

Manual

CZ

Blue Power IP65 charger

12/5 24/5

12/7 24/8

12/10

12/15

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Safety notice



- Always ensure sufficient ventilation when charging.
- Do not cover the charger.
- Never attempt to charge non-rechargeable or frozen batteries.
- Never place the charger on top of the battery when charging.
- Avoid sparks near the battery, as the battery may produce explosive gases when charging.
- Battery acid is corrosive. If it comes into contact with skin, rinse immediately with water.
- This device is not intended for use by young children or people who cannot read or understand the manual unless they are supervised by a responsible person who can ensure that they can use the charger safely. Store and use the charger out of the reach of children and ensure that they cannot play with it.
- The connection to the mains power supply must comply with national regulations for electrical equipment. If the power cable is damaged, please contact the manufacturer or the service centre.

1. Quick User Guide

AND. Connect the charger to the battery.

B. Plug the charger into a wall outlet. The TEST LED will indicate that the power cord is connected to the outlet. *All charging status LEDs will flash if there is a reverse polarity connection, a short circuit, or if a 12V charger is connected to a 24V battery.*

The TEST LED will flash until the charging pulse increases the battery voltage to more than 12.5V or 25V.

If the test LED is still on, proceed to point C.

C. If necessary, press the MODE button to select a different charging algorithm. If you select RECONDITION together with NORMAL or HIGH, then the RECONDITION LED will flash during recovery mode.

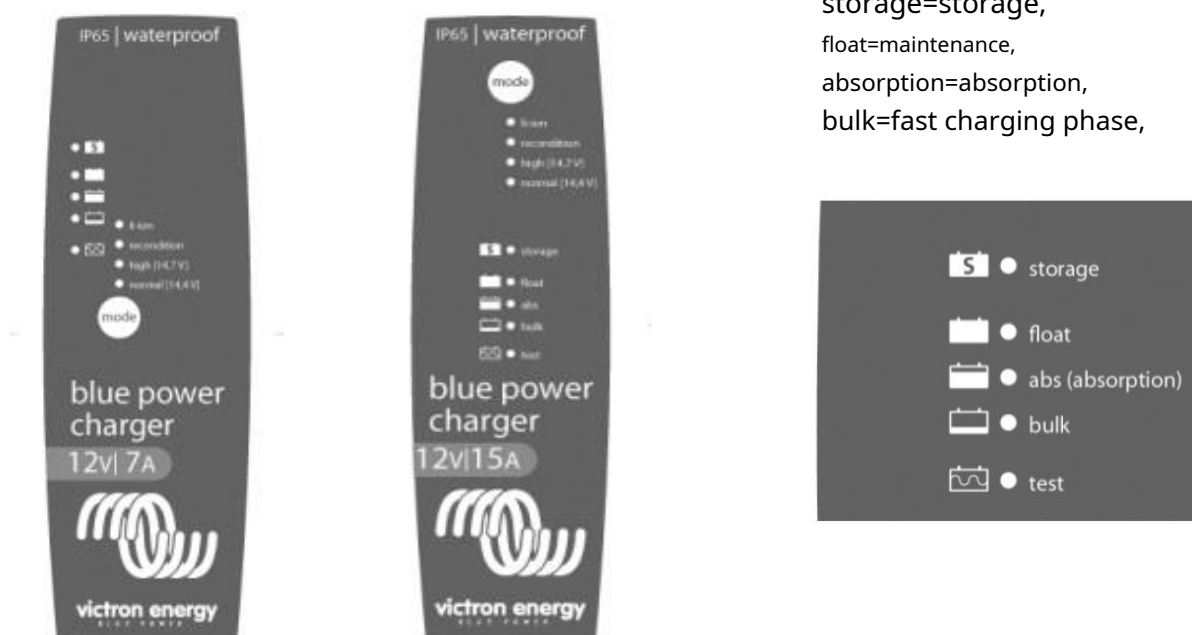
The charger can be switched to low current mode (see technical specifications) by pressing the MODE button for three seconds. The TEST LED will flash during low current mode.

Low current mode will remain activated until you press the MODE button again for 3 seconds.

D The battery is about 80% charged and ready for use when the absorption LED turns on.

