



## Blue Smart IP22 Charger

12V - 15/20/30A | 24V - 8/12/16A | 230/240VAC

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## 1. Safety instructions



### CAUTION: CAREFULLY READ AND FOLLOW ALL SAFETY INSTRUCTIONS

- Ensure the area around the battery and charger is properly ventilated.
- Do not cover or place any objects on top of the charger.
- Do not place the charger on top of the battery.
- Ensure that there are no sparks or ignition sources near the battery; batteries can emit explosive gasses while being charged.
- Battery acid is corrosive; if battery acid comes into contact with skin immediately rinse with water.
- Do not attempt to charge non-rechargeable or frozen batteries.
- The charger must not be used by children or people who cannot read and understand the instruction manual, unless they are under strict supervision of a responsible person to ensure the charger is used safely.

Store and use the charger out of the reach of children.

- The charger must be connected in the following order:
  1. Connect the DC cable to the battery terminal that is not connected to the chassis
  2. Connect the remaining DC cable to the chassis, away from the battery and any fuel lines/sources
  3. Connect the AC power cable to a mains power outlet
- After charging, the charger must be disconnected in the following order (reverse of the connection order):
  1. Disconnect the AC power cable from the mains power outlet
  2. Disconnect the DC cable that is connected to the chassis
  3. Disconnect the DC cable connected to the battery terminal
- Connection to the mains supply must be in accordance with local electrical regulations. In case the AC power cable is damaged, contact the manufacturer or a service agent.
- The charger must only be plugged into an earthed AC mains power outlet.
- The integrated charge modes (selected using the MODE button) and adaptive charge logic are well suited for most common battery types; such as flooded lead-acid, AGM, Gel and lithium.

If necessary, advanced configuration with user defined settings is possible using the VictronConnect app and a Bluetooth enabled device (such as a mobile phone or tablet).
- It is possible to charge multiple batteries simultaneously, providing that the combined battery capacity is within the recommended battery capacity limits for the particular charger - see section 8 'Technical specifications'.

## 2. Quick start guide

1. Connect DC cables to the charger and then the battery or batteries; ensure that there is a good electrical connection and keep the terminals away from any surrounding objects that could cause a short circuit.



2. Connect the AC power cable to a mains power outlet; the BULK LED will be illuminated when the **blue smart charger** is powered up.
3. Select the charge mode appropriate for the battery type; briefly press the MODE button to cycle through the available options, the LED beside the currently selected charge mode will be illuminated.

When recondition mode is selected, the RECONDITION LED will be illuminated in addition to the selected charge mode LED.

The charger will automatically store the selected charge mode and recall it for future charge cycles (even after being disconnected from power).



4. If required:
  - a. Activate night mode (disabled fan and reduced charge current for 8h); depress and hold the MODE button for 3 seconds, when activated the NIGHT LED will be illuminated.  
Night mode will automatically end after 8 hours or depress and hold the MODE button for 3 seconds again to end night mode earlier.
  - b. Activate low current mode (disabled fan and reduced charge current); depress and hold the MODE button for 6 seconds, when activated the NIGHT LED will blink. Depress and hold the MODE button for 6 seconds again to end low current mode.
5. When the ABS LED is illuminated the charger has moved into absorption stage (bulk stage is complete); the battery will be approximately 80% charged (or >95% for Li-ion batteries) and may be returned into service if required.
6. When the FLOAT LED is illuminated the charger has moved into float stage (absorption stage is complete); the battery will be fully (100%) charged and is ready to be returned into service.
7. When the STORAGE LED is illuminated the charger has moved into storage mode (float stage is concluded); to maintain the battery at full charge, the battery can be left on continuous charge for an extended duration.
8. Disconnect the AC power cable from the mains power outlet at any time to stop charging.

## 3. Features

### a. Bluetooth setup and monitoring (Using VictronConnect)

Easily setup, monitor or update the charger firmware using the **VictronConnect** app and a Bluetooth enabled device (such as a mobile phone or tablet).

### b. Multi-stage charge algorithm

The multi-stage charge algorithm is specifically engineered to optimise each recharge cycle and charge maintenance over extended periods.

### c. Adaptive absorption

Adaptive absorption monitors the battery's response during initial charging and intelligently determines the appropriate absorption duration for each individual charge cycle. This ensures that the battery is fully recharged regardless of the discharge level or capacity and avoids excessive time at the elevated absorption voltage (that can accelerate battery aging).

### d. Temperature compensation

Charge voltage is automatically compensated depending on the ambient temperature; this ensures that the battery is charged at the optimal charge voltage regardless of the climate and avoids the need for manual settings adjustments.

Temperature compensation is not required and automatically disabled when in LI-ION charge mode.

### e. High efficiency

The **blue smart charger** range is up to ~95% efficient; resulting in lower power usage, less heat generated and cooler operation.

### f. Durable and safe

- i. Engineered to provide years of trouble-free and dependable operation in all usage conditions
- ii. Protection against overheating: output current will be reduced if the charger temperature increases to 50°C
- iii. Integrated cooling fan to maintain low charger temperature during highly demanding conditions and avoid the need for current reduction
- iv. Protection against short circuit: If a short circuit condition is detected the charger will immediately shut down
- v. Protection against reverse polarity connection: If the charger is incorrectly connected to a battery with reverse polarity the user replaceable fuse will blow

### g. Silent operation

Charger operation is totally silent whilst the cooling fan is off; the cooling fan is only activated during demanding periods, when it is necessary.

If the NIGHT or LOW mode is activated; the maximum output current is reduced to 50% of nominal and the cooling fan will always remain off.

### h. Lithium Ion compatible

Compatible with Li-ion (LiFePO<sub>4</sub>) batteries; when the integrated LI-ION charge mode is selected the charge cycle settings are altered to suit.

If the charger is connected to a battery where under voltage protection (UVP) has tripped, the **blue smart charger** range will automatically reset UVP and start charging; many other chargers will not recognise a battery in this state.

**Warning: Never charge a Li-ion battery when its temperature is below 0°C.**

### i. Storage stage

An additional stage to extend battery life whilst the battery is unused and on continuous charge.

### j. Recondition stage

An optional stage that can partially recover/reverse lead acid battery degradation due to sulfation; typically caused by inadequate charging or if the battery is left in a deeply discharged state.

### k. Low current mode

An optional mode that limits the maximum charge current to a significantly reduced level; recommended when charging lower capacity batteries with a high current charger.

