TRIO-PM... CAN BUS Protocol V1.00

Data sheet
112011_en_00

 2025-06-18

1 Description

This document describes the CAN-BUS communication protocol for communication between one or more power modules and a superordinate controller.

Here, the superordinate controller, always handles communication with the bus devices on the linear CAN-BUS.

The CAN-BUS communication protocol supports the following communication method:

– Peer-to-peer

Supported power modules

The following TRIO-PM... power modules are currently supported by the CAN-BUS communication protocol.

Item designation	Item no.
TRIO-PM/1AC/24DC/1500W/PT	1635197
TRIO-PM/1AC/24DC/2500W	1635194
TRIO-PM/1AC/24DC/2500W/PT	1635195
TRIO-PM/1AC/48DC/1500W/PT	1739009
TRIO-PM/1AC/48DC/2500W/PT	1738960

2 Summary

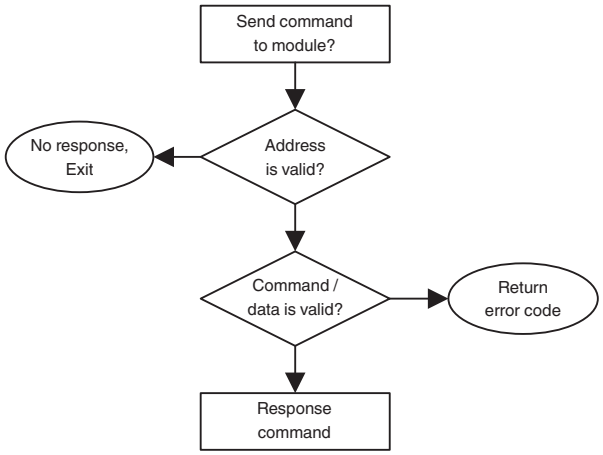
2.1 CAN protocol

– Uses the extended frame mode CAN 2.0B
– The bit rate is 250 kbps at:

Item designation	Item no.
TRIO-PM/1AC/24DC/1500W/PT	1635197
TRIO-PM/1AC/24DC/2500W	1635194
TRIO-PM/1AC/24DC/2500W/PT	1635195
TRIO-PM/1AC/48DC/1500W/PT	1739009
TRIO-PM/1AC/48DC/2500W/PT	1738960

– External termination resistors (120 Ohm) are necessary for terminating the CAN bus

2.2 Communication procedure



2.3 Data type

Send the bytes in a decreasing sequence. Begin with byte 7. Depending on the command number, the data type of the command can contain ASCII and direct data format.

2.3.1 ASCII Format

The data in ASCII Format is in hexadecimal code and can take up a length of 1 to 6 bytes.

2.3.2 Direct Data Format

Direct data format consists of two or four bytes in ASCII format in hexadecimal code.

The decimal number is:

$$X = Y \times 10^{-R} - b$$

Where:

X, decimal number

Y, data in Hex

R, exponent, depends on the command

b, offset, depends on the command

For each command, **R** and **b** are described (refer to 3.3 „Command description“ .

Example: The power supply reports the output voltage with the data 00 F1 (**Y**=241) in hexadecimal. For this command, **R** = 1 and **b** = 0 as described in 3.3 „Command description“ .

3 Frame format application and data definition

3.1 Frame format

Communication between the superordinate charging controller and one or more power module is via CAN 2.0B frames.

The frame format is illustrated in the following table:

Description	Code
Start of frame	SOF (1 bit)
Arbitration field	Identifier (11 bits)
	SRR
	IDE
	Identifier (18 bits)
	RTR
Control field	Reserved (1 bit)
	Data Len (4 bits)
Data field	Data (0-8 bytes)
CRC field	CRC (16 bits)
Ack field	Ack (2 bits)
End of frame	(7 bits)

The data length in this protocol is 8 bytes. The controllable part is comprised of the identifier and the data.

