

**Bidirectional PCS(AC/DC) power  
module & Battery Test Device  
CAN bus communication protocol**

**User 's manual**

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**YSTECH**

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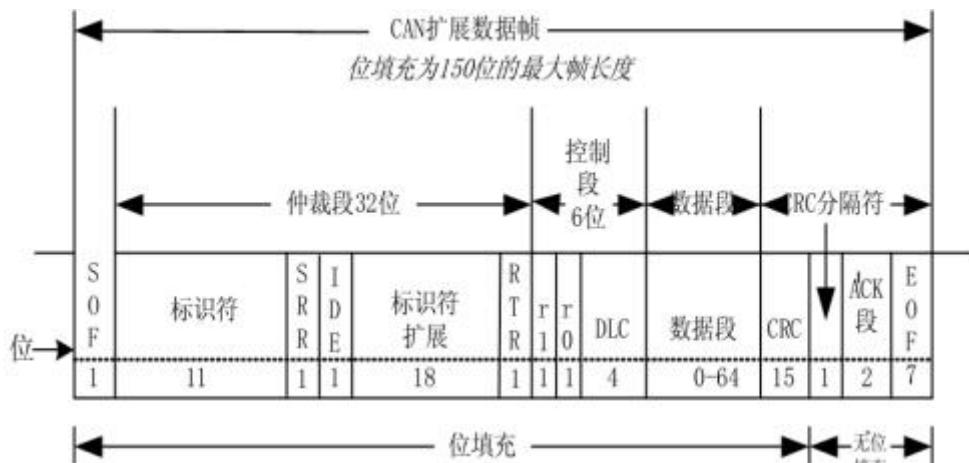
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## 一. Protocol Description

- 1) Adopting CAN communication interface;
- 2) Data Bode Rate: 250kbps;
- 3) The specific data parameter range in the protocol is modified according to different modules or cabinet types.

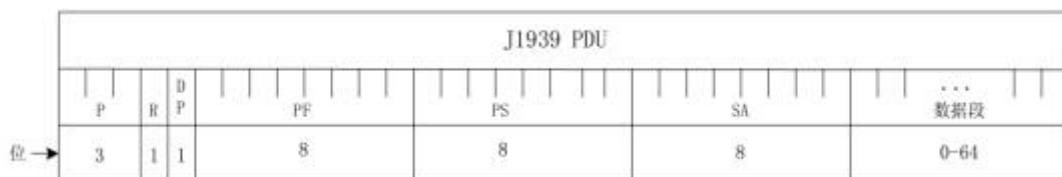
## 二. Physical layer interface

The physical link layer interface of this protocol is the CAN bus, and the message format follows the CAN2.0B specification. All messages use the CAN extended frame format as follows:



## 三. Protocol Data Unit

The protocol data unit of this agreement follows the J1939 protocol, and the PDU consists of seven parts: priority, reserved bit, data page, PDU format, specific PDU (can be used as target address, group extension or dedicated), source address and data domain, as follows:



Definition: P is the priority, R is the reserved bit, and DP is the data page,

Regulation: PF is the protocol message command code; PS is the target address; SA is the source address

## 四. Protocol address allocation

The address allocation is as follows:

Address	Device	Note
180 (0xB4)	Other devices	
1-254	PCS	PCS module or cabinet equipment (does not use 0xB4, defaults to 0xFA)
0	Broadcast address	Batch setting module data for other devices

Note: The CAN address of the PCS device can be set through the PCS device display screen.

## 五. Specific data frames

### 1. System boundary protection parameter reading

(1) Data frame 1 (ID: 0x1801XX B4): Read PCS device protection parameters

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data name	Note
6	0	0	01	XX (0-0xFE)	B4	1 Byte	Read protection parameter types	fact: 1; offset: 0
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is sent by other device to read the type of protection parameter of PCS device:

0x01: Read protection parameter 1 , maximum output voltage, minimum output voltage, maximum charge current, maximum discharge current. The PCS device receives this type and replies with a data frame 2 message.

0x02: Read protection parameter 2, maximum charging power, maximum discharging power, upper limit of AC voltage, lower limit of AC voltage. The PCS device receives this type and replies with a data frame 3 message.

0x03: Read protection parameter 3, AC current upper limit, AC frequency upper limit, AC frequency lower limit. The PCS device receives this type and replies with data frame 4. Other data are invalid.

(2) Data frame 2 (ID: 0x1802B4XX): Reply protection parameter 1

Sending node: PCS, receiving node: Other devices, communication cycle: Receive reply priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data Name	Note
6	0	0	02	B4	XX (1-0xFE)	1 Byte	Maximum output voltage high byte	fact: 0.1V; Offset: 0V Data range: 0.0V- 1000.0V
						2 Byte	Maximum output voltage low byte	
						3 Byte	Minimum Output Voltage High Byte	fact: 0.1V; offset: 0V Data range: 0.0V- 1000.0V
						4 Byte	Minimum Output Voltage low Byte	
						5 Byte	Maximum charging current high byte	fact: 0.1A; offset: 0A Data range: 0.0A- 1000.0A
						6 Byte	Maximum charging	

							current low byte	
7 Byte	Maximum discharge current high byte						fact: 0.1A; offset: 0A	Data range:
8 Byte	Maximum discharge current low byte						0.0A- 1000.0A	

This data frame is replied by the PCS device after it receives the read protection parameter type 0x01, and contains the protection parameters set by the PCS device, such as the maximum output voltage, the minimum output voltage, the maximum charging current, the maximum discharging current, and so on.

### (3) Data frame 3 (ID: 0x1803B4XX): Reply protection parameter 2

Sending node: PCS; Receiving node: Other devices, cycle time: ;Receive reply priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data Name	Note
6	0	0	03	B4	XX (1-0xFE)	1 Byte	Maximum charging power high byte	fact: 0.1kW; offset: 0kW
						2 Byte	Maximum charging power low byte	Data range: 0.0kW- 1000.0kW
						3 Byte	Maximum discharge power high byte	fact: 0.1kW; offset: 0kW
						4 Byte	Maximum discharge power low byte	Data range: 0.0kW- 1000.0kW
						5 Byte	AC Voltage Upper Limit High Byte	fact: 0.1V; offset: 0V
						6 Byte	AC Voltage Upper Limit low Byte	Data range: 0.0V-300.0V
						7 Byte	AC voltage lower limit high byte	fact: 0.1V; offset: 0V
						8 Byte	AC voltage lower limit low byte	Data range: 0.0V-300.0V

This data frame is replied by the PCS device after receiving the read protection parameter 0x02, which includes the maximum charging power, maximum discharge power, AC voltage upper limit, AC voltage lower limit and other protection parameters set by the PCS device.

