UDAN BMS Calibration System Manual

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Table of Content

1. Overview

The BMS field calibration system is an application designed and developed based on UDAN BMS. The system obtains and parses messages from the master-salve CAN of BMS to acquire relevant functional information. There are seven main menus: System Overview, Real-time Information, Parameter Calibration, Force Control, Firmware Upgrading, and History data.

# 2. Installation

The Installation steps are as follows：

a) Double-click on the *.exe file of the BMS field calibration system namely, BFCS-en_US-v1.57.6782-setup-x86.exe, which was provided by UDAN:
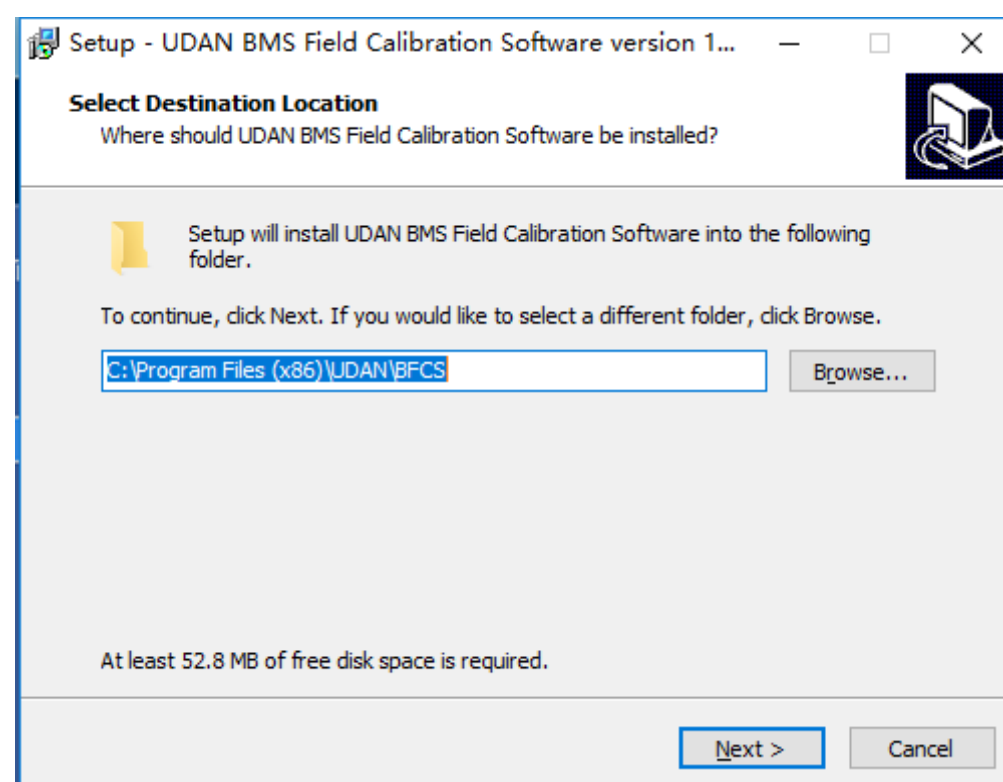
Remarks:

i. The installation process may ask for permission from the user's OS, please click on Yes if necessary.

