CAN Communication Protocol_V1.1

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Overview

The default communication baud rate of the CAN interface is 1MHz, and the upper computer can configure the following baud rate: 1MHz, 500KHz, 250KHz, 125KHz and 100KHz. All CAN messages of the current motor driver are data frames and standard frames. All bytes are in **little-endian byte order**. (The data communication medium between the motor driver and the upper computer is RS485 interface or USB interface)

In particular, the binary length of the frame ID of CAN communication standard frame is 11 bits. In this protocol, the frame ID of the communication frame is composed of two parts: **the upper 7 bits are the command code, and the lower 4 bits are the device ID.** For example: the relative position of the motor with the device address of 1 needs to be controlled to rotate 1000Count ([command code: 0x56] [device address: 0x01]). According to the frame ID composition format of the CAN communication frame of this protocol, the content of the CAN communication frame ID is (0x56<<4 | 0x01) = 0x561. According to the protocol content, the length of data frame DLC is 0x02, and the frame content is 0xe8, 0x03.

The default device address of the motor driver is 0x01.

The device address of the motor driver can be configured through the upper computer, and the configurable range of the address is 1~32. The current address of the device can be obtained according to the flashing status of the green LED on the driver board.

Control Command List

Supported CAN custom control commands are as follows:

CATEGORY	COMMAND CODE	COMMAND FUNCTION DESCRIPTION
Encoder Information	0x20	Motor encoder calibration (the motor has been calibrated before the factory)
	0x21	Set the current position of the motor as the origin
	0x2F	Read encoder real-time data
Motor Running Status	0x40	Read motor status information (voltage, current, temperature, fault code, running status)
	0x41	Clear motor fault code
Motor Control	0x50	After turning off the motor, the motor enters a free state and is not controlled (the motor is in this state after it is powered on)
	0x51	The motor returns to the set origin according to the multi-turn absolute angle
	0x52	The motor returns to the set origin according to the shortest distance, and the rotation angle is not more than 180°
	0x53	Motor open-loop control
	0x54	Motor speed closed-loop control
	0x55	Motor absolute position closed-loop control
	0x56	Motor relative position closed-loop control
	0x57	Read and configure position closed-loop target speed

Single motor Command description

➢ Motor encoder calibration【0x20】

The encoder has been calibrated before the motor leaves the factory. If the user disassembles the motor drive board, he/she needs to execute this command to re-calibrate the motor encoder. Note: When calibrating the motor encoder, please make sure that the motor is in no-load state, and at the same time, do not interfere with the motor rotation during the calibration process.

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x20<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

- The motor responds to the host

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x20<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

➢ Set the current position of the motor as the origin【0x21】

After the motor receives the command, set the current position of the motor as the origin and switch the motor operation mode to off mode

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID = (0x21<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

- The motor responds to the host

SN	Field Content	Content Description (data)
CAN	StdID= (0x21<<4 | DevAddr)	CAN communication frame ID

StdID		(command code + address)
DLC	0x03	Dataframe length
DATA[0]	Low byte of the encoder original angle	Original angle of encoder chip Angle° = val*(360/16384)
DATA[1]	High byte of the encoder original angle	
DATA[2]	Configuration success sign	【0x00: failure】 【0x01: success】

- Read the encoder single-turn absolute angle value, multi-turn absolute angle value and mechanical speed【0x2F】

The range of single-turn absolute is 0x00-0X3FFF (that is, 0~16383).

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x2F<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

- The motor responds to the host

SN	Field Content	Content Description (data)
CAN StdID	StdID = (0x2F<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x08	Dataframe length
DATA[0]	Single-turn absolute angle low byte	Motor single-turn absolute angle（uint16_t） Angle° = val*(360/16384)
DATA[1]	Single-turn absolute angle high byte	
DATA[2]	Multi-turn absolute angle low byte 1	Motor multi-turn absolute angle(int32_t) Total Angle° = val*(360/16384)
DATA[3]	Multi-turn absolute angle byte 2	
DATA[4]	Multi-turn absolute angle byte 3	

DATA[5]	Multi-turn absolute angle high byte 4	
DATA[6]	Mechanical speed low byte	Motor speed （int16_t） Unit: 0.1Rpm
DATA[7]	Mechanical speed high byte	

➢ Read the real-time status information of the motor【0x40】

Real-time voltage, real-time current, real-time temperature, fault code, operating status

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x40<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

- The motor responds to the host

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x40<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x05	Dataframe length
DATA[0]	Voltage	Voltage = val*0.2(V)
DATA[1]	System current	System current = val*0.03(A)
DATA[2]	System temperature	System temperature= val*0.4(℃)
DATA[3]	Fault code	The motor enters off mode after the fault occurs. The red light will flash and the motor is out of control. [Bit0]: Voltage fault [Bit1]: Current fault [Bit2]: Temperature fault
DATA[4]	Operating status	0：Closed state 1：Open-loop mode 3：Speed mode 5：Position mode

- Clear current system faults (voltage fault, current fault, temperature fault)【0x41】

  - The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x41<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

  - The motor responds to the host

    Except for the different response command code, the content that motor responses to the host is the same with the content of 0x40 command code.

