

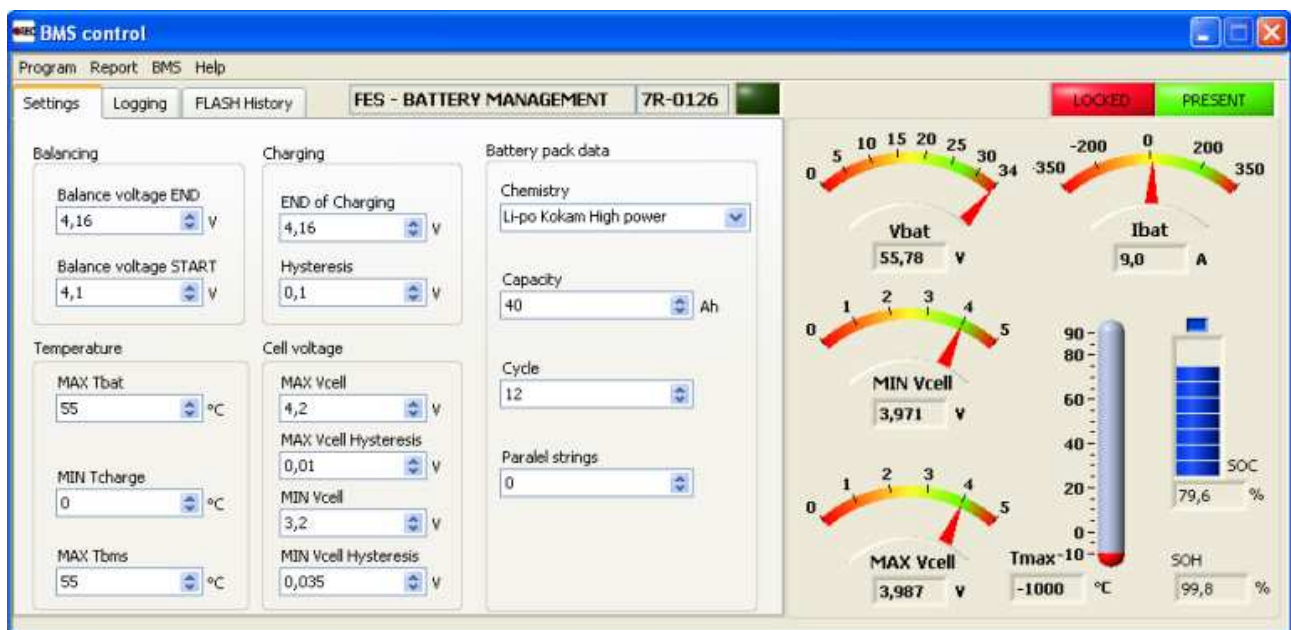


# FES BMS CONTROL MANUAL

Version 1.21

for BMS control software version 1.31

Suitable for: -FES BATTERY PACK GEN1 (with external BMS)  
-FES BATTERY PACK GEN2 (with internal BMS)



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## 1. Important notices

Please read this manual thoroughly. It contains important information about your system, having a vital importance to the flight safety.

Information in this document is subject to change without notice. LZ design reserves the right to change or improve their products 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 for proper operation.



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 LZ design FCU 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 repairs or replacement will be made at no charge to the customer for parts and labor, 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.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL LZ DESIGN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. LZ design retains the exclusive right to repair or replace the unit or software, or to offer a full refund of the purchase price, at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local LZ design dealer or contact LZ design directly.

## 2. Installing the BMS Control Software

FES BMS Control setup file is available for download at our dedicated FES website, in download section, under software.