### l. Recovery function

The **blue smart charger** range will attempt to recharge a severely discharged battery (even down to 0V) with low current and then resume normal charging once the battery voltage has risen sufficiently - many other chargers will not recognise a battery in this state.

m. **Power supply mode**

A specific mode to use the charger as a DC power supply; to power equipment at a constant voltage with or without a battery connected.

## 4. Operation

### 4.1. Charge algorithm

The Victron **blue smart charger** range are intelligent multi-stage battery chargers, specifically engineered to optimise each recharge cycle and charge maintenance over extended periods.

The multi-stage charge algorithm includes the individual charge stages described below:

#### 1. Bulk

The battery is charged at maximum charge current until the voltage increases to the configured absorption voltage.

The bulk stage duration is dependent on the battery's level of discharge, the battery capacity and the charge current.

Once the bulk stage is complete, the battery will be approximately 80% charged (or >95% for Li-ion batteries) and may be returned into service if required.

#### 2. Absorption

The battery is charged at the configured absorption voltage, with the charge current slowly decreasing as the battery approaches full charge.

The absorption stage duration is adaptive and intelligently varied depending on the battery's level of discharge – this is determined from the duration of the bulk charge stage.

The absorption stage duration can vary between a minimum of 30 minutes, up to a maximum limit of 8 hours (or as configured) for a deeply discharged battery.

#### 3. Recondition

The battery voltage is attempted to be increased to the configured recondition voltage, while the charger output current is regulated to 8% of the nominal charge current (for example - 1.2A maximum for a 15A charger).

Recondition is an optional charge stage for lead acid batteries and not recommended for regular/cyclic use - use only if required, as unnecessary or overuse will reduce battery life due to excessive gassing.

The higher charge voltage during recondition stage can partially recover/reverse battery degradation due to sulfation, typically caused by inadequate charging or if the battery is left in a deeply discharged state for an extended period (if performed in time).

The recondition stage may also be applied to flooded batteries occasionally to equalise individual cell voltages and prevent acid stratification.

Recondition stage is terminated as soon as the battery voltage increases to the configured recondition voltage or after a maximum duration of 1 hour (or as configured).

Note that in certain conditions it is possible for the recondition state to end before the configured recondition voltage is achieved, such as when the charger is simultaneously powering loads, if the battery was not fully charged before recondition stage commenced, if the recondition duration is too short (set to less than one hour) or if the charger output current is insufficient in proportion to the capacity of the battery/battery bank.

#### 4. Float

The battery voltage is maintained at the configured float voltage to prevent discharge.

Once float stage is commenced the battery is fully charged and ready for use.

The float stage duration is also adaptive and varied between 4 to 8 hours depending on the duration of the absorption charge stage, at which point the charger determines the battery to be in storage stage.

#### 5. Storage

The battery voltage is maintained at the configured storage voltage, which is slightly reduced compared to the float voltage to minimise gassing and extend battery life whilst the battery is unused and on continuous charge.

#### 6. Refresh

To refresh the battery and prevent slow self-discharge while in storage stage over an extended period, a 1 hour absorption charge will automatically occur every 7 days (or as configured).

## 4.2. Temperature compensation

The Victron **blue smart charger** range will automatically compensate the configured charge voltage based on ambient temperature (except for Li-ion mode or if manually disabled).

The optimal charge voltage of a lead acid battery varies inversely with battery temperature; automatic temperature-based charge voltage compensation avoids the need for special charge voltage settings in hot or cold environments.

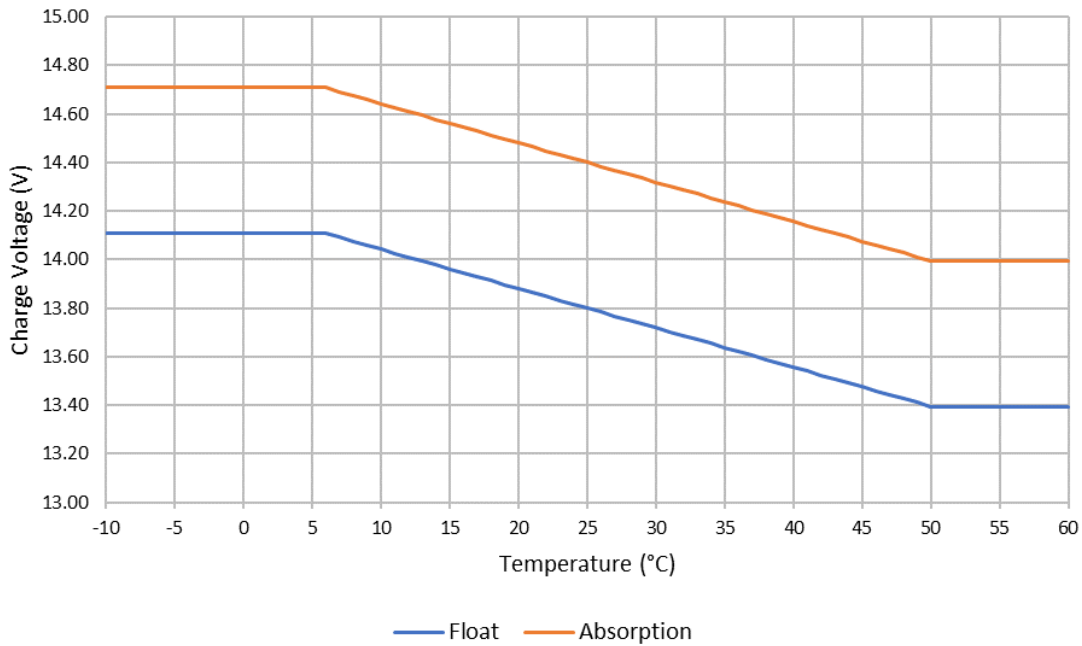
During power up the charger will measure its internal temperature and use that temperature as the reference for temperature compensation, however the initial temperature measurement is limited to 25°C as it's unknown if the charger is still warm from earlier operation.

Since the charger generates some heat during operation, the internal temperature measurement is only used dynamically if the internal temperature measurement is considered reliable; when the charge current has decreased to a low/negligible level and adequate time has elapsed for the charger's temperature to stabilise.

The configured charge voltage is related to a nominal temperature of 25°C and linear temperature compensation occurs between the limits of 6°C and 50°C based on the default temperature compensation coefficient of 16.2mV/°C (for 24v chargers multiply the coefficient by 2) or as configured.

