Smart IP43 Charger

12/30, 12/50, 24/16, 24/25, 36/15, 48/13 | (1) (1+1) & (3) Output | 120-240V

Table of Contents

1. Safety instructions

WARNING: CAREFULLY READ AND FOLLOW ALL SAFETY INSTRUCTIONS

- Carefully read the manual **before** the charger is installed and operated; retain the manual in a safe place for future reference.

- The charger must **not** be installed or operated by anyone who lacks the appropriate knowledge or competence required for safe installation and/or usage.

- **Charger installation and operation**

  A. Install the charger in a location with good natural airflow/ventilation and sufficient unobstructed space around it; refer to the the 'Installation > Mounting' section for more information.

  B. Install the charger on a non-flammable substrate and ensure there are no heat-sensitive items in the immediate vicinity; it is normal for the charger to become hot during operation.

  C. Install the charger in a location where it is protected from environmental conditions such as water, moisture, dust and direct sunlight.

  D. Do not install or operate the charger directly above the battery, or in a sealed compartment with the battery; batteries can emit explosive gasses.

  E. Do not cover or place any other items on top of the charger.

- **Battery installation and charging**

  A. Install and charge the battery in a location with good natural airflow/ventilation.

  B. Ensure that there are no ignition sources near the battery; batteries can emit explosive gasses.

  C. Battery acid is corrosive; if battery acid comes into contact with skin immediately rinse with water.

  D. Do not charge non-rechargeable batteries or Li-ion batteries if the battery temperature is below 0°C.

- **DC connection to battery**

  A. Ensure that the DC power cable polarity is correct at all connections.

  B. Ensure that the DC system is fully shut down/isolated prior to disconnection of any existing cabling and/or new connections are made to the battery/DC system.

  C. There are specific wiring connection instructions for charging a battery installed within a vehicle; refer to the 'Installation > Wiring' section for more information.

- **AC connection to mains supply**

  A. Do not operate the charger if the AC power cable is damaged, contact a service agent.

- **Charger setup**

  A. Refer to the battery manufacturers instructions and specifications to ensure the battery is suitable for use with this charger and confirm the recommended charge settings.

2. Quick start guide

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3. Features

A.   **Bluetooth setup and monitoring (Using VictronConnect)**

Equipped with integrated Bluetooth; enabling quick and simple setup, advanced configuration, comprehensive monitoring and firmware updates via the **VictronConnect** app and a Bluetooth enabled device (mobile phone or tablet).

B.   **Integrated charge presets**

C.   **Multi-stage charge algorithm**

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

D.   **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).

E.   **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.

F.   **Durable and safe**

Engineered to provide years of trouble-free and dependable operation in all usage conditions:

i.

ii.   Protection against output short circuit: If a short circuit condition is detected the charger will shut down

iii.

G.   **Silent operation**

H.   **Lithium Ion compatible**

Compatible with Li-ion (LiFePO$_4$) 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, it will automatically reset UVP and start charging; many other chargers will not recognise a battery in this state.

Warning: Do not charge Li-ion batteries if the battery 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.   **Configurable output current**

L.   **Recovery function**

The charger 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 **Smart IP43 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 default absorption stage duration is adaptive and intelligently varied depending on the battery's level of discharge (determined from the duration of the bulk charge stage).

   Adaptive 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.

   Alternatively, fixed absorption duration can be selected; fixed absorption duration is the automatic default when Li-ion mode is selected.

   Absorption stage can also be ended early based on the tail current condition (if enabled), which is when the charge current drops below the tail current threshold.

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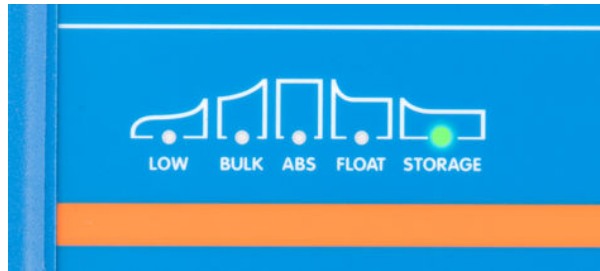
   The float stage duration is also adaptive and varied between 4 to 8 hours depending on the duration of the absorption charge stage, at which point the charger determines the battery to be in storage stage.

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. **Repeated absorption**

   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).

Alternatively, a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app can be used to view the active charge state; refer to the 'Monitoring > VictronConnect' section for more information.

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4.2. Charge modes

There are 3 integrated charge modes (Normal, High and Li-Ion), as well as an optional Recondition stage that can be included (except for Li-ion mode).

The integrated charge modes combined with adaptive charge logic are well suited for most common battery types; such as flooded lead-acid, AGM, Gel and LiFePO4.

If necessary, advanced configuration with user defined settings is also possible using a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app; refer to the 'Advanced configuration > Advanced settings' and 'Advanced configuration > Expert mode settings' sections for more information.

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

4.2.1. Charge voltage

The charge voltage settings for each of the integrated charge modes are specified in the table below:

> ℹ To ensure proper charging, battery longevity and safe operation it is important to select a charge mode appropriate for the battery type and capacity being charged; refer to the battery manufacturer's recommendations.
>
> The **Smart IP43 Charger** range feature temperature compensation, which will automatically optimise the nominal/configured charge voltage based on ambient temperature (except for Li-ion mode or if manually disabled); refer to the 'Operation > Temperature compensation' section for more information.

4.2.2. Recondition mode

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.

When recondition mode is enabled the recondition stage is included within the charge cycle (after the absorption stage is complete) and the battery voltage will be increased to an elevated level; refer to the 'Operation > Charge algorithm' section for more information.

4.2.3. Low current mode

Low current mode is recommended when charging lower capacity batteries with a high current charger; charging at an excessive charge current can cause premature battery degradation and overheating.

Typically the maximum charge current for lead acid based batteries should not exceed ~0.3C (more than 30% of the battery capacity in Ah) and the maximum charge current for LiFePO4 batteries should not exceed ~0.5C (more than 50% of the battery capacity in Ah).