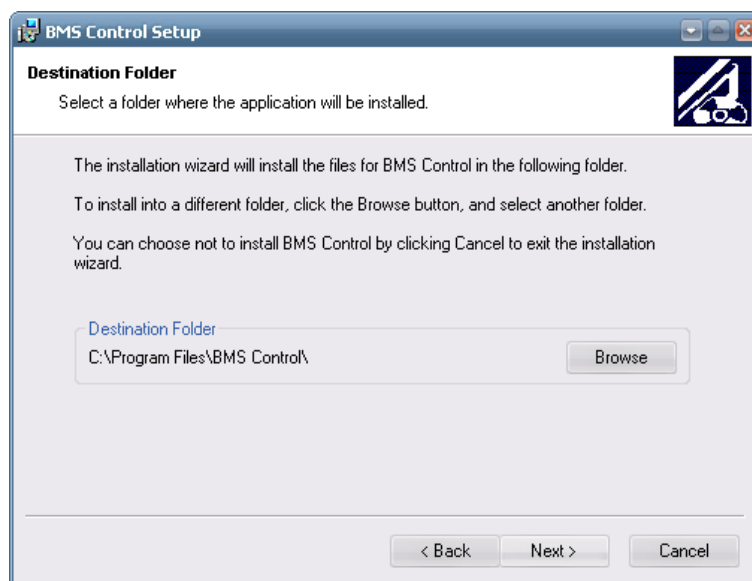
<http://www.front-electric-sustainer.com/download.php>

After download is completed, run the Setup.exe application in the BMS Control Setup folder.

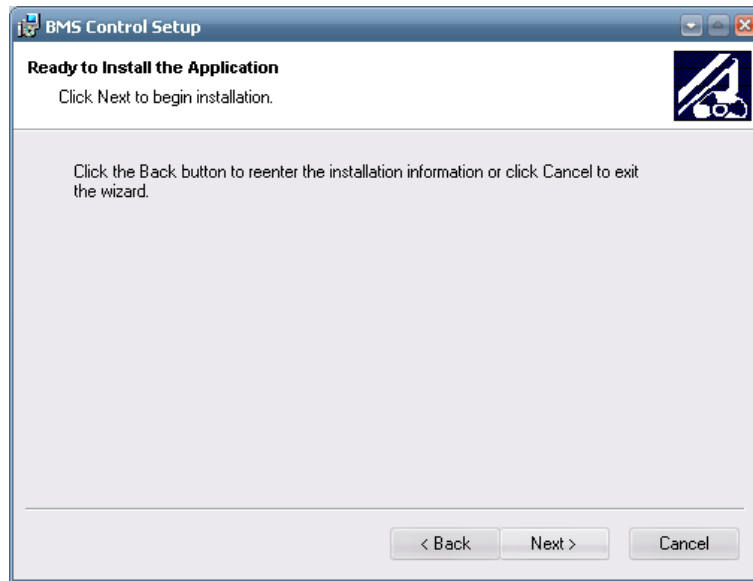
Click "Next" at the **Welcome to the BMS Control Installation Wizard**.



Choose the Destination folder where the application will be installed.



Confirm the installation information by clicking "Next" button or reenter the installation information by clicking "Back" button.



You have now successfully installed the software. Click the "Finish" button to exit the installation.



### 3. Communication cable

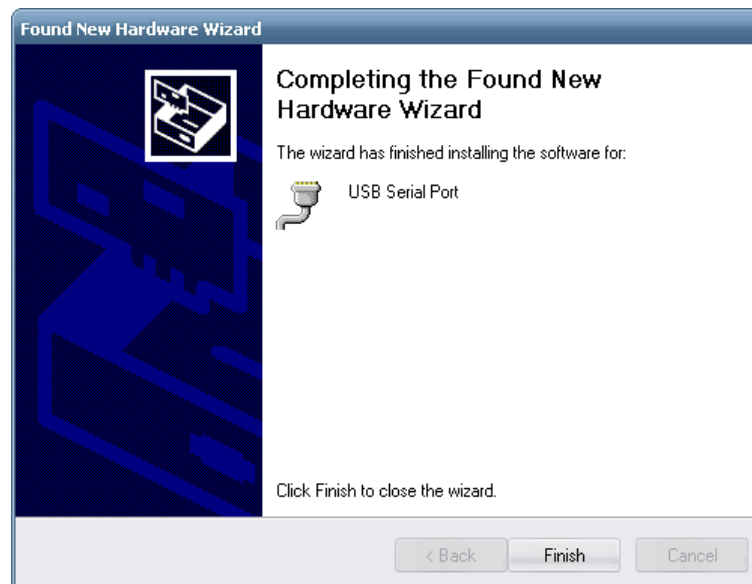


BMS-PC communication cable (suitable for external BMS, GEN1 battery packs)