### (4) Data frame 4 (ID: 0x1804B4XX): Reply protection parameter 3

Sending node: PCS, receiving node: Other devices, cycle time: ;Receive reply priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data Name	Note
6	0	0	04	B4	XX (1-0xFE)	1 Byte	Upper limit of discharge frequency high byte	Fact: 0.1Hz; Offset: 0Hz
						2 Byte	Upper limit of discharge frequency low byte	Data range: 40.0Hz-70.0Hz
						3 Byte	Lower limit of charging frequency High byte	
						4 Byte	Lower limit of charging	

						frequency low byte	
5 Byte	AC Frequency Upper Limit	fact: 1Hz; Offset: 0Hz					
6 Byte	AC Frequency Lower Limit	Data range: 40Hz-70Hz					
7 Byte	Reserved						
8 Byte	Reserved						

This data frame is replied by the PCS device after receiving the read protection parameter of 0x03, which includes parameters such as the upper limit of AC current, upper limit of AC frequency, and lower limit of AC frequency set by the PCS device.

## 2. System boundary protection parameter settings

(5) Data frame 5 (ID: 0x1805XX B4): Set protection parameter 1 for other devices

Sending node:other devices, receiving node:PCS devices, cycle titme: burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	05	XX (0-0xFE)	B4	1 Byte	Maximum output voltage high byte	Fact: 0.1V; Offset: 0V Data range: 0.0V-1000.0V
						2 Byte	Maximum output voltage low byte	
						3 Byte	Minimum Output Voltage High Byte	Fact: 0.1V; Offset: 0V Data range: 0.0V-1000.0V
						4 Byte	Minimum Output Voltage low Byte	
						5 Byte	Maximum charging current high byte	fact: 0.1A; offset: 0A data range: 0.0A-1000.0A
						6 Byte	Maximum charging current low byte	
						7 Byte	Maximum discharge current high byte	fact: 0.1A; offset: 0A data range: 0.0A-1000.0A
						8 Byte	Maximum discharge current low byte	

This data frame is actively sent by other devices, and protection parameters such as the maximum output voltage, minimum output voltage, maximum charging current, and maximum discharge current of the PCS device are set.

The PCS device replies whether the setup is successful or not, the reply message is e.g. data frame 8, type: 0x01.

(6) Data frame 6 (ID: 0x1806XX B4): Set protection parameters for other devices 2

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data name	Note
6	0	0	06	XX (0-0xFE)	B4	1 Byte	Maximum charging power high byte	Fact: 0.1kW; offset: 0kW
						2 Byte	Maximum charging power low byte	Data range: 0.0kW- 1000.0kW
						3 Byte	Maximum discharge power high byte	fact: 0.1 kW; offset: 0 kW
						4 Byte	Maximum discharge power low byte	Data range: 0.0kW- 1000.0kW
						5 Byte	AC voltage upper limit high byte	fact: 0.1V; offset: 0V
						6 Byte	AC voltage upper limit low byte	Data range: 0.0V-300.0V
						7 Byte	AC voltage lower limit high byte	fact: 0.1V; offset: 0V
						8 Byte	AC voltage lower limit low byte	Data range: 0.0V-300.0V

This data frame is actively sent by other devices, and protection parameters such as maximum charging power, maximum discharge power, AC voltage upper limit, and AC voltage lower limit are set for the PCS device.

Is the PCS device successful in setting the reply message, such as data frame 8, with a type of 0x02.

(7) Data frame 7(ID: 0x1807XX B4):Other devices set protection parameters 3

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority:

6

ID (Hex data)						data		
P	R	DP	PF	PS	SA	byte	Data name	note
6	0	0	07	XX (0-0xFE)	B4	1 Byte	Upper limit of discharge frequency high byte	Fact: 0.1Hz; Offset: 0Hz
						2 Byte	Upper limit of discharge frequency low byte	Data range: 40.0Hz-70.0H
						3 Byte	Charging frequency lower limit high byte	
						4 Byte	Charging frequency lower limit low byte	

					5 Byte	Upper limit of AC Power frequency	Fact: 1Hz; Offset: 0Hz Data range: 40.0Hz-70.0Hz
					6 Byte	Lower limit of AC power frequency	
					7 Byte	Reserved	
					8 Byte	Reserved	

This data frame is actively sent by other devices, setting parameters such as the upper limit of AC current, upper limit of AC frequency, and lower limit of AC frequency for the PCS device.

Is the PCS device successful in setting up a reply message, such as data frame 8, with a type of 0x03.

(8) Data frame 8 (ID: 0x1808B4XX): Set PCS device protection parameter reply message

Sending node: PCS, receiving node: other devices, cycle time: ;burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	byte	Data name	note
6	0	0	08	B4	XX (1-0xFE)	1 Byte	Set data type	Fact: 1; offset: 0
						2 Byte	01: success, Other: fail	
						3 Byte	Reserved	
						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

After receiving the command to set protection parameters, the PCS device sends this data frame to determine whether the protection parameters of the corresponding type of PCS device have been successfully set. The data type is set as follows:

0x01: Set the maximum output voltage, minimum output voltage, maximum charging current, and maximum discharge current.

0x02: Set maximum charging power, maximum discharge power, upper limit of AC voltage, and lower limit of AC voltage.

0x03: Set the upper limit of AC current, upper limit of AC frequency, and lower limit of AC frequency.

### 3. System operation control commands and status data

#### (9) Data frame 9 (ID: 0x1809XX B4): Set time

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data Name	Note
6	0	0	09	XX (0-0xFE)	B4	1 Byte	Year, high byte	fact: 1; offset: 0
						2 Byte	Year, low byte	
						3 Byte	month	
						4 Byte	day	
						5 Byte	hour	
						6 Byte	minute	fact: 1; offset: 0
						7 Byte	second	
						8 Byte	Reserverd	

This data frame is actively sent by other devices, set the time parameters of the PCS device.