E. The battery is fully charged when the FLOAT or STORAGE LED turns on.

F. Stop charging at any time by unplugging the main power cord from the wall outlet.



2. Important features and facts

2.1 Ultra high efficiency “green” battery charger

With up to 95% efficiency, these chargers produce up to 4x less heat than the industry standard.

When the battery is fully charged, power consumption drops to 0.5W, which is 5x to 10x better than the current standard.

2.2 Durability, safety and quiet operation

- Low thermal load on electronic components
- Protection against ingress of dust, water and chemicals.
- Overheating protection: the output current will decrease as the temperature increases up to 60°C, but the charger will not fail.
- The chargers are completely silent: they do not contain an active heat sink (fan) or other moving parts.

2.3 Reverse polarity protection

Once the battery is connected, the charger immediately detects the voltage and polarity. If the battery is connected incorrectly, all status LEDs will start flashing. No sparks will appear.

2.4 Recovery function for completely discharged batteries

Most reverse polarity protected chargers will not recognize batteries discharged to zero or near zero voltage and will therefore not start charging them. Charger *Blue Power Charger* However, it will attempt to recharge even a completely discharged battery with a low current and resume normal charging as soon as sufficient voltage appears at the battery terminals.

2.5 Temperature compensated charging

The optimal charging voltage for a lead-acid battery varies inversely with its temperature. Charger *Blue Power IP65 Charge* measures the ambient temperature during the test phase and compensates for it during charging. The temperature is measured again when the charger is in low current mode during maintenance or storage. Therefore, no special settings are needed for cold or hot environments.

2.6 Adaptive battery management

Lead-acid batteries should be charged in three stages: [1] *fast charging stage or constant current charging*; [2] *by absorption or charging of the highest values* and [3] *holding voltage*.

A battery requires several hours of absorption to fully recharge to prevent premature failure leading to sulfation¹.

However, the relatively high voltage during absorption accelerates aging and leads to grid corrosion on the positive electrodes.

Adaptive battery management limits corrosion by reducing absorption time whenever possible, i.e. when charging a battery that is already (almost) fully charged.

2.7 Storage mode: less corrosion of positive electrodes

Even a lower float charge voltage following the absorption phase will cause grid corrosion, so it is imperative to continue to reduce the charge voltage if the battery remains connected to the charger for more than 48 hours.

2.8 Regeneration

A lead acid battery that has already been undercharged or left discharged for several days or weeks will deteriorate due to sulfation.¹ If detected early, sulfation can sometimes be partially reversed by charging at a low current until the battery reaches a higher voltage.

Comment:

- and) Regeneration should only be applied occasionally for VRLA batteries with flat electrodes (gel and AGM) as the resulting gassing will dry out the electrolyte.
- b) VRLA batteries with cylindrical cells create more internal pressure before gassing and therefore lose less water when subjected to regeneration. Some battery manufacturers with cylindrical cells therefore recommend regeneration during cyclic use.
- c) Regeneration can be used for conventional batteries to "equalize" the cells as protection against acid stratification (the stratification of the acid according to its density and therefore the degree of charge).
- d) Some charger manufacturers recommend pulse charging to reverse the sulfation process. However, most battery experts agree that there is no conclusive evidence that pulse charging works any better than constant voltage charging, and our tests confirmed this.

2.9 Lithium-ion (LiFePO₄)battery

Li-ion batteries are not subject to sulfation, but are very sensitive to undervoltage and overvoltage.² Li-ion batteries are therefore often equipped with a system that balances the cells and protects against undervoltage and overvoltage (UVP).

Some reverse polarity protected chargers do not recognize the battery when the UVP system is triggered.

Charger *Blue Power Charger* however, it will automatically reset the UVP and start charging.

Important note:

NEVER attempt to charge a Li-ion battery if its temperature is below 0°C.

2.10 Low current mode

Some lead-acid batteries can overheat if charged at a current higher than 0.3C (where C is the capacity in Ah). For example, a 12 Ah battery should not be charged at a current higher than $0.3 \times 12 = 4$ A. Low-current mode should be used to charge low-capacity lead-acid batteries (where the charging current is limited to 4 A or less, see technical specifications).