The temperature compensation coefficient is specified in mV/°C and applies to the entire battery/battery bank (not per battery cell).

Charge Voltage - Temperature Compensation





### 4.3. Commencing a new charge cycle

A new charge cycle will commence when:

- a. Bulk stage is complete and the current output increases to the maximum charge current for four seconds (due to a simultaneously connected load)
- b. If re-bulk current is configured; the current output exceeds the re-bulk current in float or storage stage for four seconds (due to a simultaneously connected load)
- c. The MODE button is pressed or a new charge mode is selected
- d. VictronConnect is used to select a new charge mode or change the function from 'Power Supply' to 'Charger' mode
- e. The AC supply has been disconnected and reconnected

#### 4.4. Estimating charge time

A lead acid battery is at approximately 80% state of charge (SOC) when the bulk charge stage is completed.

The bulk stage duration  $T_{\text{bulk}}$  can be calculated as  $T_{\text{bulk}} = Ah / I$ , where  $I$  is the charge current (excluding any loads) and  $Ah$  is the depleted battery capacity below 80% SOC.

An absorption period  $T_{\text{abs}}$  of up to 8 hours may be required to fully recharge a deeply discharged battery.

For example, the charge time of a fully discharged 100Ah battery when charged with a 10A charger to approximately 80% SOC is  $T_{\text{bulk}} = 100/10 = 10$  hours.

Including an absorption duration of  $T_{\text{abs}} = 8$  hours, the total estimated charge time would be  $T_{\text{total}} = T_{\text{bulk}} + T_{\text{abs}} = 10 + 8 = 18$  hours. A Li-ion battery is more than 95% charged at the end of the bulk stage and reaches 100% charge after approximately 30 minutes of absorption charge.

## 5. Setup

### 5.1. Using the MODE button

There are 3 easily selectable integrated charge modes that are suitable for most common battery types, as well as an optional recondition stage that can be included (except for Li-ion mode).

Any settings made are stored and will not be lost when the charger is disconnected from mains power or the battery.

#### 5.1.1. Charge voltage

By simply selecting the appropriate charge mode for the battery type being charged, (refer to the battery manufacturer's recommendations) the voltage settings for each charge stage will be altered according to the table below:

Mode	Absorption	Float	Storage	Recondition
Normal	14.4V	13.8V	13.2V	16.2V
High	14.7V	13.8V	13.2V	16.5V
Li-ion	14.2V	13.5V	13.5V	N/A



#### NOTES:

1. For 24V chargers multiply all voltages by 2
2. Charge voltage is automatically compensated depending on ambient temperature (except for Li-ion mode or if manually disabled) - see section 4.2 'Temperature compensation' for more information.

The desired charge mode can be selected by briefly pressing the MODE button to cycle through the charge modes – the LED beside the active charge mode (NORMAL / HIGH / LI-ION) will be illuminated.

#### 5.1.2. Recondition mode

If enabled the recondition stage is included in the charge cycle; use only if required as a corrective/maintenance action - see section 4.1 'Recondition' for more information.

If recondition mode is enabled the RECONDITION LED will be illuminated and blink during recondition stage.

#### 5.1.3. Night mode

If enabled the charge current is temporarily limited to half the nominal charge current and the cooling fan will be disabled for totally silent operation over the following 8h (overnight).

Once 8h have elapsed the charger will return to normal operation, with full charge current available and cooling fan operation re-enabled.

To enable night mode, depress and hold the MODE button for 3 seconds; the NIGHT LED will illuminate once activated.

To end night mode prior to the 8h duration elapsing, also depress and hold the MODE button for 3 seconds. Night mode will also be ended if the charger is disconnected from mains power.

#### 5.1.4. Low current mode

If enabled the charge current is continuously limited to a significantly reduced level (varies per model - refer to specifications) compared to the nominal charge current and the cooling fan will be disabled for totally silent operation.

Low current mode is recommended when charging lower capacity batteries with a high current charger, for example some lead acid batteries can overheat if charged with a current that exceeds 0.3C (more than 30% of the battery capacity in Ah).

To enable low current mode, depress and hold the MODE button for 6 seconds; the NIGHT LED will blink once activated.

To disable low current mode, also depress and hold the MODE button for 6 seconds.

## 5.2. Using VictronConnect

With the **blue smart charger** range, selection of an integrated charge mode and other general settings can also be made with a Bluetooth enabled device (such as a mobile phone or tablet); using the VictronConnect app.

For further details about the VictronConnect app refer to the online user manual:

<https://www.victronenergy.com/live/victronconnect:start>

To setup the charger using VictronConnect:

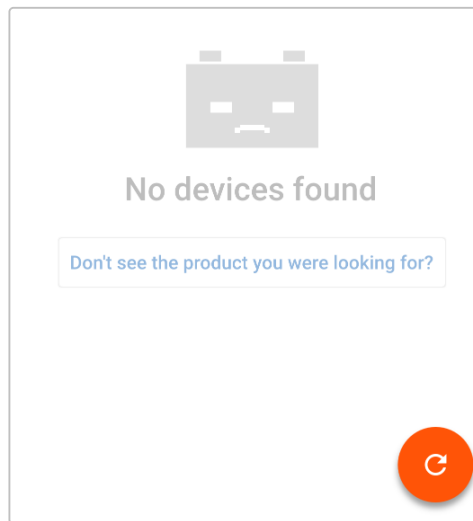
- a. Download and install the VictronConnect app.

The VictronConnect app can be downloaded from the following locations:

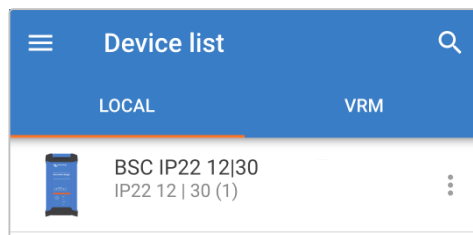
- i. Android – Google Play Store
- ii. iOS/Mac – Apple App Store

- b. Enable Bluetooth on the mobile phone or tablet (if not already enabled).