ii. The user may choose the location of installation by clicking on the button of Browse.. and find the user's possible location for the program.
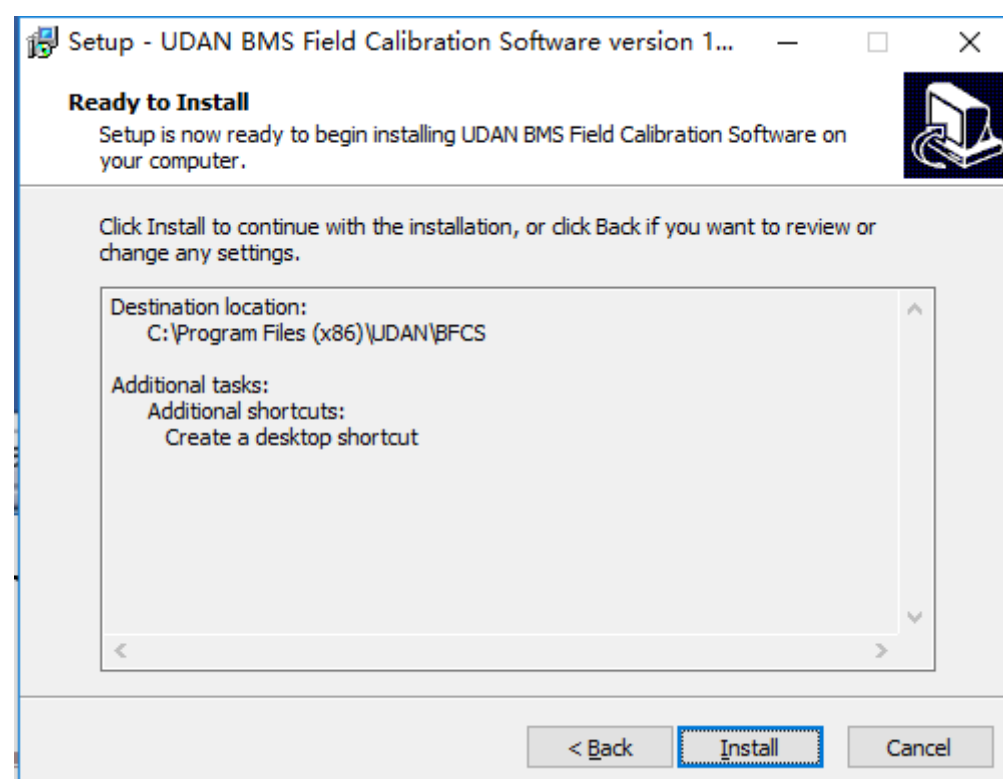
iii. Then click on Next> to continue.

b) Once the following interface appears, click Next> button again
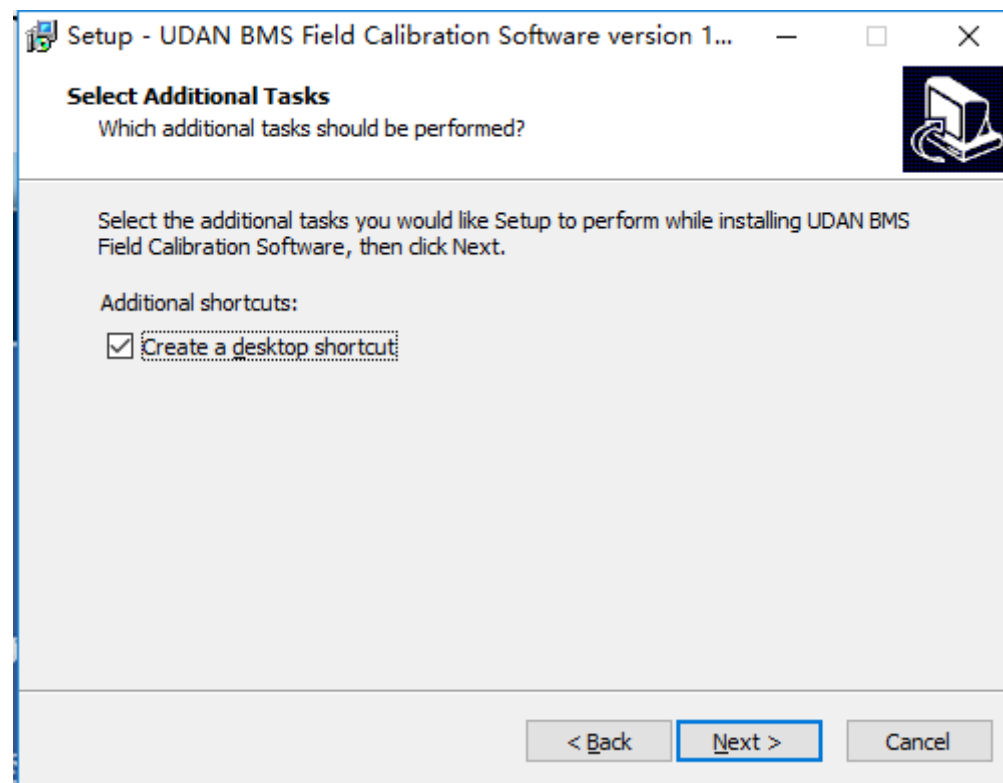
Remarks:

i. It is strongly recommended here to check the Create a desktop shortcut here, otherwise the start-up program will cost extra time to locate.
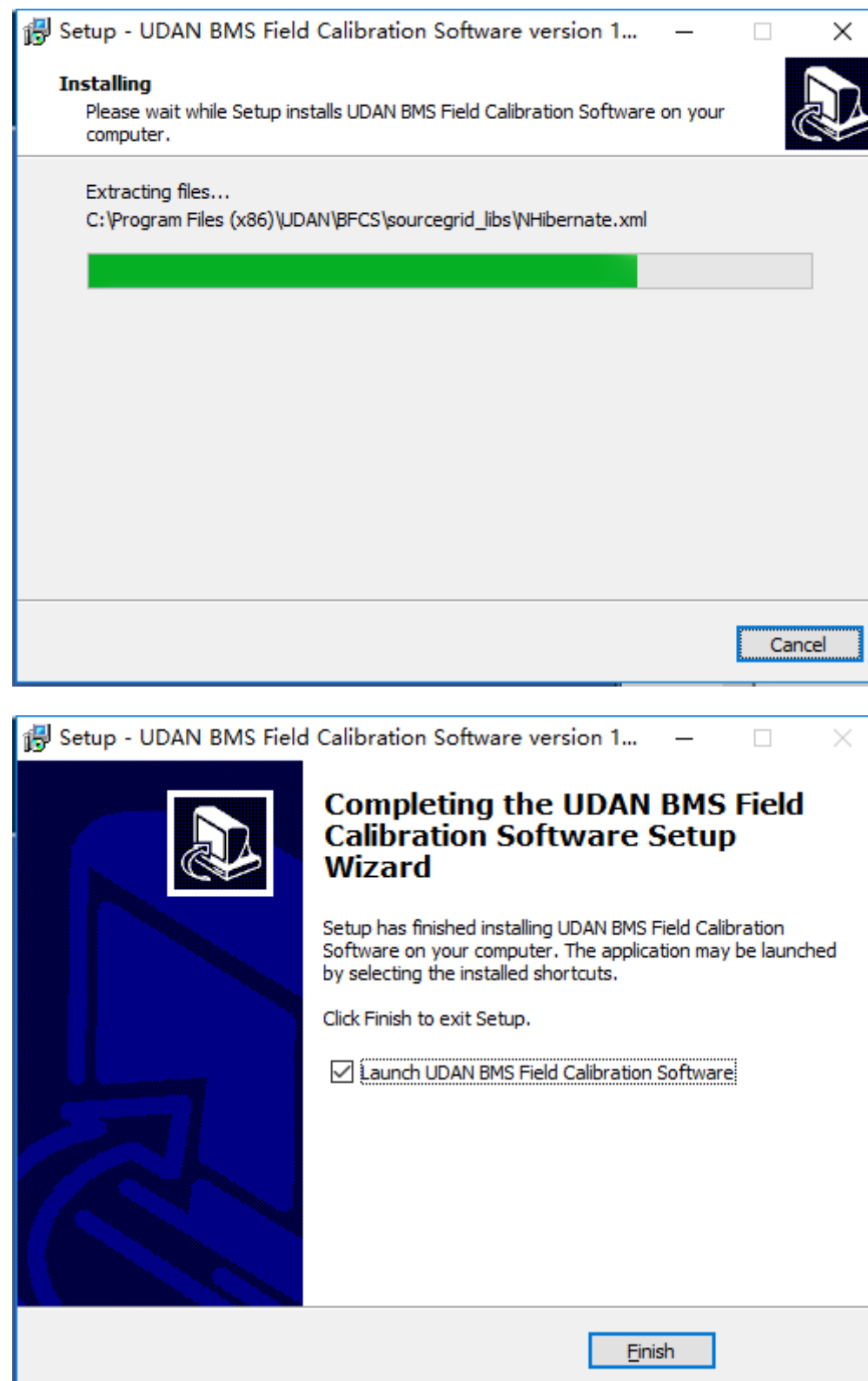
ii. Click on Next> to continue.

c) Click on Install if the user sees the following interface：

Remark:

i. The interface has the additional tasks because the editor had checked the Create a desktop shortcut option in the previous step.

d) Waiting for the Installing process until the user see the second screenshot here. The installation process is basically done.

Remarks:

i. If the extra option has been chosen before, a shortcut is automatically created on the desktop of the computer.

ii. If the user leave the Launch UDAN BMS Filed Calibration Software option and click the Finish button, the start-up program will run. The user may choose to uncheck the option and start the program manually latter.

