M6 2C

112

规格书

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Direct Drive Tech
本末科技

Content

◆ Disclaimer

Thank you for purchasing the M series permanent magnetic synchronous motor (hereinafter referred to as "motor") from Dongguan Direct Drive Technology Co., Ltd. (hereinafter referred to as Direct Drive Tech). This manual has been published to guide the use of this product.

Before starting operation, please be sure to read through this manual carefully and follow the relevant instructions to avoid injury or damage. By using this product, you are deemed to have accepted all the terms and contents of the specification and all relevant documents of this product. You promise to use this product only for legitimate purposes and take full responsibility for the possible consequences of using this product. Direct Drive Tech shall not be responsible for any damage, injury, or legal liability caused by the direct or indirect use of this product.

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◆ Safety Precautions

1. Before starting operation, make sure whether the working voltage is the one specified in this manual.

2. Make sure the motor is used within the specified ambient temperature range.
3. Avoid soaking the motor in water. Failure to do this may result in abnormal operation or damage to the motor.
4. Before starting operation, be sure to correctly and securely perform the cable to avoid loose contact.

5. Before starting operation, refer to the installation guidelines to make sure the motor is installed correctly and securely.
6. Before starting operation, refer to the installation guidelines to make sure the external output part of the motor is installed correctly and securely.

7. During operation, avoid damaging the cables. Failure to do this may result in abnormal operation or damage to the motor.
8. During operation, do not touch the rotating parts of the motor. This may result in injury.

9. When the motor produces high torque output with heat generation, do not touch the motor. This may result in scald.

10. Do not disassemble the motor without permission. This may result in abnormal operation or damage to the motor and bring protentional safety hazards.

◆ Introduction

M15 series motor is an independently developed product by Direct Drive Technology Co., Ltd. This product is a highly reliable permanent magnet synchronous motor, integrating external rotor BLDC motors, encoder, and servo system based on the concept of integration development. It has compact structure, ease of installation, stability in operation, small size and large torque, which is especially suitable for the following direct drive fields: robotics, : robots, AGVs, automation equipment, warehousing logistics, etc. By optimizing the number of poles and wedges, wedge shape, air gap, permanent magnet materials, etc., the motor can ensure larger torque output, less torque fluctuations, and provides high-performance direct drive application solutions. The motor driver embeds the field-oriented control (FOC) algorithm. Together with the high-precision sensor, the motor achieves great control accuracy and nice mute effect. The drive has a complete and reliable motor OBD monitoring and protection mechanism to ensure the safe and reliable operation of the motor.

◆ Product Features

1. Integrated design of motor and motor driver.

2. 485 communication mode supported.

3. Special design in structure allows the sensor to measure the overall temperature of motor.

4. Angle, velocity, current, fault value and other information of the motor can be obtained through communication.

5. Equipped with hall sensing and protections.

6. Electrical brake supported.

◆ Prduct List

Motor Assembly
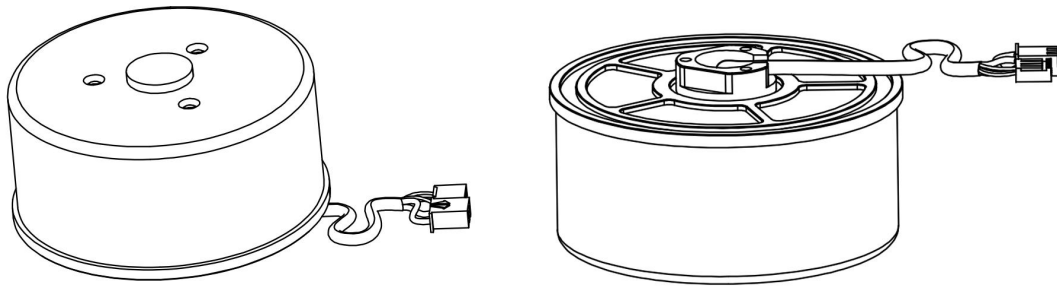
# ◆ Motor Driver Interface and Cable Instructions
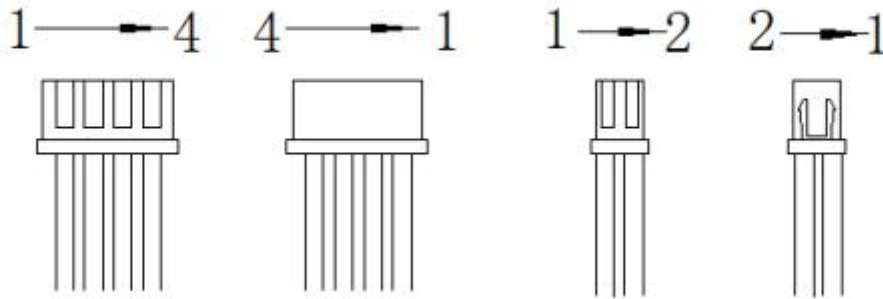
| | Signal line | Battery line |