#### (10) Data frame 10 (ID: 0x180AB4 XX): Set time reply

Sending node: PCS, receiving node: other devices, cycle time: ;burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data name	Note
6	0	0	0A	B4	XX (1-0xFE)	1 Byte	0x01: success;other:fail	fact: 1; offset: 0
						2 Byte	Reserved	
						3 Byte	Reserved	
						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

#### (11) Data frame 11 (ID: 0x180BXX B4): Set working mode and parameters

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority:

6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data name	Note
6	0	0	0B	XX (0-0xFE)	B4	1 Byte	Working mode	Working mode, accuracy, offset, range, etc., refer to Appendix 1
						2 Byte	Reserved	
						3 Byte	Reserved	
						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

This data frame is sent by other devices to set the operating mode of the PCS device and the corresponding parameters.

It is not possible to change the mode online, but requires downtime. Refer to Appendix I for the operating mode, parameter descriptions, accuracy, offset, range, etc.

The PCS device replies whether the setting is successful or not, and the reply message is as data frame 14.

## (12) Data frame 12 ( ID: 0x180CXX B4 ): Setting of operating mode and parameters

Sending node: other device, receiving node: PCS, cycle time: ;burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data Name	Note
6	0	0	0C	XX (0-0xFE)	B4	1 Byte	Setting parameter 1 Highest byte	Refer to Appendix I for operating modes, parameter descriptions, fact, offsets, ranges, etc.
						2 Byte	Setting parameter 1 High byte	
						3 Byte	Setting parameter 1 Low byte	
						4 Byte	Setting parameter 1 Lowest byte	
						5 Byte	Setting parameter 2 Highest byte	
						6 Byte	Setting parameter 2 High byte	
						7 Byte	Setting parameter 2 low byte	
						8 Byte	Setting parameter 2 Lowest byte	

This data frame is sent by other devices on their own initiative to set data such as the operating mode and corresponding parameters of the PCS device. Refer to Appendix I for the operating mode, parameter description, accuracy, offset, range, etc.

The PCS device replies whether the setting is successful or not, and the reply message is as data frame 14.

**(13) Data frame 13 ( ID: 0x180DXX B4 )**: Setting of operating mode and parameters

Sending node: other device, receiving node: PCS, Cycle time: burst transmission priority: 6

ID ( Hex data )						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	0D	XX (0-0xFE)	B4	1 Byte	Setting parameter 3 Highest byte	Refer to Appendix I for operating modes, parameter descriptions, fact, offsets, ranges, etc.
						2 Byte	Setting parameter 3 High byte	
						3 Byte	Setting parameter 3 Low byte	
						4 Byte	Setting parameter 3 Lowest byte	
						5 Byte	Setting parameter 4 Highest byte	
						6 Byte	Setting parameter 4 High byte	
						7 Byte	Setting parameter 4 low byte	
						8 Byte	Setting parameter 4 Lowest byte	

This data frame is sent by other devices on their own initiative to set data such as the operating mode and corresponding parameters of the PCS device. Refer to Appendix I for the operating mode, parameter description, accuracy, offset, range, etc.

The PCS device replies whether the setting is successful or not, and the reply message is as data frame 14.

**(14) Data frame 14 ( ID: 0x180EB4XX )**: Setting the operating mode and parameter response

Sending node: PCS, receiving node: other devices, cycle time: ;burst transmission priority:

6

ID ( Hex data )						Data		
P	R	DP	PF	PS	SA	Bytes	Data Name	Note
6	0	0	0E	B4	XX (1-0xFE)	1 Byte	0x01:success, Other:fail	fact: 1; offset: 0
						2 Byte	Reserved	
						3 Byte	Reserved	
						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

The PCS device returns to the operating mode and whether the corresponding parameters and other data are set successfully.

0x01:Success, other: Fail.

#### (15) Data frame 15 ( ID: 0x180FXX B4 ): Sets PCS device start/stop and other settings.

Sending node: other device, receiving node: PCS, cycle time: ;burst transmission priority: 6

ID ( Hex data )						Data		
P	R	DP	PF	PS	SA	Bytes	Data Name	Note
6	0	0	0F	XX (0-0xFE)	B4	1 Byte	Start/Stop command	fact: 1; Offset: 0
						2 Byte	Fault status clear command	
						3 Byte	Power on self start flag	
						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

This data frame is sent by other devices to set the start stop, fault clearing, and self start settings of the PCS device. When only one command is modified by these three commands, the other two command data need to maintain their original values.

Start/stop command, 0: close, 1: open.

Fault state clearing command, 0: Do not clear fault, 1: Clear fault.

Power on self start flag, 0: Power on not self start, 1: Power on self start.

#### (16) Data frame 16 ( ID: 0x1810B4XX): Start stop command reply

Sending node: PCS, receiving node: Other devices, cycle time: Receive reply priority: 6

ID ( Hex data )						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
						1 Byte	Start stop command reply	Fact: 1; Offset: 0

6	0	0	10	B4	XX (1-0xFE)	2 Byte	Reserved
						3 Byte	Reserved
						4 Byte	Reserved
						5 Byte	Reserved
						6 Byte	Reserved
						7 Byte	Reserved
						8 Byte	Reserved

This data frame is set successfully by the PCS device after receiving the start stop command.

0x01: Success, other data: Failure

#### Set the active power of three-phase modules A, B, and C for three-phase modules

Data frame (ID: 0x1821XX B4): Set working mode and parameters

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	21	XX (0-0xFE)	B4	1 Byte	Set parameter 1 high byte	Parameter 1 (active power of phase A)、 Parameter 2 (active power of phase B)、 Parameter 3 (active power of phase C) Fact: 0.1KW
						2 Byte	Set parameter 1 low byte	
						3 Byte	Set parameter 2 high byte	
						4 Byte	Set parameter 2 low byte	
						5 Byte	Set parameter 3 high byte	
						6 Byte	Set parameter 3 low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is sent by other devices on their own initiative to set data such as the operating mode and corresponding parameters of the PCS device. Refer to Appendix I for the working mode, parameter descriptions, accuracy, offset, range, etc.

The PCS device replies whether the setting is successful or not, and the reply message is as data frame 14

### Setting A, B and C reactive power for three-phase modules

Data frame ( ID: 0x1822XX B4 ): set operating mode and parameters

Sending node: other devices, receiving node: PCS, cycle time: ;burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	22	XX (0-0xFE)	B4	1 Byte	Set parameter 1 high byte	Parameter 1 (A-phase reactive power)、 Parameter 2 (B-phase reactive power)、 Parameter 3 (C-phase reactive power) Fact: 0.1Kvar
						2 Byte	Set parameter 1 low byte	
						3 Byte	Set parameter 2 high byte	
						4 Byte	Set parameter 2 low byte	
						5 Byte	Set parameter 3 high byte	
						6 Byte	Set parameter 3 low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is sent by other devices on their own initiative to set the operating mode of the PCS device and the corresponding parameters and other data. Refer to Appendix I for the operating mode, parameter description, accuracy, offset, range, etc.