3. Introduction to Sysrem Features

The BMS field calibration system has seven functional menus: system overview, real-time information, parameter calibration, mandatory control, firmware upgrade, and historical information:

3.1 System Overview

The system overview page shows information including the total voltage, total current, charger-related information, system configuration, extreme values such as maximum and minimum voltage and temperature, and DTU status.
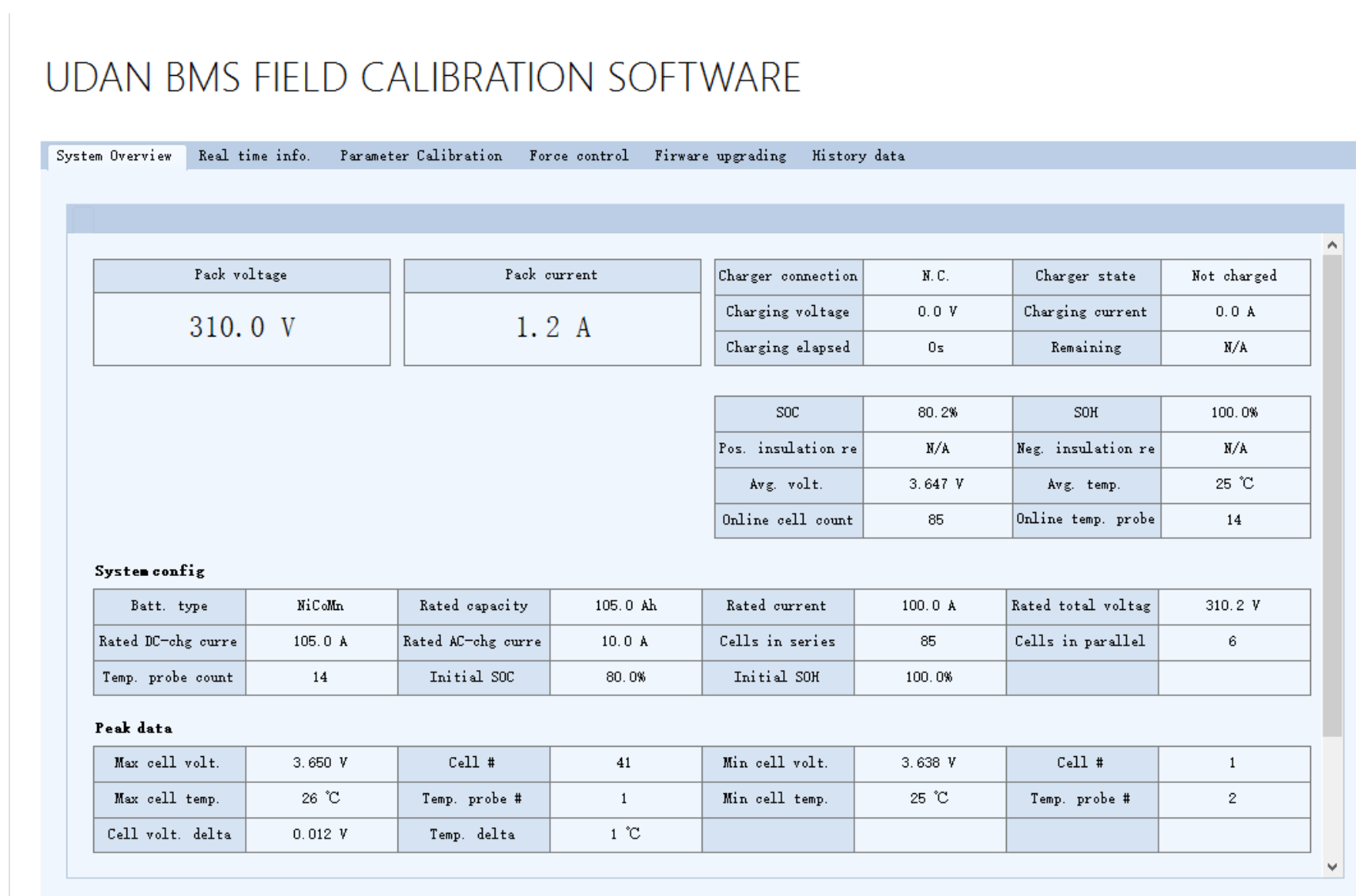
UDAN BMS FIELD CALIBRATION SOFTWARE

System Overview	Real time info.	Parameter Calibration	Force control	Firware upgrading	History data

Pack voltage		Pack current		Charger connection	N.C.	Charger state	Not charged
310.0 V		1.2 A		Charging voltage	0.0 V	Charging current	0.0 A
				Charging elapsed	0s	Remaining	N/A

