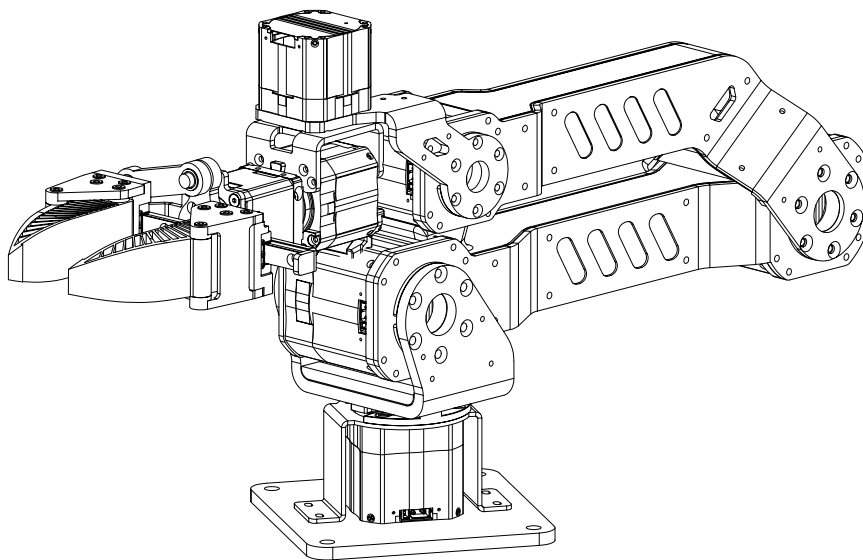


Panthera-HT Robotic Arm

Parameter Manual



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I. Disclaimer

- ⊙ This manual is written by GZ Gaoqing EM TECH Co., Ltd (hereinafter referred to as "Hightorque"), and is intended to help users use this product correctly and safely. Please read this manual carefully before the first use and strictly follow the instructions.
- ⊙ Once this product is used, it is deemed that the user has read, understood, and accepted all the terms and conditions listed in this manual, including but not limited to safety instructions, usage restrictions, and disclaimer contents.
- ⊙ If users violate the operational specifications of this manual or unauthorizedly change system configurations, purposes, etc., any resulting personal injury, property damage, or other adverse consequences shall not be the legal responsibility of Hightorque.
- ⊙ The user agrees to be responsible for their own actions and independently bear all legal consequences arising from the use of this product.
- ⊙ Users should only use this product for legal and compliant purposes and must not use it for any activities that
- ⊙ violate laws and regulations, infringe on the legitimate rights of third parties, or endanger public safety. Otherwise, Hightorque reserves the right to terminate its after-sales support and services and hold the user legally accountable.
- ⊙ To the maximum extent permitted by law, Hightorque makes no express or implied warranties regarding this product, including but not limited to warranties of merchantability, fitness for a particular purpose, or non-infringement of third-party rights.
- ⊙ To the maximum extent permitted by law, Hightorque shall not be liable for any direct or indirect, incidental, or consequential damages arising from the use, inability to use, or misuse of the product, nor shall it be liable for any claims resulting from product performance or service delays, interruptions, or errors, including but not limited to loss of profit, business interruption, or loss of information, even if Hightorque has been advised of the possibility of such damages.
- ⊙ Hightorque's liability to users for any compensation related to this product (whether based on contract, tort, or other legal grounds) shall in any case be limited to the total amount actually paid by the user for the purchase of the product.
- ⊙ In view of the possibility of continuous optimization and upgrades of the product, the functions, appearance, parameters, etc. listed in this manual may differ from the actual product. Please refer to the actual product. This manual does not constitute any legally binding commitment to product performance.
- ⊙ Users should strictly comply with the laws and regulations of their location when using this product, including but not limited to restrictions on safe use, transportation, and import/export. This product must not be used for any dangerous purposes, including but not limited to harming others, animals, or modifying it into a weapon.
- ⊙ If the user violates applicable laws and regulations or these terms, the warranty rights for the purchased products will automatically become invalid, and Hightorque has the right to refuse to provide any subsequent technical support, repair, or replacement services.
- ⊙ Hightorque reserves the right to update, modify, or terminate these terms as needed, without prior notice. The updated terms will take effect from the date of publication. The right to interpret the contents involved in this manual belongs to Gaoqing and shall be executed in accordance with the relevant laws and regulations of the People's Republic of China.

