

CANBUS Protocol of High Voltage system

Change record				
Date	Version	Chapter	Description	Author
2016/7/19	1.00		First Version.	邹慧兴
2016/8/15	1.01		1、Add sleep wake up control/增加休眠唤醒控制/ 2、Add relay faulty check./ 增加继电器检测故障	姜炜
2016/8/17	1.02		Add charge/discharge command./ 增加充放电命令	姜炜
2016/11/15	1.03		Add forced charge and balance charge flag bit /增 加强充、均充标志位	姜炜
2016/12/04	1.04		Add broadcast to get information of battery cell and module /增加广播获取单芯及模块信息	邹慧兴
2016/12/19	1.05		Add voltage, temperature value, alarm and protection of module /增加电池模块电压温度值及告 警保护信息 告警保护信息	姜炜
2016/12/22	1.06		Add system equipment information/ 增加系统装备 信息 Add commando of relay force to break/ 增加继电器 强制断开命令	姜炜
2017/01/03	1.07		New composing for external PCS communication or internal BMCU communication/ 调整文本顺序, 便于区分对外 PSC 通信或者内部 BMCU 模块通信	邹慧兴
2017/01/12	1.08		Add charge forbidden and discharge forbidden	邹慧兴

			mark. 增加禁止充电，禁止放电标志	
2017/08/22	1.09		Add mark of connect multi-racks(pile) in parallel 增加并柜标志	秦威
2017/9/22	1.10		Add mark of connect multi-rack(pile) in parallel in all broadcast frames 所有广播帧中增加并柜标志	姜炜
2017/11/08	1.11		Add mark of "other error" 增加“其他故障”标志	
2018/03/27	1.12		Delete mark of connect multi-racks(pile) in parallel, delete irrelevant internal communication command, this protocol is for customer only. 去掉并柜标志，去除无关指令，此协议只做对外通信对接使用。	姜炜
2018/04/02	1.13		Add function of keep relay on even there is no communication. 增加临时屏蔽“外部通信故障”功能	姜炜
2018/06/12	1.14	chapter1.2 Page8	Revise System Device information's response data 系统装备信息响应数据： 1. Revise the "hardware version info." and "software version info." In the system device information data 调整系统装备信息中的“硬件版本信息”和“软件版本信息” 2. Revise the system device information's date from 1bit to 2bits, so that the battery capacity can be showed from 255Ah to 65535Ah 系统装备信息中电池容量信息由一个字节改为2字节表示，原来只支持最大 255AH，改后最大 65535AH	邹慧兴
2018/09/25	1.15	Table 2	Add Battery cell error mark 增加电池损坏故障位	
2018/11/06	1.16		Add the System error Extension mark: 增加故障扩展位： 1. Add Shutdown circuit error mark 增加关机电路等故障位 2. Add BMIC error mark 增加 BIMC 故障位 3. Add Internal bus error mark 增加内部总线异常故障位 4. Add Self-test error 增加开机自检异常故障位	姜炜
2019/04/11	1.17		Added the support for standard frames, When the	邹慧兴

			background monitoring software sends with the standard frame ID, the battery system replies with the standard frame ID 增加对标准帧的支持,上位机使用标准帧 ID 发送时, 电池系统则使用标准帧 ID 回复;	
2019/05/30	1.18	chapter 3 chapter 1.1 chapter 1.2	<p>1. Added firmware transfer protocol to add remote upgrade function 增加固件传输协议, 以增加远程升级功能</p> <p>2. Delete the standard frame ID, the standard frame ID is used in customization 去掉 V1.17 中增加的标准帧协议, 标准帧暂时只做非标功能</p> <p>3. Communication Address starts from 1 通讯地址由 1 开始</p> <p>4. Add Chip error mark 增加安全功能异常故障位</p> <p>5. Add the Manufacturer's identification 增加厂商识别</p>	邹慧兴 姜炜
2019/08/20	1.19	chapter 1 && chapter 2	1. 恢复 V1.17 中对于标准帧的支持	姜炜
2020/07/27	1.20	1.1	1.增加端子温度最高最低值和通道信息(模块端子温度, 和主控端子温度), 以及端子温度告警位, 风扇异常告警位	邹慧兴
2020/08/20	1.21	Table 4	1.增加 VDE 版本的单体欠压二级保护标志位	邹慧兴

CAN 总线规格： CANBUS frame format:

支持 29 位标识符的扩展帧格式及 11 位标识符的标准帧格式传输，总线传输速率为 500kbps.

