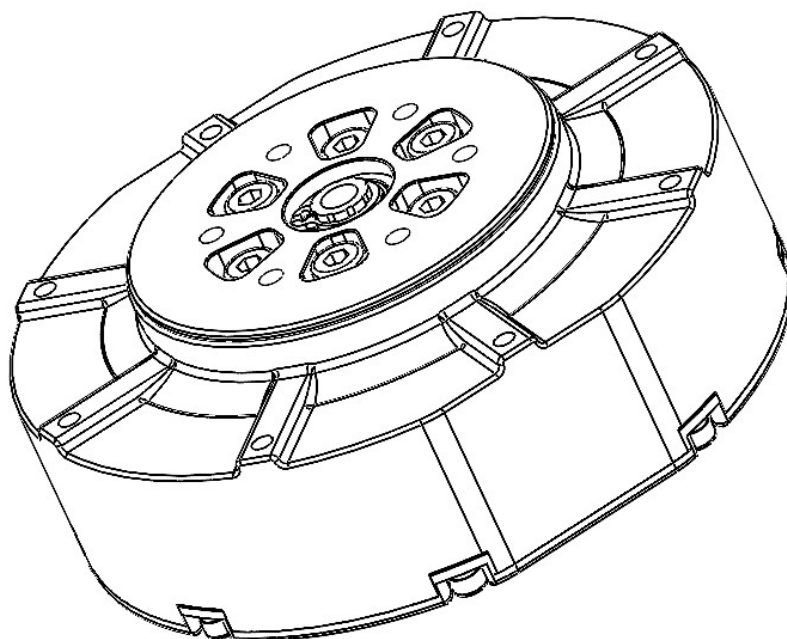


GO-M8010-6 Motor

User Manual V1.0



Unitree

www.unitree.cc/cn

Catalogue

Disclaimer	2
Symbol Description	2
Notes for Using.....	2
Introduction.....	3
1. Specification and Parameters	3
2. Dimensional Drawing	4
3. Electrical Connection Introduction	4
4. Specifications of Connectors	5
5. Performance Parameter	6
6. Software Support	7
7. Control Characteristics.....	7

Disclaimer

Thank you for purchasing GO-8010-6 motor. Please read this statement carefully before use, and once used, it is deemed to be a recognition and acceptance of the entire contents of this statement. Please strictly follow the manual to use this product. Unitree Robotics will not bear any liability for any loss caused by improper use, installation, and modification by users.

Unitree is a trademark of Unitree Robotics. The product names and brands, etc. appear in this article are trademarks or registered trademarks of the company to which they belong. Unitree Robotics owns the copyright of this product and the user manual. It may not be reproduced or reprinted in any form without our permission.

There may be semantic differences in the disclaimer in different languages. Please follow the Chinese version in China and the English version in other regions.

Symbol Description



Important Note



Operation, Tips for Use

Notes for Using



- If used improperly, the large torque of the motor may cause serious injury and damage to personal property. Therefore, when using, it is very important to pay attention to safety.
- The GO motor has a large torque. To avoid potential safety risks, please operate with caution. Non-professional users and persons under the age of 18 should not use it.

1) The maximum allowable voltage of the GO motor is 30V, please be sure to operate following the relevant safety regulations.

2) When using AC-DC/DC-DC switching power supply, it is forbidden to insert the XT30 2+2 power supply connector with power on. Please connect the motor power supply plug before turning on the power supply. (Because the voltage range of some SMPS is insufficient, power-on will cause a strong peak voltage and damage the motor drive)

3) If there is a [power generation condition](#) when the motor is working, please ensure that your power supply has the ability to recover or use battery power to avoid overloading the bus voltage.

4) Please pay attention to controlling the motor parameters when using, do not make the output torque or speed too large.

5) Please check if the motor is normal and if there is a motor stall, etc. before use. If any abnormal, please replace it in time.

6) Please pay attention to the temperature of the motor and do not touch its surface to avoid burns.

7) When installing and unloading the mechanical structure of the output terminal, be sure to disconnect the motor power.