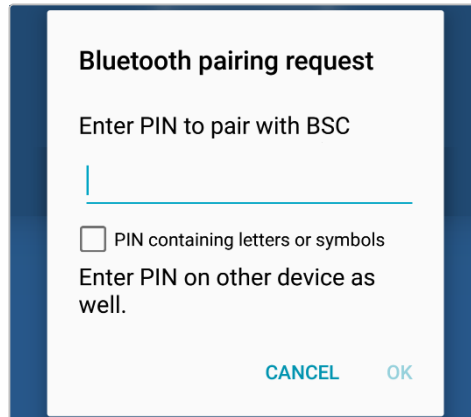
- c. Open the VictronConnect app and look for the **blue smart charger** in the LOCAL page, if it doesn't automatically appear perform a scan for devices in range by selecting the 'scan' button (round orange button with circular arrow) in the bottom right corner.



- d. Select the **blue smart charger** from the local device list.



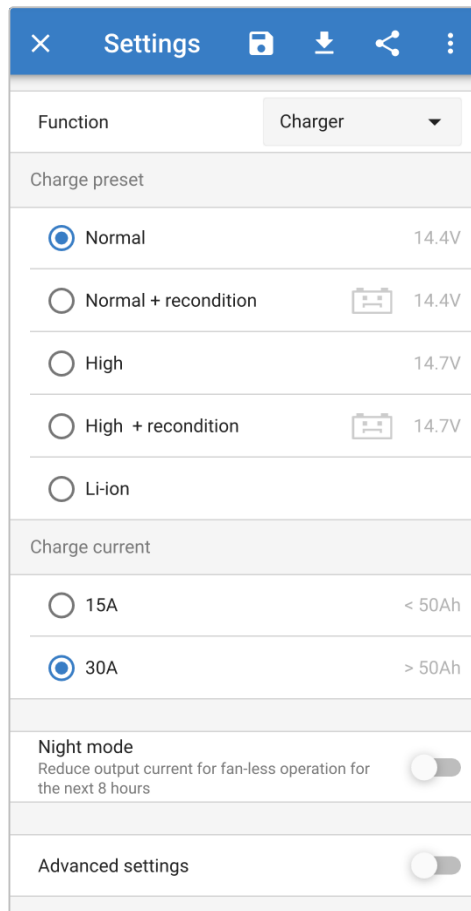
- e. During initial connection a 'Bluetooth pairing request' prompt will appear requesting the Bluetooth PIN code; enter the default PIN code 000000.



- f. Access the settings menu by selecting the 'setting' icon (gear) in the top right corner.



- g. Select the required 'charge preset', the 'maximum charge current' (standard or low) and if desired enable 'night mode' directly from the settings list.



- h. The indicator LEDs on the **blue smart charger** will be illuminated to confirm the active charge mode and settings implemented.

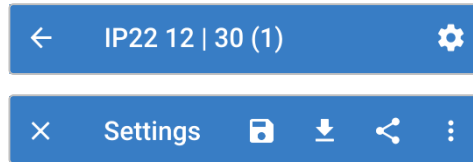
## 5.3. Bluetooth

### 5.3.1. Changing the PIN code

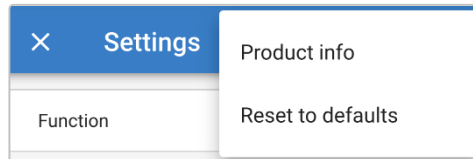
To prevent an unauthorised Bluetooth connection, it is highly recommended to change the default PIN code.

To change the Bluetooth PIN code:

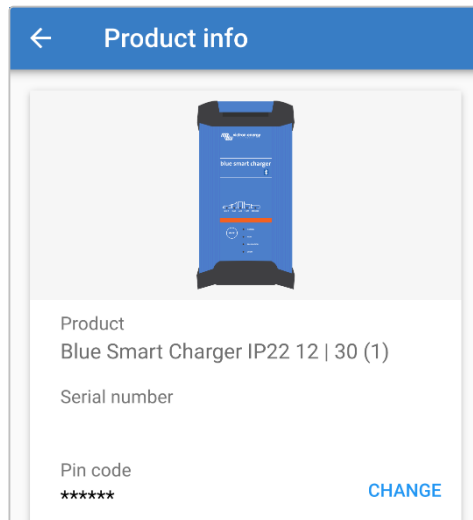
- Complete initial Bluetooth pairing and connection using the default PIN code (000000)
- Access the 'device options' by selecting the 'settings' icon (gear) in the top right corner, then the 'device options' icon (three vertical dots).



- Open the 'Product info' page by selecting 'Product info'.



- Beside 'Pin code' select 'CHANGE' to open the 'Change PIN code' window.



- e. Enter the current and new PIN code (twice), then select OK; avoid using an obvious PIN code that is easy for someone else to guess, such as 111111 or 123456.

**Change PIN code**

Current PIN

New PIN

Repeat new PIN

Show PIN codes

CANCEL OK

v2.07

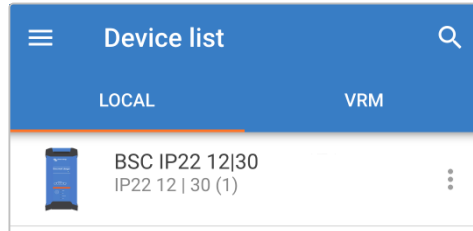
### 5.3.2. Resetting the PIN code

If the PIN code is forgotten or lost, it can be easily reset to the default 000000 using the VictronConnect app or the MODE button on the charger.

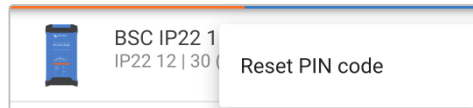
#### Using VictronConnect

To reset the Bluetooth PIN code:

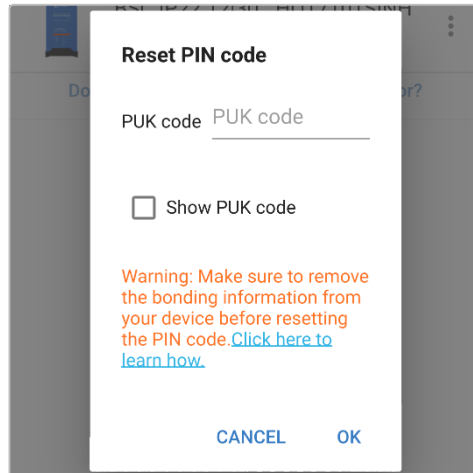
- a. Locate the **blue smart charger** in the LOCAL page and select the 'device options' icon (three vertical dots) on the right side of the description.



- b. Select 'Reset PIN code' from the pop-up prompt.