Both 29 bits identifier (extended frame format) and 11 bits identifier (standard frame format) are used to transfer, and the bus transmission rate is 500kbps.

上位机设备发送 29 位 ID 的扩展帧，电池回复 29 位 ID 的扩展帧数据，上位机发送 11 位 ID 的标准帧，则电池也回复 11 位 ID 的标准帧数据。

The host device sends the 29-bit ID extended frame, the battery respond the 29-bit extended frame data, The host The host device sends the 11-bit ID standard frame, the battery also respond the 11-bit standard frame data.

通信方式： Communication Mode:

上位机设备发送查询或控制指令后，电池组设备响应数据。

After the host device sends the check or control command, the battery system responds data.

Report Sending is LSB. 发送为低字节在前

Catalog

1 查询指令 Query Instruction.....	5
1.1 总体信息 Ensemble information.....	5
1.2 系统装备信息 system equipment information.....	10
2 控制指令 Control Command.....	11
2.1 休眠唤醒控制 Sleep / Awake Command.....	11
2.2 充电放电命令 Charge/Discharge Command.....	12
2.3 临时屏蔽“通信故障”指令 Temporary masking “external communication error” command....	13
3. 固件升级相关命令 FirmWare upgrade related commands.....	14

1 查询指令 Query Instruction

1.1 总体信息 Ensemble information

- 上位机设备发送数据: Host device sending data:

CAN ID: 0x4200(29 bits identifier) or 0x420(11 bits identifier) (为广播帧) (this is Broadcast Frame)

Byte0	0	Ensemble Information 总体信息
Byte1	Reserve	
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	
Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

- 电池组设备响应数据: The battery pile device responds the following data:

CAN ID: 0x4210+Addr(29 bits identifier) (设备地址 Addr. = 1~F, 最多 15 台设备并联通信) (Equipment Address: Addr. = 1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x421 (11 bits identifier)

Byte0	电池组总电压 Battery Pile Total Voltage	Resolution: 0.1V
Byte1		Offset: 0
Byte2	电池组电流 Battery Pile Current	Resolution: 0.1A
Byte3		Offset: -3000A
Byte4	主控温度 second level BMS Temperature	Resolution: 0.1 °C
Byte5		Offset: -100 °C
Byte6	SOC	Resolution: 1%, Offset: 0
Byte7	SOH	Resolution: 1%, Offset: 0

CAN ID: 0x4220+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x422 (11 bits identifier)

Byte0	充电截止电压 Charge Cutoff Voltage	Resolution: 0.1V
Byte1		Offset: 0
Byte2	放电截止电压 Discharge Cutoff Voltage	Resolution: 0.1V
Byte3		Offset: 0
Byte4	最大充电电流 MAX Charge Current	Resolution: 0.1A

Byte5		Offset: -3000A
Byte6	最大放电电流 MAX Discharge Current	Resolution: 0.1A
Byte7		Offset: -3000A

CAN ID: 0x4230+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x423 (11 bits identifier)

Byte0	最高单体电池电压	Resolution: 0.001V
Byte1	MAX Single Battery Cell Voltage	Offset: 0
Byte2	最低单体电池电压	Resolution: 0.001V
Byte3	MIN Single Battery Cell Voltage	Offset: 0
Byte4	最高单体电池电压编号	Resolution: 1
Byte5	MAX Single Battery Cell Voltage Number	Offset: 0
Byte6	最低单体电池电压编号	Resolution: 1
Byte7	MIN Single Battery Cell Voltage Number	Offset: 0

CAN ID: 0x4240+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x424(11 bits identifier)

