



## FES Travel Charger

Standard version suitable for charging FES 14S Battery packs  
or  
Special version suitable for charging FES 16S Battery packs

User manual, Version 1.0



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**Table of content**

- 1. Important notices ..... 3
  - 1.1 Limited Warranty ..... 3
  - 1.2 Invalid Warranty ..... 3
- 2. Introduction ..... 4
- 3. Technical specifications ..... 4
- 4. Basic overview ..... 5
- 5. Charging start ..... 6
  - 5.1 Thermal Rollback ..... 6
- 6. Charging process ..... 7
  - 6.1 Charge Complete ..... 7
  - 6.2 Abort Charge ..... 7
  - 6.3 Abort Charge ..... 7
- 7. Additional information on Screens ..... 8
  - 7.1 Profile Statistics ..... 8
  - 7.2 Charge Graph ..... 8
  - 7.3 Screen Saver ..... 8
- 8. Revision history ..... 8

## 1. Important notices

This user manual contains important information about proper and safe usage of FES Travel charger. If you need more information, please contact LZ design company.

Information's in this document are subject to change without notice. LZ design reserves the right to change or improve this product and to make changes in the content of this material without obligation to notify any person or organization of such changes or improvements.



**Caution:** A Yellow triangle is shown for parts of the manual which should be read carefully and are important.



**Warning:** Notes with a red triangle describe procedures that are critical and may result in reduced safety or may lead to critical situation.



**Note:** A bulb icon is shown when a useful hint is provided to the reader.

### 1.1 Limited Warranty

This product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, LZ design will, at its sole option, repair or replace any components that fail in normal use. Such repair or replacement will be made at no charge to the customer for parts and labour, however the customer shall be responsible for any transportation cost.

Usage of device is at user's own risk. LZ design will not under any circumstances accept any responsibility or will be liable for possible damage on people, animals or things, which might directly or indirectly happen from using the charger.

To obtain warranty service, please contact LZ design directly.

### 1.2 Invalid Warranty

The warranty does not cover failures due to abuse, misuse, accident, or unauthorised alterations or repairs.

The warranty becomes invalid in the case of connecting and charging any other unauthorized batteries.

The device is not waterproof in anyway.

## 2. Introduction

FES Travel charger was designed with a very compact and small form factor so that it could be used as a portable stand-alone charger.

Required input voltage is 100V or 240V~ 50/60 Hz, so it is suitable for EU and US owners of FES battery packs without usage of voltage converter.

Available are two different versions of FES Travel charger:

**1. Standard version: FES Travel charger for charging FES 14S battery packs, with max charging current of 8A.**

**2. Special version: FES Travel charger for charging FES 16S battery packs, with max charging current of 5A.**



**Warning: It is not allowed to use this special version for charging 14S battery packs, due to potential overcharging to 4.7 V per cell**