| Type	Index	Name	Label	Description
Signal Cable (ZH1.5*4P)	1	GND	Signal Ground	Connected to Power Negative
	2	A	DATA+	485 bus A
	3	B	DATA-	485 bus B
	4	/		Reserved
Power Cable (XH2.54*2P)	1	VCC	Power Positive	Maximum 24 VDC input
	2	GND	Power Negative	

Please refer to the size and position of the motor mounting holes to install the motor on the custom device.
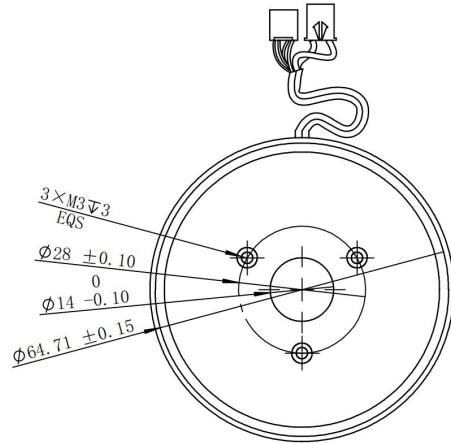
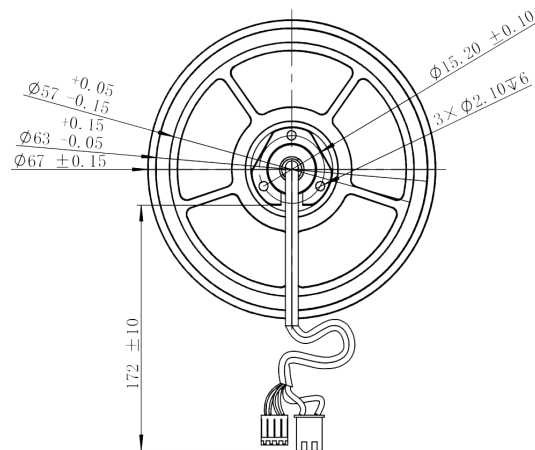Bottom View
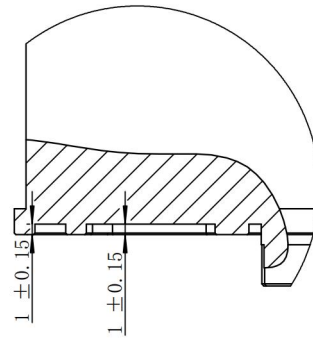
Local Vision, Rate 2 : 1
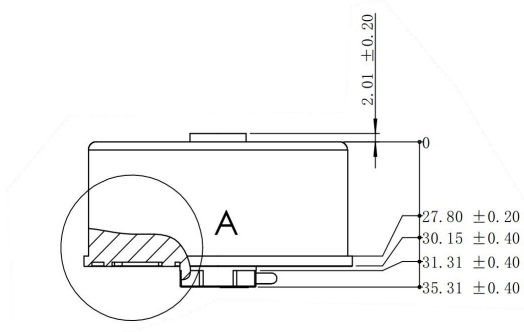
Side View

Vertical View

The screw hole on the rotor is M3, 4mm depth, distributed at ϕ28 circularly.

The installation hole on the stator is M2 (ϕ2.1), 6mm depth, distributed at the ϕ15.2 circle and the 8mm flat position.

Please choose proper screws for installation.

◆ M0602C_112 Motor Driver Instructions

1. The motor can communicate with the computer with a USB To 485 tool.

   Firmware update is possible through the computer.

2. The motor driver follows the user input through current loop or velocity loop.

◆ Communication Method

485 Bus Communication

Follow the protocol, send corresponding messages through the 485 to control the

motor.