II. Safety Instructions

- ⊙ Please place the product on a flat and stable surface to avoid damage from falling.
- ⊙ Do not insert fingers or other objects into the joint to prevent pinching injuries.
- ⊙ Avoid placing the product in humid or dusty environments to prevent damage to electronic components.
- ⊙ To extend the product's service life, do not use this product in high-temperature or high-pressure environments for extended periods.

- ⊙ When using the product, ensure that it remains within your line of sight. The product must maintain a safe distance from people (especially the elderly, weak, sick, disabled, and pregnant), obstacles, complex terrain, bodies of water, and other objects!

- ⊙ The product is not waterproof. Do not use it on damp floors or in rainy or snowy weather.
- ⊙ The product is not dustproof. Do not use it in gravel or dusty environments.
- ⊙ Do not use in severe weather, such as fog, snow, rain, lightning, sandstorms, storms, tornadoes, etc.

- ⊙ Do not use in environments with electromagnetic interference, including but not limited to high-voltage power transmission lines, high-voltage substations, mobile phone base stations, and television broadcast signal towers.

- ⊙ Please do not use in scenarios where there are many wireless communication devices operating.
- ⊙ The controller's control proficiency varies. To ensure stability, please use it in a flat and open environment.
- ⊙ Do not push or hit the product suddenly with force, as this may cause it to fall and get damaged, which will not be covered under warranty.
- ⊙ The product is only for use by people aged 14 and above.
- ⊙ This product should not be used by individuals with physical, sensory, or intellectual disabilities, as well as those without relevant experience, skills, or knowledge.

- ⊙ All components and accessories of the product must be correctly installed and used in accordance with the 'User Guide'. Improper installation and use may pose usage risks.

- ⊙ Check the universal box and power adapter for damage before use. Do not use the product if the universal box or power adapter is damaged.

- ⊙ The product and power adapter contain live components; do not immerse them in water or other liquids for cleaning. Wipe the body and sensors such as the camera with a dry cloth, and wait until they are completely dry before use.

- ⊙ Please supply power according to the instructions in the manual; incorrect power supply methods may damage the product.
- ⊙ During the power supply process, if there is an unusual smell, smoke, heating, discoloration, or deformation, immediately unplug the power adapter from the product and stop using this product.

III. Packing List

Essential



1 robotic arm



Universal box base plate
1 piece

(7-way CAN board) (with casing) (no system)



USB to FDCAN
1 development board



G clamps, 2 pieces



220V to 24V power adapter
1 set



XT60 female connector
1 piece



XT30(2 2) 2 pieces



1 terminal resistor



Cup head M6*10, 4 pieces

Base of the robotic arm and optical
plate fixing screws



USB to Type-C, 1 piece



Main arm control handle
and D405 camera bracket



Packaging box



Quick Start Guide 1 Copy



1 Parameter Manual

PART 01

Product Introduction

IV. Product Overview

1. Product Information

◎ **Product Name:** Panthera-HT 6-DOF robotic arm

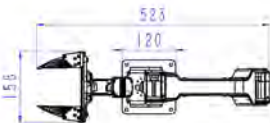
◎ **Product Introduction:** The Panthera-HT 6-axis robotic arm focuses on a lightweight body, precise control, and efficient expansion, providing a flexible and reliable solution for automated operations. The body is made of lightweight aluminum alloy, with a net weight of only 4.35 kg and a load capacity of up to 3.5 kg. Its 860 mm extra-long arm span combined with a 6-axis flexible structure allows for smooth and unrestricted movement. Relying on advanced motion control algorithms and high-precision sensors, its repeat positioning accuracy reaches 0.1 mm.