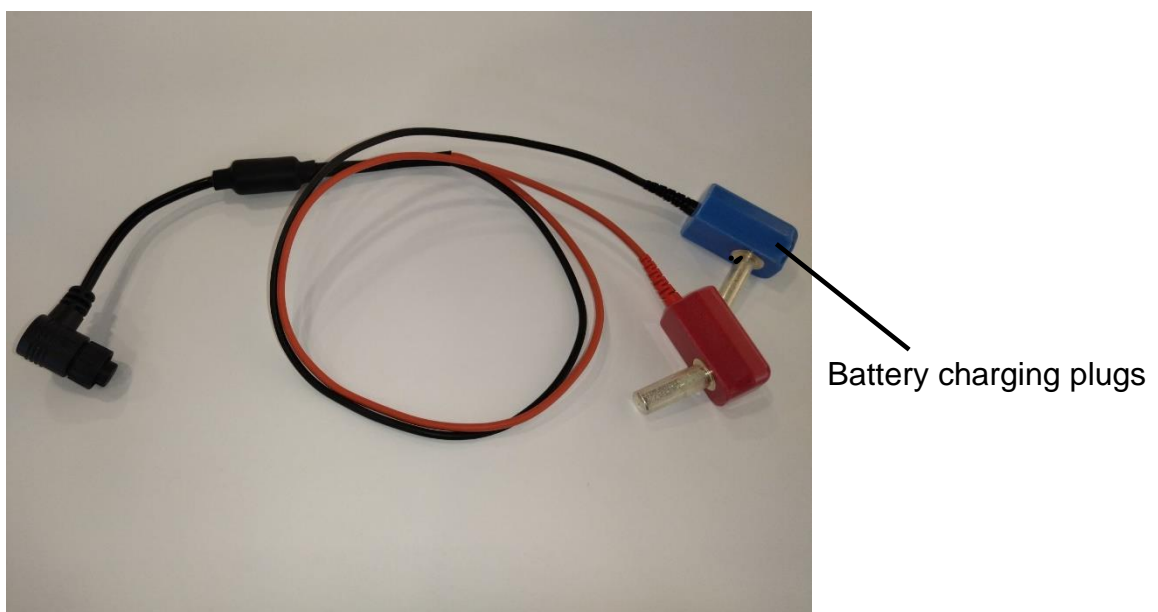
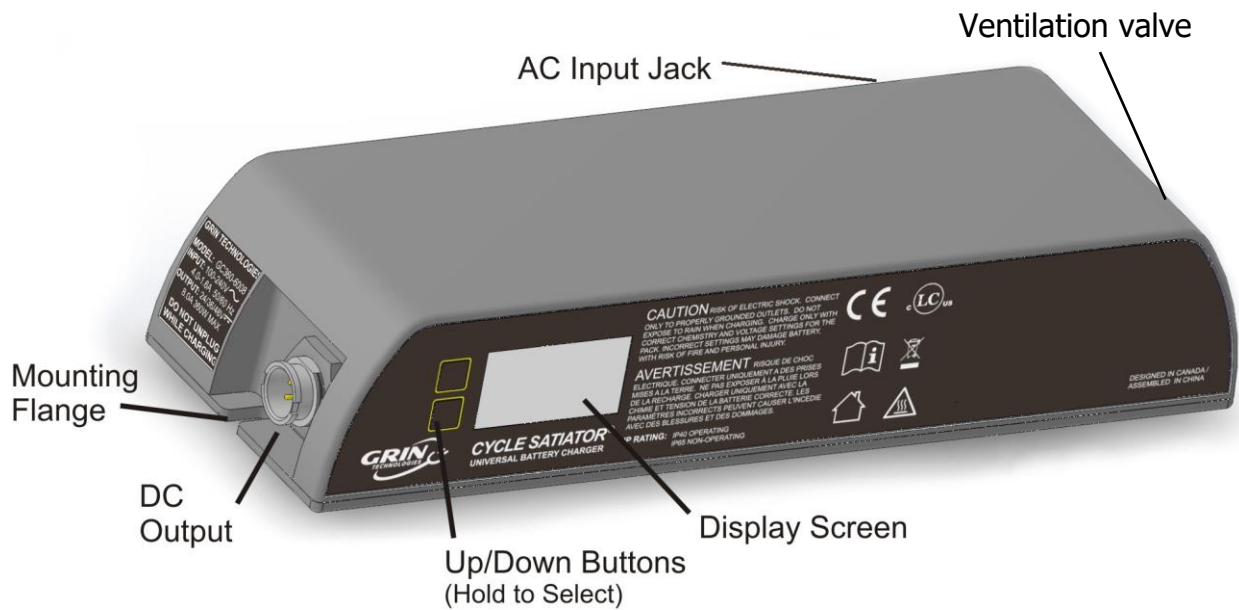
It has an AC input power port on the back (100-240V AC), a DC output cable to connect the charger to the battery pack on the left side, a graphical display screen for showing the real-time charging status, and a pair of buttons to navigate the charger menus. It maintains record of the lifetime charge history about number of charging cycles, kWh and Ah charged.

## 3. Technical specifications

	Standard FES Travel 14S	Special FES Travel 16S
Input range	100V-240V AC / 50 - 60Hz	
Max Output Range	63V	103V
Max charging voltage set to	<b>58.0V</b>	<b>66.3V</b>
Min. starting voltage set to	42V	48V
Max charging current	8A	5A
Output power	max 360W	
Operating efficiency	95% @230V, 94% @120V	
Dimensions (L x W x H)	237 x 78 x 48 mm	
Weight	1,06kg (1,47kg with AC supply cable and DC charging cable)	
Safety	UL 1012, CSA C22.2 No. 107.2, CE / IEC 60335-1/2-29	
Emissions	FCC Part 15 B, EN55014, EN 61000-3-2, EN 61000-3-3	
Immunity	EN 61000-4-2/-3/-4/-5/-6/-11	

### 4. Basic overview

The FES Travel Charger does not have an ON/OFF switch, so it will turn on whenever there is power present on the AC input port. The 3-pin IEC connector is the familiar standard for personal computers, and if the included cable does not match your country's outlet standard, then there should be no problem finding one locally. Just be sure to use a grounded 3-pin outlet.