¹ For more information on batteries, see our book 'Energy Unlimited' (downloadable at www.victronenergy.com), or http://batteryuniversity.com/learn/article/sulfation_and_how_to_prevent_it

² For more information about Li-ion batteries, visit: <http://www.victronenergy.com/batteries/lithium-battery-12,8v/>

3. Charging algorithms

3.1 Smart charging algorithm with optional regeneration for lead-acid batteries

Charging voltage at room temperature:

REGIME	ABS IN	HOLD. IN	WAREHOUSE. IN	REGENERATION Max IN AT % Inom
NORMAL	14.4	13.8	13.2	16.2 at 8%, max 1h
HIGH	14.7	13.8	13.2	16.5 at 8%, max 1h
LI-ION	14.2	13.5	13.5	on

For 24V chargers, multiply all voltage values by two.

NORMAL (14.4V): recommended for regular lead-antimony flat cell batteries (starter batteries), flat gel and AGM batteries. HIGH (14.7V): recommended for regular lead-calcium batteries, Optima spiral cell batteries and Odyssey batteries.

Seven-step charging sequence for lead-acid batteries:

1. CHARGING/TEST

It tests whether the battery is capable of charging, even when it is fully discharged (there is zero or almost zero voltage at the terminals).

All charging status LEDs will flash if the battery is low.

for reverse polarity connection, short circuit, or if a 12V charger is connected to a 24V battery.

The TEST LED will flash until the charging pulse increases the battery voltage to more than 12.5V or 25V respectively. If the flashing continues for several minutes, the battery may be damaged (internal short circuit): disconnect the charger. A false rejection may occur if a load is simultaneously draining a very weak or completely discharged battery during the test phase: disconnect the load and repeat the test

The charger can be switched to low current mode (see technical specifications) by pressing the MODE button for 3 seconds. When the charger switches to low current mode, the MODE LED will flash. Low current mode will remain activated until you press the MODE button again for 3 seconds.

2. FAST

It charges the battery at maximum current until the absorption voltage is reached. The battery will be about 80% charged and ready for use.

3. ABSORPTION

It charges the battery at a constant voltage with decreasing current until it is fully charged. The absorption voltage at room temperature is shown in the table above. *Adaptive battery management:*

The absorption time is short (minimum 30 minutes) if the battery has been (almost) fully charged, and increases to 8 hours in the case of a complete discharge of the battery.

4. REGENERATION

Optional regeneration Regeneration for deep discharged lead acid batteries is applicable to the NORMAL and HIGH charging algorithms. It can be selected by pressing the MODE button again after selecting the desired algorithm. When the charger is in regeneration mode, the battery will be charged at a low current until it reaches a higher voltage at the end of the absorption phase. The RECONDITION LED will be on during charging and will flash during the regeneration period.

During regeneration, the maximum current is equal to 8% of the rated current until the maximum voltage is reached. Regeneration ends after one hour or when the maximum voltage is reached, whichever comes first. See table. *Example:*

For a 12/15 charger, the regeneration current is equal to: $15 \times 0.08 = 1.2A$.

5. MAINTENANCE

Keep the battery at a constant voltage and fully charged.

6. STORAGE

Maintain the battery at a reduced constant voltage to reduce gassing and corrosion of the positive electrodes. Slow self-discharge is prevented by automatic weekly battery regeneration through short absorption charging.

7. READY- BATTERY READY

The battery is fully charged when the FLOAT or STORAGE LEDs light up.

3.2 Lithium-ion (LiFePO₄)battery

When charging a Lithium-ion battery, the charger uses *Blue Power Charger* specific charging algorithm for Lithium-ion batteries to ensure optimal performance. Press the MODE button to select *LI-ION*.

3.3 After connecting the load to the battery

A load can be connected to the battery during charging as long as the current drawn is much lower than the charger's rated power. Regeneration is not possible if a load is connected to the battery.

Comment:

- a) Before attempting to charge a very weak or completely discharged lead acid battery, disconnect all loads. Loads can be reconnected after the fast charging phase begins.
- b) Before attempting to charge a Li-ion battery that has been triggered by Under Voltage Protection (UVP), disconnect all loads. Loads can be reconnected after the fast charging phase begins.