4.3. Temperature compensation

The **Smart IP43 Charger** range feature temperature compensation, which will automatically optimise the nominal/configured charge voltage based on ambient temperature (except for Li-ion mode or if manually disabled).
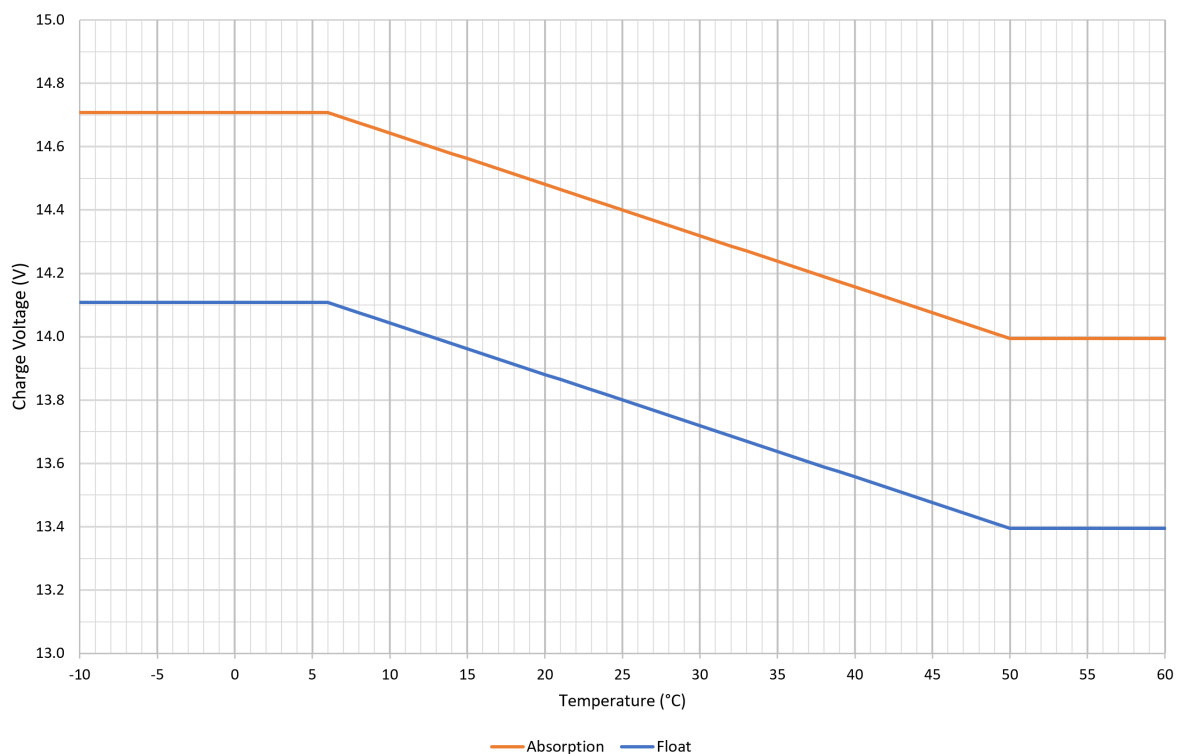
The optimal charge voltage of a lead-acid battery varies inversely with battery temperature; automatic temperature-based charge voltage compensation avoids the need for special charge voltage settings in hot or cold environments.

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.

For more accurate temperature compensation, battery temperature data can be sourced from a compatible battery monitor (such as a BMV, SmartShunt, Smart Battery Sense or VE.Bus Smart Dongle) via VE.Smart Networking; refer to the 'Operation > VE.Smart Networking' section for more information.

Refer to the graph below for the default temperature vs charge voltage curve for 12V chargers:

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

If the battery manufacturer specifies a temperature compensation coefficient per cell, it will need to be multiplied by the total number of cells in series (there are typically 6 cells in series within a 12V lead-acid based battery).

4.4. Commencing a new charge cycle

A new charge cycle will commence when:

1. **VictronConnect** is used to select a new charge mode or change the function from Power Supply to Charger mode.

2. The power supply to the AC power supply has been disconnected and reconnected.

4.5. Estimating charge time

The time required to recharge a battery to 100% SOC (state of charge) is dependant on the battery capacity, the depth of discharge, the charge current and the battery type/chemistry, which has a significant effect on the charge characteristics.

4.5.1. Lead-acid based chemistry

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

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

The absorption stage duration T_{abs} will vary depending on the depth of discharge; up to 8 hours of absorption may be required for a deeply discharged battery to reach 100% SOC.

For example, the time required to recharge a fully discharged Lead-acid based 100Ah battery with a 10A charger would be approximately:

• **Bulk stage** duration, T_{bulk} = 100Ah x 80% / 10A = 8 hours

• **Absorption stage** duration, T_{abs} = 8 hours

• **Total** charge duration, T_{total} **=** T_{bulk} **+** T_{abs} = 8 + 8 = 16 hours

4.5.2. Li-ion based chemistry

A Li-ion based battery is normally well above 95% state of charge (SOC) when the bulk charge stage is completed.

The bulk stage duration T_{bulk} can be calculated as T_{bulk} **= Ah / I**, where **I** is the charge current (excluding any loads) and **Ah** is the depleted battery capacity below 95% SOC.

The absorption stage duration T_{abs} required to reach 100% SOC is typically less than 30 minutes.

For example, the charge time of a fully discharged 100Ah battery when charged with a 10A charger to approximately 95% SOC is T_{bulk} = 100 x 95% / 10 = 9.5 hours.

For example, the time required to recharge a fully discharged Li-ion based 100Ah battery with a 10A charger would be approximately:

• **Bulk stage** duration, T_{bulk} = 100Ah x 95% / 10A = 9.5 hours

• **Absorption stage** duration, T_{abs} = 0.5 hours

• **Total** charge duration, T_{total} **=** T_{bulk} **+** T_{abs} = 9.5 + 0.5 = 10 hours

5. Installation

5.1. Mounting

Before mounting, the following aspects should be considered to identify/provide a suitable and safe location:

A. Install the charger in a location with good natural airflow/ventilation; in case airflow is a restricted, consider adding a cooling fan.