◎ **ROS Version:** ROS 2

◎ **Operating System:** Ubuntu_22.04

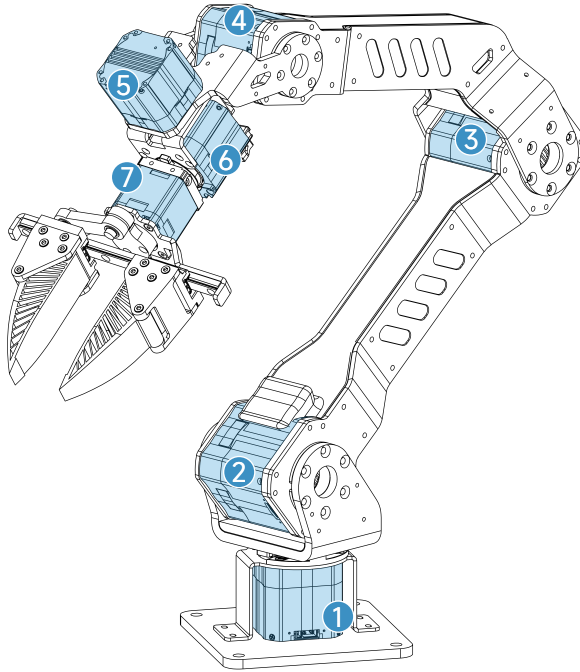
The basic parameters are as follows:

- Standing dimensions: **860mm** - Folded size: **460mm**
- Weight: **4.35kg** - Operating voltage: **24V**
- Maximum Load: **3.5kg** - DOF: **6**
- Maximum Joint Torque (Peak): **36Nm** - Communication method: **CAN FD**
- Maximum end-effector speed: **0.8m/s**



