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› Bolisila GIM8108-6 Mini Four-Legged Robot Servo Motor Joint Module Reducer with MIT Driver User Manual

## Bolisila GIM8108-6

# Bolisila GIM8108-6 Mini Four-Legged Robot Servo Motor Joint Module Reducer with MIT Driver User Manual

## INTRODUCTION

This manual provides essential information for the proper installation, operation, and maintenance of your Bolisila GIM8108-6 Mini Four-Legged Robot Servo Motor Joint Module Reducer with MIT Driver. This high-performance joint module is designed for robotic applications requiring precise control, high torque, and efficient operation. Please read this manual thoroughly before using the product to ensure safe and optimal performance.

## SAFETY INFORMATION

Observe the following safety precautions to prevent injury and damage to the product:

- Ensure the power supply voltage matches the specified input voltage ( $24V \pm 10\%$ ). Incorrect voltage can damage the motor.
- Do not attempt to disassemble or modify the motor. Unauthorized modifications can lead to malfunction and void the warranty.
- Keep the motor away from water, excessive dust, and corrosive environments. The motor has an IP54 protection grade, but extreme conditions should be avoided.
- Handle the motor with care to avoid dropping or impacting it, which could damage internal components.
- Ensure proper ventilation during operation to prevent overheating.
- Disconnect power before performing any maintenance or installation procedures.

## PRODUCT OVERVIEW

The GIM8108-6 is a compact and powerful servo motor joint module featuring a planetary gear reducer and a 12-bit resolution MagAlpha MA702 encoder. It is designed for applications requiring high torque and precise angular positioning, such as in four-legged robots and other advanced robotic systems. This variant includes an MIT driver for enhanced control capabilities.



Figure 1: Top view of the GIM8108-6 motor joint module. This image shows the circular housing, central output shaft, and mounting points around the perimeter.