BMS-Charger-PC communication cable (suitable for GEN2 battery packs)

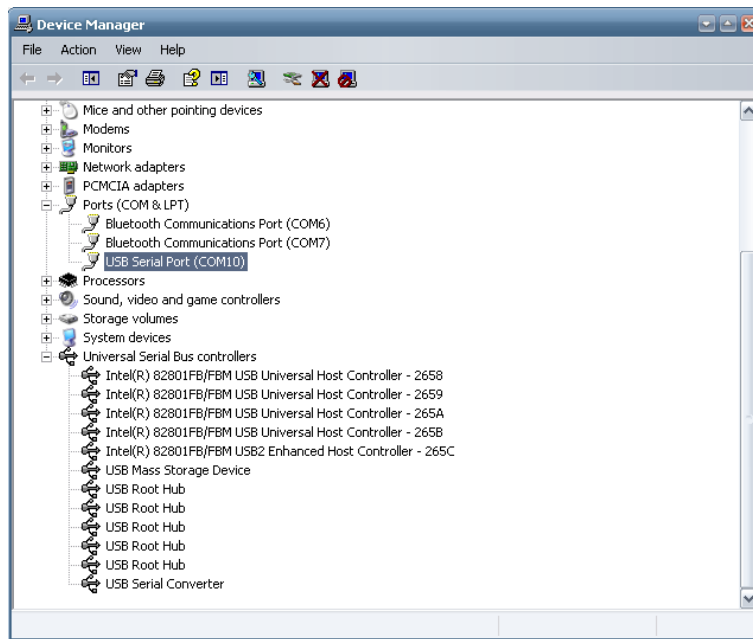
When the BMS-PC cable is inserted in the USB port of PC for the first time, drivers needs to be installed. The **Found New Hardware Wizard** pop-up window appears. Choose "Install the software automatically" option and click Next.



To complete the Found New Hardware Wizard click the "Finish" button.



The BMS-PC cable behaves as virtual com port (VCP). A number is assigned to the VCP in the Control panel/System/Device Manager under Ports (COM & LPT). This port number is used to set the communication parameters in the **Set communication properties** window of the BMS Control software.



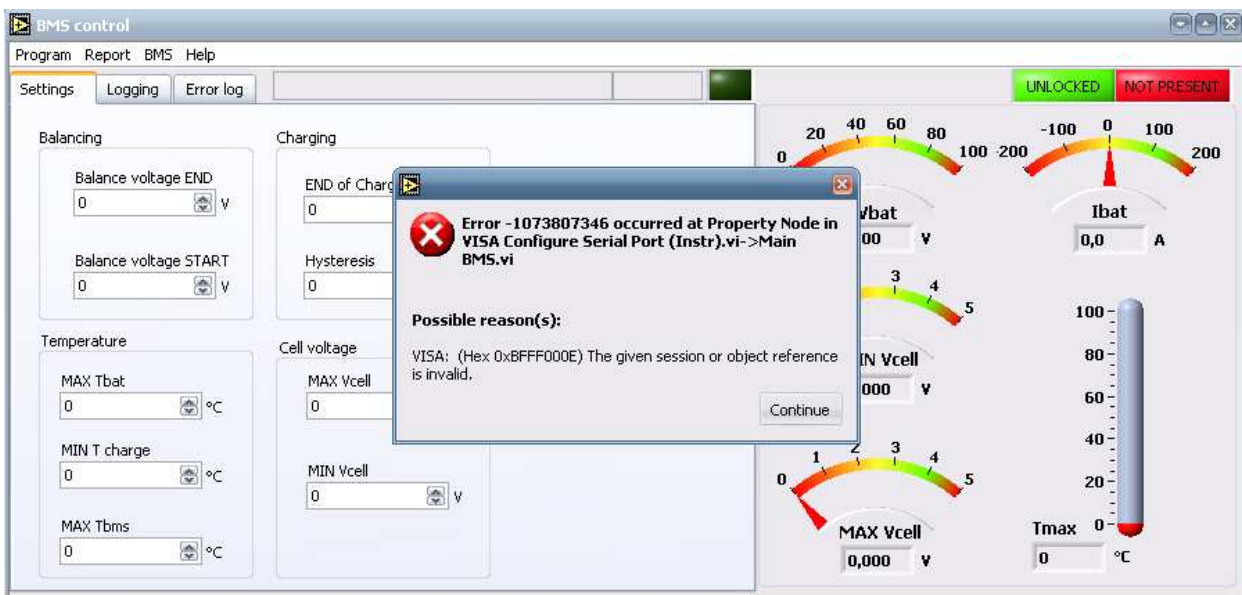
If drivers were not installed automatically you can find them also on the FTDI web site

<http://www.ftdichip.com/Drivers/VCP.htm>

In case of troubles contact LZ design.

