



FES Wi-Fi Module

User manual, Version 1.0



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1. Important notices

This user manual contains important information about proper and safe usage of “FES Wi-Fi module”.

If you need more information, please contact the manufacturer LZ design.

Informations 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.



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



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



A bulb icon is shown when a useful hint is provided to the reader

1.1 Limited Warranty

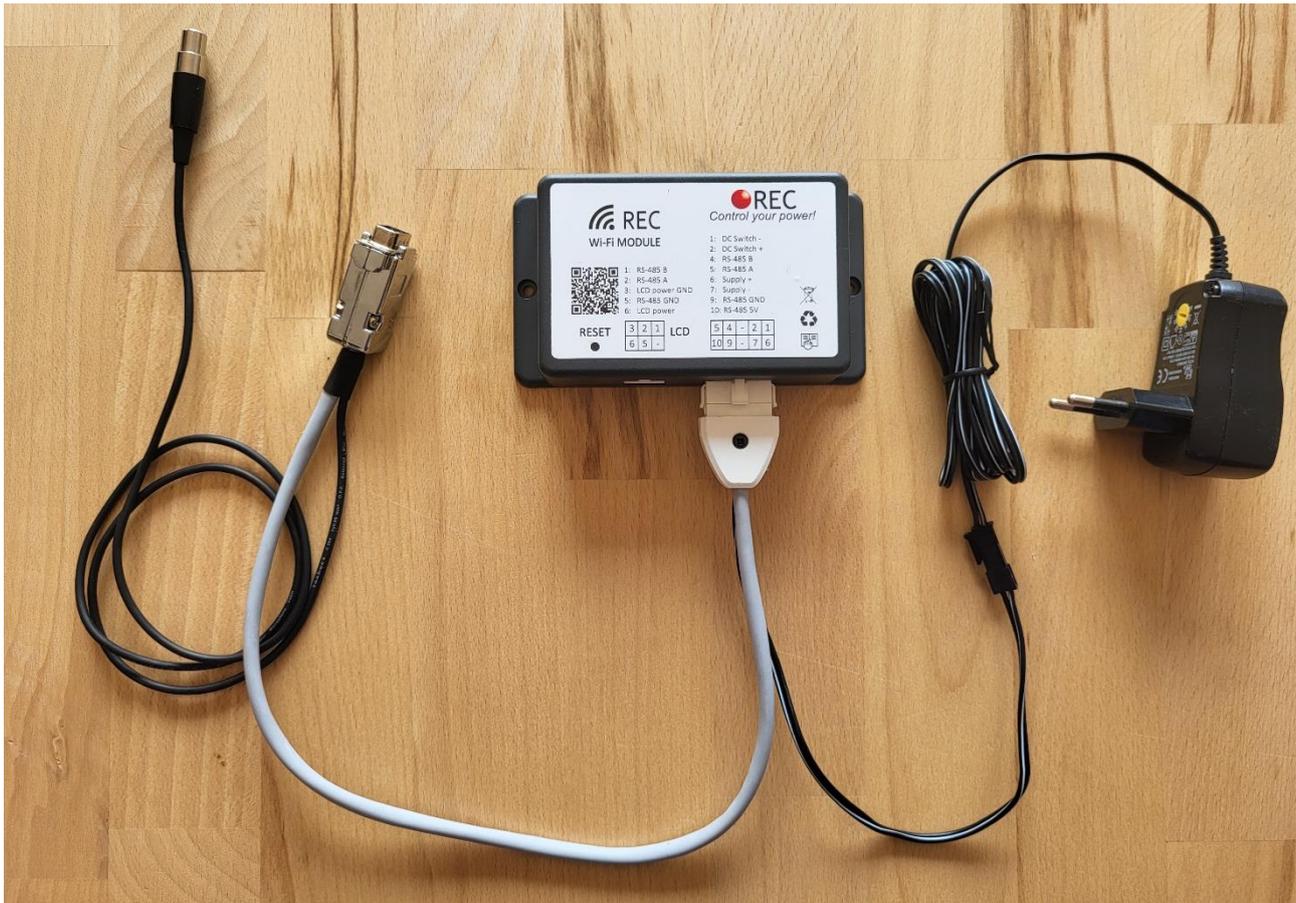
This product is warranted to be free from defects in materials or workmanship for one year from the date of purchase. Within this period, LZ design will, at its sole option, repair or replace any components that fail in normal use. Such repair or replacement will be made at no charge to the customer for parts and labor, however the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs.