B. Ensure there is sufficient unobstructed space around the charger; a minimum clearance of 100mm above and below is recommended.

C. Install the charger on a non-flammable substrate and ensure there are no heat-sensitive items in the immediate vicinity; it is normal for the charger to become hot during operation.

D. Install the charger in a location where it is protected from environmental conditions such as water, high moisture and dust, and also located well away from any flammable liquids or gasses.

E. Do not install or place/operate the charger on top of the battery, directly above the battery, or in a sealed compartment with the battery; batteries can emit explosive gasses.

F. Do not cover or place any other items on top of the charger.

Select and use screws with a pan/flange head (do not use screws with a countersunk/tapered head), and a screw thread outer diameter well matched to the mounting hole/slot internal diameter (~5mm max OD to provide a clearance fit).

Refer to the drawing below for mounting dimensions:

5.2. Wiring

1.

2.

3.   Connect the DC power cabling to the battery/batteries or DC system distribution bus - follow the instructions relevant to the installation type.

    A.   **For hardwired installations, or when charging a battery outside of a vehicle/installation:**

        i.   Ensure that the DC system is shut down (all DC loads and charge sources off/isolated) prior to disconnection of any existing battery / DC system distribution bus cabling and connection of the charger to the battery terminals / DC system distribution bus.

        ii.   Connect the positive DC cable (red insulation) to the positive (**+**) terminal and the negative DC cable (black insulation) to the negative (**-**) terminal connection; ensure that the cable connection polarity is correct.

        iii.   Torque all wiring termination hardware to manufacturers torque specifications using a suitable torque wrench and socket / screw driver bit.

    B.   **For temporary installations when charging a battery installed within a vehicle, and the negative (-) battery terminal is grounded to the vehicle chassis (conventional):**

        i.   Connect the positive DC cable / battery clamp (red insulation) directly to the battery positive (**+**) terminal first.

        ii.   Then connect the negative DC cable / battery clamp (black insulation) to a suitable grounding point on the vehicle chassis (not directly to the negative battery terminal).

        iii.   When disconnecting the charger, disconnect the DC cables / battery clamps in reverse of the connection order.

    C.   **For temporary installations when charging a battery installed within a vehicle, and the positive (+) battery terminal is grounded to the vehicle chassis (unconventional):**

        i.   Connect the negative DC cable / battery clamp (black insulation) directly to the battery negative (**-**) terminal first.

        ii.   Then connect the positive DC cable / battery clamp (red insulation) to a suitable grounding point on the vehicle chassis (not directly to the positive battery terminal).

        iii.   When disconnecting the charger, disconnect the DC cables / battery clamps in reverse of the connection order.

4.

> Example wiring schematics depicting most typical installation configurations are also provided for reference; refer to the 'Installation > Schematics' section for more information.
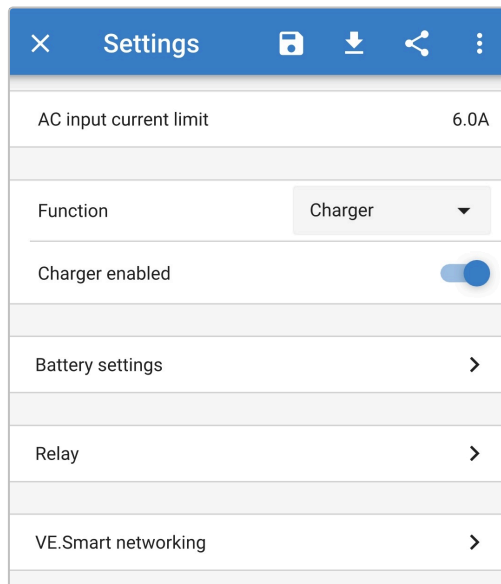
5.2.1. DC power cable

5.3. Schematics

5.3.1. Basic install

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6. Setup

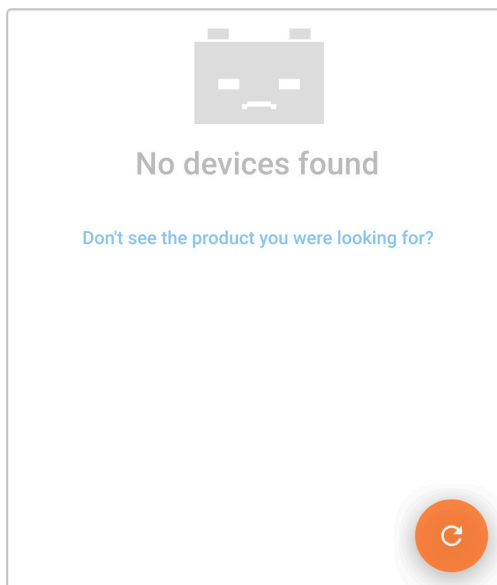## 6.1. Setup using VictronConnect

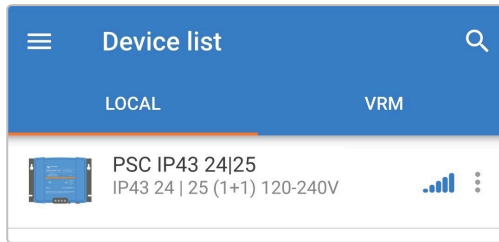For further information about the **VictonConnect** app refer to the VictronConnect manual.
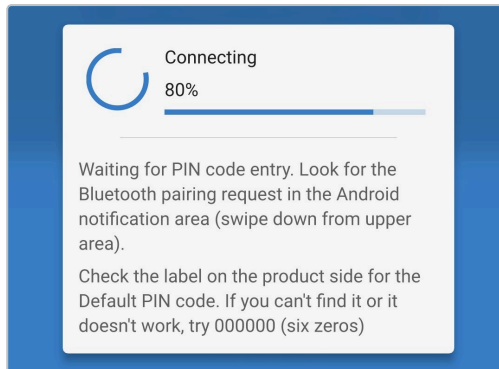
To setup using Bluetooth:

1. Download and install the **VictronConnect** app onto the Bluetooth enabled device (mobile phone or tablet).

   The **VictronConnect** app can be downloaded from the following locations:

   A. Android - Google Play Store

   B. iOS/Mac - Apple App Store

   C. Windows and other - Victron Energy website > Downloads > Software

2. Enable Bluetooth on the Bluetooth enabled device (mobile phone or tablet) if not already enabled, but do not attempt to pair with the **Smart IP43 Charger**.