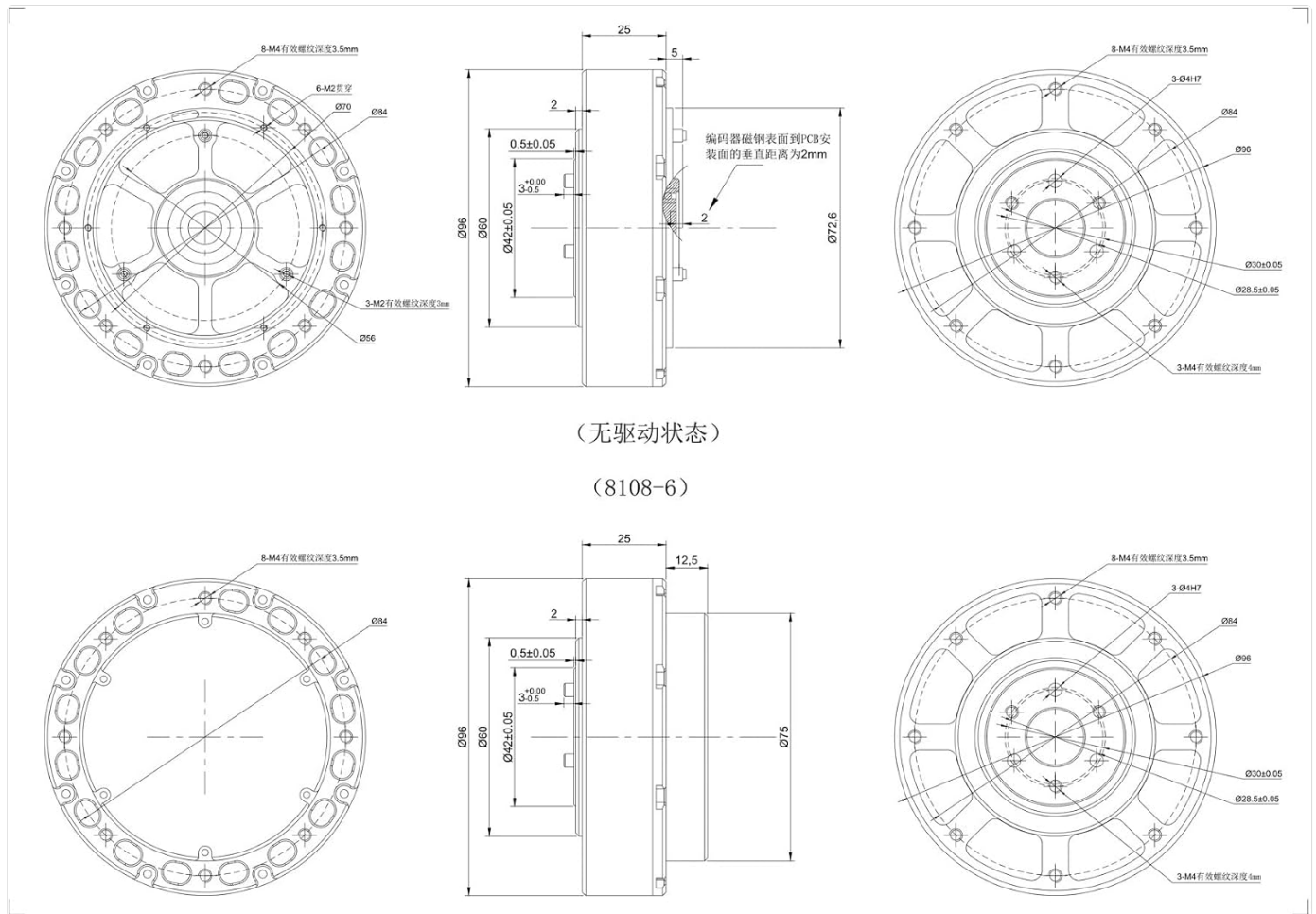


Figure 2: Technical drawing illustrating the dimensions and mounting hole patterns for the GIM8108-6 motor, both without and with the driver. Key dimensions such as diameter ( $\varnothing 96\text{mm}$ ) and thickness are shown.

## SETUP

Follow these steps for proper installation of the GIM8108-6 motor joint module:

- Mounting:** Securely attach the motor to your robotic structure using the designated mounting holes. Refer to the technical drawing (Figure 2) for precise dimensions and hole patterns. Ensure all fasteners are tightened appropriately to prevent vibration and movement during operation.
- Power Connection:** Connect the motor to a stable 24V DC power supply. Verify polarity before connecting to avoid damage. The input voltage should be within  $24\text{V} \pm 10\%$ .
- Communication Connection:** Establish communication via the CAN bus interface. Connect the CAN\_H and CAN\_L lines to your control system. Ensure proper termination resistors are used on the CAN bus if required by your network topology.
- Driver Integration (MIT Driver):** This model comes with an integrated MIT driver. Ensure the driver is correctly configured and initialized according to your control system's requirements.
- Initial Testing:** Before full operation, perform a low-power test to verify basic functionality and communication. Observe for any unusual noises or movements.

## OPERATING INSTRUCTIONS

The GIM8108-6 motor is designed for precise and powerful operation. Its high torque and fast response make it suitable for dynamic robotic movements. The integrated encoder provides accurate position feedback for closed-loop control.

- Control Modes:** Utilize the CAN bus interface to send commands for position, velocity, or torque control, depending

on your application's needs. Refer to the MIT driver documentation for specific command protocols.

- **Performance Monitoring:** Monitor motor temperature and current during operation, especially under heavy loads, to ensure it remains within safe operating limits.
- **Quiet Operation:** The motor is designed for low noise and smooth performance, contributing to a quieter robotic system.
- **Wide Applications:** This motor is compatible with various equipment and scenarios, offering flexibility in robotic design.