2. Product Composition

2.1 Exterior Structure

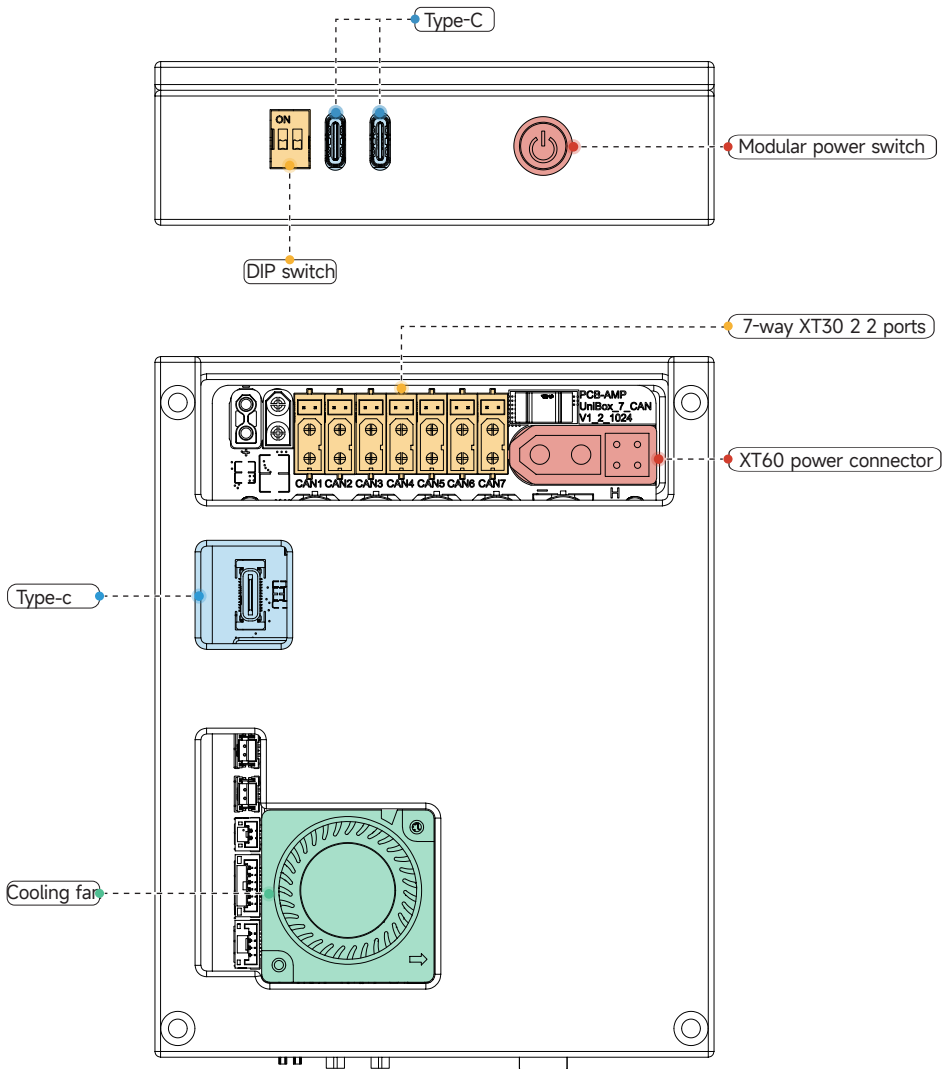


The range of joint motion is as follows:

- | | |
|--|--|
| - Motor No. 1: $-180^{\circ} \sim 180^{\circ}$ | - Motor No. 2: $0^{\circ} \sim 200^{\circ}$ |
| - Motor No. 3: $0^{\circ} \sim 230^{\circ}$ | - Motor No. 4: $-90^{\circ} \sim 90^{\circ}$ |
| - Motor No. 5: $-90^{\circ} \sim 90^{\circ}$ | - Motor No. 6: $-180^{\circ} \sim 180^{\circ}$ |

2.2 Hardware System

2.2.1 General Box Base Plate



Parameter Information:

- CAN Baud Rate: **1Mbps**
- CAN FD Baud Rate: **5Mbps**
- Serial communication baud rate: **4Mbps**

⊙ Function Introduction:

- Output up to 7 channels of CANFD information through the SDK, with each channel able to control up to 20 motor modules.
- Use software algorithms to control the overall hardware system to achieve robot posture control.

⊙ Communication board external interface:

The Type-C port on the right side is the external interface of the communication board.

⊙ DIP switch:

- Switch 1 corresponds to the Type-C port on the right, and Switch 2 corresponds to the Type-C port on the left.
- When switches 1 and 2 are both flipped down to the off position, it serves as the internal system computing power input.
- 1. When switches 1 and 2 are both turned on, it serves as the external master control computing power input.

⊙ Modular power switch:

- Power on: Briefly press the switch button to turn on the joint module power. After turning on, the switch light will illuminate.
- Power off: Press the switch button briefly to turn off the joint module power. After turning off, the switch light will go out.

2.2.2 Joint module

Detailed parameter introduction of Motor No. 1 HTDW-5036-02-CNE is as follows:

- Reduction ratio: **36**
- Rated current: **2A**
- Voltage range: **12-48V**
- Peak current: **10A**
- Stall torque: **21Nm**
- Rated torque: **6Nm**
- Rated speed: **50RPM**
- No-load speed: **75RPM**
- Communication Baud Rate: **5Mbps**
- Control frequency: **3KHz**
- Rotational speed control accuracy: **±10%**
- Response Time: **≤140μs**

The detailed specifications of motor No.2-3 HTDW-6036-02-DNE are as follows:

- Reduction ratio: 36	- Rated current: 3A
- Voltage range: 12-48V	- Peak current: 15A
- Stall torque: 36Nm	- Rated torque: 10Nm
- Rated speed: 50RPM	- No-load speed: 60RPM
- Communication Baud Rate: 5Mbps	- Control frequency: 3KHz
- Rotational speed control accuracy: ±10%	- Response Time: ≤140μs

Detailed parameter introduction of Motor No. 4 HTDW-5036-02-DNE is as follows:

- Reduction ratio: 36	- Rated current: 2A
- Voltage range: 12-48V	- Peak current: 10A
- Stall torque: 21Nm	- Rated torque: 6Nm
- Rated speed: 50RPM	- No-load speed: 75RPM
- Communication Baud Rate: 5Mbps	- Control frequency: 3KHz
- Rotational speed control accuracy: ±10%	- Response Time: ≤140μs

Detailed specifications of the No. 5-6 motor HTDW-4438-30-NE (HTDW-4530-02-DNE) are as follows:

- Reduction ratio: 30	- Rated current: 0.7A
- Voltage range: 12-48V	- Peak current: 10A
- Stall torque: 10Nm	- Rated torque: 6Nm
- Rated speed: 40RPM	- No-load speed: 160RPM
- Communication Baud Rate: 5Mbps	- Control frequency: 3KHz
- Rotational speed control accuracy: ±10%	- Response Time: ≤140μs

Detailed parameter introduction of Motor No. 7 HTDW-3532-02-DNE is as follows:

- Reduction ratio: 32	- Rated current: 0.35A
- Voltage range: 12-48V	- Peak current: 10A
- Stall torque: 3.7Nm	- Rated torque: 0.6Nm
- Rated speed: 60RPM	- No-load speed: 300RPM
- Communication Baud Rate: 5Mbps	- Control frequency: 3KHz
- Rotational speed control accuracy: ±10% - Response Time: ≤140μs	

2.2.3 Claw

The detailed parameters of the gripper are as follows:

- Weight (including motor): 0.49kg	- Repeat positioning accuracy: <0.15mm
- Rotation angle of Motor No. 7: 0 ~ 2rad	- Absolute positioning accuracy: <0.19mm
- Maximum opening stroke: 82mm	- Rated clamping force: 1.3kgf
- Opening and closing time (full travel): 1.0 ~ 1.8s	- Peak clamping force: 8.0kgf

2.3 Expansion Accessories

The D405 camera is composed of the Intel RealSense module D401 and the Intel RealSense vision processor D4 board v4.

D405 Camera Parameters:

- Size: 42×42×23mm	- Depth Field of View (FOV): 87°×58°
- Weight: 60g	- Depth output resolution: 1280×720
- Minimum Depth Range: 7cm@480p	

PART 04

Maintenance and upkeep

V. Transportation, Handling, and Storage

1. Air travel/high-speed rail and other public transportation

- Ⓢ The product's outer packaging meets the size requirements for carry-on luggage, so you can take it on airplanes, high-speed trains, and other public transportation.
- Ⓢ If the product contains batteries (such as HTB24/HTB48 lithium batteries), transportation must comply with national laws and regulations as well as carrier security inspection requirements regarding the transport of lithium batteries. If users need to carry them on high-speed trains or flights, please check the security policies of the destination in advance. We can provide compliance certificate materials for the batteries, but we are not responsible for transportation delays, returns, or safety incidents caused by regional policy differences or carrier refusals.

2. International transportation

- Ⓢ For export products, please provide battery compliance certification documents (such as CE, UN38.3, RoHS, etc.) according to the relevant requirements of the destination country. It is recommended to use international logistics services with hazardous goods transportation qualifications to ensure smooth customs clearance.
- Ⓢ A clear warning label should be affixed to the packaging.

3. Precautions for Express Delivery

- Ⓢ The logistics for our shipments or returns are all handled by compliant and legitimate logistics companies with hazardous materials transportation qualifications. The packaging, labeling, and transportation processes all comply with national and relevant industry standards, ensuring the safety and regulation of the products during transportation.
- Ⓢ If the user sends the product for repair on their own initiative, please confirm the shipping method and packaging requirements with us in advance to ensure that the product is not damaged or delayed due to improper packaging or non-compliant logistics.
- Ⓢ If using a third-party courier to send products, it is recommended to choose a logistics company that is qualified to transport lithium batteries.
- Ⓢ When packing, be sure to use the original protective foam and compression-resistant box to prevent severe vibration, squeezing, dropping, and other situations during transportation, in order to avoid damage to the product or fire risk.