3.

4. Open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page, under Other devices.

   In case the **Smart IP43 Charger** does not automatically appear, ensure that the mobile phone or tablet has Bluetooth enabled and is within close range, then perform a manual scan for devices by selecting the **Scan** button (round orange button with circular arrow) in the bottom right corner.
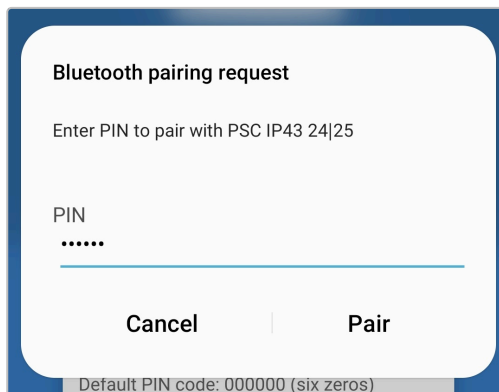
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5. Select the **Smart IP43 Charger** from the Device list Local page, under Other devices.

6. **VictronConnect** will attempt to establish a Bluetooth connection with the **Smart IP43 Charger** and display the connection progress in the Connecting pop-up dialog box.

7. When attempting to establish a Bluetooth connection with a new/unpaired device, the Bluetooth pairing request pop-up dialog box will appear after a short delay; enter the default PIN code stated on a label located on the side of the charger (or try 000000 if there is no default PIN code label), then select **Pair**.

8. Select the **Settings** icon (gear in the top right corner) to access the Settings page.

9. Ensure that recondition stage is only enabled when required, as unnecessary or overuse will reduce battery life.

10.

11. Lock Mode Button - When enabled, the mode button is locked and cannot change the charger's configuration. However, the following functions still work:

- Restart charge cycle to Bulk

- Reset Bluetooth

When locked, pressing or holding the button will cause all LEDs to flash to indicate the lock is active.

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

To ensure proper charging, battery longevity and safe operation it is important to select a charge mode appropriate for the battery type and capacity being charged; refer to the 'Operation > Charge modes' section and the battery manufacturers recommendations for more information.

6.2. Bluetooth

6.2.1. Changing the PIN code

To prevent unauthorised Bluetooth connections, it is highly recommended to change the default PIN code to a unique PIN code that that offers a greater level of security.

The Bluetooth PIN code can be changed using a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app.

To change the Bluetooth PIN code:

1.

2. Using a Bluetooth enabled device (mobile phone or tablet), open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page, then connect to the device (the default PIN code is stated on a label located on the side of the charger, or try 000000 if there is no label).
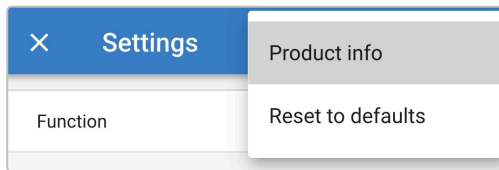
3. Select the **Settings** icon (gear in the top right corner) to access the Settings page.

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4. Select the **Device options** icon (three vertical dots in the top right corner) to access the Device options dropdown menu.
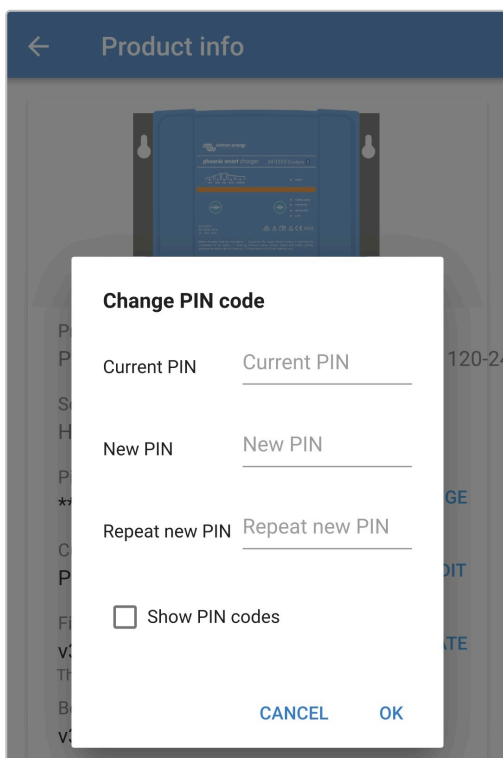
<div align="center">

✕   Settings   ⋮

</div>

5. Select **Product info** from the dropdown menu to access the Product info page.

<div align="center">

✕   Settings | Product info

Function   Reset to defaults

</div>

6. Select **CHANGE** in the Pin code field to open the Change PIN code pop-up dialog box.

<div align="center">

Pin code
******   CHANGE

</div>

7. Enter the current PIN code and the desired new PIN code (twice), then select **OK**; avoid using a simple PIN code that is easy for someone else to guess, such as 123456.

8. After a short delay a pop-up dialog box will appear confirming that the Bluetooth PIN code has been successfully changed.