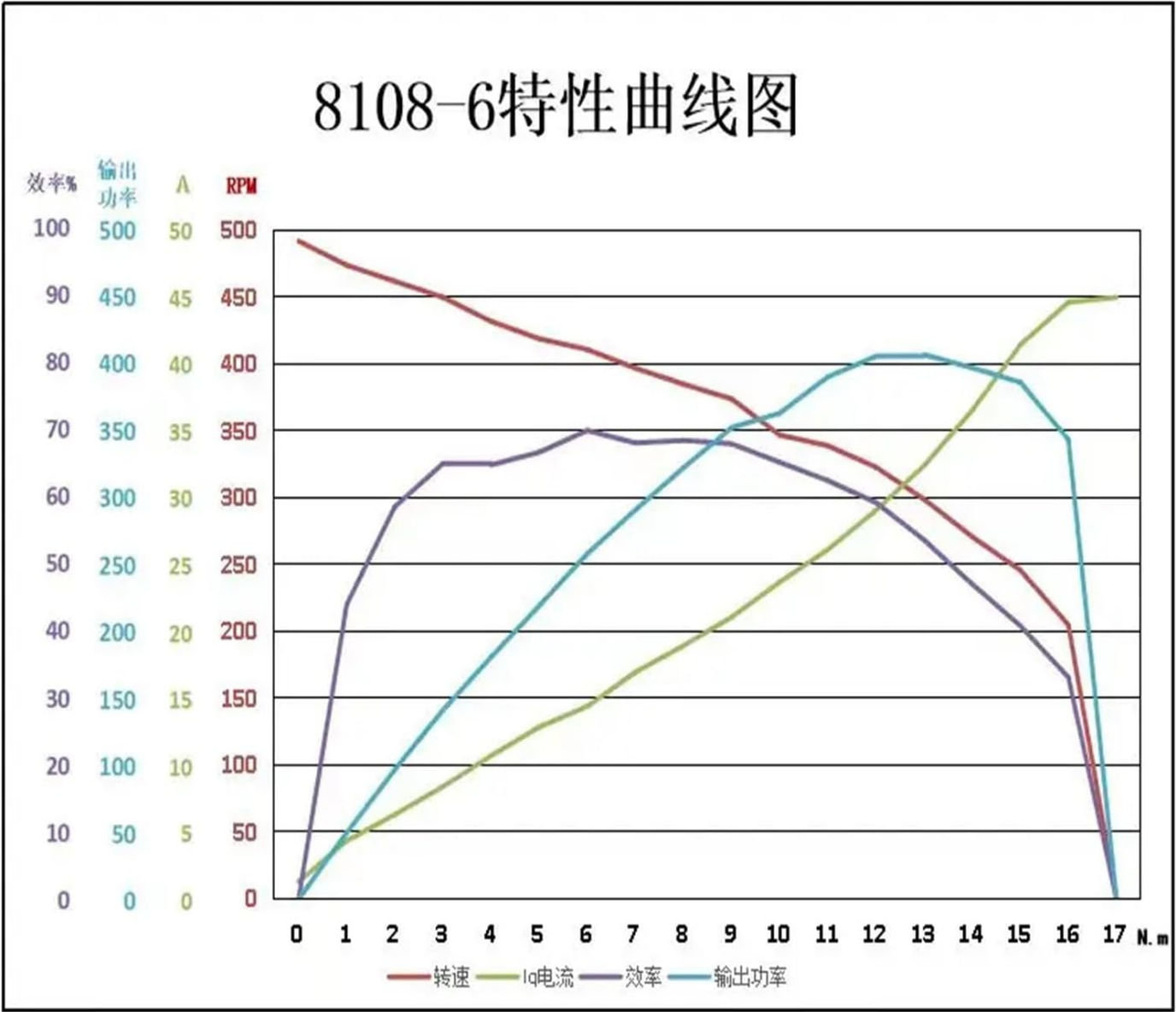


Figure 3: Performance curve graph for the 8108-6 motor, illustrating the relationship between speed (RPM), current (IQ), efficiency, and output power across its operating range.

### MAINTENANCE

The GIM8108-6 motor is designed for hassle-free maintenance. Regular checks can help ensure its longevity and reliable performance.

- **Cleaning:** Periodically clean the exterior of the motor to remove dust and debris. Use a soft, dry cloth. Avoid using harsh chemicals or solvents.
- **Connection Checks:** Regularly inspect all electrical connections (power and CAN bus) to ensure they are secure and free from corrosion.
- **Physical Inspection:** Check for any signs of physical damage, loose mounting screws, or unusual wear on the

housing.

- **Environmental Protection:** Ensure the operating environment remains within the specified temperature range (-20°C to +80°C) and that the IP54 protection grade is maintained (protection against dust ingress and splashing water).
- **Lubrication:** The planetary gear reducer is factory-lubricated. No user lubrication is typically required under normal operating conditions.

## TROUBLESHOOTING

If you encounter issues with your GIM8108-6 motor, refer to the following common troubleshooting steps:

| Problem                        | Possible Cause                                                            | Solution                                                                                                                          |
|--------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Motor does not respond         | No power, incorrect wiring, CAN bus communication error, driver fault.    | Check power supply and connections. Verify CAN bus wiring and termination. Consult MIT driver documentation for diagnostic steps. |
| Motor operates erratically     | Loose connections, electrical interference, incorrect control parameters. | Inspect all connections. Shield communication cables if necessary. Review control parameters and encoder feedback.                |
| Motor overheats                | Excessive load, insufficient ventilation, continuous high current.        | Reduce mechanical load. Ensure adequate airflow around the motor. Check for short circuits or excessive current draw.             |
| Unusual noise during operation | Mechanical obstruction, worn bearings, gear issues.                       | Inspect for any foreign objects. If noise persists, contact support; internal components may require inspection.                  |