Byte0	最高单体电池温度	Resolution: 0.1°C
Byte1	MAX Single Battery Cell Temperature	Offset: -100
Byte2	最低单体电池温度	Resolution: 0.1 °C
Byte3	MIN Single Battery Cell Temperature	Offset: -100
Byte4	最高单体电池温度编号 MAX Single	Resolution: 1
Byte5	Battery Cell Temperature Number	Offset: 0
Byte6	最低单体电池温度编号 MIN Single Battery	Resolution: 1
Byte7	Cell Temperature Number	Offset: 0

CAN ID: 0x4250+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x425(11 bits identifier)

Byte0	基本状态 Basic Status	详见附表一 See Table 1 for details.
Byte1	循环周期 Cycle Period	
Byte2		
Byte3	故障 Error	详见附表二 See Table 2 for details.
Byte4	告警 Alarm	详见附表三 See Table 3 for details.
Byte5		
Byte6	保护 Protection	详见附表四 See Table 4 for details.
Byte7		

➤ Table 1: Basic Status

Bit7	Reverse
Bit6	Reverse
Bit5	Reverse
Bit4	0: Null; 1: 请求均充/Balance charge request
Bit3	0: Null; 1: 请求强充/Forced charge request
Bit2	0: Sleep, 1: Charge, 2: Discharge, 3: Idle, 4~7: Reserve 0: 休眠, 1: 充电, 2: 放电, 3: 搁置, 4~7: 保留
Bit1	
Bit0	

➤ Table 2: Fault

Bit7	Other error 其他故障（具体见故障扩展）
Bit6	电池损坏故障（电池过放等原因导致）/ Battery cell error
Bit5	RELAY_ERR/ 继电器检测故障 Relay Check Error
Bit4	RV_ERR/ 输入反接故障 Input transposition Error
Bit3	DCOV_ERR/ 输入过压故障 Input Over Voltage Error
Bit2	IN_COMM_ERR/ 内部通信故障 Internal Communication Error
Bit1	TMPR_ERR/ 温度传感器故障 Temperature Sensor Error
Bit0	VOLT_ERR/ 电压传感器故障 Voltage Sensor Error

➤ Table 3: Alarm

Bit15	Reserve
Bit14	Reserve
Bit13	风扇异常告警 Fan Alarm
Bit12	端子温度高告警 Terminal High Temperature Alarm
Bit11	MHV: 电池模块高压告警 Module High Voltage Alarm
Bit10	MLV: 电池模块低压告警 Module Low Voltage Alarm
Bit9	DOCA: 电池组放电过流告警 Discharge Over Current Alarm
Bit8	COCA: 电池组充电过流告警 Charge Over Current Alarm
Bit7	DHT: 放电高温告警 Discharge Cell High Temperature Alarm
Bit6	DLT: 放电低温告警 Discharge Cell Low Temperature Alarm
Bit5	CHT: 充电高温告警 Charge Cell High Temperature Alarm
Bit4	CLT: 充电低温告警 Charge Cell Low Temperature Alarm
Bit3	PHV: 电池组充电高压告警 Charge system High Voltage Alarm
Bit2	PLV: 电池组放电低压告警 Discharge system Low Voltage Alarm
Bit1	BHV: 电池单体高压告警 Single Cell High Voltage Alarm
Bit0	BLV: 电池单体低压告警 Single Cell Low Voltage Alarm

➤ Table 4: Protection

Bit15	Reserve
Bit14	Reverse
Bit13	Reverse
Bit12	BUV2: 电池单体二级欠压保护
Bit11	MOV: 电池模块过压保护 Module Over Voltage Protect
Bit10	MUV: 电池模块欠压保护 Module Under Voltage Protect
Bit9	DOC: 电池组放电过流保护 Discharge Over Current Protect

Bit8	COC: 电池组充电过流保护 Charge Over Current Protect
Bit7	DOT: 放电高温保护 Discharge Cell Over Temperature Protect
Bit6	DUT: 放电低温保护 Discharge Cell Under Temperature Protect
Bit5	COT: 充电高温保护 Charge Cell Over Temperature Protect
Bit4	CUT: 充电低温保护 Charge Cell Under Temperature Protect
Bit3	POV: 电池组充电高压保护 Charge system Over Voltage Protect
Bit2	PUV: 电池组放电低压保护 Discharge system Under Voltage Protect
Bit1	BOV: 电池单体高压保护 Single Cell Over Voltage Protect
Bit0	BUV: 电池单体低压保护 Single Cell Under Voltage Protect