Usage of device is at user’s own risk. Manufacturer 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 FES Wi-Fi module.

With using of FES Wi-Fi module user automatically agree with above listed terms.

To obtain warranty service, please manufacturer of your glider, local dealer of glider manufacturer or LZ design directly.

2. Introduction



FES Wi-Fi module is device that connects to FES battery pack via RS-485 and sets up its own network (or connects to an existing network) to enable monitoring of your battery pack in a browser on your smartphone or PC. Parameters such as cell voltages, current, temperatures, state of charge and state of health are all easily displayed and trended. The interface includes several tabs to ensure ease of use:

General tab - HOME is used to display important parameters while dedicated tabs can be used to display advanced battery pack information. An **alarm pop-up** sign informs the user in case of any system error or alarm, containing its diagnostics.

SETTINGS tab enables the user to configure all the voltage, current and system settings for the battery pack including ESS settings. In addition, all the settings of the BMS may be exported to a file and imported back as your default settings or for a purpose application.

LOGGING tab enables logging interval setting, importing logs and log analyzer. Logs are saved to an internal 16 Gb micro-SD memory card and may be easily transferred to any connected device for further analysis.

Additionally, the REC WiFi module enables to remotely activate a DC switch. A galvanically isolated fused opto-relay is used to power the loads up to 100 VDC, 3A. This function is easily controlled from a single pushbutton on your main screen.