## SPECIFICATIONS

The following table details the technical specifications for the GIM8108-6 motor joint module with MIT driver:

| Specification                | Value (MIT Driver) |
|------------------------------|--------------------|
| Nominal Voltage              | 24 V               |
| Voltage Range                | 24-48 V            |
| Power                        | 125 W              |
| Nominal Torque               | 6 N.M              |
| Stall Torque                 | 15 N.M             |
| Nominal Speed (after Reduce) | 200 RPM            |
| Max Speed (after Reduce)     | 350 RPM            |
| Nominal Current              | 5 A                |
| Stall Current                | 20 A               |
| Phase to Phase Resistance    | 0.28 Ω             |

| Specification             | Value (MIT Driver)   |
|---------------------------|----------------------|
| Phase to Phase Inductance | 0.17 mH              |
| Speed Constant            | 100 rpm/V            |
| Torque Constant           | 0.091 N.M/A          |
| Rotor Inertia             | 800 gcm <sup>2</sup> |
| Number of Pole Pairs      | 21 Pairs             |
| Gear Ratio                | 6:1                  |
| Gear Type                 | Planetary            |
| Reducer Gear Material     | STEEL                |
| Reducer Gear Backlash     | < 6 arcmin           |
| Motor Weight with Driver  | 567 g                |
| Size with Driver          | ø96-41.5 mm          |
| Max Axial Load            | 800 N                |
| Max Radial Load           | 900 N                |
| Noise                     | < 60 dB              |
| Motor Protection Grade    | IP54                 |
| Working Temperature       | -20 ~ +80 °C         |

| GIM8108-6                             |        |            |            |
|---------------------------------------|--------|------------|------------|
| Specs/Driver Type                     | Unit   | MIT driver | SHS driver |
| 额定电压(Nominal Voltage)                 | V      | 24         | 36         |
| 电压范围(Voltage Range)                   | V      | 24~48      | 24~48      |
| 功率(Power)                             | W      | 125        | 170        |
| 额定扭矩(Nominal Torque)                  | N.M    | 6          | 6.5        |
| 堵转扭矩(Stall Torque)                    | N.M    | 15         | 17         |
| 减速后额定转速(Nominal Speed after Reduce)   | RPM    | 200        | 250        |
| 减速后最大转速(Max Speed after Reduce)       | RPM    | 350        | 650        |
| 额定电流(Nominal Current)                 | A      | 5          | 14.5       |
| 堵转电流(Stall Current)                   | A      | 20         | 45         |
| 相间电阻(Phase to Phase Resitance)        | Ω      | 0.28       | 0.132      |
| 相间电感(Phase to Phase Inductance)       | mH     | 0.17       | 0.062      |
| 转速常数(Speed Constant)                  | rpm/v  | 100        | 13.8       |
| 扭矩常数(Torque Constant)                 | N.M/A  | 0.091      | 0.45       |
| 转子惯量(Rotor Inertia)                   | gcm^2  | 800        | 42.60      |
| 极对数(Number of Pole Pairs)             | Pairs  | 21         |            |
| 减速比(Gear Rate)                        | /      | 6:1        |            |
| 减速器类型(Gear Type)                      | /      | Planetary  |            |
| 减速器齿轮材料(Reducer Gear Material)        | /      | STEEL      |            |
| 减速器齿轮背隙(Reducer Gear Backlash)        | arcmin | < 6        |            |
| 电机重量不带驱动(Motor Weight without Driver) | g      | 525        |            |
| 电机重量带驱动(Motor Weight with Driver)     | g      | 567        |            |
| 电机尺寸不带驱动(Size without Driver)         | mm     | Ø96*34     |            |
| 电机尺寸带驱动(Size with Driver)             | mm     | Ø96*41.5   |            |
| 轴向最大负载(Max Axial Load)                | N      | 800        |            |
| 径向最大负载(Max Radial Load)               | N      | 900        |            |
| 噪音(Noise)                             | dB     | < 60       |            |
| 电机防水防尘等级(Motor Protection Grade)      | /      | IP54       |            |
| 工作温度范围(Working Temperature)           | ℃      | -20~+80    |            |

Figure 4: Comprehensive specifications table comparing the GIM8108-6 motor with MIT and SHS drivers, detailing electrical, mechanical, and environmental parameters.

## WARRANTY AND SUPPORT

For warranty information and technical support, please refer to the documentation provided at the time of purchase or contact your vendor. Bolisila is committed to providing high-quality products and customer satisfaction. If you have any questions or require assistance, please reach out to our support team.

### ASK A QUESTION ABOUT THIS MANUAL

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