9. The Bluetooth PIN code has now been changed to the new PIN code.

> **During this procedure:**
>
> A. The Bluetooth PIN code is changed to the new PIN code
>
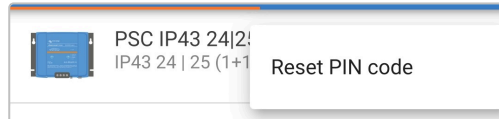> B. Bluetooth pairing information is not cleared
>
> Accordingly Bluetooth pairing with the device (mobile phone or tablet) used to change the PIN code is unaffected, however it is necessary to unpair any other devices (mobile phones or tablets) previously paired with the **Smart IP43 Charger** and establish a new Bluetooth pairing.

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6.2.2. Resetting the PIN code

Reset PIN using VictronConnect

To reset the Bluetooth PIN code:

1. Locate the PUK code stated on a label located on the side of the charger and record it for use later.

2.

3. Using a Bluetooth enabled device (mobile phone or tablet), open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page.

4. Select the **Device options** icon (three vertical dots on the right side of the description) to access the dropdown menu.

5. Select **Reset PIN code** from the dropdown menu to open the Reset PIN code pop-up dialog box.

6. Enter the PUK code (recorded earlier) and select **OK**.

7. A pop-up dialog box with the text "Busy" will be displayed while the Bluetooth PIN code is being reset.

8. After a short delay a pop-up dialog box will appear confirming that the Bluetooth PIN code has been successfully reset; select **OK** to exit into the **VictronConnect** Device list LOCAL page.

9. The Bluetooth PIN code has now been reset to 000000.

> **During this procedure:**
>
> A. The Bluetooth PIN code is reset to 000000 (not the default PIN code stated on the label)
>
> B. Bluetooth pairing information is not cleared
>
> Accordingly Bluetooth pairing with the device (mobile phone or tablet) used to reset the PIN code is unaffected, however it is necessary to unpair any other devices (mobile phones or tablets) previously paired with the **Smart IP43 Charger** and establish a new Bluetooth pairing.

6.2.3. Disabling Bluetooth

If required, Bluetooth communication can be totally disabled using a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app.

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 or in highly specialised installations where the Bluetooth radio frequency is undesirable.

6.2.4. Re-enabling Bluetooth

> **ℹ** **During this procedure:**
>
> A. Bluetooth operation is re-enabled
>
> B. The Bluetooth PIN code is reset to 000000 (not the default PIN code stated on the label)
>
> C. Bluetooth pairing information is cleared
>
> Accordingly it is necessary to unpair all devices (mobile phones or tablets) previously paired with the **Smart IP43 Charger** and establish a new Bluetooth pairing.

6.3. Reset to defaults

If required, all **Smart IP43 Charger** settings can be reset/restored to factory defaults using a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app.

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

To reset all settings to factory defaults:

1.

2. Using a Bluetooth enabled device (mobile phone or tablet), open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page, then connect to the device (the default PIN code is stated on a label located on the side of the charger, or try 000000 if there is no label).

3. Select the **Settings** icon (gear in the top right corner) to access the Settings page.

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4. Select the **Device options** icon (three vertical dots in the top right corner) to access the Device options dropdown menu.

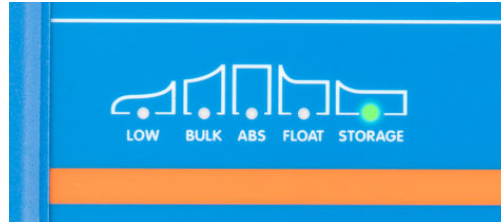<div align="center">

✕   Settings   ⋮

</div>

5. Select **Reset to defaults** from the dropdown menu to open the Restore device pop-up dialog box.

6. Read the warning message, then select **Yes** to proceed.

7. All settings have now been reset/restored to factory defaults.

7. Monitoring

7.1. LED indications

7.1.1. Operation states

The LEDs on the **Smart IP43 Charger** unit can be referenced to determine the current charge state and other operational information.

Refer to the LED indications in the table below:

7.2. VictronConnect

The **Smart IP43 Charger** operation can be monitored in real-time and/or after completion of a charge cycle using a Bluetooth enabled device (mobile phone or tablet) with the **VictronConnect** app; this includes live data such as charger output voltage, output current, the current charge stage, charge cycle statistics, warnings, alarms and errors.
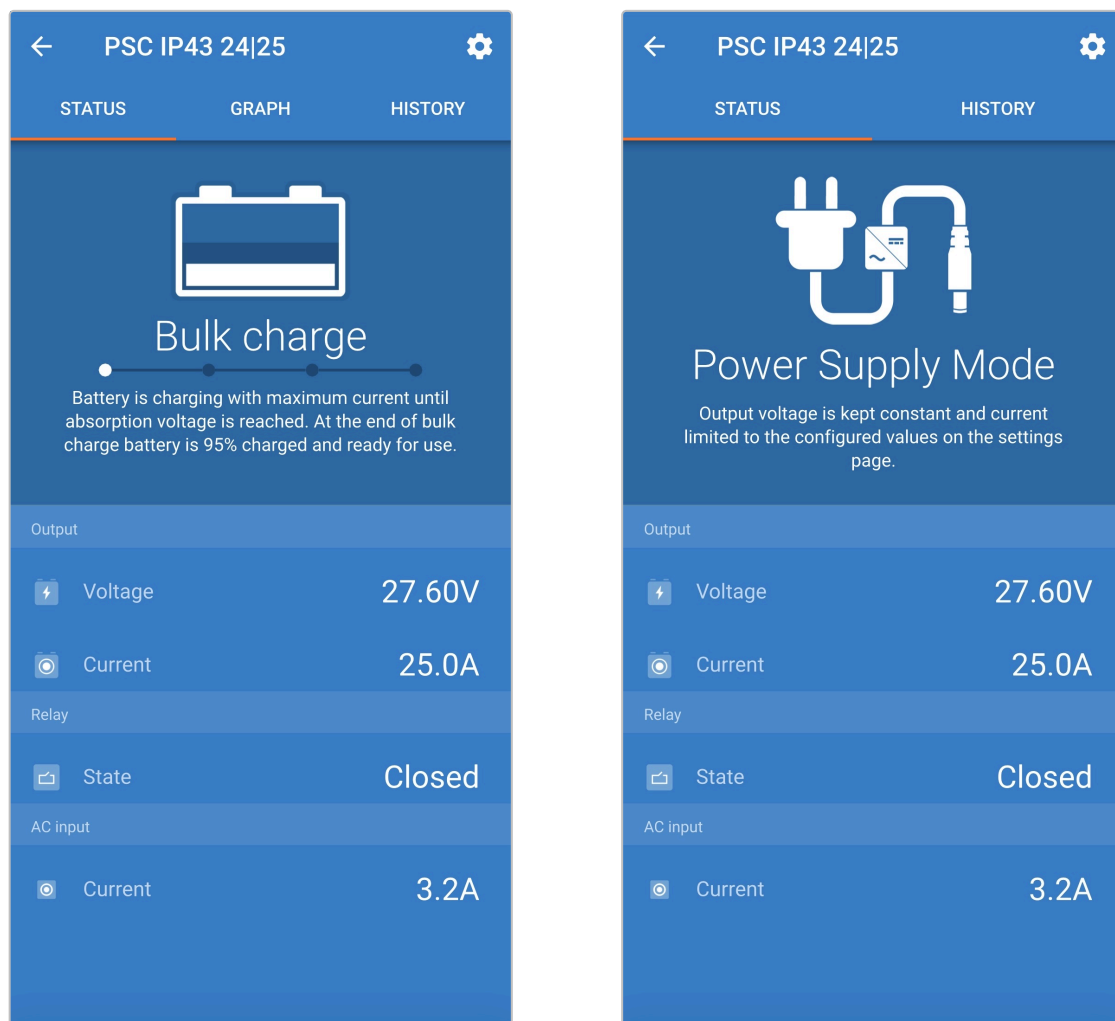
When a Bluetooth connection is established with the charger, detailed data is available across three different overview screens available (STATUS, GRAPH and HISTORY), each displaying different monitoring or historical data spanning back over the last 40 charge cycles; the desired screen can be selected by either selecting the related title or by swiping between screens.

It is also possible to view and monitor key data and notifications directly in the **VictronConnect** Device list Local page without connecting to the charger, via Instant readout functionality.

7.2.1. Status screen

The Status screen is the main overview screen; it displays the function mode (charger or power supply), the active charge state (in charger mode), the battery voltage and the charge/output current.
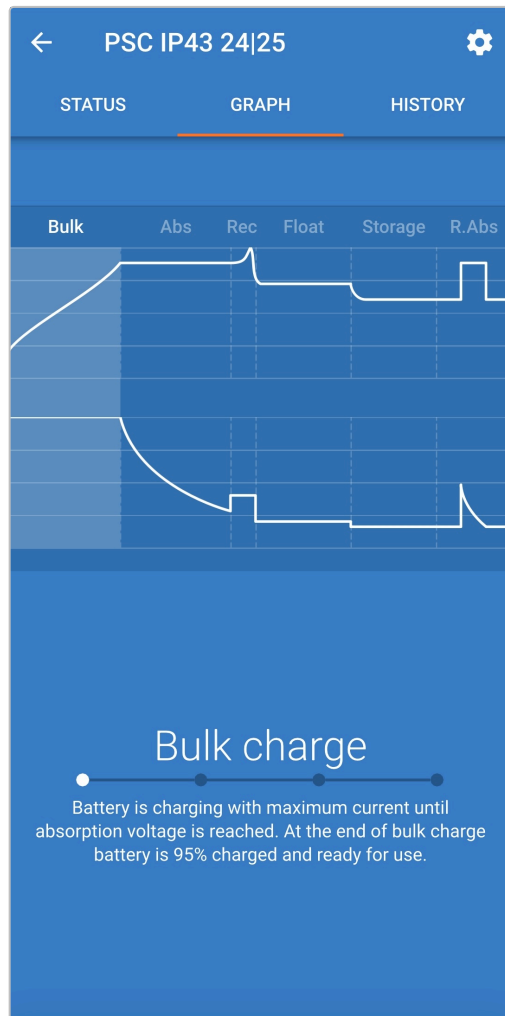
This data will update continuously in real time as the charge cycle progresses.
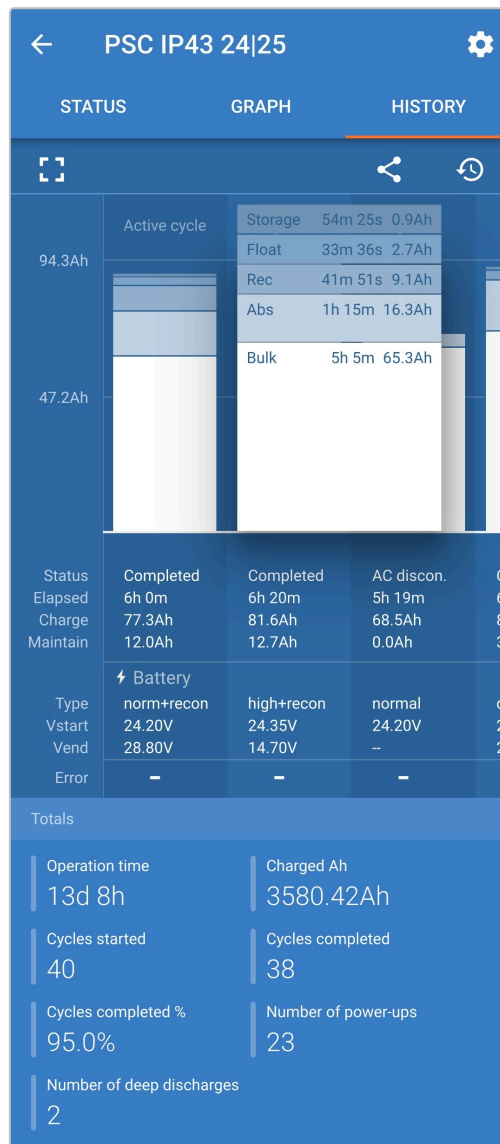
7.2.2. Graph screen

The Graph screen provides an easy to understand graphical representation of each charge state with respect to typical battery voltage and charge current.

