Equalizer communication protocol

1 Overview

This protocol specif the electrical interface, data format,communication speed, and other contents of the external communication of the equalizer.

2 Communication parameters

The communication parameters are shown in Table 1

Table 1

communication interface	TTL
Baud rate	115200
Data format	8,N,1

3 Communication format

The system adopts a master-slave response method for communication transmission. During the communication process, the equalizer is the slave and the control device is the master.

All communication can only be initiated by the master.

After receiving the command, the slave executes the corresponding operation and returns the result to the master within 2 seconds. If the complete response data frame from the slave is not received after 2 seconds, it indicates that the data transmission has failed. After the master sends a frame of data, it must wait for the slave to return the data or timeout before starting the next command transmission.

The communication content is transmitted in hexadecimal, and the transmission unit is "frame". It is stipulated that data transmission from the master to the slave is for distribution, and data transmission from the slave to the master is for uploading.

4 Frame format sent by the master

Frame header	Address	Read Write Flag	Function code	Data length	Data Content	Check	End of Frame
2Byte	1Byte	1Byte	2Byte	2Byte	length *1Byte	1Byte	1Byte
0x55,0xAA	0x11	0x00	shown in Table 2	0x14,0x00	shown in Table 2	Sum of all previous data accumulation	0xff

Notes:

"Frame header": Represents the beginning of a frame of data, with a length of 2 Bytes and fixed as 0xAA and 0x55.

"Address": Represents the slave number operated by this instruction, with TTL communication fixed as 0X11.

"Read Write Flag": fixed as 0x00.

"Function code": Represents the operation content of the frame.

"Data length": Represents the length of the frame data, which is fixed as 0x14 and 0x00.

"Data Content": Represents the data carried by the frame.

"Check": Using addition and check, is the sum of frame header to frame data.

“End of Frame”: End flag, fixed as 0xFF.

4.1 Frame format uploading by the slave

Frame header	Address	Read Write Flag	Function code	Data length	Data Content	Check	End of Frame
2Byte	1Byte	1Byte	2Byte	2Byte	length *1Byte	1Byte	1Byte
0x55, 0xAA	0x11	0x00	shown in Table 2	0x14, 0x00	The success value is finally set on the lower computer	Sum of all previous data accumulation	0xff

Table 2:

Function code	setting function	Byte size	Set Content Data Type	Setting Value Description
0x05, 0x01	Qty (S)	1Byte	1-Byte unsigned int	set range 2-24S
0x05, 0x02	Startup DifVol (V)	4Byte	4-Byte float	* shown in Notes
0x05, 0x03	Max Equcur(A)	4Byte	4-Byte float	*
0x05, 0x04	StopVol(V)	4Byte	4-Byte float	*
0x05, 0x17	RunVol(V)	4Byte	4-Byte float	*
0x05, 0x16	Soc(AH)	4Byte	4-Byte unsigned int	*
0x05, 0x0d	Equalization switch control	1Byte	1-Byte unsigned int	0: close 1: open
0x05, 0x13	Modifying Bluetooth Name	10Byte	Max 10-Byte str	The name can only contain letters, numbers, and '-'
0x05, 0x14	Buzzer ringing mode	1Byte	1-Byte unsigned int	1: close 2: once
0x05, 0x15	Battery type setting	1Byte	1-Byte unsigned int	1:NCM 2:LFP 3:LTO

*: The range of set values will vary according to the product type and battery type, and the effective range of values will be limited in the computer program.

4.2 Example:

Qty (S)	Upper computer sending	AA 55 11 00 05 01 14 00 X1 00 00 00 00 00 00 00 00 00 XX FF
	Lower computer return	55 AA 11 00 05 01 14 00 X2 00 00 00 00 00 00 00 00 00 XX FF

Notes: If the number of cells sent by the upper computer is 2<=X1<=24, then the lower computer returns X2=X1; Otherwise, if X1<2, then X2=2; If X1>24, X2=24. And X2 returned by the lower machine is the valid value for the final setting.