SOC	80.2%	SOH	100.0%
Pos. insulation re	N/A	Neg. insulation re	N/A
Avg. volt.	3.647 V	Avg. temp.	25 ℃
Online cell count	85	Online temp. probe	14

System config

Batt. type	NiCoMn	Rated capacity	105.0 Ah	Rated current	100.0 A	Rated total voltag	310.2 V
Rated DC-chg curre	105.0 A	Rated AC-chg curre	10.0 A	Cells in series	85	Cells in parallel	6
Temp. probe count	14	Initial SOC	80.0%	Initial SOH	100.0%		

Peak data

Max cell volt.	3.650 V	Cell #	41	Min cell volt.	3.638 V	Cell #	1
Max cell temp.	26 ℃	Temp. probe #	1	Min cell temp.	25 ℃	Temp. probe #	2
Cell volt. delta	0.012 V	Temp. delta	1 ℃				

Figure 1. System Overview

3.2 Real Time Info

The real-time information page is divided into three subpages:

The cell info page which display real time online cell voltage and the corresponding cell temperature of battery orderly.
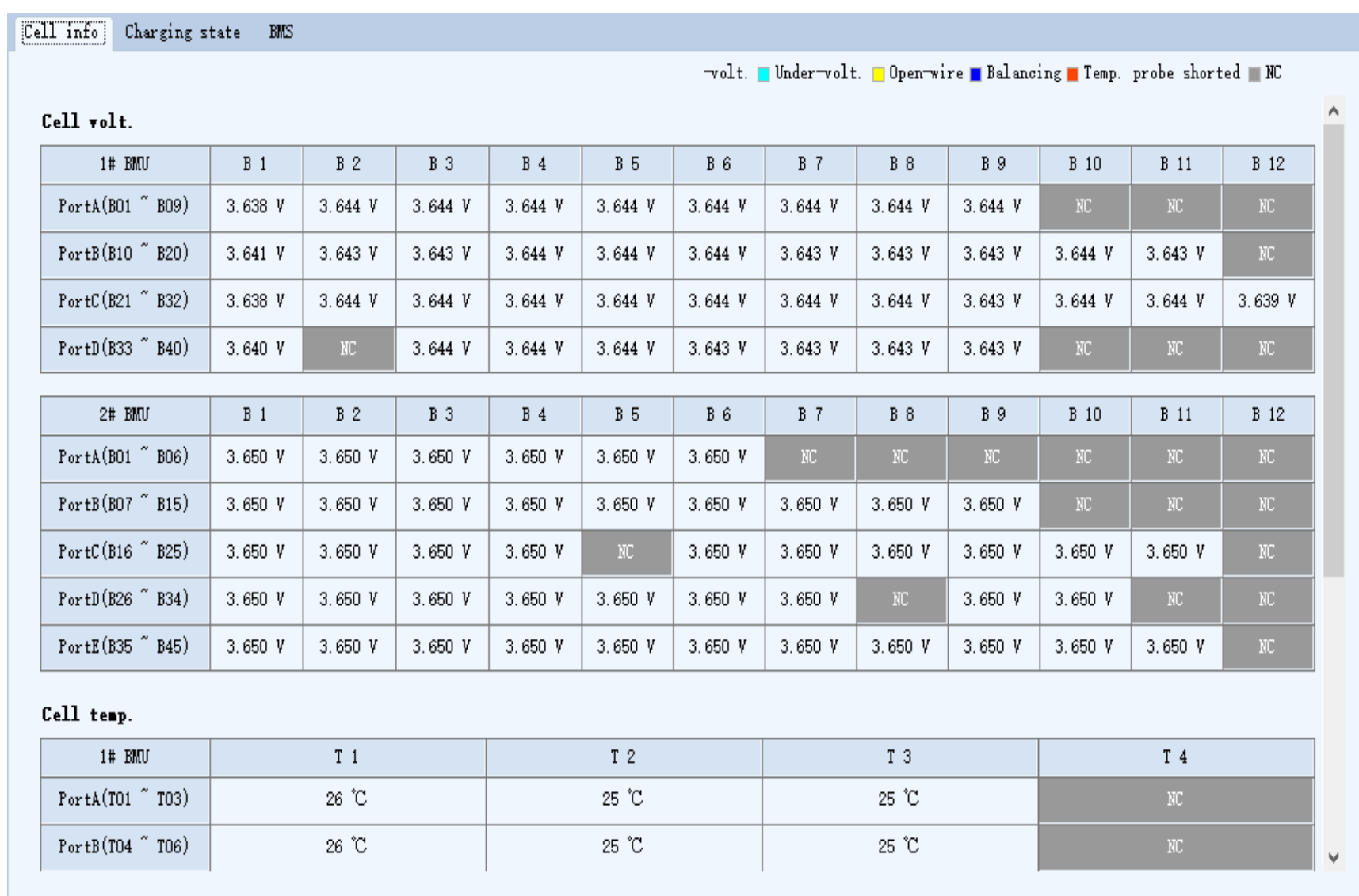
Cell info   Charging state   BMS