Identifier			Data	
29 bits	Byte 0	Byte 1	...	Byte 7
Identifier	Data (8 bytes)			

3.2 Identifier

28-26	25	24	23-16	15-8	7-0
Priority (3 bit)	Reserved bit (1 bit)	Data page (1 bit)	Command No. (8 bit)	Target address (8 bit)	Source address (8 bit)

3.2.1 Priority bit

Sets the priority of messages from highest (0) to lowest (7) in binary. The chronological order of the messages is more important than the priority. This means that the last message sent represents the current status, even if a message with a higher priority was sent previously.

3.2.2 Reserved bit

Reserved bit value fixed to 0.

3.2.3 Data page

Fixed bit value fixed to 0.

3.2.4 Command No.

Detailed information can be found in 3.3 „Command description“ , 8 bits.

3.2.5 Target address/source address

Describes equal-authority communication between the controller and individual power modules. The request/response pattern is unidirectional.

The address of the power supply is the automatically assigned module address 0xE0 (224). If more than one power supply is to be integrated into one CAN bus, each power supply should first be connected individually to the CAN bus and assigned a different module address. Otherwise, all power supplies on the CAN bus will have the same address (default 0xE0).

It is possible to connect up to 16 power supplies in parallel on one CAN bus via Daisy Chain.
The available addresses are listed in the table below.

Node Name	Target Address/Source Address (SA)
Controller	243 (0xF3)
PSU1	224 (0xE0) default
...	...
PSU16	239 (0xEF)

3.3 Command description

Note
In the following table, please note that the abbreviation Mdl = power module and Ctrl = charging controller in the listed examples.

Command No.	Description							
0x20	**Report Reference Values** Peer-to-peer: Yes, cycle 200 ms							
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not applicable							
	Data Order			High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte
	Response	Control Mode 0x00 = Local 0x01=Remote	Operation 0x00 = Off 0x80 = On	Nominal value (V) (Direct Data, R = 1, b = 0)		Max available voltage (V) (Direct Data, R = 1, b = 0)		Min available voltage (V) (Direct Data, R = 1, b = 0)	
	Example	Mdl report: 18 20 F3 E2		00 00 00 F0 01 2A 00 EB		Mdl #3 is in local control mode, operation off, the nominal voltage is 24.0 V and the available voltage range is 23.5 V ... 29.8 V			
0x21	**Report Output Values** Peer-to-peer: Yes, cycle 200 ms								
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not applicable							
	Data Order	High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte
	Response	Output Voltage (V) (Direct Data, R = 1, b = 0)		Output Current (A) (Direct Data, R = 1, b = 0)		Output Power (W) (Direct Data, R = 1, b = 0)		Protection Status[1]	
	Note	[1] Each bit definition is shown below: Bit 0 Hardware fault 0 - Normal/1 - Fault Bit 1 Software OVP 0 - Normal/1 - Fault Bit 2 Software UVP 0 - Normal/1 - Fault Bit 3 Software OTP 0 - Normal/1 - Fault				Bit 4 Software UTP 0 - Normal/1 - Fault Bit 5 Software OCP 0 - Normal/1 - Fault Bit 6 Software SCP 0 - Normal/1 - Fault Bit 7 Software OPP 0 - Normal/1 - Fault Bit 8 Software Fan 0 - Normal/1 - Fault			
	Example	Mdl report: 18 21 F3 E4		00 01 00 02 00 00 00 08		Mdl #5 PSU's output voltage is 0.1 V, output current is 0.2 A, output power is 0.0 W and PSU is OTP.			
0x22	**Report Temperature Values** Peer-to-peer: Yes, cycle 200 ms								
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not applicable							
	Data order	High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte		
	Response	Temperature (°C) (Direct Data, R = 0, b = 0)		Fan1 Speed Value (rpm) (Direct Data, R = 0, b = 0)		Fan2 Speed Value (rpm) (Direct Data, R = 0, b = 0)		Reserved 0x00	
	Note	1. Fan 1 refers to the fan on the right-hand side when viewing the fans from the front, with the label facing upward. Fan 2 is located on the left-hand side. 2. If the temperature value is negative, subtract 65536 from the decimal value to convert it to degrees Celsius (°C).							
	Example	Mdl report: 18 22 F3 E1		FF F6 0B B8 0C CE 00 00		Mdl #2 PSU temperature is -10 °C, fan1 speed is 3000 rpm, and fan2 speed is 3300 rpm.			
		Mdl report: 18 22 F3 E1		00 32 17 70 18 38 00 00		Mdl #2 PSU temperature is 50 °C, fan1 speed is 6000 rpm, and fan2 speed is 6200 rpm.			
0x23	**Report Firmware Version** Peer-to-peer: Yes, cycle 200 ms								
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not applicable							
	Data order	High Byte					Low Byte		
	Response	Firmware Version (ASCII)						Reserved 0x00	
	Note								
	Example	Mdl report: 18 23 F3 E8		53 30 30 45 30 36 00 00		Mdl #9 PSU's firmware version is S00E06			