5 Obtain the battery pack data of the lower computer

When the mobile APP is connected to the lower computer, the lower computer will send one frame of battery pack data every 1 second, which can also be received through the TTL interface. If the connection of the APP is disconnected, the lower computer will stop sending. To obtain the battery pack data, the upper computer needs to send the following command to obtain the battery pack data. After the command is sent, the lower computer sends one frame of battery pack data every second.

Command content (HEX): AA 55 11 01 02 00 14 00 00 00 00 00 00 00 00 00 00 00 27 FF
300 bytes of data content in total:

Starting Byte	Data Content	Byte size	Note
0-1	Frame header	2Byte	0x55, 0xAA
2	Slave address	1Byte	0x11
3	Read Write Flag	1Byte	0x01
4-5	Function code	2Byte	0x02, 0x00
6-7	Data length	2Byte	0x2C, 0x01
8	Packet serial number	1Byte	Add 1 to each packet

9-104	24s battery voltage	4Byte*24 Total 96 Byte	4-Byte float *24
105-200	Undefined	Undefined	All unused are 0,
201-204	Total battery voltage	4Byte	4-Byte float
204-208	Individual average voltage	4Byte	4-Byte float
209-212	Maximum differential pressure	4Byte	4-Byte float
213	Highest cell voltage serial number	1Byte	0-23
214	Minimum cell voltage serial number	1Byte	0-23
215	Undefined	1Byte	Undefined
216	Device running status flag	1Byte	shown in Table 3
217-220	EQU current	4Byte	4-Byte float
221-224	NTC1 temperature	4Byte	4-Byte float
225-228	NTC2 temperature	4Byte	4-Byte float
229-253	Alarm information	25Byte	shown in Table 4
254-257	Run time	4Byte	4-Byte unsigned int
258-297	System Reserved	40Byte	Write all undefined bytes to 0
298	Check Code	1Byte	The sum of all previous bytes
299	Frame end	1Byte	0xFF

Table 3:

Data content	APP corresponding display content	
1	The number of units does not match the setting	
2	EQU line resistance detection in progress	
3	The resistance of the EQU line is too large	
4	System ready	
5	EQU run	
6	EQU completed	
7	Battery low voltage	
8	Main engine temperature is too high	
9	Host failure, please contact the agent	
10	Low battery voltage, EQU stop	
11	Main engine temperature is too high, EQU stop	
12	Self-check completed, system waiting	

Table 4:

First Byte	Battery status detection	0:Battery detection normal	1:Battery detection failed	Bit0→B1.....Bit7→B8
Second Byte	Battery status detection	0:Battery detection normal	1:Battery detection failed	Bit0→B9.....Bit7→B16
Third Byte	Battery status detection	0:Battery detection normal	1:Battery detection failed	Bit0→B17.....Bit7→B24
Fourth Byte	Battery overvoltage protection	0:Battery detection normal	1: Voltage too high	Bit0→B1.....Bit7→B8
Fifth Byte	Battery overvoltage protection	0:Battery detection normal	1: Voltage too high	Bit0→B9.....Bit7→B16
Sixth Byte	Battery overvoltage protection	0:Battery detection normal	1: Voltage too high	Bit0→B17.....Bit7→B24
Seventh Byte	Battery undervoltage protection	0:Battery detection normal	1: Voltage too low	Bit0→B1.....Bit7→B8
Eighth Byte	Battery undervoltage protection	0:Battery detection normal	1: Voltage too low	Bit0→B9.....Bit7→B16
Ninth Byte	Battery undervoltage protection	0:Battery detection normal	1: Voltage too low	Bit0→B17.....Bit7→B24
Undefined				
Undefined				
Undefined				

13th Byte	Linear resistance state	0:Line resistance detection is normal	1: Line resistance detection is Excessive	Bit0→B1.....Bit7→B8
Fourteenth Byte	Linear resistance state	0:Line resistance detection is normal	1: Line resistance detection is Excessive	Bit0→B9.....Bit7→B16
15th Byte	Linear resistance state	0:Line resistance detection is normal	1: Line resistance detection is Excessive	Bit0→B17.....Bit7→B24
16th Byte	NTC Temperature	0 : The NTC temperature is normal	1 : The NTC temperature is Excessive	Bit0→NTC1 Bit1→NTC2
Undefined				