CAN ID: 0x4260+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x426 (11 bits identifier)

Byte0	Module Max. Voltage 最高电池模块电压	Resolution: 0.001V
Byte1		Offset: 0
Byte2	Module Min. Voltage 最低电池模块电压	Resolution: 0.001V
Byte3		Offset: 0
Byte4	Module Max. Voltage Number 最高电池模块电压编号	Resolution: 1
Byte5		Offset: 0
Byte6	Module Min. Voltage Number 最低电池模块电压编号	Resolution: 1
Byte7		Offset: 0

CAN ID: 0x4270+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x427 (11 bits identifier)

Byte0	Module Max. Temperature 最高电池模块温度	Resolution: 0.1°C
Byte1		Offset: -100
Byte2	Module Min. Temperature 最低电池模块温度	Resolution: 0.1°Ce
Byte3		Offset: -100
Byte4	Module Max. Temperature Number 最高电池模块温度编号	Resolution: 1
Byte5		Offset: 0
Byte6	Module Min. Temperature Number 最低电池模块温度编号	Resolution: 1
Byte7		Offset: 0

CAN ID: 0x4280+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x428 (11 bits identifier)

Byte0	Charge forbidden mark 禁止充电标志	0xAA 有效, 其它值无效 0xAA: effect; other value: NULL
Byte1	Discharge forbidden mark 禁止放电标志	0xAA 有效, 其它值无效 0xAA: effect; other value: NULL
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	

Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

CAN ID: 0x4290+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x429 (11 bits identifier)

Byte0	故障扩展 1 / System error list Extension 1	详见附表五 See Table 5 for details.
Byte1	Reserve	
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	
Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

➤ Table 5: 故障扩展 1 / System error list Extension 1

Bit7	Reserve
Bit6	Reserve
Bit5	Reserve
Bit4	安全功能异常 / Chip error
Bit3	开机自检异常 / Self-test error
Bit2	内部总线异常 / Internal bus error
Bit1	BMIC 异常 / BMIC error
Bit0	关机电路异常 / Shutdown circuit error

CAN ID: 0x42A0+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x42A (11 bits identifier)

Byte0	Terminal Max. Temperature 最高端子温度	Resolution: 0.1 °C Offset: -100
Byte1		
Byte2	Terminal Min. Temperature 最低端子温度	Resolution: 0.1 °C Offset: -100
Byte3		
Byte4	Terminal Max. Temperature Number 最高端子温度编号	Resolution: 1, Offset: 0 如果为模块, 则通道为模块号, 如果是主控, 则通道为模块数+1, 例如系统电 池模块数 34, 则 0~33 为模块号, 34 为主控
Byte5		
Byte6	Terminal Min. Temperature Number 最低端子温度编号	同上
Byte7		

1.2 系统装备信息 system equipment information

- The host device sends the data: 上位机设备发送数据:

CAN ID: 0x4200 (29 bits identifier) or 0x420 (11 bits identifier) (is broadcast frame) (为广播帧)

Byte0	2	2 is system equipment information 系统装备信息
Byte1	Reserve	
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	
Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

- Battery System Response Data: 电池组设备响应数据:

CAN ID: 0x7310+Addr(29 bits identifier) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.) (设备地址 Addr=1~F, 最多 15 台设备并联通信)

CAN ID: 0x731 (11 bits identifier)

Hardware Version: such as V2.1

Software Version: such as V1.2

Byte0	Hardware Version 硬件版本	0: Null; 1: ver. A; 2: ver. B; Others: Reserve. 0:无效; 1:A 版本; 2:B 版本 ; 其他:预留
Byte1	reserve	
Byte2	Hardware Version-V 硬件版本-V	0x02
Byte3	Hardware Version-R 硬件版本-R	0x01
Byte4	Software Version-V 软件版本-V (主版本 Major)	0x01
Byte5	Software Version-V 软件版本-V (子版本 Minor)	0x02
Byte6	Software Version-开发主版本	
Byte7	Software Version 开发子版本	

CAN ID: 0x7320+Addr(29 bits identifier) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.) (设备地址 Addr=1~F, 最多 15 台设备并联通信)