The PCS device replies whether the setting is successful or not, and the reply message is as data frame 14.

#### 4. System real-time data sending

(17) Data frame 17 ( ID: 0x1811B4XX ): PCS device sends real-time DC data

Sending node: PCS, receiving node: other devices, cycle time: 200ms Priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	说明
6	0	0	11	B4	XX (1-0xFE)	1 Byte	Output Voltage High Byte	Fact: 0.1V; offset: 0V
						2 Byte	Output Voltage low Byte	
						3 Byte	Output Current High Byte	fact: 0.1A; offset: -1000A
						4 Byte	Output Current low Byte	
						5 Byte	Output Power High Byte	fact: 0.1kW; offset: 0kW
						6 Byte	Output Power low Byte	
						7 Byte	Air inlet temperature high byte	fact: 0.1°C; offset: -50°C

						8 Byte	Air inlet temperature low byte	
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This data frame is periodically sent by the PCS device and contains real-time output data such as DC voltage, DC current, and DC power from the PCS device.

(18) Data frame 18 (ID: 0x1812B4XX): PCS device sends real-time ampere hour and watt hour data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	12	B4	XX (1-0xFE)	1 Byte	Capacity, high bytes	Fact: 0.1AH; Offset: 0AH
						2 Byte	Capacity, low bytes	
						3 Byte	Energy, highest byte	
						4 Byte	Energy, high byte	Fact: 0.1WH; Offset: 0WH
						5 Byte	Energy, low byte	
						6 Byte	Energy, lowest byte	
						7 Byte	Air outlet temperature high byte	Fact: 0.1°C; Offset: - 50°C
						8 Byte	Air outlet temperature low byte	

This data frame is periodically sent by the PC device and contains real-time capacity and energy data output by the PC device.

(19) Data frame 19 (ID: 0x1813B4XX): pcs device sends real-time status

Sending node: pcs, receiving node: other devices, cycle time: 200ms, or status change,priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	13	B4	XX (1-0xFE)	1 Byte	running state	fact: 1; offset: 0
						2 Byte	reserved	
						3 Byte	Fault code high byte	Fact: 1; offset: 0
						4 Byte	Fault code low byte	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

This data frame is periodically sent by the PCS device and contains real-time status and fault code information of the PCS device. The operating status is as follows:

1-Long pause, 2-short stop, 3-long idle, 4-short idle, 5-stop, 6-fault, 7-AC constant power operation, 8-power failure, 9-self check, 10-soft start, 11-constant voltage operation, 12-constant current operation, 13-standby, 14-off grid inverter operation. Fault code reference Appendix 2.

(20) Data frame 20 (ID: 0x1814B4XX): PCS device sends real-time grid voltage data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	14	B4	XX (1-0xFE)	1 Byte	Grid U-phase voltage high byte	fact: 0.1V; offset: 0V
						2 Byte	Grid U-phase voltage low byte	
						3 Byte	Grid V-phase voltage high byte	
						4 Byte	Grid V-phase voltage low byte	
						5 Byte	Grid W-phase voltage high byte	
						6 Byte	Grid W-phase voltage low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by PCS equipment and contains real-time data of three-phase voltage on the grid side detected by PCS equipment in real time.

### (21) Data frame 21 (ID: 0x1815B4XX): PCS device sends real-time grid current data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	15	B4	XX (1-0xFE)	1 Byte	Grid U-phase current high byte	fact: 0.1A; offset: 0A
						2 Byte	Grid U-phase current low byte	
						3 Byte	Grid V-phase current high byte	
						4 Byte	Grid V-phase current low byte	
						5 Byte	Grid W-phase current high byte	
						6 Byte	Grid W-phase current low byte	
						7 Byte	PF high byte	fact: 0.1; offset: 0
						8 Byte	PF low byte	

This data frame is periodically sent by the PCS device, which includes real-time detection of three-phase current data on the grid side by the PCS device and PF data from the PCS device.

### (22) Data frame 22 (ID: 0x1816B4XX): PCS device sends real-time system power data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data	note
6	0	0	16	B4	XX (1-0xFE)	1 Byte	System active power high byte	fact: 0.1kW; offset: 0kW
						2 Byte	System active power low byte	
						3 Byte	System reactive power high byte	fact: 0.1kVar; offset: 0kVar
						4 Byte	System reactive power low byte	
						5 Byte	System apparent power high byte	fact: 0.1kVA; offset: 0kVA
						6 Byte	System apparent power low byte	
						7 Byte	Frequency, high bytes	fact: 0.1Hz; offset: 0 Hz
						8 Byte	Frequency, low bytes	

This data frame is periodically sent by the PCS device and includes real-time detection of the active, reactive, apparent power, and frequency data of the power grid system by the PCS device.

### (23) Data frame 23 (ID: 0x1817B4XX): PCS device sends real-time load side voltage data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data name	note
6	0	0	17	B4	XX (1-0xFE)	1 Byte	Load U-phase voltage high byte	fact: 0.1V; offset: 0V
						2 Byte	Load U-phase voltage low byte	
						3 Byte	Load V-phase voltage high byte	
						4 Byte	Load V-phase voltage low byte	
						5 Byte	Load W-phase voltage high byte	
						6 Byte	Load W-phase voltage low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and contains real-time detection of three-phase voltage data on the load side by the PCS device.

(24) Data frame 24 (ID: 0x1818B4XX): PCS device sends real-time load side current data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Byte	Data name	note
6	0	0	18	B4	XX (1-0xFE)	1 Byte	Load U-phase current high byte	fact: 0.1A; offset: 0A
						2 Byte	Load U-phase current low byte	
						3 Byte	Load V-phase current high byte	
						4 Byte	Load V-phase current low byte	
						5 Byte	Load W-phase current high byte	
						6 Byte	Load W-phase current low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and contains real-time output of three-phase current data on the load side by the PCS device.