- c. Enter the PUK code and select 'OK'. The PUK code is located on a label stuck to the back of the **blue smart charger**.



#### Using the MODE button

To reset the Bluetooth PIN code:

- a. Depress and hold the MODE button (on the **blue smart charger**) for 10 seconds.
- b. After 10 seconds have elapsed all blue LEDs will blink twice to indicate that the PIN code has been reset.

**DURING THIS PROCEDURE:**

- a. The PIN code is reset to default (000000)
- b. Any active Bluetooth connections are disconnected
- c. All Bluetooth pairing information is cleared

Subsequently, before attempting to re-connect it's also necessary to remove/clear the **blue smart charger** Bluetooth pairing information from any devices (mobile phones or tablets) that were previously paired.



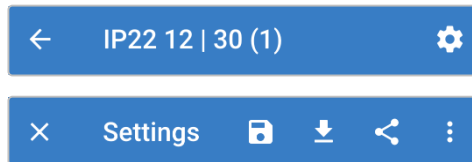
### 5.3.3. Disabling Bluetooth

It is possible to totally disable Bluetooth communication if desired.

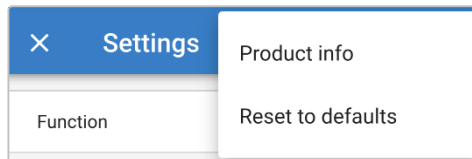
Typically, there is no need to disable Bluetooth since unauthorised access is protected with a PIN code, but certain situations may warrant it for an even higher level of security.

To disable Bluetooth:

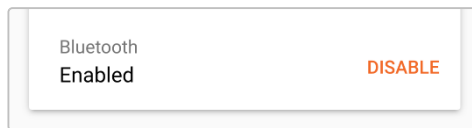
- a. Complete initial Bluetooth pairing and connection using the default PIN code (000000) or the current PIN code set.
- b. Access the 'device options' by selecting the 'settings' icon (gear) in the top right corner, then the 'device options' icon (three vertical dots).



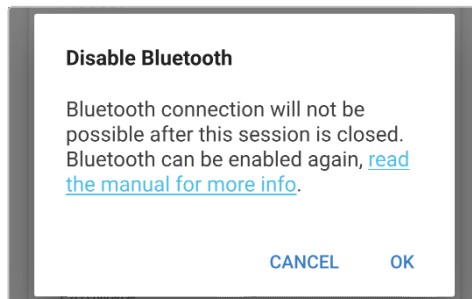
- c. Open the 'Product info' page by selecting 'Product info'.



- d. Beside 'Bluetooth Enabled' select 'DISABLE' to open the 'Disable Bluetooth' window.



- e. Select 'OK' as confirmation.



### 5.3.4. Re-enabling Bluetooth

It is possible to re-enable Bluetooth using the MODE button.

To re-enable Bluetooth:

- a. Depress and hold the MODE button (on the **blue smart charger**) for 10 seconds.
- b. After 10 seconds have elapsed all blue LEDs will blink twice to indicate that Bluetooth has been re-enabled, and all Bluetooth settings reset.



**DURING THIS PROCEDURE:**

- a. Bluetooth is re-enabled
- b. The PIN code is reset to default (000000)
- c. Any active Bluetooth connections are disconnected
- d. All Bluetooth pairing information is cleared

Subsequently, before attempting to re-connect it's also necessary to remove/clear the **blue smart charger** Bluetooth pairing information from any devices (mobile phones or tablets) that were previously paired.

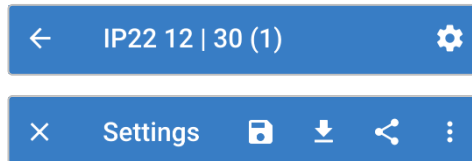
## 5.4. System reset

It is possible to perform a full system reset to restore all charger/battery related settings to their default value; using the VictronConnect app.

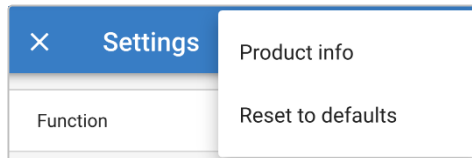
Note that this does **not** reset any Bluetooth related settings, such as the PIN code or pairing information.

To perform a system reset:

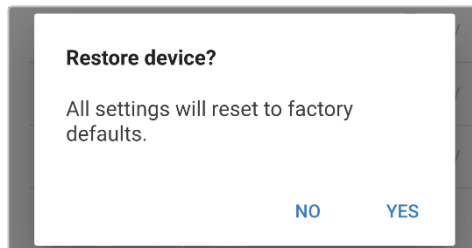
- a. Complete initial Bluetooth pairing and connection using the default PIN code (000000)
- b. Access the 'device options' by selecting the 'settings' icon (gear) in the top right corner, then the 'device options' icon (three vertical dots).



- c. Open the 'restore device' page by selecting 'Reset to defaults'.



- d. Select 'YES' to reset all settings to factory defaults.



## 6. Monitoring

The charger operation and recharge statistics can be closely monitored live or post charging with a Bluetooth enabled device (such as a mobile phone or tablet) using the VictronConnect app.

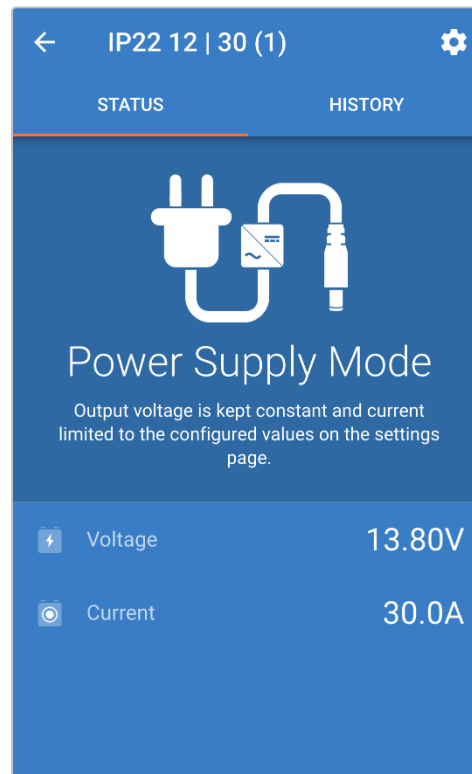
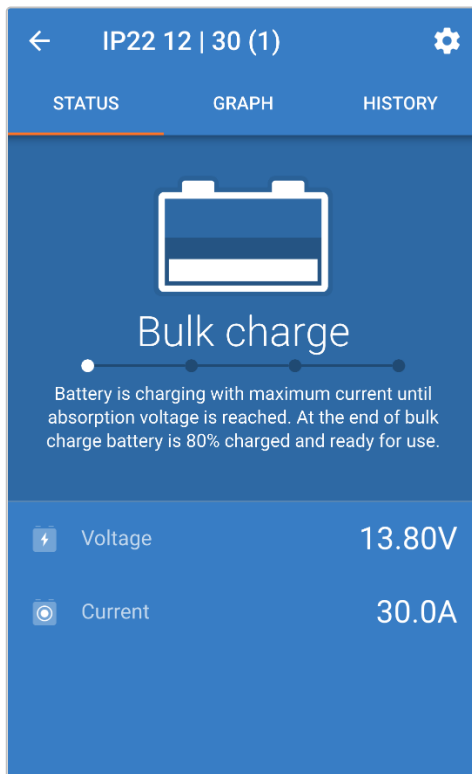
There are 3 different overview screens available (STATUS, GRAPH and HISTORY), each displaying different monitoring or historical data; spanning back over the last 40 charge cycles.