4. Moving Instructions

- Ⓢ Do not shake or tilt the product violently, and avoid dropping or striking the product structure.
- Ⓢ When moving the device, it is recommended that two people cooperate to avoid structural displacement or joint injuries caused by single-person handling.

5. Storage requirements

- Ⓢ The product should be stored in a dry, ventilated environment free of strong magnets and corrosive gases, avoiding direct sunlight and high temperature and high humidity conditions.
- Ⓢ When not used for a long time, please disconnect the main power supply. The battery should be kept at 30%-60% charge, and the recommended storage temperature is between 10°C-35°C to prevent over-discharge or deterioration of battery cell performance.

VI. Maintenance and Care

1. Host Maintenance

- Ⓢ Please regularly check whether the appearance of each part is in good condition and whether it has been damaged by external impact.
- Ⓢ Before maintenance and cleaning, please ensure that the product is turned off.
- Ⓢ The exterior of the product can be cleaned with a mild detergent; do not use strong solvents.
- Ⓢ When using, please ensure the surface of the head is clean. Avoid scratching the camera lens.
- Ⓢ When transporting, please handle with care to avoid dropping, as mechanical impact can cause damage to components. When placing the product, ensure it is in its natural state to avoid stress on the joints.

VII. Troubleshooting

1. Motor disconnection

The product has 7 motors. When a motor has no feedback, you can refer to the following situations for troubleshooting:

- ⊙ Loose or disconnected wiring
 - *The power cord or communication cable is not properly plugged in, plugged in incorrectly, or has poor contact.*
 - *Connector aging or terminal oxidation.*
- ⊙ Interface damaged
 - *CAN interface, CAN FD module, and driver board are damaged.*
 - *Wire breakage or internal wire break.*
- ⊙ Connected to the wrong interface
 - *The motor is connected to the wrong communication port, or there is a conflict of multiple motor addresses.*
- ⊙ CAN ID conflict or configuration error
 - *Multiple motors using the same ID caused recognition failure.*
- ⊙ Terminal resistor not connected or connected incorrectly
 - *The CAN bus does not have a 120Ω termination resistor connected at both ends, or it is connected in the wrong position.*
- ⊙ The motor is not initialized or not calibrated
 - *The motor cannot respond to control commands because the self-check or initialization process is not completed.*
- ⊙ Firmware abnormal or corrupted
 - *Motor firmware flashing failed or the version is incompatible.*

If you encounter the above problems, please first confirm:

- ⊙ Confirm that the power supply is normal and stable.
- ⊙ Check the cable connections, try changing the cable or unplugging and reconnecting it;
- ⊙ Check whether the motor ID is duplicated and whether the CAN is terminated;
- ⊙ If a motor is suspected to be damaged, you can replace it with another motor to test the communication.

If you are unable to troubleshoot, please contact Gaoging official technical support in a timely manner.

2. Other Instructions

- ⊙ If you encounter irreparable or recurring issues, do not disassemble the device yourself to avoid affecting the warranty.
- ⊙ For more development tutorials, you can visit the official website.
- ⊙ For more technical support, please call: 86-18144897433 or add on WeChat: GQJD2022.

VIII. After-sales Warranty

- ⊙ After you purchase the complete machine and other related products, the warranty period starts from the day you receive the goods.
- ⊙ The product warranty period is 1 year, starting from the date you pick up the product yourself or the date the courier logistics information shows it has been signed for.
- ⊙ During the warranty period, if you privately modify, disassemble, or open the casing, the warranty will be directly voided.
- ⊙ If the product experiences non-human-induced performance failures during the warranty period under normal use, we will provide free repairs or parts replacement for the purchased product. You need to provide valid proof of purchase (invoice/order/contract record).
- ⊙ If the product you purchased is already out of the warranty period, you can also obtain our assistance by purchasing additional services.
- ⊙ You can submit your after-sales requests and check the after-sales progress through the official after-sales platform <https://www.hightorque.cn/support>.




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