(25) Data frame 25 (ID: 0x1819B4XX): PCS device sends real-time load side power data

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data name	Note
6	0	0	19	B4	XX (1-0xFE)	1 Byte	Load active power high byte	fact: 0.1kW; offset: 0kW
						2 Byte	Load active power low byte	
						3 Byte	Load reactive power high byte	fact: 0.1kVar; offset: 0kVar
						4 Byte	Load reactive power low byte	
						5 Byte	Load apparent power high byte	fact: 0.1kVA; offset: 0kVA
						6 Byte	Load apparent power low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and includes real-time detection of system active, reactive, and apparent power data on the load side by the PCS device.

**Data frame (ID: 0x1823B4XX): PCS device returns A-phase active, reactive, and apparent power**

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID ( Hex data)						data		
P	R	DP	PF	PS	SA	byte	Data name	note
6	0	0	23	B4	XX (0-0xFE)	1 Byte	A-phase, active high byte	精度: 0.1KW 偏移量: 0KW  fact: 0.1kVar; offset: 0Var  fact: 0.1KVA; offset: 0KVA
						2 Byte	A-phase, active low byte	
						3 Byte	A-phase, reactive power high byte	
						4 Byte	A-phase, reactive power low byte	
						5 Byte	A-phase, apparent power high byte	
						6 Byte	A-phase, apparent power low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and contains real-time system active, reactive, and apparent power data detected by the PCS device on the system side.

**Data frame (ID: 0x1824B4XX): PCS device returns B-phase active, reactive, and apparent power**

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data name	note
6	0	0	24	B4	XX (0-0xFE)	1 Byte	B-phase active power high byte	fact: 0.1KW offset: 0KW  fact: 0.1kVar; offset: 0Var  fact: 0.1KVA; offset: 0KVA
						2 Byte	B-phase active power low byte	
						3 Byte	B-phase, reactive power high byte	
						4 Byte	B-phase, reactive power low byte	
						5 Byte	B-phase, apparent power high byte	
						6 Byte	B-phase, apparent power low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and contains real-time system active, reactive, and apparent power data detected by the PCS device on the system side.

**Data frame (ID: 0x1825B4XX): PCS device returns C-phase active, reactive, and apparent power**

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data name	note
6	0	0	25	B4	XX (0-0xFE)	1 Byte	C-phase active power high byte	fact: 0.1KW offset: 0KW
						2 Byte	C-phase active power low byte	
						3 Byte	C-phase, reactive power high byte	fact: 0.1kVar; offset: 0Var
						4 Byte	C-phase, reactive power low byte	
						5 Byte	C-phase, apparent power high byte	fact: 0.1KVA; offset: 0KVA
						6 Byte	C-phase, apparent power low byte	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is periodically sent by the PCS device and contains real-time system active, reactive, and apparent power data detected by the PCS device on the system side.

**Data frame (ID: 0x1839B4XX): PCS device returns DC voltage and current**

Sending node: PCS, receiving node: other devices, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	note
6	0	0	25	B4	XX (0-0xFE)	1 Byte	Output voltage, highest byte	fact: 0.001V offset: 0V
						2 Byte	Output voltage, high byte	
						3 Byte	Output voltage, low byte	
						4 Byte	Output voltage, lowest byte	
						5 Byte	Output current, highest byte	fact: 0.001A, offset: -1000A
						6 Byte	Output current, high byte	
						7 Byte	Output current, low byte	

						<b>8 Byte</b>	Output current, lowest byte
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This data frame is periodically sent by the PCS device and contains the real-time output DC voltage and DC current of the PCS device.

## 5. Sending data from other devices

(26) Data frame 26 (ID: 0x181AXXB4): Data sent from other devices to PCS devices

Sending node: other devices, receiving node: PCS, cycle time: 200ms, priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	bytes	Data name	Note
6	0	0	1A	XX (0-0xFE)	B4	<b>1 Byte</b>	DC voltage high byte	fact: 0.1V; offset: 0V
						<b>2 Byte</b>	DC voltage low byte	
						<b>3 Byte</b>	DC current high byte	fact: 0.1A; offset: -1000A
						<b>4 Byte</b>	DC current low byte	
						<b>5 Byte</b>	running state	fact: 1; offset: 0
						<b>6 Byte</b>	reserved	
						<b>7 Byte</b>	reserved	
						<b>8 Byte</b>	reserved	

This data frame is periodically sent by other devices, including real-time detection of DC voltage, DC current, and operating status by other devices. If other devices do not detect DC current and voltage, the DC voltage and DC current data can be sent as 0 (ARM program version needs to be higher than BT02.02.01V02.01.38).

Operating status: 0x01: Shutdown, 0x02: Running, 0x03: Fault

After PCS equipment detects that other equipment is in a faulty state, it will shut down and report other equipment faults.

## 6. Set special settings data

(27) Data frame 27 (ID: 0x181BXXB4): Set PCS device bus voltage and reactive power

Sending node: other devices, receiving node: PCS, cycle time: , priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	1B	XX (0-0xFE)	B4	<b>1 Byte</b>	Bus voltage high byte	fact: 0.1V; offset: 0V
						<b>2 Byte</b>	Bus voltage low byte	Data range: 680.0V~1000.0V
						<b>3 Byte</b>	Reactive power high byte	fact: 0.1Var; offset: 0kVar
						<b>4 Byte</b>	Reactive power low byte	data range: -1000.0kVar ~1000.0kVar
						<b>5 Byte</b>	reserved	
						<b>6 Byte</b>	reserved	
						<b>7 Byte</b>	reserved	
						<b>8 Byte</b>	reserved	

This data frame is actively sent by other devices to set parameters such as PCS device bus voltage and reactive power. Is the PCS device successful in setting the reply message, such as data frame 29, with a special data type set to 0x01.

**(28) Data frame 28 (ID: 0x181FXXB4): Set BTLA device IOBUS output**

Sending node: other devices, receiving node: PCS, cycle time: , priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	1F	XX (0-0xFE)	B4	1 Byte	IO1	fact: 1; offset: 0
						2 Byte	IO2	fact: 1; offset: 0
						3 Byte	IO3	fact: 1; offset: 0
						4 Byte	IO4	fact: 1; offset: 0
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is actively sent by other devices, and the PCS device controls the external IO output of the device. Is the PCS device successful in setting the reply message, such as data frame 29, with a special set data type of 0x02.

IO setting value, can only be 0 or 1.

**Data frame (ID: 0x1826XXB4): Set PCS device split phase power control enable**

Sending node: other devices, receiving node: PCS, cycle time: , priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	26	XX (0-0xFE)	B4	1 Byte	Enable split phase power control	0- Disable ; 1- enable
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is actively sent by other devices, and PCS device phase separation power control is enabled. Whether the PCS device reply was successfully set, the reply message is like data frame 29, and the special data type is: 0x03.