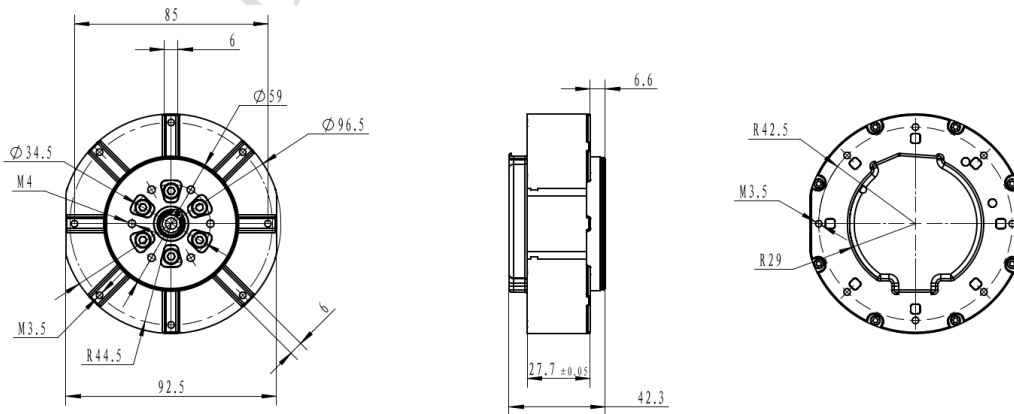
Introduction

The GO motor is a highly integrated permanent magnet synchronous motor. The robot dog Go1 consists of 12 motors of GO. The motor composes of the stator, rotor, driver board, reducer, encoder, and bearing. It makes the complex control system modularized and the installation and debugging simple and quick. This motor can be used for various products such as robotic arms, PTZs, exoskeletons, robots, etc.

1. Specification and Parameters

Function	Parameters
Model	GO-M8010-6
Size(length*width*height)	96.5mm x 92.5mm x 42.3mm
Weight	About 530g
Working Voltage	12~30VDC, 24VDC is recommended
Maximum Relative Current	40A
Maximum Torque	23.7NM
Maximum Revolution Speed	30 rad/s(24V power supply hour)
Torque Constant	0.63895 Nm/A
Reduction Ratio	1:6.33
Communication Mode	High Speed 485
Communication Baud Rate	4Mbit/s
Communication Control Frequency	6KHz
Temperature Sensor	Yes
Rotor Absolute Value Encoder	15bit
Motor Sensory Feedback	Torque, Angle, Angular Velocity, Temperature
Motor Control Directive	Torque, Angle, Angular Velocity, Temperature, Stiffness, Damping
Usage Environment	-5°C~40°C

2. Dimensional Drawing

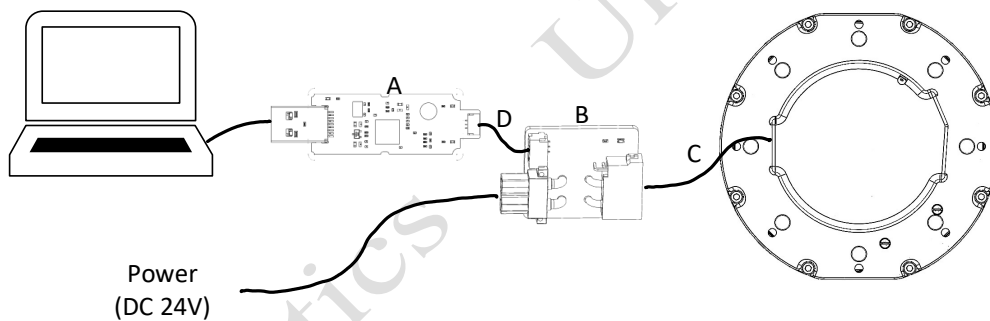


3. Electrical Connection Introduction

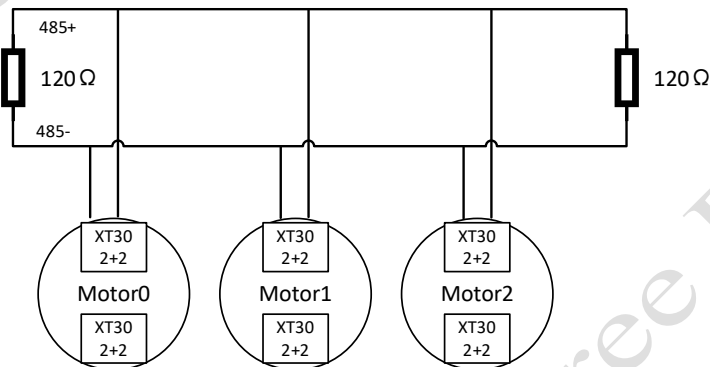
The following accessories need to be prepared.