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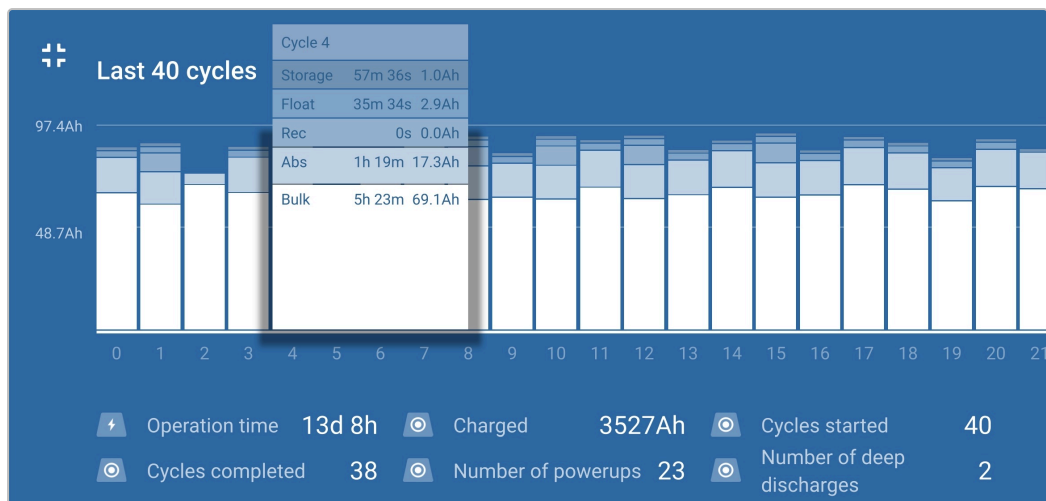
7.2.3. History screen

The History screen is a very powerful reference as it contains historical usage data over the charger 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.

Charge cycle statistics

A. **Cycle overview**

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

B. **Status**

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

C. **Elapsed**

The elapsed time of the recharge stages (Bulk and Absorption)

D. **Charge**

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

E. **Maintain**

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

F. **Type**

The charge cycle mode used; either a Built-in preset mode or a custom User defined configuration

G. **Vstart**

Battery voltage when charging commences

H. **Vend**

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

I. **Error**

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

Charger lifetime statistics

A. **Operation time**

The total operation time over the lifetime of the charger

B. **Charged Ah**

The total charge capacity (in Ah) provided over the lifetime of the charger

C. **Cycles started**

The total charge cycles started over the lifetime of the charger

D. **Cycles completed**

The total charge cycles completed over the lifetime of the charger

E. **Cycles completed %**

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

F. **Number of power-ups**

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

G. **Number of deep discharges**

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

8. Advanced Configuration

8.1. Advanced settings

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 using a Bluetooth enabled device (mobile phone or tablet) with 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.

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

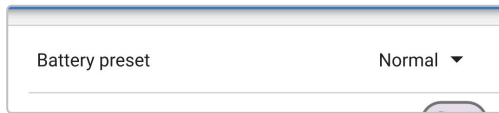| ←	Settings	
Battery preset		User defined ▼
Expert mode		⚪
Maximum charge current		25.0A
Charge voltage		
Absorption voltage		28.80V
Float voltage		27.60V
Storage voltage		26.40V
Recondition voltage Increases the battery voltage while the current is below 2.0A		Disabled
Voltage compensation		
Temperature compensation		-32.40mV/°C
Battery limits		
Low temperature cut-off		Disabled

To access the advanced settings:

1.

2. Using a Bluetooth enabled device (mobile phone or tablet), open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page, then connect to the device (the default PIN code is stated on a label located on the side of the charger, or try 000000 if there is no label).

3. Select the **Settings** icon (gear in the top right corner) to access the Settings page.
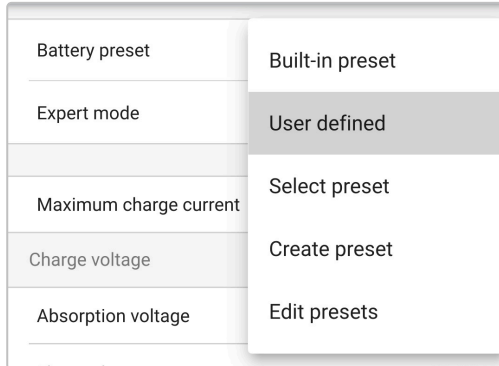
←	PSC IP43 24|25	⚙
	Battery settings	＞

4.

To configure user defined advanced settings:

1. Select the **Battery preset** dropdown arrow to expand the dropdown menu.

Battery preset	Normal ▼

2. Select **User defined** from the Battery preset dropdown menu.

Battery preset		Built-in preset
Expert mode		User defined
Maximum charge current		Select preset
Charge voltage		Create preset
Absorption voltage		Edit presets

3. User defined configuration will now be enabled.

Battery preset	User defined ▼

4. Configure the advanced settings as required per battery manufacturers recommendations.

The advanced settings (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**

   Configuration of user defined charge settings and selection of the last user defined configuration

   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**

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 can be configured for the following charge stages:

   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).