#### Data frame (ID: 0x1828XXB4): Set PCS device inverter phase

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	28	XX (0-0xFE)	B4	1 Byte	Inversion phase selection	7: A-phase host; 8: B-phase host; 9: C-phase host 10: A-phase Slave; 11: B-phase Slave; 12: C-phase Slave
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is actively sent by other devices, and PCS device phase separation power control is enabled. Is the PCS device successful in setting the reply message, such as data frame 29, with a special data type set to 0x04.

#### Data frame (ID: 0x182AXXB4): Set PCS device reactive power control mode and power factor

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	2A	XX (0-0xFE)	B4	1 Byte	Reactive power control mode	0: Reactive power; 1: power factor
						2 Byte	Power factor setting high byte	-0.999~1.000 Fact: 0.001; Offset: 0
						3 Byte	Power factor setting low byte	

						4 Byte	Reserved	
						5 Byte	Reserved	
						6 Byte	Reserved	
						7 Byte	Reserved	
						8 Byte	Reserved	

This data frame is actively sent by other devices, and the reactive power control mode and power factor of the PCS device are set. Whether the PCS device reply was successfully set, the reply message is like data frame 29, and the special data type is set to: 0x05.

#### Data frame (ID: 0x182CXXB4): Set PCS device on/off grid settings

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	2C	XX (0-0xFE)	B4	1 Byte	on/off grid settings	0: disable; 1: Automatic switching
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is actively sent by other devices, and the PCS device is set to be off grid. Is the PCS device successful in setting the reply message, such as data frame 29, with a special data type set to 0x06.

#### Data frame (ID: 0x182EXXB4): Set PCS device module parallel mode

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID ( Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
						1 Byte	Module parallel mode	0: Single; 1: host; 2: Slave
						2 Byte	Module parallel number	1~10

6	0	0	2E	XX (0-0xFE)	B4	3 Byte	Hall sensor variation ratio, high byte	Fact: 1; offset: 0
						4 Byte	Hall sensor variation ratio, low byte	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is actively sent by other devices, and the PCS device module parallel mode is set. Is the PCS device successful in setting the reply message, such as data frame 29, with a special data type set to 0x07.

#### Data frame (ID: 0x1830XXB4): Set PCS device channel parallel mode

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	30	XX (0-0xFE)	B4	1 Byte	Channel parallel mode	0: single channel; 1: Main channel; 2: Slave channel
						2 Byte	Channel parallel way	0: Non; 1: Single module channel parallel connection 2: Multi module channel parallel connection
						3 Byte	Number of channels in parallel	1~10
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is sent by other devices on their own initiative to set the PCS device channel in parallel mode. the PCS device replies whether the setting is successful, the reply message such as data frame 29, the special setting data type: 0x08.

#### Data frame (ID: 0x1832XXB4): Setting the PCS device bus in parallel

Sending node: other devices, receiving node: PCS, cycle time: ; burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note

							1 Byte	Bus parallel connection	0: disable; 1: Enable
							2 Byte	reserved	
							3 Byte	reserved	
6	0	0	32	XX (0-0xFE)	B4		4 Byte	reserved	
							5 Byte	reserved	
							6 Byte	reserved	
							7 Byte	reserved	
							8 Byte	reserved	

This data frame is sent by another device on its own initiative to set the PCS device bus in parallel. the PCS device replies whether the setting is successful or not, the reply message is like data frame 29, the special setting data type is: 0x09.

#### (29) Data frame 29 (ID: 0x181C B4XX): PCS device reply special data setting result

Sending node: PCS, receiving node: Other devices, cycle time: ; Receive reply priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
						1 Byte	Special Setting Data Type	fact: 1; offset: 0
						2 Byte	01: success, other: fail	
6	0	0	1C	B4	XX (0-0xFE)	3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is sent by the PCS device after receiving the command to set other parameters, and the corresponding type of PCS device's setting parameters are sent:

Special setting data type: 0x01: Set bus voltage and reactive power.

Special setting data type: 0x02: Set IOx type.

Special setting data type: 0x03: Set split phase power control enable.

Special setting data type: 0x04: Set inverter phase.

Special setting data type: 0x05: Equipment reactive power control mode and power factor

Special setting data type: 0x06: Off grid setting

Special setting data type: 0x07: Module parallel mode

Special setting data type: 0x08: Channel parallel mode

Special setting data type: 0x09: Bus parallel setting

## 7. Read special setting data

#### (30) Data frame 30 (ID: 0x181DXXB4): Read special data from PCS device

Sending node: other devices, receiving node: PCS, cycle time: ; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	1D	XX (0-0xFE)	B4	1 Byte	Special Setting Data Type	fact: 1; offset: 0
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame was sent by other devices. After reading the special setting parameters of the PCS device, the PCS device replied to send the corresponding type of special setting parameters:

Special setting data type:

0x01: Read the set bus voltage and reactive power.

0x02: Read the IOx input signal and AD voltage sampling signal of the PCS device.

0x03: Read the enable flag for split phase power control.

0x04: Read inverter phase selection.

0x05: Read reactive power control mode and power factor settings

0x06: Read off grid settings

0x07: Read module parallel mode

0x08: Read channel parallel mode

0x09: Read bus parallel setting

0x0A: Read program version

0x0B: Read working mode and parameters

(31) Data frame 31 (ID: 0x181EB4XX): PCS device returns stored bus voltage and reactive power

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	1E	XX (0-0xFE)	B4	1 Byte	Bus voltage high byte	fact: 0.1V; offset: 0V
						2 Byte	Bus voltage low byte	
						3 Byte	Reactive power, high byte	fact: 0.1kVar; offset: 0Var
						4 Byte	Reactive power, low byte	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device as a reply to the bus voltage, reactive power, etc. set by the PCS device after the other device sends the command type: 0x01 to read the special setup parameters.

(32) Data frame 32 (ID: 0x1820B4XX): The PCS device returns the signal value of the IOx with the AD sample value

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	20	B4	XX (0-0xFE)	1 Byte	IO1	fact: 1; offset: 0
						2 Byte	IO2	fact: 1; offset: 0
						3 Byte	IO3	fact: 1; offset: 0
						4 Byte	IO4	fact: 1; offset: 0
						5 Byte	AD1 Voltage Sample Value High Byte	fact: 0.001V; offset: 0V
						6 Byte	AD1 Voltage Sample Value low Byte	
						7 Byte	AD2 Voltage Sample Value High Byte	fact: 0.001V; offset: 0V
						8 Byte	AD2 Voltage Sample Value low Byte	

This data frame is received by the PCS device after the other device sends the Read Special Setup Parameters command type 0x02, which replies to the signal value of the IOx of the PCS device with the AD voltage sampling value.