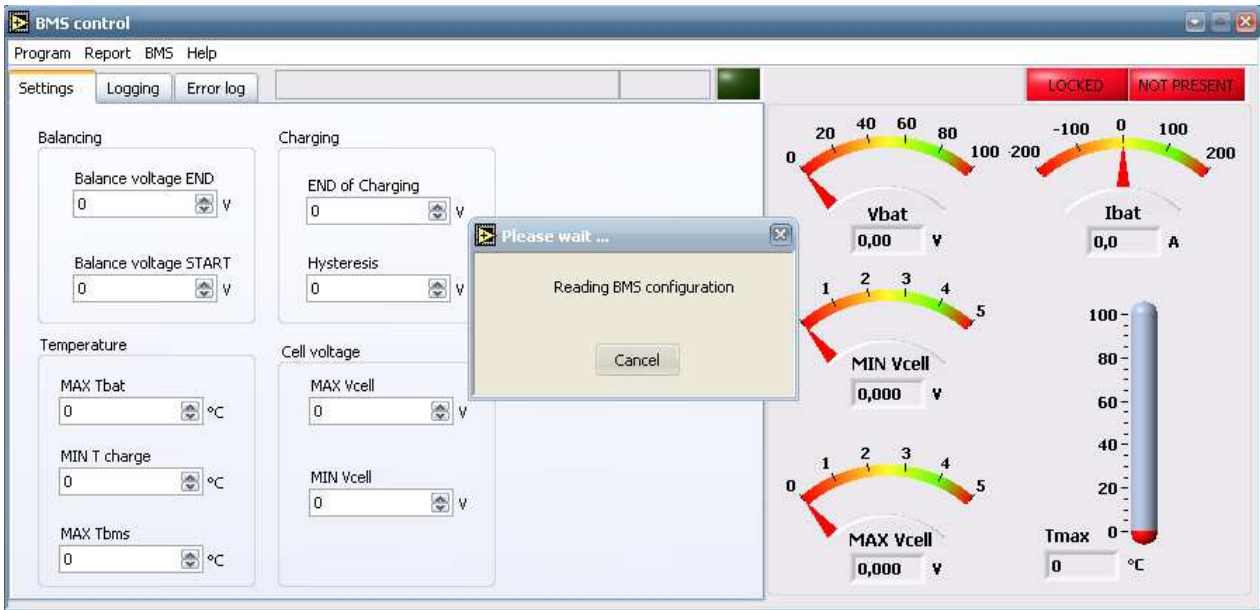
#### 4. Setting communication with BMS

You can now run the BMS Control software. If this is the first time you have been running the program, the Serial ports has not been set yet and the Error occurs. You must follow the procedure described below. Click the "Continue" button.