¬volt. ☐ Under¬volt. ☐ Open¬wire ☐ Balancing ☐ Temp. probe shorted ☐ NC

Cell volt.

1# BMU	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	B 12
PortA(B01 ~ B09)	3.638 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	NC	NC	NC
PortB(B10 ~ B20)	3.641 V	3.643 V	3.643 V	3.644 V	3.644 V	3.644 V	3.643 V	3.643 V	3.643 V	3.644 V	3.643 V	NC
PortC(B21 ~ B32)	3.638 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.644 V	3.643 V	3.644 V	3.644 V	3.639 V
PortD(B33 ~ B40)	3.640 V	NC	3.644 V	3.644 V	3.644 V	3.643 V	3.643 V	3.643 V	3.643 V	NC	NC	NC

2# BMU	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	B 12
PortA(B01 ~ B06)	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	NC	NC	NC	NC	NC	NC
PortB(B07 ~ B15)	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	NC	NC	NC
PortC(B16 ~ B25)	3.650 V	3.650 V	3.650 V	3.650 V	NC	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	NC
PortD(B26 ~ B34)	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	NC	3.650 V	3.650 V	NC	NC
PortE(B35 ~ B45)	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	3.650 V	NC

Cell temp.

1# BMU	T 1	T 2	T 3	T 4
PortA(T01 ~ T03)	26 ℃	25 ℃	25 ℃	NC
PortB(T04 ~ T06)	26 ℃	25 ℃	25 ℃	NC

Figure 2. Cell Info

The Charging state page can real time display charging related status such as electronic lock, charging socket temperature, basic status of charger, and self-diagnosis information of both charge and discharge state.

Cell info	Charging state	BMS	

Elec. lock state

Elec. lock driving state	Unlock	Elec. lock actual state	Unlock

Charging pluging temperature

Temp. probe index	Temperatures	voltage
Temp. probe 1	86 ℃	2.056 V
Temp. probe 2	Open-wire	4.093 V
Temp. probe 3	N/A	N/A
Temp. probe 4	N/A	N/A
Temp. probe 5	N/A	N/A

Charger state

Charger connection state	N.C.	Charger pwr-on state	Not open
Charger state	Not charged	Charging type	None
CC Resistance	N/A	CC voltage	5.039 V
CC2 Resistance value	N/A	CC2 voltage	5.032 V
CP PWM freq.	0 Hz	CP PWM Duty	0.0 %
Charger voltage	0.0 V	Charger current	0.0 A

Figure 3. Charging State

The BMS page displays basic BMS information such as version of mater and slaves, the display of master-related signal, the display of acquisition value of the current sensor, the display of high voltage detection value, and the display of open/close states of high and low side switch signal, etc.

Figure 4. BMS

3.3 Parameter Calibration

In parameter calibration page, kinds of parameters' thresholds are displayed in two category, system parameters and calibration parameters.

When the master is in normal mode, the system takes the category of system parameters. In this mode, in addition to SOC/SOH/high voltage detection/ current sensor and other parameters that needs to be calibrated can be calibrated, other parameters cannot be changed.

When the master enters calibration mode though a Dongle, the system takes the category of system parameters. At this time, these parameters can be modified using the calibration software to help field debug. Once the Dongle is disconnected and reboot, the master return to normal mode. The calibrated parameters lost, and the system retake the system parameters.

In calibration mode, this interface can also synchronize, read, write, import, export data for calibration parameters. For example, if the user want to quickly keep the

calibration parameters consistent with the system parameters, the user can perform the following steps: sync and then click the write button. Or if the user want to save the changed calibration parameters and write them to another master: read first (equivalent to refreshing to ensure correctness of the calibration parameters) and then click the export button to save after selecting the save path, Replace the master that is connected to calibration system, enter parameter calibration interface, click the import button and find the exported.json saved previously. By clicking on the write button, the calibration parameters are successfully configured. (Note, the above operations are based on the calibration mode, the mode can be checked in the real time overview at the far right of the calibration system.)