#### Data frame (ID: 0x1827B4XX): PCS device returns split-phase power control enable flag

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	27	B4	XX	1 Byte	Split-phase power control enable flag	0-disable; 1-enable
					(0-0xFE)	2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device and the PCS device responds to the split-phase power control enable flag after the other device sends the Read Special Setup Parameter command of type 0x03.

**Data frame (ID: 0x1829B4XX): PCS device returns inverter phase selection settings**

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	29	B4	XX (0-0xFE)	1 Byte	Inversion phase selection	7: A-phase host; 8: B-phase host; 9: C-phase host
						2 Byte	reserved	10: A-phase Slave; 11: B-phase Slave; 12: C-phase Slave
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device after the other device sends the Read Special Setting Parameter command type: 0x04. Responds to the inverter phase selection setting of the PCS device.

**Data frame (ID: 0x182BB4XX): PCS device returns reactive power control method and power factor setting**

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	2B	B4	XX (0-0xFE)	1 Byte	Reactive power control method	0: Reactive power; 1: power factor
						2 Byte	Power Factor Setting High Byte	-0.999~1.000 fact: 0.001; offset: 0
						3 Byte	Power Factor Setting low Byte	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device to reply to the PCS device's reactive power control mode and power factor setting after the other device sends the command type 0x05 to read the special setting parameters.

### Data frame (ID: 0x182DB4XX): PCS device returns on/off grid settings

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	2D	B4	XX (0-0xFE)	1 Byte	on/off grid settings	0: disable; 1: automatic switching; 2: IO switching
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device, and after receiving a command type of 0x06 to read special setting parameters from other devices, it responds to the PCS device's on/off grid setting.

### Data frame (ID: 0x182FB4XX): PCS device return module parallel setting

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	2F	B4	XX (0-0xFE)	1 Byte	Module parallel mode	0: single; 1: host; 2: Slave
						2 Byte	Number of parallel modules	1~10
						3 Byte	Hall Current Sensor Variable Ratio High Byte	fact: 1; offset: 0
						4 Byte	Hall Current Sensor Variable Ratio low Byte	
						5 Byte	保留	
						6 Byte	保留	
						7 Byte	保留	
						8 Byte	保留	

This data frame is received by the PCS device after the PCS device receives the command type 0x07 from another device to read the special setup parameter, and replies to the parallel setup of the PCS device module.

**Data frame (ID: 0x1831B4XX): PCS device return channel parallel setting**

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	31	B4	XX (0-0xFE)	1 Byte	Channel Parallel Mode	0: single channel; 1: main channel; 2: slave channel
						2 Byte	Channel parallel mode	0: non; 1: Single Module Channel Parallel; 2: Multi-module channels in parallel
						3 Byte	Number of channels in parallel	1~10
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device after the other device sends the Read Special Setup Parameters command type 0x08 to reply to the PCS device channel parallel setup.

**Data frame (ID: 0x1833B4XX): PCS device returns to bus parallel setting**

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority:

6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	33	B4	XX (0-0xFE)	1 Byte	Bus parallel connection	0: disable; 1: enable
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device as a reply to the PCS device bus parallel setting after the other device sends the command type 0x09 to read the special setting parameters.

#### Data frame (ID: 0x1834B4XX): PCS device returns ARM version

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	34	B4	XX (0-0xFE)	1 Byte	Hardware V Version	0: disable; 1: enable
						2 Byte	Hardware B Version	
						3 Byte	Hardware D Version	
						4 Byte	Software V Version	
						5 Byte	Software B Version	
						6 Byte	Software D Version	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device as a reply to the PCS device's ARM version after the other device sends the Read Special Setup Parameters command type 0x0A.

#### Data frame (ID: 0x1835B4XX): PCS device returns DSP version

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	35	B4	XX (0-0xFE)	1 Byte	Hardware V Version	0: disable; 1: Enable
						2 Byte	Hardware B Version	
						3 Byte	Hardware D Version	
						4 Byte	Software V Version	
						5 Byte	Software B Version	
						6 Byte	Software D Version	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device as a reply to the DSP version of the PCS device after the PCS device receives the Read Special Setup Parameters command type 0x0A from another device.

**Data frame (ID: 0x1836B4XX): PCS device returns operating mode and parameters**

Sending node: PCS, receiving node: other devices, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	35	B4	XX (0-0xFE)	1 Byte	operating mode	
						2 Byte	reserved	
						3 Byte	reserved	
						4 Byte	reserved	
						5 Byte	reserved	
						6 Byte	reserved	
						7 Byte	reserved	
						8 Byte	reserved	

This data frame is received by the PCS device as a reply to the PCS device's operating mode and parameters after the PCS device receives the Read Special Setup Parameters command type 0x0B from another device.

**Data frame (ID: 0x1837B4XX): PCS device returns operating mode and parameters**

Sending node: other devices, receiving node: PCS, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0	0C	XX (0-0xFE)	B4	1 Byte	Setting parameter 1 Highest byte	Refer to Appendix I for operating modes, parameter descriptions, accuracies, offsets, ranges, etc.
						2 Byte	Setting parameter 1 High byte	
						3 Byte	Setting parameter 1 low byte	
						4 Byte	Setting parameter 1 Lowest byte	
						5 Byte	Setting parameter 2 Highest byte	
						6 Byte	Setting parameter 2 High byte	
						7 Byte	Setting parameter 2 low byte	
						8 Byte	Setting parameter 2 Lowest byte	

This data frame is received by the PCS device in response to the PCS device's operating mode and parameters after the other device sends the Read Special Setup Parameters command type: 0x0B..

**Data frame (ID: 0x1838B4XX): PCS device returns operating mode and parameters**

Sending node: other devices, receiving node: PCS, cycle time:; Burst transmission priority: 6

ID (Hex data)						Data		
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P	R	DP	PF	PS	SA	Bytes	Data name	Note
6	0	0D	XX (0-0xFE)	B4		1 Byte	Setting parameter 3 Highest byte	Refer to Appendix I for operating modes, parameter descriptions, accuracies, offsets, ranges, etc.
						2 Byte	Setting parameter 3 High byte	
						3 Byte	Setting parameter 3 low byte	
						4 Byte	Setting parameter 3 Lowest byte	
						5 Byte	Setting parameter 4 Highest byte	
						6 Byte	Setting parameter 4 High byte	
						7 Byte	Setting parameter 4 low byte	
						8 Byte	Setting parameter 4 Lowest byte	

This data frame is received by the PCS device as a response to the PCS device's operating mode and parameters after the PCS device receives the Read Special Setup Parameters command type 0x0B from another device.