- A) 485rpm USB module.
- B) XT30 (2+2) adapter board.
- C) XT30 (2+2) cable.
- D) GH1.25-3 cable.

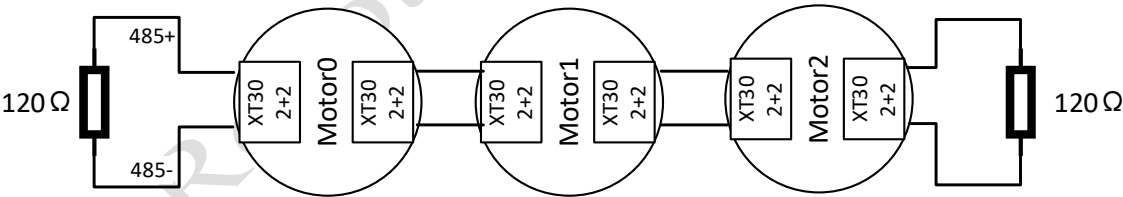
Connect as shown below:



When using multiple motors, the motors can be cascaded in multiple batches, and it requires the 120Ω matching resistor added to the motor head and motor end. Figure (a) and (b) shown below are the electrical connection method:



(a)



(b)

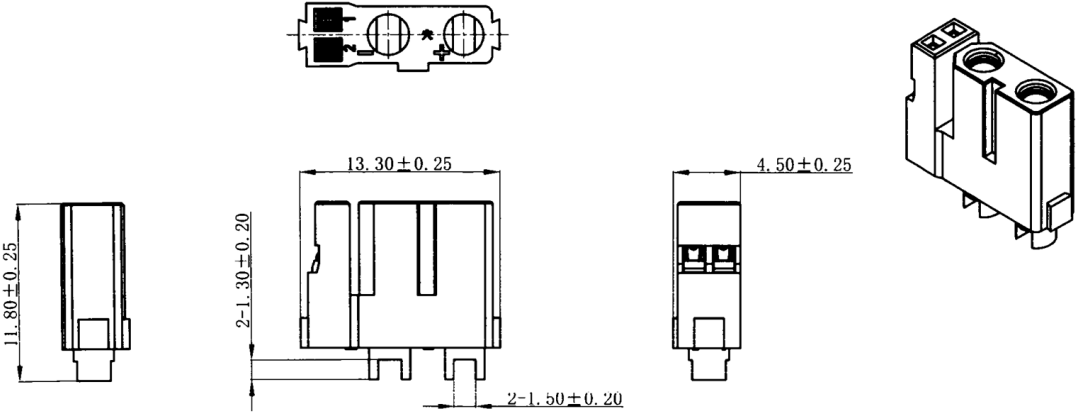
● In the case of using multiple motors, the 120Ω matching resistor must be added to the motor head and motor end to ensure electrical integrity. When facing serious communication packet loss, please check if the matching resistor on the line is used correctly.

● Note that when using the motor, the size of the power wire should be at least above 16AWG, otherwise the motor will work because of the high voltage drop of the line.