CATEGORY	THRESHOLD	SYSTEM PARAMETER	CALIBRATION PARAMETER	UNIT	OFFSET	MIN	MAX	RESOLUTION
Capacity configurat…	SOH	100	calibration	%	0	0	110	0.1
	SOC	80.2	calibration	%	0	0	110	0.1
SOC calib. config.	Avg. cell volt. to trigger capac…	3.9	3.9	V	0	0	5	0.01
	Avg. cell volt. to trigger capac…	3.4	3.4	V	0	0	5	0.01
	Low SOC threshold to trigger SOC…	10	10	%	0	0	100	0.01
	Over-discharging and SOC calib.…	60	60	Second	0	0	600	0.01
SOC Over HIGH	LVL 1 ALRM THRESHOLD	101	101	%	0	0	120	0.01
	LVL 1 ALRM RELEASE THRESHOLD	0	0	%	0	0	120	0.01
	LVL 1 ALRM DELAY	5	5	Second	0	0	600	0.01
	LVL 1 ALRM RELEASE DELAY	2	2	Second	0	0	600	0.01
	LVL 2 ALRM THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 2 ALRM RELEASE THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 2 ALRM DELAY	655.35	600	Second	0	0	600	0.01
	LVL 2 ALRM RELEASE DELAY	655.35	600	Second	0	0	600	0.01
	LVL 3 ALRM THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 3 ALRM RELEASE THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 3 ALRM DELAY	655.35	600	Second	0	0	600	0.01
	LVL 3 ALRM RELEASE DELAY	655.35	600	Second	0	0	600	0.01
	LVL 4 ALRM THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 4 ALRM RELEASE THRESHOLD	65535	65535	%	0	0	120	0.01
	LVL 4 ALRM DELAY	655.35	600	Second	0	0	600	0.01
	LVL 4 ALRM RELEASE DELAY	655.35	600	Second	0	0	600	0.01

Figure 5. Parameter calibration interface under the calibration mode

3.4 Force Control

Force control page, which is used to force the closure and opening of the electronic lock and the high and low side switch by sending instructions.

The steps for forcedly control are as follows:

i. According to the demand, select the corresponding control project, click the cancel button under the strong control command;

ii. Select the open/closed/cancel command in the drop-down box that appears;

iii. Click the Implement button at the appropriate location in the Operation column;

iv. The status feedback allows the user to see the force control status.

force control project	force control command	operation	State feedback
Electronic lock force control	Cancel	Implement	Not in force ctrl
HSS 1	Cancel	Implement	Not in force ctrl
HSS 2	Cancel	Implement	Not in force ctrl
HSS 3	Cancel	Implement	Not in force ctrl
HSS 4	Cancel	Implement	Not in force ctrl
HSS 5	Cancel	Implement	Not in force ctrl
HSS 6	Cancel	Implement	Not in force ctrl
HSS 7	Cancel	Implement	Not in force ctrl
HSS 8	Cancel	Implement	Not in force ctrl
LSS 1	Cancel	Implement	Not in force ctrl
LSS 2	Cancel	Implement	Not in force ctrl
1# BMU HSS 1	Cancel	Implement	Not in force ctrl
1# BMU HSS 2	Cancel	Implement	Not in force ctrl

Figure 6. Force control interface

3.5 Firmware upgrading

Program Upgrade allows local and network burning:

The master can only run in calibration mode after local burning, at which time the master needs to connect to a Dongle for debugging purposes.

Network burning requires computer have functionally internet connection. The user can use a verified account to log in and then choose the program needed to burn. Such burning method can burn released program only.

The network burning steps are as follows:

i. Click the Network button.

System Overview	Real time info.	Parameter Calibration	Force control	Firmware upgrading	History data

Local | Network

Device type	A602	State	Ready
HWID	4341525454303132333435363738393 0	FWID	
Hardware version number	011	Software version	3.0.7
Bootloader ver.			

Flash

ii.Enter the user's username and password in the login box that pops up and click OK.

Device type	A602	State	Ready
HWID	4341525454303132333435363738393 0	FWID	
Hardware version number	011		3.0.7
Bootloader ver.			

Login ✕

User [   ]

Password [   ]

confirm   Cancel

Flash

iii.After successful login, the user can enter the network burn page. The user needs to select the program to be updated by checking the FWID

iv.Click the Flash button to initiate the burning.

v.After the burning is complete, a prompt window says Burning Completed pops up.