## 5. Charging start

FES Travel Charger will start charging the battery whenever it is connected to a battery pack that isn't fully charged.



**Caution:** *FES Travel Charger have no communication with BMS, so this charger should not be used for regular charging of FES battery packs. It could be used only for occasional charging of FES battery packs, with condition that battery pack cell voltage difference is not more than 50mV.*

If there is no battery attached, the display screen will say *CONNECT BATTERY* along with a summary of the charge profile. Once it detects a pack has been plugged in, then the charger will automatically start the charge process, and the display will show the charging status in real time.

If *CONNECT BATTERY* still shows on the screen even after plugging in a pack, then a Force Start may be required

### 5.1 Thermal Rollback

The FES Travel Charger operates with much higher efficiency than most of the bigger chargers (94-95% versus 80-85%). But it also packs twice the power output into a smaller footprint and eliminates active fan cooling, so the casing will still get quite warm during use. At full output power in a room temperature environment, it will typically reach about 55-60 degrees Celsius. This will feel hot to the touch but is not a cause for concern. We recommend placing the charger in a location where it is exposed to free air to help dissipate this heat. If the charger is in an enclosed space or is used in a hot environment and starts to overheat, then it will automatically scale back the output power so that the internal temperature does not get beyond 70 Celsius. This will not affect its ability to complete a charge cycle, but it will take longer as charging current will be reduced.

## 6. Charging process



**Caution:** Place charger on a safe, secure position. Keep away from dust, direct sunlight, fire, smoke, children, and any unattended person!



**Warning:** Before charging, physical condition inspection of the battery packs should be done. Any sign of mechanical damage, such as a puncture, dents, scratches, must be evaluated and reported to manufacturer before charging.

Battery to charger connection procedure:

1. Connect RED + and BLUE - cables from charger to first battery pack.
2. Turn on BMS (We recommend, but not necessary for this type of charger to start charging as there is no communication with BMS). When the test procedure is completed the green »Power LED« starts blinking indicating that the BMS is working in the normal mode.
3. Plug in the charger to the outlet (100 – 240V AC / 50 - 60Hz).
4. FES Travel Charger start to charge automatically.

### 6.1 Charge Complete

If the battery is left charging until reaching a full charge of 58,0 V, the title bar will invert and say *CHARGE COMPLETE* allowing you to see from a distance that the cycle has finished.

On the FES Travel Charger display you will also see a summary of the elapsed charge time and amp-hours delivered to the battery pack.

### 6.2 Abort Charge

You can also stop the charge by simply disconnecting the battery from the charger. Once the battery is removed, the screen will return to saying CONNECT BATTERY. Be aware that you cannot see the elapsed amp-hours and charge time when the battery is disconnected. If the battery is plugged back in within 5 seconds, then it will resume charging from the previous amp-hours and time, but if the delay is longer then it will start a new charge cycle and the previous charge statistics will be lost.

### 6.3 Abort Charge

If you want to stop the charge process while charging is underway, without unplugging the battery, press and hold the top button until *Abort Charge* pops up.

## 7. Additional information on Screens

During charging, a brief up/down button press will cycle through the statistics and graph displays to show additional information related both to the charge profile and the charge cycle that is underway.

### 7.1 Profile Statistics

The FES Travel Charger maintains a record of the lifetime charge history. This is visible from the 2nd display screen. On the left side are the total cycles, total kilowatt hours of energy, and total amp-hours of charge that the selected profile has seen. The column on the right shows the average watt-hours, amp-hours, and charge time for batteries on this profile.

### 7.2 Charge Graph

The 3rd display screen is a real-time graph of the current charge cycle. The battery voltage is shown as a solid infill, while the charge amperage is shown as a bold yellow line. The battery graphic is plotted versus time until charge complete is detected. Markers on the horizontal axis indicate the elapsed charge time and auto scale as the charge progresses.

### 7.3 Screen Saver

After several minutes with no button activity, the FES Travel Charger will go into a screen saver mode, where the current charge statistics and status are instead shown in a small text box that moves around the display. The screen saver will preserve the life and brightness of the OLED display pixels and ensures that they have a uniform intensity.

## 8. Revision history

June 2022	Initial release of user manual, v1.0
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