3.4 Starting a new charging cycle A

new charging cycle begins when:

- a) The charger has reached the maintenance or storage value and, due to the load, the load current has increased to the maximum charger current value for more than 4 seconds.
- b) The MODE button was pressed during charging.
- c) The AC power source has been disconnected and reconnected.

3.5 Charging time estimation

The lead acid battery is about 80% charged at the beginning of the absorption phase. Time to 80% charge can be calculated as follows: $T = Ah / I$

Where:

I is the charging current (= charger power current minus consumer current).

Ah is the number of Ah to be recharged.

The entire absorption time, up to 8 hours, is required to charge the battery to 100%.

Example:

Charging time of a fully discharged 100Ah battery to 80% when charging with a 10A charger

Blue Power Charger: $T = 100 / 10 = 10$ hours

Charging time to 100%: $10 + 8 = 18$ hours.

The Li-ion battery is more than 95% charged at the beginning of the absorption phase and reaches 100% charge after approximately 30 minutes of absorption charging.

3.6 High internal resistance

When a battery reaches the end of its cycling or maintenance life, or fails prematurely due to sulfation or corrosion, its capacity will decrease dramatically and its internal resistance will increase. The charger will not recognize such a battery during the test phase (as it could just as well be a nearly fully charged battery).

However, a very short fast charging time for a supposedly dead battery will indicate that the battery has reached the end of its life.

Note: Sulphation can sometimes be partially reversed by repeated use of the regeneration mode.

3.7 Can be used as a power source

If no battery is connected, the charger will power DC appliances.

3.8 Connecting using the Victron connect app and Bluetooth You can set up, view and configure the Blue Smart IP65 charger via your smartphone and Bluetooth. You can view the status of the charger and battery. You can even control the charger functions using the VictronConnect app. The default voltage and current are displayed on the screen. You can download the app for iOS and Android at <https://www.victronenergy.com/live/victronconnect>

4. Technical specifications

Blue Power Charger IP65	12V 5/7/10/15A	24V 5/8A
Input voltage range	180-265 VAC	
Efficiency	94%	95%
Standby power consumption	0.5W	
Minimum battery voltage	Starts charging from 0 V	
Charging voltage 'absorption'	Normal: 14.4 V High: 14.7V Li-ion: 14.2V	Normal: 28.8V High: 29.4V Li-ion: 28.4V
Charging voltage 'maintenance'	Normal: 13.8V High: 13.8V Li-ion: 13.5V	Normal: 27.6V High: 27.6V Li-ion: 27.0V
Charging voltage 'storage'	Normal: 13.2 V High: 13.2V Li-ion: 13.5V	Normal: 26.4V High: 26.4V Li-ion: 27.0V
Charging current	5 / 7 / 10 / 15 A	5 / 8 A
Charging current in low current mode	2 / 2 / 3 / 4 A	2 / 3 A
Temperature compensation (lead-acid batteries only)	16 mV/°C	32 mV/°C
Can be used as a power source	Yes	
Reverse current consumption	0.7 Ah/month (1 mA)	
Protection	Reverse polarity Short circuit at output Overheating	
Operating temperature range	- 20 to +50°C (full power up to 30°C)	
Humidity (non-condensing)	Max 95%	
HOUSING		
Battery connection	Black and red cable, 1.5 meters long	
Connection to 230 V AC voltage	1.5 meter cable with CEE 7/7, BS 1363 (UK) or AS/NZS 3112 plugs	
Protection category	IP65 (splash and dust resistant)	
Weight	0.9 kg	0.9 kg
Dimensions (h x w x d)	12/7: 47x95x190mm Other: 60x105x190mm	24/5: 47x95x190mm 24/8: 60x105x190mm
STANDARDS		
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	

Five-year limited warranty

This limited warranty covers defects in materials and workmanship on this product and lasts for five years from the original purchase date. The customer must return the product with the proof of purchase to the place of purchase.

This limited warranty does not cover damage, deterioration in performance or failure resulting from alteration, modification, misuse, abuse, neglect, or exposure to excessive moisture, fire, improper packaging, lightning, power surges, or other acts of nature. This limited warranty does not cover damage, deterioration in performance or failure resulting from attempted repairs by anyone not authorized by Victron Energy to perform such repairs.

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

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

Distributor:

Serial number:

Version : 05
Date : 29 December 2014