◆ Communication Protocol

Baud rate：115200   **Data bit**：8bit   **Stop bit**：1bit   **Parity check**：none

Data length：10 字节

method：polling

maximum frequency： 500 Hz

Current Mode：-32767~32767 correspond to 0~8A，INT16

Velocity Mode：-330~330 rpm，INT16

Angle Mode：0~32767correspond to 0°~360°，UINT16

Operation steps：

①Set the motor ID (save in FLASH when power off)

②Set motor mode (current loop, velocity loop, angle loop，default in velocity loop）

③Send the set value

1、 Spin the motor

Command										
Date field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	ID	0x64	Velocity/ Current/ Angle loop set, high 8 bits	Velocity /Current /Angle loop set, high 8 bits	0	0	Ac cel erat ion	Brak e	0	CRC8
Feedback										
Date field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	ID	mode	Current High 8 bits	Current Low 8 bit	Veloc ity High 8 bits	Veloc ity Low 8 bits	An gle Hig h 8 bits	Angl e Low 8 bits	Fault value	CRC 8

Acceleration：Valid in velocity loop. unity: RPM/0.1ms. When set to 0, it would be the default value

Brake：Valid in velocity loop when the value is 0XFF. Brake won't work at other values.

2、Obtain other feedback

Command										
Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri-ption	ID	0x74	0	0	0	0	0	0	0	CRC8

feedback										
Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri-ption	ID	mode	Current High 8 bits	Current Low 8 bit	Velocity High 8 bits	Velocity Low 8 bits	Stator temperature	Angle in 8 bits	Fault value	CRC8

Angle in 8 bits：0~256 corresponds to 0~360°

Stator temperature ：unity：℃

Fault value ：

Fault value	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Descrip-tion	Reserved	Reserved	Reserved	Over heat	Stall	Phase Over current	Bus over current	Sensor Fault

E.g.：0x02　or 0b00000010　　corresponds to Bus over current.

CRC8：

Use CRC-8\Maxim algorithm to validate the value from DATA[0] to DATA[]

CRC-8\Maxim：x8 + x5 + x4 + 1

3、 Mode switching:

Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	ID	0xA0	0	0	0	0	0	0	0	Mode

mode：

0x01 ： Current loop

0x02 ： Velocity loop

0x03 ： Angle loop

Only when the velocity is lower than 10 rpm that switching to angle loop is available.

4、 ID setting

Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	0xAA	0x55	0x53	ID	0	0	0	0	0	0

Note：When setting the ID, please make sure that the bus has only one motor.
ID setting is allowed once every power reset.
The ID will be changed after 5 times repeating the ID setting command.

5、ID check:

Command										
Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	0XC8	0x64	0	0	0	0	0	0	0	CRC8
Feedback										
Data field	DATA [0]	DATA [1]	DATA [2]	DATA [3]	DATA [4]	DATA [5]	DATA [6]	DATA [7]	DATA [8]	DATA [9]
Descri -ption	ID	mode	Curre nt High 8 bits	Curre nt Low 8 bit	Veloci ty High 8 bits	Veloci ty Low 8 bits	Stator tempe rature	Angle in 8 bits	Fault value	CRC8

Note: When checking the ID, please make sure that the bus has only one motor.

◆ Protection

1、Bus current protection threshold： Approximately 3A，motor power off, and recover after 5 seconds.

2、Over temperature threshold：Approximately 80℃，recover if the temperature is 5℃ lower than the threshold.

3、Phase current protection threshold：Approximately 4.6A，motor power off, and recover after 5 seconds.

4、Stall protection：motor power off after five seconds of stalling，and recover after 5 seconds.

◆ Firmware update

The motor can connect the PC with USB To 485 tool. Firmware update is available

on DDT TOOL software.

◆ Motor parameters

Motor parameters with M6 built-in driver

Unload velocity	315rpm±10rpm
Unload current	≤0.25A
Rated velocity	200rpm
Rated torque	0.55Nm
Rated current	1.45A
Maximum efficiency	≥50%
Stall torque	1.1Nm
Stall current	≤3.5A
Rated voltage	18VDC
Torque constant	0.37Nm/A
Velocity constant	17.5rpm/V
Ambient temperature	-20℃~45℃
Motor weight	300g
Encoder resolution	4096
Absolute accuracy	1024
Noise level	≤52dB

Note: The parameters are tested under 18VDC.

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