3. Description

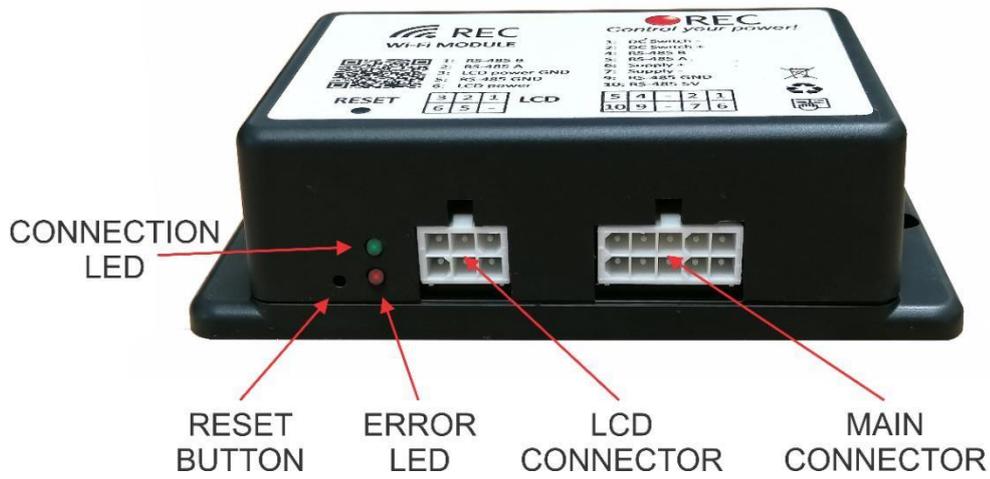


Figure 1: WiFi module description

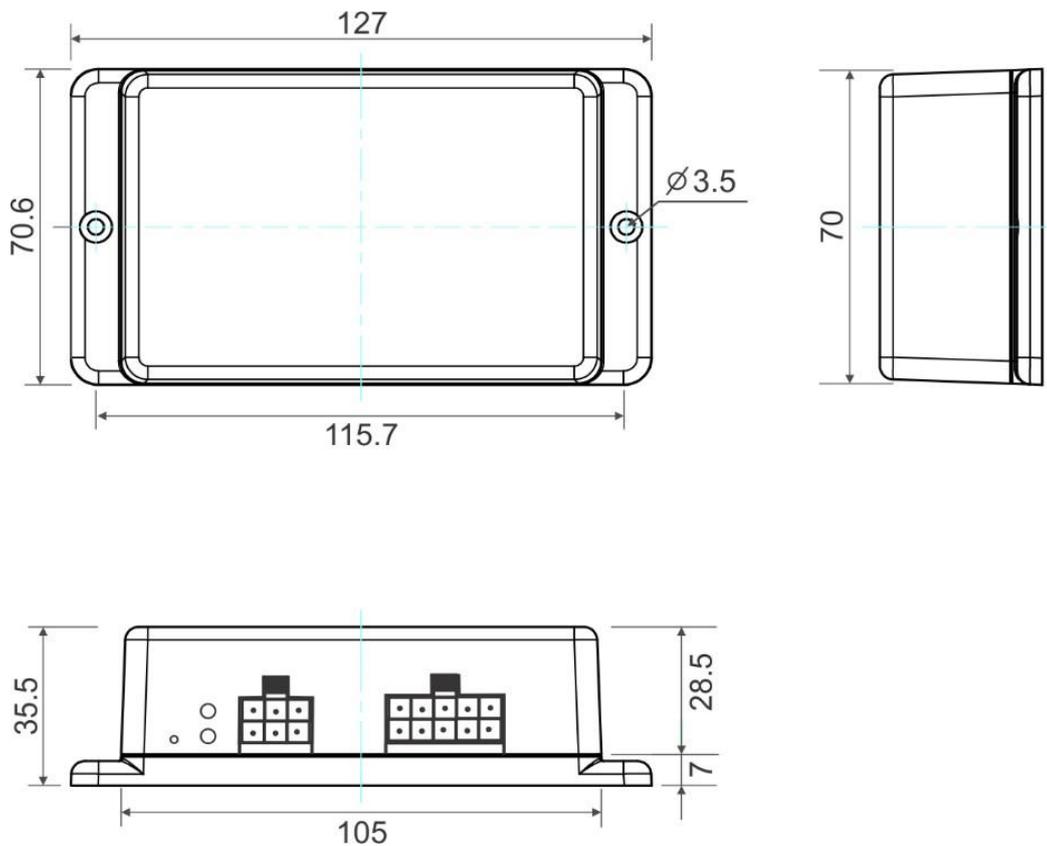


Figure 2: WiFi module enclosure dimensions.

4. Initial setup

Follow next steps:

1. Connect the module DB plug to the Data port of FES battery pack, and switch ON BMS.
2. Connect the power supply to the FES WiFi module.
3. If connecting the module for the first time, the device will set up an access point, with default credentials (SSID: FES_BMS, PASS: *none*).
4. Using a Wi-Fi supported device, connect to the access point FES-BMS_AP.
5. Open your browser (on PC, Tablet PC or Smartphone) and go to IP address **192.168.1.184** by typing it on your browser’s top line. If successful Main Menu will open with battery pack status become visible.
6. If you want to monitor FES battery pack during charging, you can connect remaining BMS data communication plug to the charger’s communication BMS data socket.



BMS data socket of FES KOP 602 charger

The WiFi module can be configured for direct access (AP) or integrated into home network (STA). To access it remotely it will need to be integrated into home network as an STA device and port forwarding set up. This is configured within your home router and is not covered here as each manufacturer handles it differently.