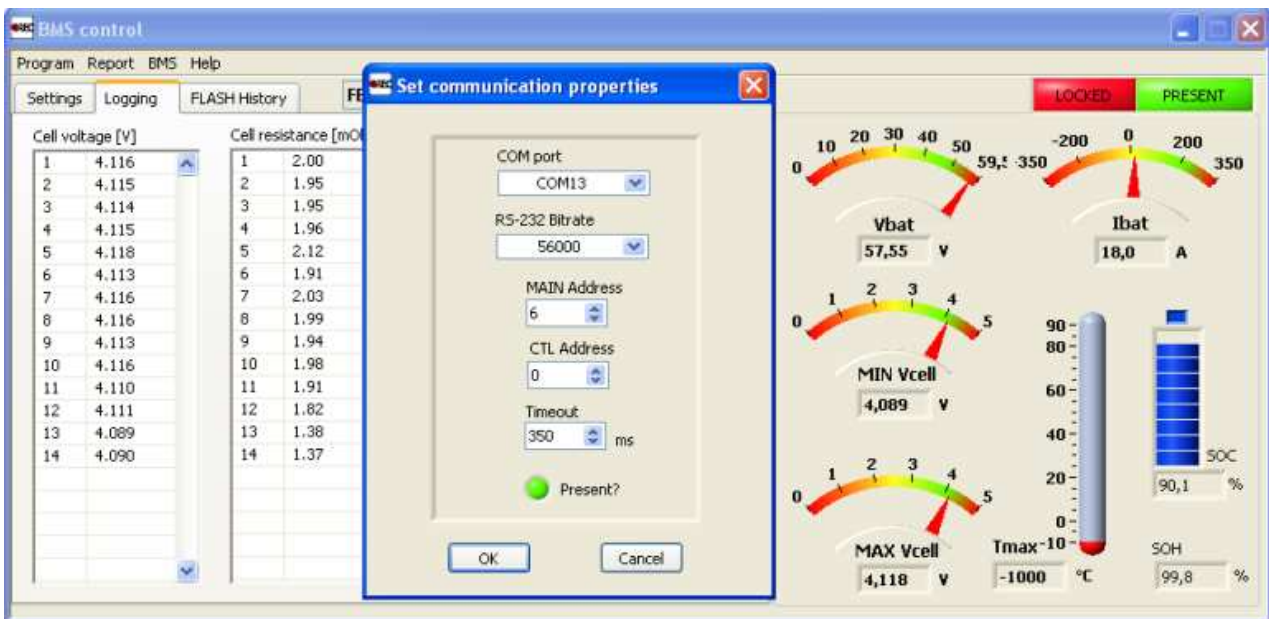




The BMS is not connected to the BMS Control software, the sign **NOT PRESENT** is turned on and **Reading BMS configuration** window pops out. Click the "Cancel" button and



open **Set communication properties** in the Program menu.



Select the proper COM port number that was assigned to and set the parameters as they are listed below.

RS-232 Btrrate: 56000

MAIN Address: 6

CTL Address: 0

Timeout: 350 ms

**In some rare cases you might not be able to choose a COM port. This usually happen if you have on your PC installed Windows Vista or Windows home premium edition operating system. In such case you will need to install additional Visa USB & COM drivers, as some operating systems do not have them included already.**

**You can download installation file for a Visa USB & COM from this link:**  
<https://www.dropbox.com/s/fnknh8rep0wjg7z/visa462full.exe>

After download, start .exe file and install everything according default settings. It will take some time that installation will be completed, but after that you will be able to choose a proper port!



*If you will plug in BMS-PC cable to another USB port next time, than you will need to choose proper COM port number again!*

When the communication properties are set properly, the **Present?** Light turns green. To confirm the settings, press "OK".