Click "确认"(OK) to finish the burning.
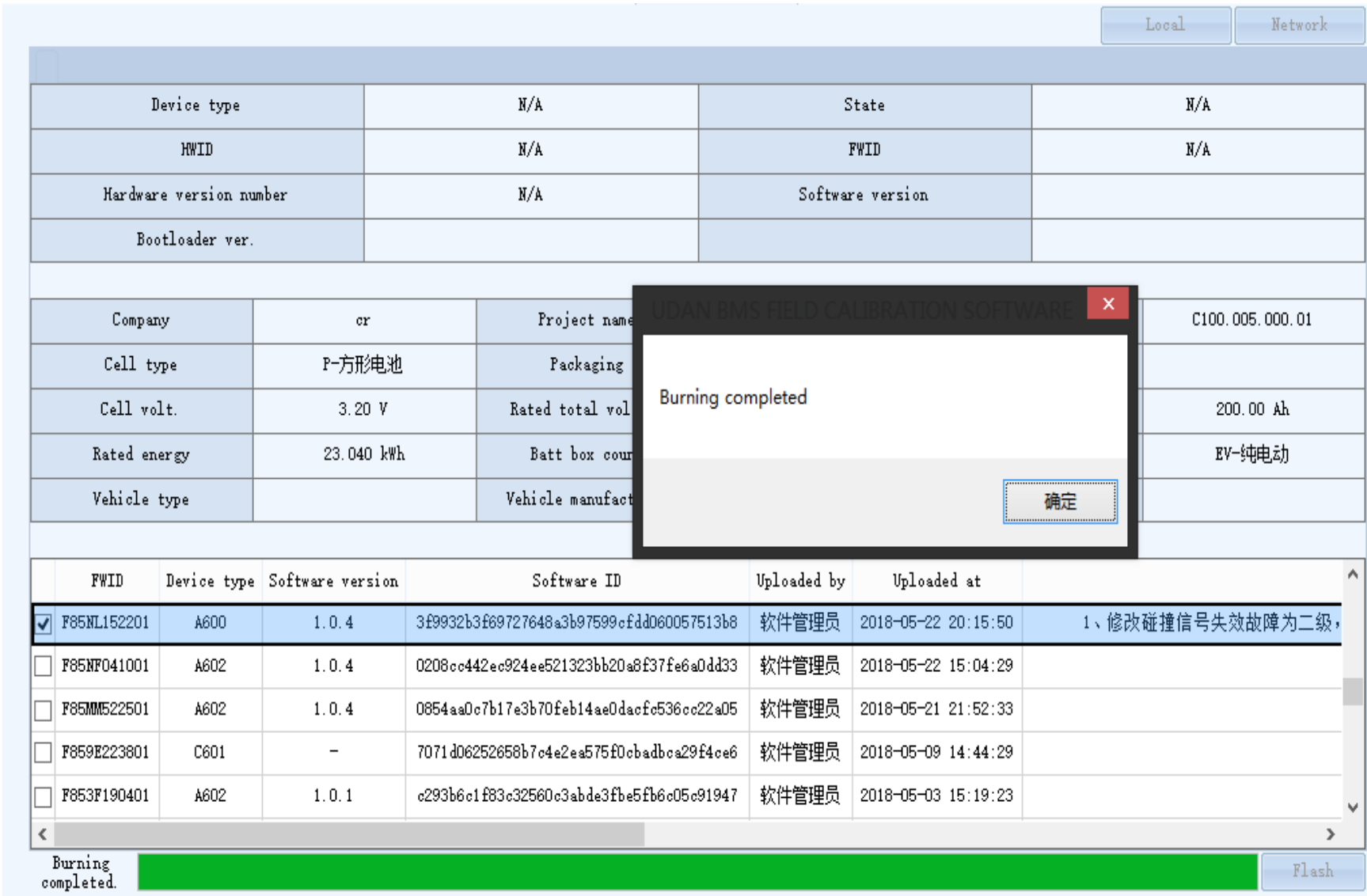
Note: Network burning requires a computer to connect to the network properly.

3.6 History Data

Clicking the history data menu when the total current is below 3A to enter data mode. After reading successfully, the user can view the BMS information stored during the running period.

3.7 Key Real-Time Information

This part is divided into real-time overview and real-time alarm info. The page displays the key information and alarm information of BMS in real time at the far right of each interface.