PARAMETER	VALUE	UNIT
IP address	192.168.1.184	n.a.
Wi-Fi SSID	FES_BMS	n.a.
Wi-Fi password	none	n.a.
Wi-Fi module connection mode	Access point (AP)	n.a.
BMS RS-485 send address	6	n.a.
WiFi module RS-485 receive address	0	n.a.
BMS RS-485 bitrate	56	kbit
LCD RS-485 bitrate	56	kbit
Logging interval	600	s
Temperature units	-	°C

Table 1: Default WiFi module parameter settings

Setting the device to direct access point (AP mode)

1. Connect to the WiFi device.
2. Select the **Firmware tab** from the Main menu.
3. Change the **Wi-Fi name** and **Wi-Fi password** (up to 50 ASCII signs for both) to desired credentials and confirm with **Submit** button.
4. Device will restart and set up the new access point.

Connecting the device to home network (STA mode)

1. Connect to the Wifi device.
2. Select the **Firmware tab** from the Main menu.
3. Change the **Wi-Fi name** and **Wi-Fi password** (up to 50 ASCII signs for both) of the desired network and confirm with **Submit** button.
4. If existing network is not found it will revert back an access point with set credentials, so you maintain your link and can try again.
5. When the Wifi module finds and connects to home network access point, WiFi network will be established, and you can log in to it when you reconnect to your home network and find what dynamic IP address has been assigned to it by your router. If you need to reconfigure it again locally, simply press the Reset button to reset it back to default (AP) settings.

5. Functionality

A list of tabs may be selected from the Main menu shown on the left side of the screen.

User may choose between:

- Home
- Tasks
- Voltage
- Impedance
- Temperature
- Settings
- Logs
- Firmware

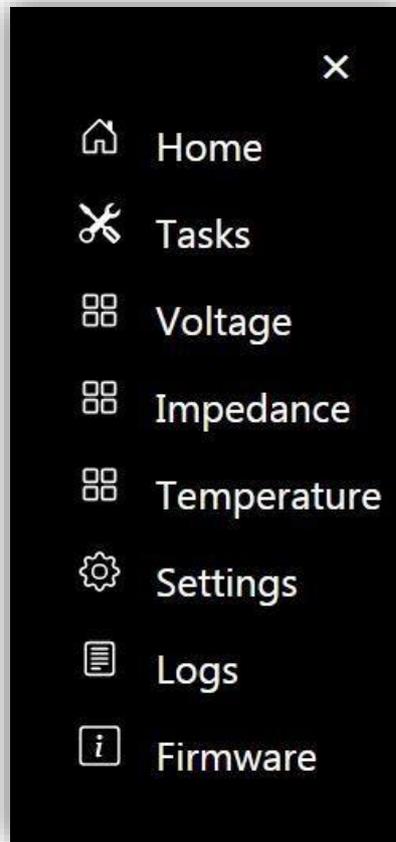


Figure 3: Main menu tab selection.

Home tab

Battery pack main parameters are shown in the **Home tab**. FES BMS serial number is shown on top, while the battery pack main parameters are shown below. State of charge (SOC) is shown as a graphical colour bar and as a number in % as well. The colour of the bar changes regarding the battery SOC state.

SOC RANGE [%]	SOC BAR APPEARANCE
0-10	Red
10-30	Orange
30-50	Yellow-Green
50-90	Light Green
90-100	Dark Green

Table 2: Battery pack SOC bar colours

Battery pack capacity in Ah is shown as total operational capacity and already used capacity. Total battery pack voltage and charging current are shown as well as charging power in W. Home tab also displays maximum and minimum cell voltage and maximum battery pack temperature. State of health (SOH) is displayed under the SOC in %. See Fig. 4