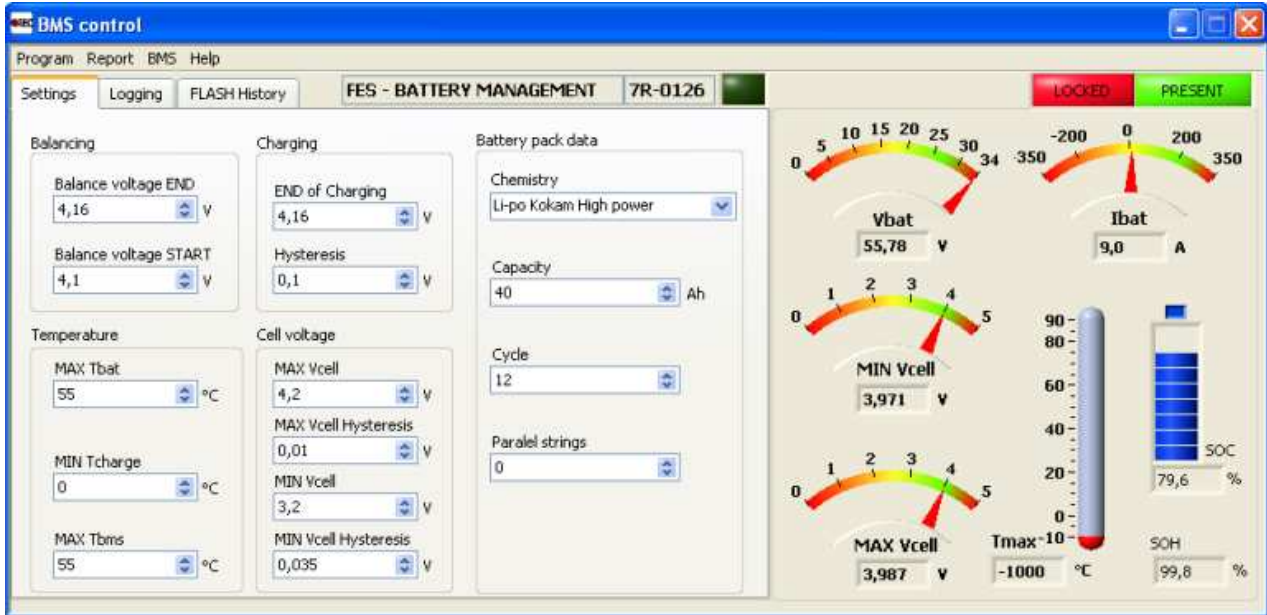


*If you have on your PC installed Windows Vista or Windows home premium edition operating system, than unfortunately you will need to install additional Visa USB & COM drivers, as only in those two operating systems they are not included already.*

*Please contact LZ design and we will provide you a link, from where you will be able to download them.*

### 5. Basic system parameters overview

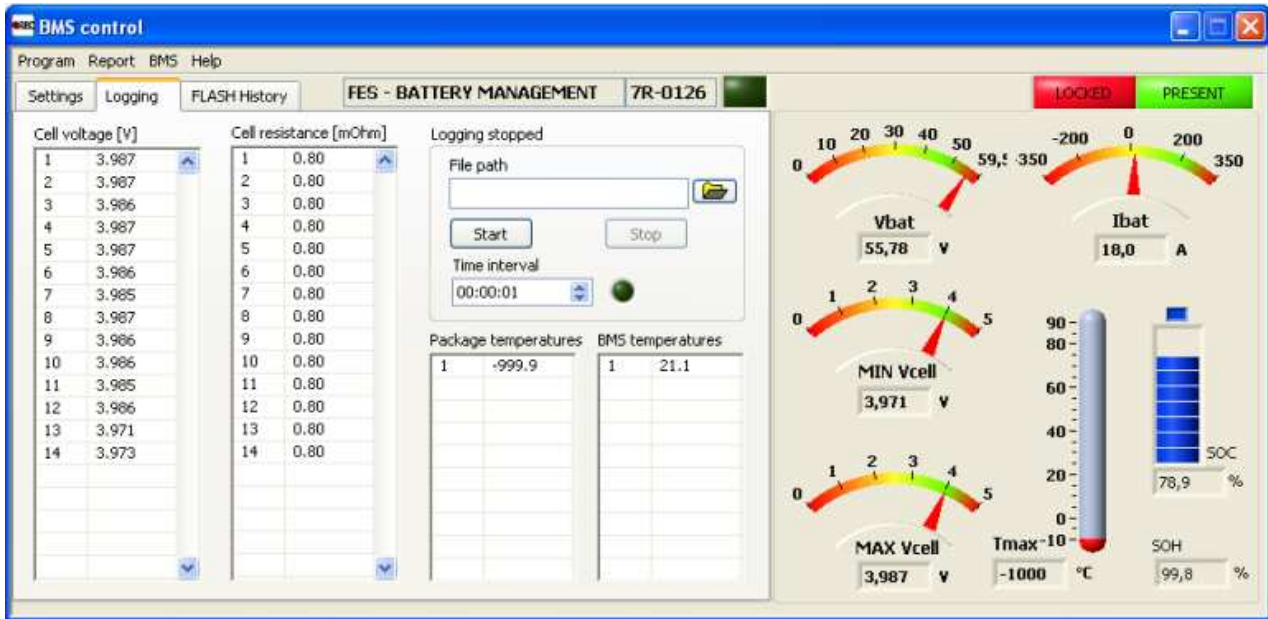
When BMS and your PC are connected, the program presents all system parameters in the original Settings window. You can read all the pre-set parameters, about Balancing, Charging, Temperature and Cell voltage. There are also pre-set Battery pack data.