Command No.	Description							
0x25	**Report Running Time** Peer-to-peer: Yes, cycle 200 ms							
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not Applicable							
	Data Order	High Byte			Low Byte	High Byte			Low Byte
	Response	Running Time (Direct Data, R = 0, b = 0)				Total Running Time (Direct Data, R = 0, b = 0)			
	Note								
	Example	Mdl report: 18 25 F3 EF		00 00 01 00 00 02 00 00		Mdl #16 PSU running time is 256 minutes, and total running time is 131072 minutes.			
0x27	**Report Replacement Advice** Peer-to-peer: Yes, cycle 200 ms							
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Request	Not Applicable							
	Data Order								
	Response	Replace Advice 0x00 = No action 0x01 = Replace-ment suggestion	Reserved 0x00						
	Note	The replacement advice is calculated based on the ambient temperature and is not a binding specification.							
	Example	Mdl report: 18 21 F3 EC		01 00 00 00 00 00 00 00		Mdl #13 PSU needs replacing.			
0x10	**Control PSU** Peer-to-Peer: Yes							
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Data Order			High Byte	Low Byte				
	Request	Control Mode[1] 0x00 = Local 0x01 = Remote	Control Mode[2] 0x00 = Off 0x80 = On	Set voltage value (V) 1500 W/24DC: 18.5V- 29.5V 1500 W/48DC: 38.0V- 58.0V 2500 W/24DC: 23.5V- 29.8V 2500 W/48DC: 45.0V- 59.0V		Reserved 0x00			
	Response	Not Applicable							
	Note	[1] The output voltage is controlled by local VR when PSU is in local control mode. If a user wants to modify output voltage via CAN message, please switch to remote control first. [2] If a user wants to turn on or off PSU via CAN message, please switch to remote control first.							
	Example	Ctrl sends: 18 10 E6 F3		01 80 01 E0 00 00 00 00		Set Mdl #7 to remote mode, operate on and set voltage value 48 V.			
0x11	**Set CAN Address** Peer-to-Peer: yes							
		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	Data order								
	Request	CAN Address[1] 0xE0 ~ 0xEF	Reserved 0x00						
	Response	Not Applicable							
	Note	[1] Please ensure that only one PSU is connected to this network. The new address will take effect after the next power cycle.							
	Example	Ctrl sends: 18 11 E0 F3		E2 00 00 00 00 00 00 00		Set PSU CAN address to 0xE2.			

Note
If the power supply gets set to "remote" control mode via CAN, it stays in this mode even after a power off. If the CAN gets disconnected, it is not possible to control the output voltage via the potentiometer. Also, if the power supply was turned off via CAN before, the power supply will not start up other than with the CAN command. This can be fixed by turning the control mode to "local" via CAN again.

Note
The interval time for controller requests should be 200 ms.

4 Reference

4.1 Recommended sequence when switching on

– Power on
– Set the output voltage for the power module
– Close the system relay
– Switch the power module on

4.2 Recommended sequence when shutting down

– Switch the power module off
– Open the system relay