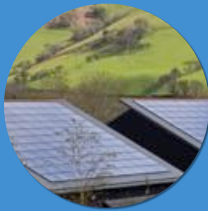
This is a 400 W array



Victron MPPTs are buck converters

The PV panel side voltage must be 5V higher than the battery side voltage to begin charging.

If Panel voltage is low (close to battery voltage), use a Victron PWM regulator instead.



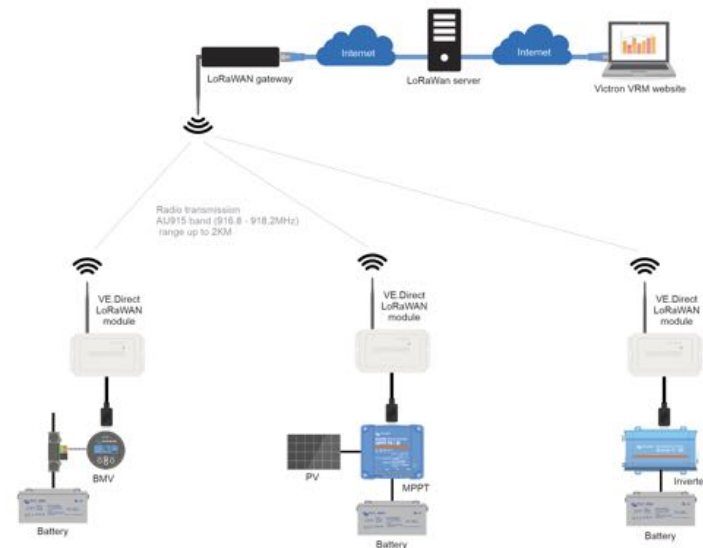
Energy. Anytime. Anywhere.

Monitoring - LoRaWAN

- Works with radio waves (915-928 MHz band)
- No sim card or Wi-Fi needed
- Works with VE.Direct: BMV, MPPT and Inverters
- Sends its data to VRM via "The Things network"
- Range: up to 25km (urban 1-2 km)

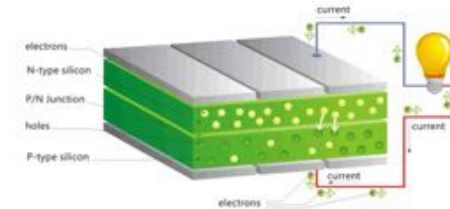
Application examples:

- Electrical hire boats
- Forklifts
- Golf carts
- Road signs
- Solar for water pumping

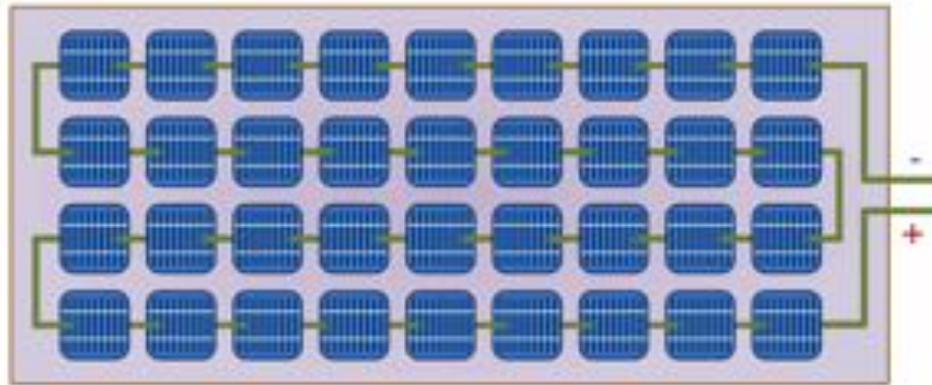


Solar panel cells

A single solar cell generates about 0.5 V
Multiple cells make up a solar panel



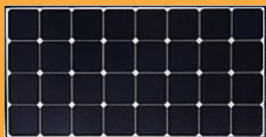
0.5 V



36 cells:

$$0.5 \text{ V} \times 36 = 18 \text{ V}$$

Various panel sizes



36 cell panel



60 cell panel



72 cell panel

$V_{nom} = 12\text{ V}$

$V_{pm} = 18\text{ V}$

$V_{oc} = 22\text{ V}$

PWM: 12 V battery

MPPT: 12 V battery

$V_{nom} = 20\text{ V}$

$V_{pm} = 30\text{ V}$

$V_{oc} = 38\text{ V}$

PWM: not suitable

MPPT: 12 V battery

$V_{nom} = 24\text{ V}$

$V_{pm} = 36\text{ V}$

$V_{oc} = 44\text{ V}$

PWM: 12 or 24 V battery

MPPT: 12 or 24 V battery