Settings:

<b>Balance Voltage END</b>	Sets the voltage level to which each individual cell will be balanced.
<b>Balance Voltage START</b>	Sets the average battery pack voltage above which the BMS performs the balancing while charging. Special balancing algorithm is used to determine which cells have to be balanced until the Balance Voltage END is reached.
<b>MAX Tbat</b>	If temperatures of battery pack reach this value charging will be stopped. MAX Tbat hysteresis is set to 2°C.
<b>MIN Tcharge</b>	If temperature of battery packs is below this value, charging is not allowed to start.
<b>MAX Tbms</b>	Sets the maximum allowable temperature of the BMS due to the balancing. When BMS reach this temperature, balancing and charging is stopped. Balancing and charging will start again, when BMS temperature drop 10°C below the set value.
<b>END of Charging</b>	Sets the end of charge voltage of the individual cell.
<b>Hysteresis</b>	Sets the Charging hysteresis of individual cell.
<b>MAX Vcell</b>	The highest allowed voltage of the individual cell above which the alarm turns on. The MAX Vcell hysteresis is 10 mV.
<b>MIN Vcell</b>	The lowest allowed voltage of the individual cell under which the alarm turns on. The MIN Vcell hysteresis is 10 mV.

To see the **single cell voltage**, switch the view from Settings to Logging.



On this second Logging screen you can see accurate Cell voltage of each 14 cells, so this is the most used screen during monitoring charging process!

After a few minutes of charging it will also start calculating Cell resistance of each cell.

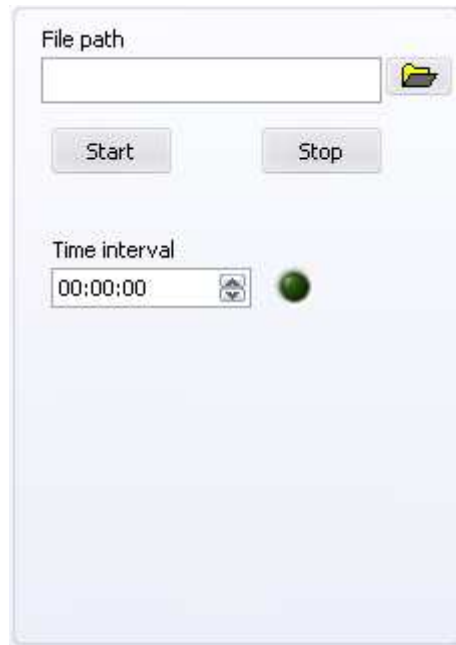
Right side of screen shows, pack voltage, minimum and maximum voltage of cells, approximate charging current (based on data which is BMS is sending to charger), SOC as state of charge, SOH as state of cells health. Temperature of pack is not visible if sensor is not connected.

Third screen Flash History is not important for FES users!

### 5.1 Data logging

If you might have some problems during charging is it suitable to record charging process data in a \*.txt file, which you can send it later by email to FES manufacturer. Such file is very helpful for troubleshooting the problem.

Choose the **File path** and set suitable **Time interval** you want BMS to report. In most cases is OK if you set time interval to 2 seconds.



*If the Time interval is set to 00:00:00 the software logs the data with its maximum achievable speed*

By pressing the "Start" button you start the logging, to stop recording, just press the button "Stop".

The data is recorded in \*.txt file you chose as follows:

date	time	Pack voltage [V]	Curren t [A]	Cell <sub>1</sub> [V]	Cell <sub>2</sub> [V]	...	Cell <sub>n</sub> [V]	T <sub>BAT</sub> [°C]	T <sub>BMS</sub> [°C]
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### 5.2 BMS settings setup

It is possible to change some BMS parameters in Settings window. This is possible only if BMS is in unlocked state. To unlock BMS you need to enter proper password, which you will get from FES manufacturer if necessary.

**6. Revision history**

February 2011	Initial release of manual
February 2013	Updated to Version 1.11
March 2013	Updated to Version 1.12
December 2013	Updated info about Visa drivers, Version 1.2
July 2014	Minor updates to Version 1.21