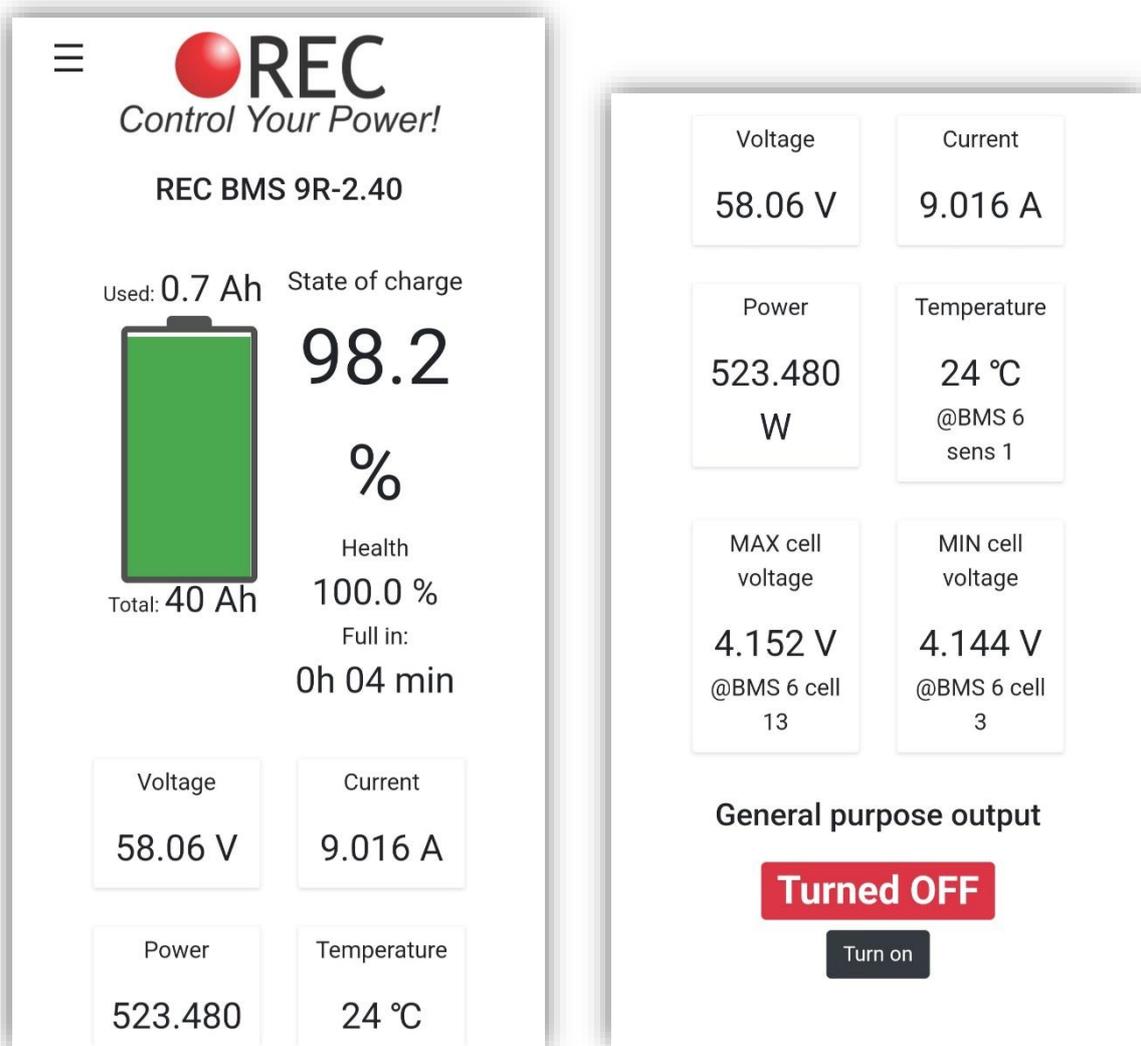


Figure 4: Home screen tab as visible on smartphone

Numbers near the maximum and minimum cell voltage describe their location in the battery pack. In case an error is present, an exclamation triangle appears in the middle of the battery icon. User may press the sign for additional error description.