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8.2. Expert mode settings

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

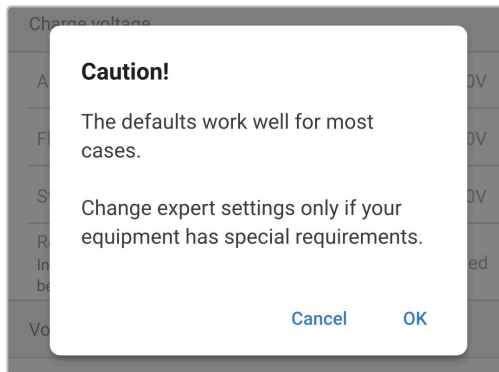| ← Settings	
Battery preset	User defined ▼
Expert mode	⬤
Maximum charge current	25.0A
Charge voltage	
Absorption voltage	28.80V
Float voltage	27.60V
Storage voltage	26.40V
Recondition voltage Increases the battery voltage while the current is below 2.0A	Disabled
BatterySafe Prevent excessive gassing by automatically limiting the rate of voltage increase.	⬤
Voltage compensation	
Temperature compensation	-32.40mV/°C
Bulk	
Bulk time limit	10h 0m
Re-bulk voltage offset	0.20V
Absorption	
Absorption duration	Adaptive
Maximum absorption time	8h 0m
Tail current	Disabled
Repeated absorption	Every 7 days
Recondition	
Recondition current percentage	8%
Recondition stop mode	Automatic, on voltage ▼
Maximum recondition duration	1h 0m
Battery limits	
Low temperature cut-off	Disabled

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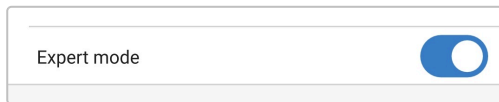
To access the expert mode settings:

1. Open the **Advanced setting** page and enable **User defined** configuration - see the 'Advanced configuration > Advanced settings' section for instructions.

2. Toggle the **Expert mod**e switch on to enable additional Expert mode settings (extension of the Advanced settings menu).

Expert mode

3. Read the warning message and then select **OK** to proceed.

Caution!

The defaults work well for most cases.

Change expert settings only if your equipment has special requirements.

Cancel   OK

4. The Expert mode settings (extension of the Advanced settings menu) will now be accessible.

Expert mode

The ADDITIONAL expert mode settings 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 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.

C. **Absorption**

    i. **Absorption duration**

        The absorption duration setting allows selection between adaptive absorption time (calculated based on the bulk time / level of discharge) or a fixed absorption time.

    ii. **Maximum absorption time / Absorption time**

        The maximum absorption time / absorption time setting enables the maximum adaptive absorption time or the fixed absorption time to be configured (depending if adaptive or fixed absorption time is selected). Note that regardless if adaptive or fixed absorption time is selected, the absorption phase can end early based on the tail current setting (if enabled).

    iii. **Tail current**

        The tail current setting enables the absorption stage to be ended early based on charge current. If the charge current drops below the tail current threshold for one minute, the absorption stage will immediately end and the charger will move to float or storage stage.

    iv. **Repeated absorption**

        The repeated absorption setting enables the elapsed time between each automatic refresh charge cycle (1h in absorption stage) to be configured. Repeated absorption is enabled by default and can be disabled which results in the battery staying in storage mode indefinitely.

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.   **Maximum 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).

8.3. Power supply mode

The **Smart IP43 Charger** range is also suitable for use as a DC power supply, to directly power loads with or without a battery connected.
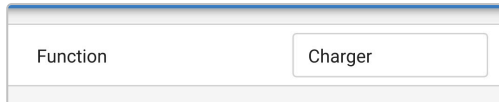
When the charger is used specifically as a DC power supply it is recommended to activate Power supply mode, which will disable the internal charge logic and provide a constant (configurable) DC voltage to the loads.
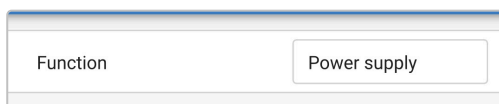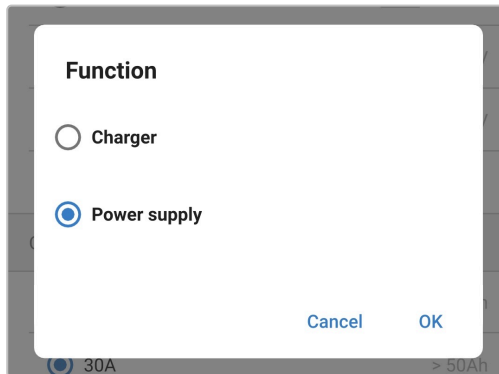
To enable power supply mode:

1.

2. Using a Bluetooth enabled device (mobile phone or tablet), open the **VictronConnect** app and locate the **Smart IP43 Charger** in the Device list Local page, then connect to the device (the default PIN code is stated on a label located on the side of the charger, or try 000000 if there is no label).

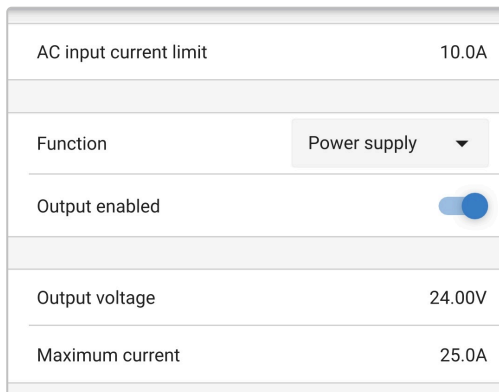3. Select the **Settings** icon (gear in the top right corner) to access the Settings page.

←	PSC IP43 24|25	⚙

4. Select the **Charger** in the Function filed to open the Function pop-up dialog box.

Function	Charger

5. Select **Power supply** from the Function pop-up dialog box, then select **OK**.

Function

○ Charger

◉ Power supply

Cancel   OK

◉ 30A   > 50Ah

Function	Power supply

6.

AC input current limit	10.0A
Function	Power supply ▼
Output enabled	🔵
Output voltage	24.00V
Maximum current	25.0A

7.

8. Power supply mode has now been enabled and configured.

To revert the charger function back to use as a normal battery charger, follow steps 1 to 4 above and then select **Charger** from the Function pop-up dialog box.

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9. Technical specifications

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10. 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.