CAN ID: 0x732 (11 bits identifier)

Byte0	Battery Module Qty.	
Byte1	电池总数	
Byte2	Battery Module in series Qty. 串联电池模块个数	
Byte3	Cell Qty. in battery module	

	模块中电池个数	
Byte4	Voltage Level	Resolution: 1V
Byte5	电压平台	Offset: 0
Byte6	AH number AH 数	Resolution: 1AH Offset: 0
Byte7		

CAN ID: 0x7330+Addr(29 bits identifier) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.) (设备地址 Addr=1~F, 最多 15 台设备并联通信)

CAN ID: 0x733 (11 bits identifier)

Byte0	Manufacturer Name 厂商名称	'P'
Byte1	Manufacturer Name 厂商名称	'Y'
Byte2	Manufacturer Name 厂商名称	'L'
Byte3	Manufacturer Name 厂商名称	'O'
Byte4	Manufacturer Name 厂商名称	'N'
Byte5	Manufacturer Name 厂商名称	'T'
Byte6	Manufacturer Name 厂商名称	'E'
Byte7	Manufacturer Name 厂商名称	'C'

CAN ID: 0x7340+Addr(29 bits identifier) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.) (设备地址 Addr=1~F, 最多 15 台设备并联通信)

CAN ID: 0x734 (11 bits identifier)

Byte0	Manufacturer Name 厂商名称	'H'
Byte1	Manufacturer Name 厂商名称	0
Byte2	Manufacturer Name 厂商名称	0
Byte3	Manufacturer Name 厂商名称	0
Byte4	Manufacturer Name 厂商名称	0
Byte5	Manufacturer Name 厂商名称	0
Byte6	Manufacturer Name 厂商名称	0
Byte7	Manufacturer Name 厂商名称	0

2 控制指令 Control Command

2.1 休眠唤醒控制 Sleep / Awake Command

不支持广播 Broadcast not supported

上位机设备发送数据: Host device send data:

CAN ID: 0x8200+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信)(Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x620 (11 bits identifier)

Byte0	休眠唤醒控制 Sleep Awake Control	0x55: 控制设备进入休眠状态 Control device enter sleep status; 0xAA: 控制设备退出休眠状态 Control device quit sleep status; Others: Null 其他: 无效
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

电池组无回复 No response from battery.

2.2 充电放电命令 Charge/Discharge Command

不支持广播 Broadcast not supported

上位机设备发送数据: Host device send data:

CAN ID: 0x8210+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信)(Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x621 (11 bits identifier)

Byte0	充电命令 Charge Command	0xAA: effect; Others: Null (* Note 1)
Byte1	放电命令 Discharge Command	0xAA: effect; Others: Null (* Note 2)
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	
Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

电池组无回复 No response from battery.

*Note:

1. 充电命令: 当电池处于欠压保护状态时, 继电器断开, 当 EMS 或 PCS 确定要对电池进行充电时可以发送此命令, 电池会闭合主继电器。若电池已休眠, 则需先唤醒。

Charge Command: When the battery is in under-voltage protection, the relay is open. When EMS or PCS is going to charge the battery, send this command, then the battery will close the main relay. If the battery is in sleep status, wake up first then use this command.

2. 放电命令: 当电池处于过压保护状态时, 继电器断开, 此时 EMS 或 PCS 确定要对电池进行放电时, 可发送此命令, 电池会闭合主继电器。若电池已休眠, 则需先唤醒。

Discharge Command: When the battery is in over-voltage protection, the relay is open. When EMS or PCS is going to discharge the battery, send this command, then the battery will close the main relay. If the battery is in sleep status, wake up first then use this command.

2.3 临时屏蔽“通信故障”指令 Temporary masking “external communication error” command

CAN ID: 0x8240+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信)(Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

CAN ID: 0x624 (11 bits identifier)

Byte0	BMS masking “external communication error” 下发“屏蔽外部通信故障”指令	0xAA: effect; Others: Null
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

电池组回复 Response from battery:

CAN ID: 0x8250+Addr(29 bits identifier) (设备地址 Addr=1~F, 最多 15 台设备并联通信)

CAN ID: 0x625 (11 bits identifier)

Byte0	System condition able to act this command or not 系统状态是否符合执行此命令条件	0xAA: 符合, 立即执行; OK, will act this command immediately Others: 不执行此命令; won't act this command
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

Danger: High Safety Risk from improper use

警示: 不正当使用会造成系统严重安全风险。

Note:

After receive this command, BMS will estimate the condition and give reply.