If device is connected to a unit that supports IO tasks, state of all outputs is also displayed. General-purpose output indicates the state of integrated DC switch with galvanically isolated opto relay. OFF indicates the relay is open and ON the opto-relay is closed. You can change its state by pressing **Turn on/Turn off** button.

Tasks tab

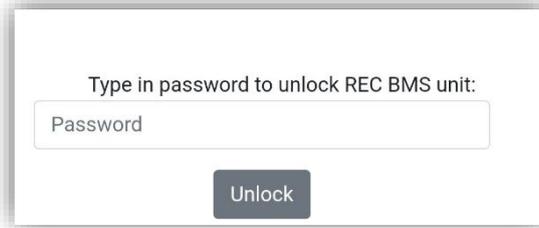


Figure 5: Tasks tab as visible on smartphone

This tab is designed for BMS firmware update.

Voltage tab

All the battery pack cell’s voltages are displayed. In case one of the cell’s voltage is too high or too low regarding the BMS cell voltage setting, the value is highlighted in red colour.

The figure consists of two side-by-side screenshots of a mobile application interface. Both screenshots show a table titled "BMS 1".

The left screenshot shows a table with two columns: "Cell" and "Cell voltage". The data is as follows:

Cell	Cell voltage
1	4.146 V
2	4.146 V
3	4.144 V
4	4.147 V
5	4.147 V
6	4.147 V
7	4.147 V

The right screenshot shows a table with two columns: "Cell" and "Cell voltage". The data is as follows:

7	4.147 V
8	4.148 V
9	4.145 V
10	4.145 V
11	4.145 V
12	4.151 V
13	4.152 V
14	4.149 V

Figure 5: Voltage levels of each cell (1-14 cells)

Impedance tab

All the battery pack cell's DC impedance values are displayed.

