Unit-Roller485

I2C Control Protocol

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1、Communication Protocol Structure

1.1 Communication Protocol Parameters

The I2C communication interface is used.
Recommended communication speed: 200-400KHz.

2、Configuration Registers

2.1 Mode Switch(00H)

- Function: Motor enable switch
- Register Address:00H

Address	R/W	Length	Parameter
00	R/W	1 byte	Status

- Input Parameters:

  Status (1byte)：

Parameter	Function	description
0x00	Motor Disable	Motor off
0x01	Motor Enable	Motor on

2.2 Mode Setting(01H)

- Function: Set motor operating mode.
- Register Address:00H

Address	R/W	Length	Parameter
01	R/W	1 byte	Mode

- Input Parameter:

  Mode (1byte)：

Parameter	Function	Description

0x01	Speed Mode	Speed control loop: controls the motor to run at the target speed.
0x02	Position Mode	Position control loop: controls the motor to rotate to the specified position.
0x03	Current Mode	Current control loop: controls the motor to operate at the target working current.
0x04	Encoder Mode	Encoder mode: device acts as an input device to collect current encoder values.

2.3 Motor Over Range Protection(0AH)

- Function: Set motor rotation range protection. When enabled, if the encoder value is <-2100000000 or >2100000000, the motor stops and enters protection state.
- Register Address: 0AH

Address	R/W	Length	Parameter
0A	W	1 byte	Protection

- Input Parameters:

  Protection (1byte)：

  0： Disable rotation range protection

  1： Enable rotation range protection

2.4 Remove Protection(0BH)

- Function: Remove Jam protection. When the jam protection is triggered, send this command to unlock.
- Register Address: 0BH

Address	R/W	Length	Parameter
0B	W	1 byte	Status

- Input Parameters:

  Status (1 byte):

1：Remove Jam Protection

2.5 Motor Status(0CH)

- Function: Motor working status.
- Register Address: 0CH

Address	R/W	Length	Parameter
0C	R	1 byte	Status

- Input Parameter：

Status (1byte)：

0: Standby

1: Running

2: Error

2.6 Motor Error(0DH)

- Function: Motor error status codes.
- Register Address: 0DH

Address	R/W	Length	Parameter
0D	R	1 byte	Status

- Input Parameter：

Status (1byte)：

1: Overvoltage

2: Jam

4: Over Range

2.7 Button Switch Mode(0EH)

- Function: Enable button mode switching.
- Register Address: 0EH

Address	R/W	Length	Parameter
0E	R/W	1 byte	Status

- Input Parameter：

Status (1byte)：

0: Disable button mode switching

1: Enable button mode switching (long press for 5 seconds to switch motor working mode)

2.8 Motor Jam Protection(0FH)

- Function: Enable or disable motor jam protection. When jam protection is triggered, the motor locks and stops rotating. Send the Remove Protection command to unlock.
- Register Address: 0FH

Address	R/W	Length	Parameter
0F	R/W	1 byte	Status

- Input Parameters：

Status (1byte)：

0: Disable jam protection

1: Enable jam protection

2.9 Device ID (10H)

- Function: Set device ID.
- Register Address: 10H

Address	R/W	Length	Parameter
10	R/W	1 byte	ID

- Input Parameters:

ID (1byte)：

0-255: New device ID

2.10 RS485 Baud Rate(11H)

- Function: Set RS485 communication baud rate.
- Register Address: 11H

Address	R/W	Length	Parameter
11	R/W	1 byte	Baud

- Input Parameters:

Baud(1byte):

0: 115200 bps

1: 19200 bps

2: 9600 bps

2.11 RGB LED Brightness(12H)

- Function: Control the brightness of the RGB LED.
- Register Address: 12H

Address	R/W	Length	Parameter
12	R/W	1 byte	Brightness

- Input Parameters:

Brightness (1byte):

0-100

2.12 RGB LED Color(30H)

- Function: Control the color of the RGB LED.
- Register Address: 30H

Address	R/W	Length	Parameter
30	R/W	3 bytes	Color

- Input Parameters:

Color(3byte):

Byte0: RGB-B value

Byte1: RGB-G value

Byte2: RGB-R value

2.13 RGB LED Mode(33H)

- Function: Control the RGB LED operating mode.
- Register Address: 33H

Address	R/W	Length	Parameter
33	R/W	1 byte	Mode

- Input Parameters:

  Mode(1byte):

  0: Default system state display

  1: User-defined control

3、Speed Loop Control Registers

3.1 Speed Setting(40H)

- Function: Configure the target speed (RPM)
- Register Address: 40H

Address	R/W	Length	Parameter
40	R/W	4 bytes	Speed

- Parameters:

  Speed (4byte):

  Speed Setting = Speed Setting-byte0 + Speed Setting-byte1 * 256 + Speed Settingbyte2 * 65536 + Speed Setting-byte3 * 16777216

  Actual Speed Setting = Speed Setting / 100

  Range: -2100000000 ~ +2100000000

3.2 Speed Max Current Setting(50H)

- Function: Configure the maximum current limit for the target speed.
- Register Address: 50H

Address	R/W	Length	Parameter
50	R/W	4 bytes	Max Current

- Parameters:

  Max Current (4byte):

  Max Current = Max Current-byte0 + Max Current-byte1 * 256 + Max Current-byte2 * 65536 + Max Current-byte3 * 16777216

Actual Max Current = Max Current / 100

Range: -120000 ~ +120000

3.3 Speed Readback(60H)

- Function: Read the current motor speed value (RPM)
- Register Address: 60H

Address	R/W	Length	Parameter
60	R	4 bytes	Speed Readback

- Parameters:

Speed Readback (4byte):