- Turn off the motor, it enters the off mode, and is in a free state uncontrolled. The motor is in this mode after powered on.【0x50】

  - The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x50<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

  - The motor responds to the host

    Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

- The motor returns to the set origin according to the current multi-turn absolute angle【0x51】

  - The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x51<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

  - The motor responds to the host

Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

- The motor returns to the set origin with the shortest distance, and the rotation angle is not more than 180°【0x52】

  - The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x52<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x00	Dataframe length

  - The motor responds to the host

    Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

- Motor open-loop control【0x53】

The type of input parameter is int16_t, and the value range is -32768~32767. When the parameter value is a negative number, it means that the motor is in reversion. The greater the Power value, the greater the output power.

  - The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x53<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x02	Dataframe length
DATA[0]	Power value low byte	The data type of output power is int16_t
DATA[1]	Power value high byte	

  - The motor responds to the host

    Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

- Motor speed closed-loop control【0x54】

The parameter type is int16_t, and the value range is -32768~32767. When the parameter value is a negative number, it means that the motor is in reversion. The unit of speed is 0.1RPM.

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x54<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x02	Dataframe length
DATA[0]	Target speed low byte	Target speed, unit: 0.1RPM Data type: int16_t
DATA[1]	Target speed high byte	

- The motor responds to the host

  Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

➢ Motor absolute position closed-loop control【0x55】

One turn of the motor is 16384 counts.

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x55<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x04	Dataframe length
DATA[0]	Target position low byte 1	Target absolute position Count value Data type: uint32_t
DATA[1]	Target position byte 2	
DATA[2]	Target position byte 3	
DATA[3]	Target position high byte 4	

- The motor responds to the host

  Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

➢ Motor relative position closed-loop control【0x56】

The relative movement angle of the motor based on the current position. The data type of the input parameter is int16_t, and the value range is -32768~32767. When the parameter value is a negative number, it means that the motor is in reversion. One turn of the motor is 16384 counts.

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x56<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x02	Dataframe length
DATA[0]	Relative position low byte	Count value of relative movement Data type: int16_t
DATA[1]	Relative position high byte	

- The motor responds to the host

  Except for the different response command code, the content that motor responses to the host is the same with the content of 0x2F command code.

➢ Read and configure position closed-loop target speed【0x57】

Read the current configured position closed-loop target speed of motor, or configure position closed-loop target speed parameter to the motor. After the motor is powered on, the default value of position closed-loop target speed is the value saved to the motor through 0x0E command. The position closed-loop target speed written by current command is just written to the motor, it won't be saved after the power turns off. The motor will move at the configured speed in the absolute position or relative position closed-loop mode after written successfully.

- The host sends to the motor

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x57<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x03	Dataframe length
DATA[0]	Read and write parameter sign	0x00：Read position closed-loop target speed 0x01：Configure position

		closed-loop target speed
DATA[1]	Position closed-loop target speed low byte	When DATA[0] is 0x00, read the position closed-loop target speed, this field can be any value When DATA[0] is 0x01, configure the position closed-loop target speed, this field is the target speed value that needs to be configured. The data type is int16_t, and the unit is 0.1RPM
DATA[2]	Position closed-loop target speed high byte	

- The motor responds to the host

SN	Field Content	Content Description (data)
CAN StdID	StdID= (0x57<<4 | DevAddr)	CAN communication frame ID (command code + address)
DLC	0x02	Dataframe length
DATA[0]	Position closed-loop target speed low byte	The data type of the target speed in the position closed loop mode of the motor feedback is int16_t, and the unit is 0.1RPM
DATA[1]	Position closed-loop target speed high byte	

Attachment: Protocol update log

Protocol version V1.1

1. Modify the 0x54 speed closed-loop control command to support lower speed control, and the speed unit is 0.1RPM
2. Add 0x57 command to read or configure the operating speed of the motor position closed-loop control mode