4. Specifications of Connectors

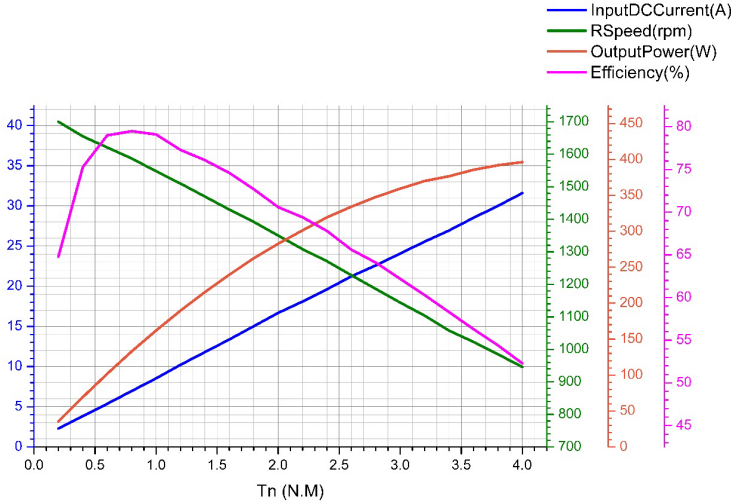
Model:	XT30(2+2)-F
Brand:	AMASS
Rated Current	20A MAX(16AWG) signal pin: 1A
Contact Resistance	≤1.2mΩ
Service Life	100 times

Connector Dimensional Drawing:

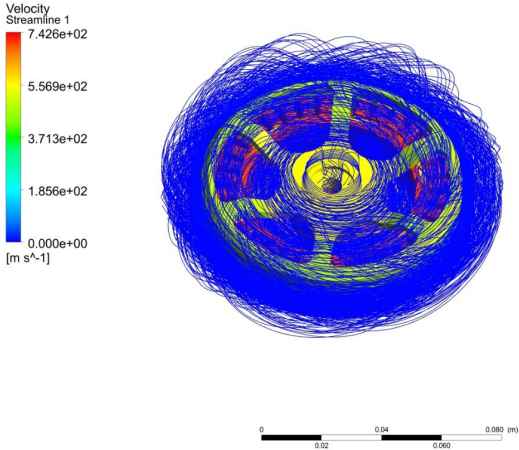


5. Performance Parameter

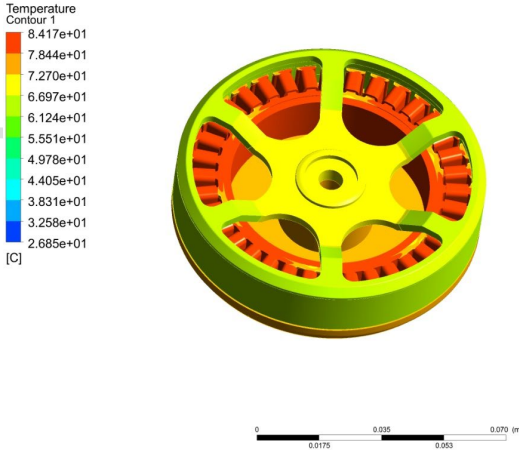
 Please use the Go motor reasonably according to the following performance parameters.



FOC Controlled Characteristic Graph



Moor Streamline Chart



Motor Temperature Chart

6. Software Support

SDK supports the following platforms and systems:

- 1) Linux system under platform x86/x64
- 2) Linux system under platform ARM32/ARM64

With each support, a code example of C++ is provided, and users only need to follow the example to complete the control of the motor.



- Detailed SDK please download in <https://github.com/unitreerobotics>.

7. Control Characteristics

As a highly integrated power unit, Go motor has encapsulated the underlying control algorithm. Users only need to send the relevant command to the joint motor, and then the motor can complete the torque output from the command to the joint.

5 motor control commands included as follow:

- 1) Feedforward Torque:Tff
- 2) Specify Angle Position:Pdes
- 3) Specify Angular Velocity:ωdes
- 4) Position Stiffness:kp
- 5) Speed Stiffness (damping):kd

In the hybrid control of joint motor, users provide deviation feedback of the motor at the output position to the torque output by using PD controller.

$$T = T_{ff} + k_p \times (P_{des} - P) + k_d \times (\omega_{des} - \omega)$$

T is the motor rotor output torque of the joint motor, P is the current angular position of the motor rotor, and ω is the angular velocity of the motor rotor.

In the actual use of the joint motor, attention need to be paid to the conversion of the control target amount of the motor output and the command of the motor rotor sent.



- For specific motor control manual, please refer to "Motor User Manual GO-M8010-6".

Reserve the right to update the contents without prior notice.

You can check the latest version of the User Manual on the Unitree Robotics official website.

<https://www.unitree.com/cn>



Scan the WeChat
Follow Unitree Robotics official account