Speed Readback = Speed Readback-byte0 + Speed Readback-byte1 * 256 + Speed Readback-byte2 * 65536 + Speed Readback-byte3 * 16777216

Actual Speed Readback = Speed Readback / 100

3.4 Speed PID Configuration(70H)

- Function: Configure PID parameters for the speed control loop.
- Register Address: 70H

Address	R/W	Length	Parameter
70	R/W	4 bytes	P
74	R/W	4 bytes	I
78	R/W	4 bytes	D

- Parameters:

P / I / D (4 byte):

PID setting value = PID-byte0 + PID-byte1 * 256 + PID-byte2 * 65536 + PID-byte3 * 16777216

P setting value = P * 10e5 = P * 100000

I setting value = I * 10e7 = I * 10000000

D setting value = D * 10e5 = D * 100000

4、Position Loop Control Registers

4.1 Position Control(80H)

- Function: Configure the target position.
- Register Address: 80H

Address	R/W	Length	Parameter
80	R/W	4 bytes	Position

- Parameters:

  Position (4byte):

  Position Setting = Position Setting-byte0 + Position Setting-byte1 * 256 + Position Setting-byte2 * 65536 + Position Setting-byte3 * 16777216

  Actual Position Setting = Position Setting / 100

  Range: -2100000000 ~ +2100000000

4.2 Position Max Current Setting(20H)

- Function: Configure the maximum current limit for the target position.
- Register Address: 20H

Address	R/W	Length	Parameter
20	R/W	4 bytes	Current

- Parameters:

  Max Current (4byte):

  Max Current = Max Current-byte0 + Max Current-byte1 * 256 + Max Current-byte2 * 65536 + Max Current-byte3 * 16777216

  Actual Max Current = Max Current / 100

  Range: -120000 ~ +120000

4.3 Position Readback(90H)

- Function: Read the current position value.
- Register Address: 90H

Address	R/W	Length	Parameter
90	R	4 bytes	Position Readback

- Parameters：

Position Readback (4byte)：

Position Readback = Position Readback-byte0 + Position Readback-byte1 * 256 + Position Readback-byte2 * 65536 + Position Readback-byte3 * 16777216

Actual Position Readback = Position Readback / 100

4.4 Position PID Configuration(A0H)

- Function: Configure PID parameters for the position control loop.
- Register Address: A0H

Address	R/W	Length	Parameter
A0	R/W	4 bytes	P
A4	R/W	4 bytes	I
A8	R/W	4 bytes	D

- Parameters:

P / I / D (4 byte)：

PID setting value = PID-byte0 + PID-byte1 * 256 + PID-byte2 * 65536 + PID-byte3 * 16777216

P setting value = P * 10e5 = P * 100000

I setting value = I * 10e7 = I * 10000000

D setting value = D * 10e5 = D * 100000

5、Current Loop Control Instruction Set

5.1 Current Control(B0H)

- Function: Configure the target operating current.
- Register Address: B0H

Address	R/W	Length	Parameter

B0	R/W	4 bytes	Current

- Parameters：

Current (4byte)：

Current Setting = Current Setting-byte0 + Current Setting-byte1 * 256 + Current Setting-byte2 * 65536 + Current Setting-byte3 * 16777216

Actual Current Setting = Current Setting / 100

Range: -120000 ~ +120000

5.2 Current Readback(C0H)

- Function: Read the current operating current.
- Register Address: C0H

Address	R/W	Length	Parameter
C0	R	4 bytes	Current

- Parameters:

Current (4byte)：

Current Readback = Current Readback-byte0 + Current Readback-byte1 * 256 + Current Readback-byte2 * 65536 + Current Readback-byte3 * 16777216

Actual Current Readback = Current Readback / 100

6、Status Read Registers

6.1 Power Vin(34H)

- Function: Read the current input voltage value of the motor (V). The read value is VIN*100. Refer to the formula below to calculate the actual input voltage.
- Register Address: 34H

Address	R/W	Length	Parameter
34	R/W	4 bytes	VIN

- Parameters:

VIN(4byte)：

```
VIN X100 = VIN X100-byte0 + VIN X100-byte1 * 256 + VIN
X100-byte2 * 65536 + VIN X100-byte3 * 16777216

Actual VIN = VIN X100 / 100
```

6.2 Internal Temperature(38H)

- Function: Internal reference temperature value register (°C). The temperature is for internal status reference only and may not be accurate.
- Register Address: 38H

Address	R/W	Length	Parameter
38	R/W	4 bytes	Temperature

- Parameters:

Temperature(4byte)：

```
Temp = Temp-byte0 + Temp-byte1 * 256 + Temp-byte2 * 65536 +
Temp-byte3 * 16777216
```

6.3 Encoder Counter(3CH)

- Function: In encoder operating mode, read the encoder value.
- Register Address: 3CH

Address	R/W	Length	Parameter
3C	R/W	4 bytes	Encoder Counter

- Parameters:

Encoder Counter (4byte)：

```
Encoder Counter = Encoder Counter-byte0 + Encoder
Counter-byte1 * 256 + Encoder Counter-byte2 * 65536 + Encoder
Counter-byte3 * 16777216
```

6.4 Save Flash(F0H)

- Function: Save parameters to flash.
- Register Address: F0H

Address	R/W	Length	Parameter
F0	W	1 byte	Save

- Parameters:

Save (1byte)： 1

6.5 Firmware Version (FEH)

- Function: Firmware version register.
- Register Address: FEH

Address	R/W	Length	Parameter
FE	R	1 byte	Version

- Parameters:

Version(1byte)：

1-127

6.6 I2C Address (FFH)

- Function: Change I2C address.
- Register Address: FFH

Address	R/W	Length	Parameter
FF	R/W	1 byte	Address

- Parameters:

Address(1byte)：

1-127