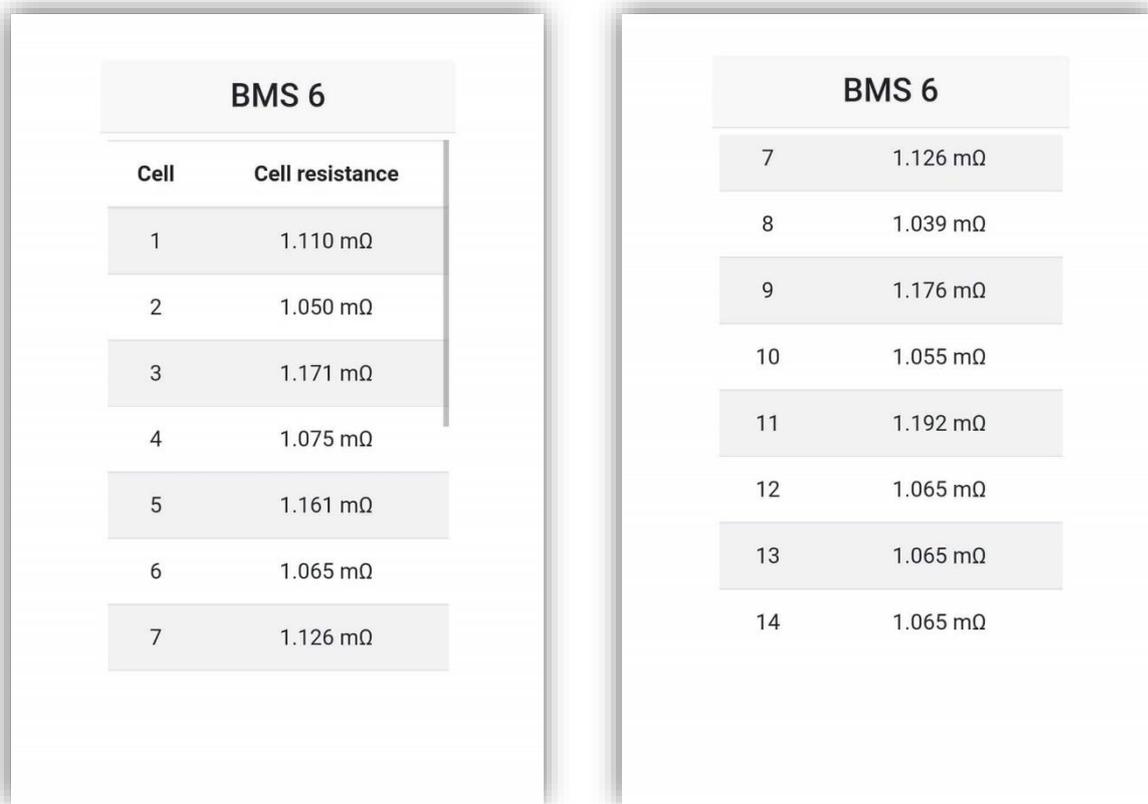


Figure 6: Cells impedances

Temperature tab

All the BMS temperature sensors values are displayed in this tab. On top BMS temperature is shown, and below battery temperature sensors values are shown. If any temperature sensor's temperature is too high, it is highlighted in red.