If meet the condition, in 5 minutes, BMS will ignore the “external communication fail” alarm, which means relay will keep ON while no communication between BMS and EMS/PCS.

In this 5 minutes, if there is a protection alarm, BMS will cut off the relay as normal.

当外部设备发起请求时, 如电池系统允许执行此动作, 则返回正常报文, 并且系统将屏蔽 5 分钟“外部通讯故障”功能。在 5 分钟内, 继电器将保持闭合。但, 当 5 分钟内发生保护时, 系统将

3. 固件升级相关命令 FirmWare upgrade related commands

3.1 发送固件长度，及固件的 CRC 校验值 Send the length of firmware, and the CRC value

CAN ID: 0x5000+Addr (设备地址 Addr=0 时，为广播信息，设备地址 Addr=1~F，最多 15 台设备并联通信) (Equipment Address: Addr=0,this is Broadcast frame, Addr=1~F, MAX 15 equipments can be parallel communicated)

Byte0	Length	Firmware length, Low bit in front
Byte1	Length	
Byte2	Length	
Byte3	Length	
Byte4	CRC_Low	CRC Value, Low bit in front
Byte5	CRC_High	0
Byte6	Reserve	0
Byte7	Reserve	0

电池组回复 Response from battery:

CAN ID: 0x5010+Addr(设备地址 Addr=1~F，最多 15 台设备并联通信)(Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

Byte0	00	00 正常 Normal, 01 异常 abnormal, 其它保留 others reserve
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

3.2 Data sending packet serial number, the length of single data packet, the Check value of single data packet 发送包序号，单包长度，单包数据的 CRC 校验值;

CAN ID: 0x5020+Addr (设备地址 Addr=0 时，为广播信息，设备地址 Addr=1~F，最多 15 台设备并联通信) (Equipment Address: Addr=0,this is Broadcast frame, Addr=1~F, MAX 15 equipments can be parallel communicated)

Byte0	Number	Serial Number of subpackage, Low bit in front
Byte1	Number	
Byte2	Length	the length of single data packet, Low bit in front, 128 bits, or 1024 bits. 单包数据长度，低字节在前，有 128 字节和 1024 字节
Byte3	Length	

Byte4	CRC_Low	the Check value of single data package, Low bit in front, 单包数据 CRC 校验值, 低字节在前
Byte5	CRC_High	
Byte6	Reserve	0
Byte7	Reserve	0

电池组回复 Response from battery:

CAN ID: 0x5030+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

Byte0	00	00 Normal 正常; 01 Abnormal for the serial Number of subpackage 包序号异常, 02 Abnormal for the length of single data packet 单包长度异常, Others reserve 其它保留
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

3.3 Sending the data of single packet 发送单包数据

CAN ID: 0x5040+Addr (设备地址 Addr=0 时, 为广播信息, 设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=0, this is Broadcast frame, Addr=1~F, MAX 15 equipments can be parallel communicated)

The length of single packet, 128 bits or 1024 bits, can single frame 8 bits, single data package has 16 单包数据长度有 128 字节和 1024 字节 2 种, CAN 单帧 8 字节, 单包数据有 16 帧和 128 帧 2 种

Byte0	Data00	
Byte1	Data01	
Byte2	Data02	
Byte3	Data03	
Byte4	Data04	
Byte5	Data05	
Byte6	Data06	
Byte7	Data07	

电池组回复 Response from battery:

CAN ID: 0x5050+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

Byte0	00	00 Normal 正常; 01 Data Abnormal
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		02 Abnormal of saving to the flash 保存到 Flash 异常, Others reserve 其它保留
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

3.4 启动升级命令 Start the upgrade command

CAN ID: 0x5060+Addr (设备地址 Addr=0 时, 为广播信息, 设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=0,this is Broadcast frame, Addr=1~F, MAX 15 equipments can be parallel communicated)

Byte0	0x00	Start the upgrade command 启动升级命令
Byte1	0xAA	
Byte2	Reserve	
Byte3	Reserve	
Byte4	Reserve	
Byte5	Reserve	
Byte6	Reserve	
Byte7	Reserve	

电池组回复 Response from battery:

CAN ID: 0x5070+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信) (Equipment Address: Addr=1~F, MAX 15 equipments can be parallel communicated.)