## 六. Other instructions

If the PCS device detects a CAN timeout of 5 seconds without receiving data from other devices, it will report a CAN1 communication fault and shut down.

### Appendix 1 Work Mode Code Table

The working mode and parameter accuracy are as follows: the CAN signal offset is 0, and the range of the set parameters must be within the protection parameter range. In the working mode, the current, power, and resistance are set to negative values, which is the charging mode, set to positive values, and set to discharge mode

Working mode		Parameter 1	Parameter 2	Parameter 3	Parameter 4
Value	meaning	4bytes	4bytes	4bytes	4bytes
0x02	DC constant voltage	Voltage setting (0.001V)			
0x08	DC Constant voltage current limiting	Voltage setting (0.001V)	Maximum charging current (0.001A)	Maximum discharging current (0.001A)	
0x21	DC Constant current	Current setting (0.001A)			
0x22	DC constant power	Power setting (0.001W)			
0x23	DC Constant resistance	Resistance setting (0.001Ω)			
0x24	DC Ramp current	Starting current (0.001A)	end current (0.001A)	Cycle time(0.001s)	

<b>0x25</b>	DC Ramp power	Starting power <b>(0.001W)</b>	End power(0.001W)	Cycle time(0.001s)	
<b>0x26</b>	DC constant magnification	Magnification Setting (0.001)			
<b>0x27</b>	DC Ramp Voltage	Starting voltage <b>(0.001V)</b>	End voltage(0.001V)	Cycle time(0.001s)	
<b>0x28</b>	DC pulse current	Current setting 1 <b>(0.001A)</b>	Current setting 2 (0.001A)	Cycle time(0.01s)	Current setting 1 duty cycle (0.01%)
<b>0x29</b>	<b>DC CC-CV</b>	Voltage Setting <b>(0.001V)</b>	Current Setting (0.001A)	End current (0.001A)	
<b>0x2a</b>	DC pulse resistance	Resistance Setting 1 (0.001Ω)	Resistance Setting 2 (0.001Ω)	Cycle time(0.01s)	Resistance setting 1 duty cycle (0.01%)
<b>0x2b</b>	DC pulse power	Power setting 1 (0.001W)	Power setting 2 (0.001W)	Cycle time(0.01s)	Power setting 1 duty cycle (0.01%)
<b>0x2c</b>	DC Internal resistance test	Current setting (0.001A)	time 1(0.001s)	time 2(0.001s)	time 3(0.001s)
<b>0x40</b>	Ac constant power	Active power setting (0.001W)	Reactive power setting (0.001Var)		
<b>0x41</b>	independent inverter	inverter voltage (0.001V)	inverter frequency (0.001Hz)		
<b>0x61</b>	<b>DC Pulse Voltage</b>	Voltage Setting 1(0.001V)	Voltage setting 2 (0.001V)	Cycle time(0.01s)	Voltage setting 1 Duty cycle (0.01%)
<b>0x91</b>	idle				
<b>0x94</b>	standby				

Appendix 2 Fault Code Table

	Error code(HEX)	Error code	note
<b>1</b>	<b>800D</b>	<b>32781</b>	CAN1 equipment failure
<b>2</b>	<b>800E</b>	<b>32782</b>	CAN2 equipment failure
<b>3</b>	<b>800F</b>	<b>32783</b>	485-1 Communication failure
<b>4</b>	<b>8010</b>	<b>32784</b>	485-2 Communication failure
<b>5</b>	<b>8011</b>	<b>32785</b>	DSP Soft start timeout
<b>6</b>	<b>8012</b>	<b>32786</b>	Emergency stop button pressed
<b>7</b>	<b>8013</b>	<b>32787</b>	Gun head temperature exceeds the limit
<b>8</b>	<b>8014</b>	<b>32788</b>	Detection point 1 Voltage abnormality
<b>9</b>	<b>8015</b>	<b>32789</b>	network disconnection
<b>10</b>	other	other	Internal failure, contact factory

Error code	descriptions	failure condition	Fault handling	Fault recovery
1	Battery voltage too high, over limit	Battery voltage exceeds boundary setting	Check battery voltage and boundary conditions	After troubleshooting, re-run to restore
2	Battery voltage low Over limit	Battery voltage below boundary setting	Check battery voltage and boundary conditions	After troubleshooting, re-run to recover
3	Battery reverse connection	Battery voltage is negative	Check the battery connection cable	After troubleshooting, re-run to recover
4	Current Over Limit	Current exceeds boundary setting	Checking work steps and boundary conditions	After troubleshooting, re-run to recover
5	overtemperature fault	Temperature over 90 °C	Check fan, ambient temperature	After troubleshooting, re-run to recover
6	soft start timeout	Module soft start over 10s	Check the module, contact the manufacturer	After troubleshooting, re-run to recover
15	Overcurrent count exceeds the limit	3 consecutive overcurrents	Checking modules and boundary conditions	After troubleshooting, re-run to recover
16	Ovvoltage count exceeds limit	3 consecutive overvoltages	Check the module, contact the manufacturer	After troubleshooting, re-run to recover
17	power limit	Power exceeds boundary setting	Checking work steps and boundary conditions	After troubleshooting, re-run to recover
18	Emergency stop button pressed	Emergency stop pressed	Check the emergency stop button	After troubleshooting, re-run to recover
26	Slave Failure			After troubleshooting, re-run to recover
257	High grid voltage Fault	Grid voltage > 264V	Check grid voltage	After troubleshooting, re-run to recover
258	Low grid voltage Fault	Grid voltage below 176V	Check grid voltage	After troubleshooting, re-run to recover
265	Input voltage negative sequence fault	Voltage phase sequence reversal	Check input voltage phase sequence	After troubleshooting, re-run to recover
280	Radiator Temperature High Fault	Heat sink temperature over 90 °C	Check fan, ambient temperature	After troubleshooting, re-run to recover
Other	internal failure	Contact the manufacturer	Contact the manufacturer	After troubleshooting, re-run to recover