The desired screen can be selected by either selecting the window title or by swiping across between screens.

### 6.1. Status screen

The STATUS screen is the main overview screen; it displays the battery voltage, the charge current and the active charge stage.

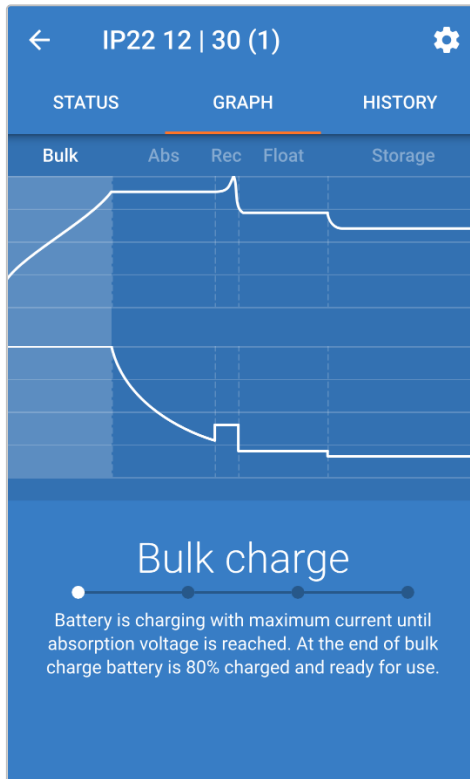
This data will update continuously and in real time as the charge cycle progresses.



## 6.2. Graph screen

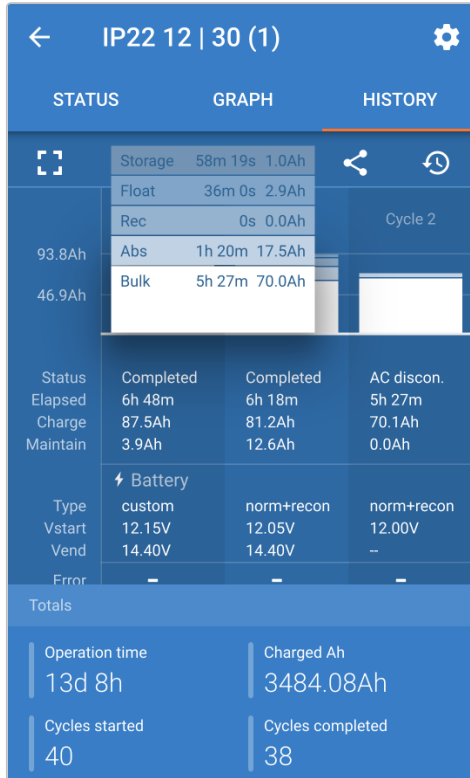
The GRAPH screen provides an easy to understand graphical representation of each charge stage with respect to battery voltage and charge current.

The active charge stage is also highlighted and stated below, along with a brief explanation.

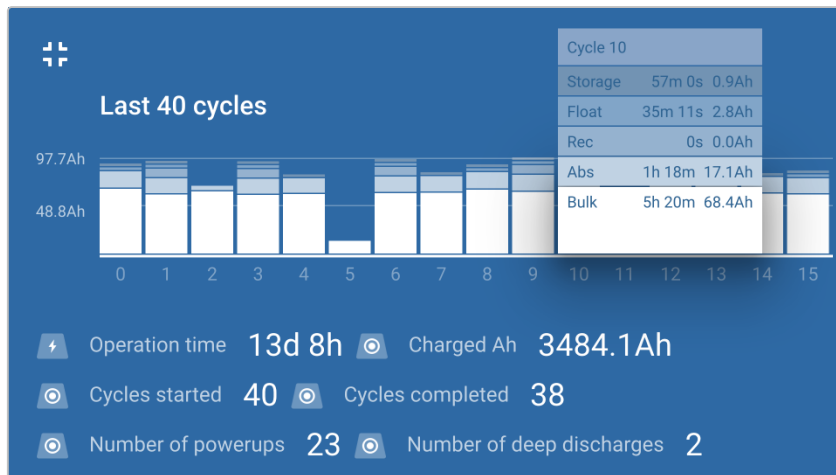


### 6.3. History screen

The HISTORY screen is a very powerful reference as it contains historical usage data over the charger's lifetime and detailed statistics for the last 40 charge cycles (even if the charge cycle is only partially completed).