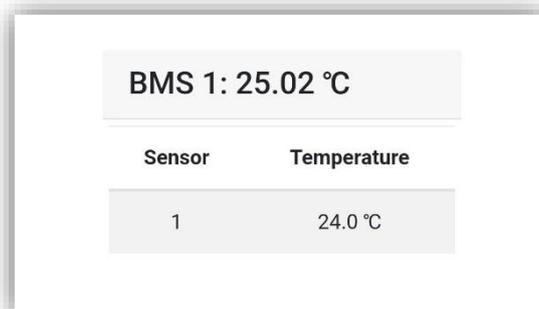


Figure 7: BMS and Cells' temperatures

Settings tab

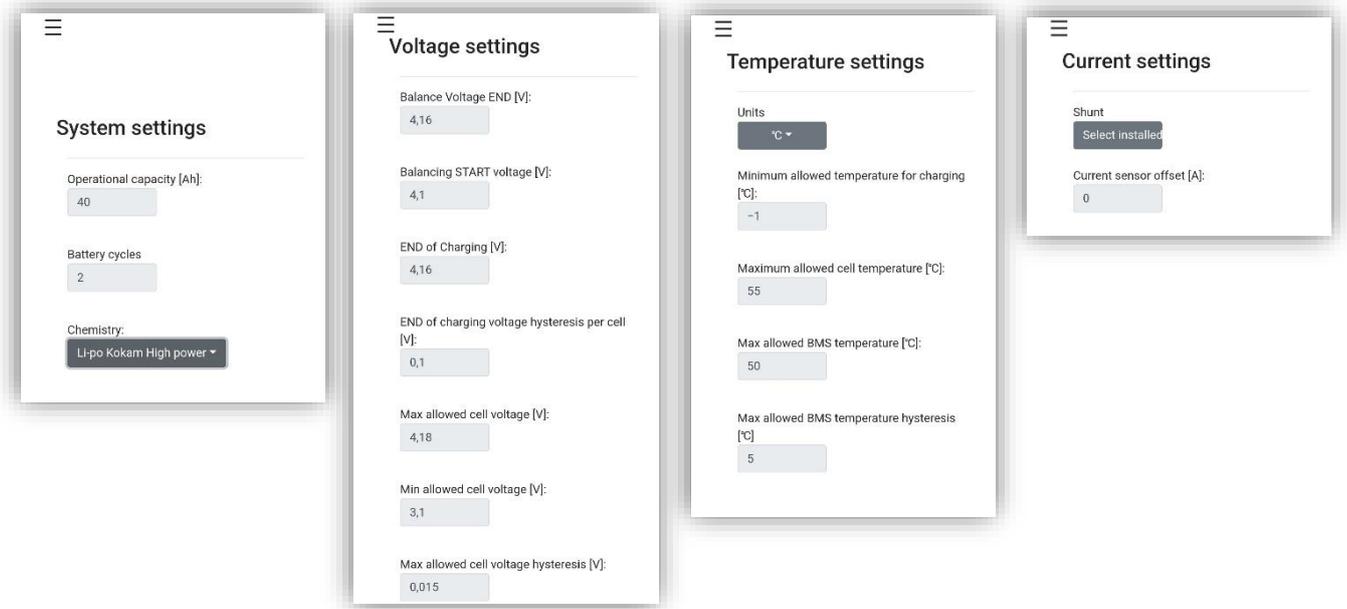


Figure 8: BMS settings

Enables the user to change most important BMS settings - when unlocked. A **Manual communication** input windows in the **Firmware tab** enable the user to observe and set non-listed settings.

Logs tab

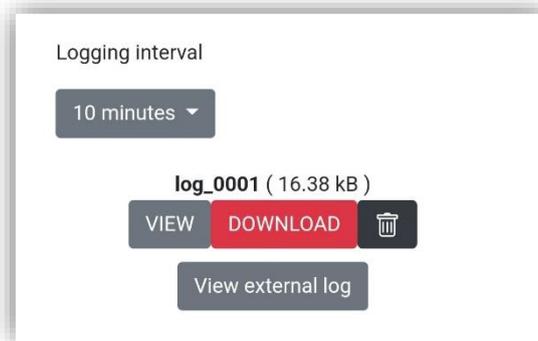


Figure 9: Logs tab

FES Wi-Fi module logs all BMS data. User can select logging interval in steps from 5 s to 60 min. Logs can be viewed by clicking **VIEW** button or downloaded by clicking **DOWNLOAD** button. If you want to view a saved log that is no longer present on the device, click **Import external log** and choose the one you desire to view.

When viewing the log, select the parameter you want to display. Single or multiple cells/temperatures may be displayed. Logs also display BMS errors in red colour with an additional description.

Firmware tab

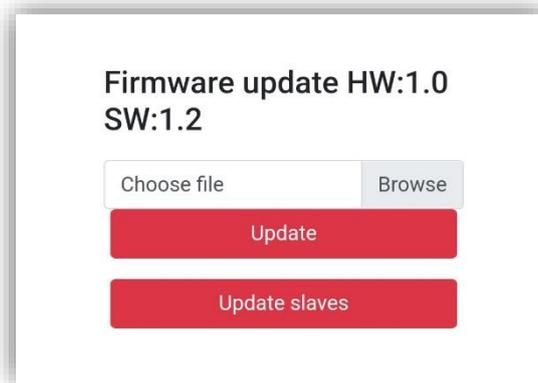


Figure 10: Firmware tab

Can be used for different purposes:

- to unlock and change the settings
- to set the communication with the connected BMS device
- operational mode of WiFi module can be set here with all the required settings
- this tab also displays the SD card information
- to update firmware of the WiFi module or BMS device.

6. Troubleshooting

In case of troubles contact local dealer of your glider manufacturer, manufacturer of your glider or LZ design directly.

Default settings

By pressing the factory reset button and hold it for 20 s, all device settings will be reset to default.

WiFi MODULE SETTING	DEFAULT VALUE
Wi-Fi SSID	REC_BMS
Wi-Fi password	<i>none</i>
IP	192.168.1.184
Send address	16
Receive address	0
Log interval	10 min

Table 3: Wifi module default settings.

To establish successful communication with FES BMS, "Send address" should be set to value 6 (default value after reset is changed to 16).

Power Saving Mode

If a FES BMS device is not detected after an hour, the WiFi module enters standby mode to reduce the power consumption. Every 2 hours it wakes up and check if device is present. Same principle applies when a low cell voltage is detected. To wake up device, turn it OFF and ON again manually by switching the power supply.

7. Revision history

October 2022	Initial release, user manual v1.0
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