



MX_SERVE-RS485 Protocol

Translated English Manual - V3.03-1

English technical translation generated from the original Chinese source document. Hex values, register addresses, data types, timing values, and units are preserved.

1. Communication Notes

- The driver RS485 port follows the communication protocol described in this document when communicating with the host controller.
- Each byte uses 10 bits: 1 start bit, 8 data bits, and 1 stop bit. Default baud rate: 9600, configurable.
- Two Modbus function-code commands are supported: 0x03 for reading data and 0x10 for writing data.
- Recommended idle interval between frames is not less than 20 ms.
- Items marked Optional must be requested in advance if the user requires that function.
- If no valid communication is received for 1.5 seconds, the motor stops.

2. Read Communication

2.1 Read driver data

Read data	Address	Type	Unit	Notes
Fault code	0x0000	UInt16		See fault code table
Temperature	0x0001	Int16	deg C	
Power-supply voltage	0x0002	Int16	0.1 V	
Motor 2 current	0x0003	Int16	0.1 A	
Motor 1 current	0x0004	Int16	0.1 A	
Motor 2 speed	0x0005	Int16	r/min	
Motor 1 speed	0x0006	Int16	r/min	

Read command frames

Frame	Fields
Host request	Driver address (0x01-0x7F), function code 0x03, data start address high/low byte, data count high/low byte, CRC_L, CRC_H
Driver response	Driver address (0x01-0x7F), function code 0x03, byte count, data, CRC_L, CRC_H
Error response	Driver address (0x01-0x7F), error code 0x83, error type 0x04, 0x00, CRC_L, CRC_H

2.2 Read test examples

Example 1: host reads the fault code of driver address 1
Request: 01 03 00 00 00 01 84 0A

Response: 01 03 02 00 00 B8 44 // no fault

Example 2: host reads the temperature of driver address 1

Request: 01 03 00 01 00 01 D5 CA

Response: 01 03 02 00 1A 39 8F // temperature: 26 deg C

Example 3: host reads fault code, temperature, power voltage, motor 2 current, motor 1 current, motor 2 speed, and motor 1 speed

Request: 01 03 00 00 00 07 04 08

Response: 01 03 0E xx xx ... xx xx xx

3. Write Communication

3.1 Driver control data table

Setting data	Address	Type	Data content	Unit
Mode and enable	0x00	Uint16	High 8 bits for motor 2: bit0 enable; bit5 coast; bit7-bit6 mode (00 torque, 01 speed, 10/11 reserved). Low 8 bits for motor 1: bit0 enable; bit5 reset enable (optional); bit7-bit6 mode (00 torque, 01 speed, 10/11 reserved).	
Motor 2 speed or torque	0x01	Int16 (-32768 to 32767)		r/min
Motor 1 speed or torque	0x02	Int16 (-32768 to 32767)		r/min
Motor 2 acceleration/deceleration	0x03	Uint16	Speed mode: speed change per second. Torque mode: current change per second.	r/min or A
Motor 1 acceleration/deceleration	0x04	Uint16	Same rule as motor 2.	r/min or A
Motor 2 Kp	0x05	Uint16	Factory default: 1000	
Motor 1 Kp	0x06	Uint16	Factory default: 1000	
Motor 2 Ki	0x07	Uint16	Factory default: 2000	
Motor 1 Ki	0x08	Uint16	Factory default: 2000	

3.2 Write driver control data

Frame	Fields
Host request	Driver address (0x01-0x7F), function code 0x10, data start address high/low byte, data count high/low byte, byte count, driver control data (18 bytes), CRC_L, CRC_H
Driver response	Driver address (0x01-0x7F), function code 0x10, data start address high/low byte, data count high/low byte, CRC_L, CRC_H
Error response	Driver address (0x01-0x7F), error code 0x90, error type 0x04, 0x00, CRC_L, CRC_H

3.3 Write test example (hex)

01 10 00 00 00 09 12 41 41 00 32 00 32 00 64 00 64 03 e8 03 e8 07 d0 07 d0 64 4A

Driver address: 01

Function code: 10

Start address high/low byte: 00 00

Register count high/low byte: 00 09

Byte count: 12

Mode and enable high 8 bits: 41 // motor 2 speed mode, enable on

Mode and enable low 8 bits: 41 // motor 1 speed mode, enable on

Motor 2 speed or torque: 0032 // 50 r/min

Motor 1 speed or torque: 0032 // 50 r/min

Motor 2 acceleration/deceleration: 0064 // 100

Motor 1 acceleration/deceleration: 0064 // 100

Motor 2 Kp: 03e8 // 1000; Motor 1 Kp: 03e8 // 1000

Motor 2 Ki: 07d0 // 2000; Motor 1 Ki: 07d0 // 2000

CRC_L: 64; CRC_H: 4A

4. Fault Code Table

Code	Definition	Code	Definition
0	Normal	1	Driver fault

Code	Definition	Code	Definition
5	Over-current	6	Over-voltage
7	Under-voltage	8	Over-temperature
11	Motor 2 over-speed	12	Motor 1 over-speed
13	Motor 2 overload	14	Motor 1 overload
15	Motor 2 phase loss	16	Motor 1 phase loss
17	Motor 2 phase short	18	Motor 1 phase short
19	Motor 2 encoder fault	20	Motor 1 encoder fault
21	Motor 2 over-temperature	22	Motor 1 over-temperature
23	Motor 2 Hall fault	24	Motor 1 Hall fault
25	Motor 2 stall	26	Motor 1 stall
27	UART communication fault	28	RS485 communication fault
29	CAN communication fault	30	Joystick fault
31	Throttle fault		

5. Driver Test Data - Factory Test Use

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// Read-data tests
01 03 00 00 00 01 84 0A // read register 1, start address 00 00
01 03 00 01 00 01 D5 CA // read register 2, start address 00 01
01 03 00 02 00 01 C5 CB // read register 3, start address 00 02
01 03 00 03 00 01 74 0A // read register 4, start address 00 03
01 03 00 04 00 01 C5 CB // read register 5, start address 00 04
01 03 00 05 00 01 94 0B // read register 6, start address 00 05
01 03 00 06 00 01 64 0B // read register 7, start address 00 06
01 03 00 00 00 07 04 08 // read seven registers, start address 00 00

// Write-data tests
01 10 00 00 00 09 12 01 01 00 00 00 0A 00 64 00 64 03 e8 03 e8 07 d0 07 d0 ac e7
01 10 00 00 00 09 12 01 01 00 0A 00 00 00 64 00 64 03 e8 03 e8 07 d0 07 d0 3e ea
01 10 00 00 00 09 12 01 01 00 0A 00 0A 00 64 00 64 03 e8 03 e8 07 d0 07 d0 26 e0
01 10 00 00 00 09 12 41 41 00 32 00 32 00 64 00 64 03 e8 03 e8 07 d0 07 d0 64 4a
01 10 00 00 00 09 12 41 41 00 00 00 32 00 64 00 64 03 e8 03 e8 07 d0 07 d0 d6 5f
01 10 00 00 00 09 12 41 41 00 32 00 00 00 64 00 64 03 e8 03 e8 07 d0 07 d0 22 f8
01 10 00 00 00 09 12 61 41 00 32 00 32 00 64 00 64 03 e8 03 e8 07 d0 07 d0 6f 80 // coast enabled
01 10 00 00 00 09 12 41 61 00 00 00 00 00 64 00 64 03 e8 03 e8 07 d0 07 d0 89 27 // reset enabled
02 10 00 00 00 09 12 41 41 00 32 00 32 00 64 00 64 03 e8 03 e8 07 d0 07 d0 9b 01
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