By selecting the full screen view the data is displayed in landscape view with significantly more days visible at the same time.



a. **Charge cycle statistics**

i. **Cycle overview**

Expandable bar chart showing the time spent in each charge stage and the charge capacity provided (in Ah) during each charge stage

ii. **Status**

Confirms if the charge cycle was successfully completed or if it was ended early/interrupted for some reason, including the reason/cause

iii. **Elapsed**

The elapsed/total charge cycle time

iv. **Charge**

Total capacity provided during the recharge stages (Bulk and Absorption)

v. **Maintain**

Total capacity provided during the charge maintenance stages (Float, Storage and Refresh)

vi. **Type**

The charge cycle mode used; either a 'Built-in preset' or a custom 'Userdefined' configuration

vii. **Vstart**

Battery voltage when charging commences

viii. **Vend**

Battery voltage when charging is complete (end of absorption stage)

ix. **Error**

Displays if any errors occurred during the charge cycle, including the error number and description

b. **Charger lifetime statistics**

i. **Operation Time**

The total operation time over the lifetime of the charger

ii. **Charged Ah**

The total charge capacity provided over the lifetime of the charger

iii. **Cycles started**

The total charge cycles started over the lifetime of the charger

iv. **Cycles completed**

The total charge cycles completed over the lifetime of the charger

v. **Cycles completed %**

The percentage of charge cycles completed over the lifetime of the charger

vi. **Number of power-ups**

The number of times the charger has been powered up over the lifetime of the charger

vii. **Number of deep discharges**

The number of times the charger has recharged a deeply discharged battery over the lifetime of the charger

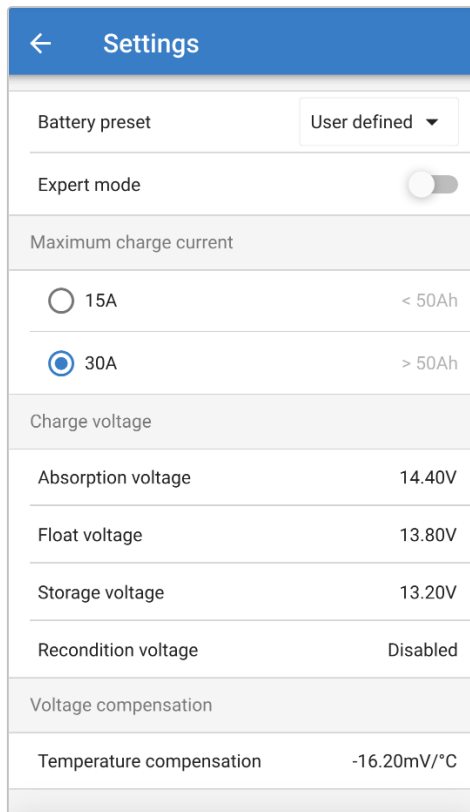
## 7. Advanced Configuration

In specific use cases where the integrated charge modes are not suitable/ideal for the battery type being charged or the battery manufacturer recommends specific charge parameters and fine tuning is desired, advanced configuration is possible with a Bluetooth enabled device (such as a mobile phone or tablet) using the VictronConnect app.

For most common battery types, advanced configuration is not required or recommended; the integrated charge modes and adaptive charge logic are typically suitable and perform very well.

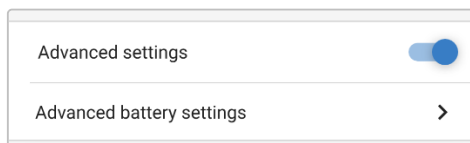
### 7.1. Advanced settings

The advanced settings menu enables specific configuration of charge parameters and user defined settings to be saved and easily loaded.



Settings	
Battery preset	User defined ▾
Expert mode	<input type="checkbox"/>
Maximum charge current	
<input type="radio"/> 15A	< 50Ah
<input checked="" type="radio"/> 30A	> 50Ah
Charge voltage	
Absorption voltage	14.40V
Float voltage	13.80V
Storage voltage	13.20V
Recondition voltage	Disabled
Voltage compensation	
Temperature compensation	-16.20mV/°C

To access the advanced settings menu, open the general settings menu and enable the 'Advanced settings' switch, then select 'Advanced battery settings'.



Advanced settings	<input checked="" type="checkbox"/>
Advanced battery settings	>



The settings in the advanced menu (with expert mode disabled) include:

a. **Battery preset**

The 'Battery preset' dropdown allows selection from the following options:

i. **Built-in preset**

Selection of a standard integrated pre-set (same as the general settings menu)

ii. **User defined**

Reselection of the last 'user defined' charge settings

iii. **Select preset**

Selection from an extended range of integrated battery charging pre-sets, including new user defined charging pre-sets

iv. **Create preset**

A new charging preset to be created and saved from user defined settings

v. **Edit presets**

An existing preset to be edited and saved

b. **Maximum charge current**

The maximum charge current setting allows selection between the standard (full current) or a significantly reduced charge current limit (varies per model - refer to specifications), same as through the general settings menu.

c. **Charge voltage**

The charge voltage settings enable the voltage setpoint for each charge stage to be independently configured and some charge stages (recondition and float) to be disabled or enabled.

The charge voltage setpoint for the following charge stages can be configured:

i. **Absorption**

ii. **Float**

iii. **Storage**

iv. **Recondition**

d. **Voltage compensation**

i. **Temperature Compensation**

The temperature compensation setting enables the charge voltage temperature compensation coefficient to be configured, or temperature compensation to be totally disabled (such as for Li-ion batteries).

The temperature compensation coefficient is specified in mV/°C and applies to the entire battery/battery bank (not per battery cell).

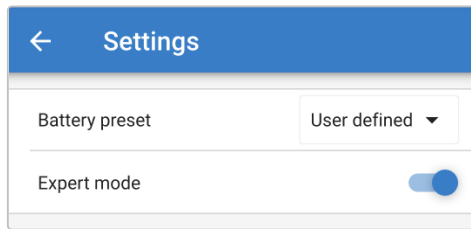
## 7.2. Expert mode settings

Expert mode expands the advanced settings menu even further to include more specialised configuration settings.

The screenshot shows the 'Settings' menu with a blue header containing a back arrow and the title 'Settings'. The settings are organized into sections with grey headers:

- Battery preset:** User defined (dropdown menu)
- Expert mode:** Enabled (toggle switch)
- Maximum charge current:**
  - 15A (< 50Ah) - Unselected
  - 30A (> 50Ah) - Selected
- Charge voltage:**
  - Absorption voltage: 14.40V
  - Float voltage: 13.80V
  - Storage voltage: 13.20V
  - Recondition voltage: Disabled
- BatterySafe:** Enabled (toggle switch). Description: Prevent excessive gassing by automatically limiting the rate of voltage increase.
- Voltage compensation:**
  - Temperature compensation: -16.20mV/°C
- Bulk:**
  - Bulk time limit: 10h 0m
  - Re-bulk current: Disabled. Description: When the charge current exceeds this value while in float/storage, the charge cycle restarts.
- Absorption:**
  - Adaptive absorption time: Enabled (toggle switch). Description: Automatically calculates the absorption time.
  - Maximum absorption time: 8h 0m
  - Repeated absorption: Every 7 days
- Recondition:**
  - Recondition stop mode: Automatic, on voltage (dropdown menu)
  - Maximum recondition duration: 1h 0m

To access expert mode and expand the advanced settings menu, enter the advanced setting menu and enable the 'Expert mode' switch.