Byte0	00	00 Normal 正常 01 Upgrade Abnormal 升级异常, Others reserve 其它保留
Byte1	Reserve	0
Byte2	Reserve	0
Byte3	Reserve	0
Byte4	Reserve	0
Byte5	Reserve	0
Byte6	Reserve	0
Byte7	Reserve	0

二、 电池内部通讯指令 (与外部通讯无需处理)

1. 查询指令

上位机设备发送数据：

CAN ID: 0x4200 (为广播帧)

Byte0	1	1 为 CELL 和 MODULE 数据
Byte1	保留	
Byte2	保留	
Byte3	保留	
Byte4	保留	
Byte5	保留	
Byte6	保留	
Byte7	保留	

电池组设备响应数据：

CAN ID: 0x5000+Addr~0x57F0+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信)

00~7F 为 128 帧数据, 对应 0~511 串电池, 每帧 4 个 cell volt, 依次排列

Byte0	Cell volt	分辨率: 0.001V
Byte1		偏移量: 0
Byte2	Cell volt	分辨率: 0.001V
Byte3		偏移量: 0
Byte4	Cell volt	分辨率: 0.001V
Byte5		偏移量: 0
Byte6	Cell volt	分辨率: 0.001V
Byte7		偏移量: 0

CAN ID: 0x6000+Addr~0x67F0+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信)

00~7F 为 128 帧数据, 对应 0~511 串电池, 每帧 4 个 cell temperature, 依次排列

Byte0	Cell temp1	分辨率: 0.1 度
Byte1		偏移量: -100
Byte2	Cell temp2	分辨率: 0.1 度
Byte3		偏移量: -100
Byte4	Cell temp3	分辨率: 0.1 度
Byte5		偏移量: -100
Byte6	Cell temp4	分辨率: 0.1 度
Byte7		偏移量: -100

CAN ID: 0x7000+Addr~0x70F0+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信)

00~0F 为 16 帧数据, 对应 64 个 module, 每帧 4 个 module, 依次排列

Byte0	Module volt	分辨率: 0.001V
Byte1		偏移量: 0
Byte2	Module volt	分辨率: 0.001V
Byte3		偏移量: 0

Byte4	Module volt	分辨率: 0.001V
Byte5		偏移量: 0
Byte6	Module volt	分辨率: 0.001V
Byte7		偏移量: 0

CAN ID: 0x7200+Addr~0x72F0+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信)

20~2F 为 16 帧数据, 对应 64 个 module, 每帧 4 个 module, 依次排列

Byte0	Module temp1	分辨率: 0.1 度
Byte1		偏移量: -100
Byte2	Module temp2	分辨率: 0.1 度
Byte3		偏移量: -100
Byte4	Module temp3	分辨率: 0.1 度
Byte5		偏移量: -100
Byte6	Module temp4	分辨率: 0.1 度 偏移量: -100

2. 控制指令

1、强制断开主继电器命令 (不支持广播)

上位机设备发送数据:

CAN ID: 0x8220+Addr (设备地址 Addr=1~F, 最多 15 台设备并联通信)

Byte0	强制断开	0xAA: 强制电池组断开主继电器 0x55: 强制断开后, 允许电池组闭合主继电器 其他: 无效
Byte1	保留	0
Byte2	保留	0
Byte3	保留	0
Byte4	保留	0
Byte5	保留	0
Byte6	保留	0
Byte7	保留	0

电池组回复 0x8230+Addr 这一帧

注: 电池组收到强制断开指令 (0xAA) 后会断开主继电器, 直到收到闭合命令 (0x55) 后才会尝试闭合主继电器; 若从未收到强制断开命令, 默认为闭合