The **additional** settings in the advanced menu with expert mode enabled include:

a. **Charge voltage**

i. **BatterySafe**

The BatterySafe setting allows the BatterySafe voltage control to be enabled or disabled. When BatterySafe is enabled, the rate of battery voltage increase during bulk stage is automatically restricted to a safe level. In cases where the battery voltage would otherwise increase at a faster rate, the charge current is consequently reduced to prevent excessive gassing.

b. **Bulk**

i. **Bulk time limit**

The bulk time limit setting restricts the maximum time the charger can spend in bulk stage as a protection measure, since the absorption voltage should have been achieved by this time. If the bulk time limit is satisfied the charger will move directly to float stage.

ii. **Re-bulk current**

The re-bulk current setting is the charge current limit that will trigger a new charge cycle if exceeded during float or storage stage, causing the charger to move back into bulk charge stage.

Note that even when the re-bulk setting is disabled, re-bulk will still occur if the charge current is maintained at the maximum charge current for 4 seconds.

c. **Absorption**

i. **Adaptive absorption time**

The adaptive absorption time setting allows selection between adaptive absorption time (if enabled) or a fixed absorption time (if disabled).

ii. **Absorption time**

The adaptive absorption time setting enables the maximum adaptive absorption time or the fixed absorption time to be configured (depending if adaptive absorption time is enabled or disabled).

iii. **Repeated absorption**

The repeated absorption time setting enables the elapsed time between each automatic refresh charge cycle (1h in absorption stage) to be configured.

d. **Recondition**

i. **Recondition stop mode**

The recondition stop mode setting allows selection between the recondition stage being ended upon the battery voltage reaching the recondition stage voltage setpoint or a fixed time period.

ii. **Recondition duration**

The recondition time setting enables the maximum recondition time or the fixed recondition time to be configured (depending on the recondition stop mode selected).

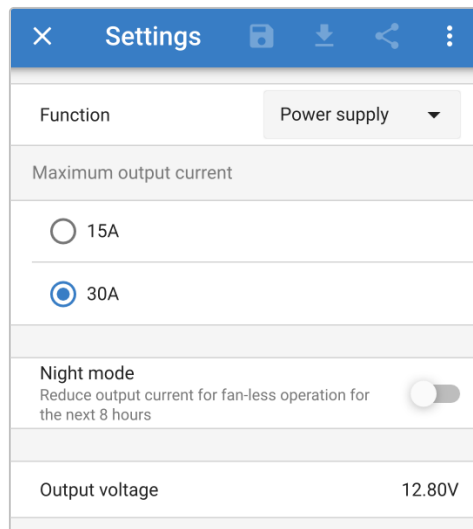
### 7.3. Power supply function

The Victron **blue smart charger** range are also suitable for use as a DC power supply, to power equipment without a battery connected (or while also connected to a battery).

While it's still possible to use the charger as a power supply without changing any settings, a dedicated 'Power supply' mode exists for this purpose/usage.

If the charger will be used as a power supply, it is recommended to activate 'Power supply' mode, as it will disable the internal charge logic and provide a constant DC supply voltage.

To activate power supply mode, open the settings menu and in the 'Function' drop down menu select 'Power supply' mode; once activated the BULK, ABS, FLOAT and STORAGE LEDs will be illuminated.



It is also possible to enable low current mode or night mode while in power supply mode and to specify the desired output voltage.

To return the charger back to normal use as a battery charger, access the settings menu and in the 'Function' drop down menu select 'Charger' mode again.

## 8. Technical specifications

Blue Smart IP22 Charger	12V 15 / 20 / 30A	24V 8 / 12 / 16A
Input voltage and frequency range	180 - 265VAC   45 - 65Hz	
Efficiency	93%	94%
Standby power consumption	0.5W	
Charge voltage - Absorption	Normal: 14.4V High: 14.7V Li-ion: 14.2V	Normal: 28.8V High: 29.4V Li-ion: 28.4V
Charge voltage - Float	Normal: 13.8V High: 13.8V Li-ion: 13.5V	Normal: 27.6V High: 27.6V Li-ion: 27.0V
Charge voltage - Storage	Normal: 13.2V High: 13.2V Li-ion: 13.5V	Normal: 26.4V High: 26.4V Li-ion: 27.0V
Max output current - Normal mode	15 / 20 / 30A	8 / 12 / 16A
Max output current - Low current mode	7.5 / 10 / 15A	4 / 6 / 8A
Max battery capacity (recommended)	150 / 200 / 300Ah	80 / 120 / 160Ah
Min battery capacity - Normal mode	Lead-acid: 50 / 67 / 100Ah Lithium: 30 / 40 / 60Ah	Lead-acid: 27 / 40 / 53Ah Lithium: 16 / 24 / 32Ah
Min battery capacity - Low current mode	Lead-acid: 25 / 33 / 50Ah Lithium: 15 / 20 / 30Ah	Lead-acid: 13 / 20 / 27Ah Lithium: 8 / 12 / 16Ah
Temperature compensation (lead-acid only)	16mV/°C	32mV/°C
Charge algorithm	6-stage adaptive	
Power supply mode	Yes	
Back current drain	0.4Ah/month (0.6mA)	
Protection	Reverse polarity (fuse), output short circuit, over temperature	
Cooling	Low rpm (silent) fan (12/15 and 24/08 are without fan)	
Operating temperature	-20 to +50°C (full rated output up to 40°C)	
Humidity (non condensing)	Max 95%	
<b>Enclosure</b>		
Material & Colour	Aluminium (blue RAL 5012)	
Battery connection	Screw terminals 16 mm <sup>2</sup> / AWG6	
AC connection	1.5m cable with CEE 7/7, BS 1363 or AS/NZS 3112 plug	
Protection category	IP22 (indoor use)	
Weight	1.3kg	
Dimensions (h x w x d)	235 x 108 x 65mm	
<b>Standards</b>		
Safety	EN 60335-1, EN 60335-2-29	
Emission	EN 55014-1, EN 61000-6-3, EN 61000-3-2	
Immunity	EN 55014-2, EN 61000-6-1, EN 61000-6-2, EN 61000-3-3	
Automotive	E4-10R	

## 9. 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.