



Build A True Intelligent Robot For Dreams And The World.

Vihero Dexterous Hand Manual



V1.0.0 | 2025.08

Shaanxi Vihero Technology Co., Ltd.

www.vihero.com

Preface

We extend our gratitude to you for purchasing and using the dexterous hand product from Shaanxi Vihero Technology Co., Ltd. (hereinafter called "Vihero" or "the Company").

Vihero dexterous hand is a robotic end-effector that simulates the functions of a human hand. Designed on a 1:1 scale with a real human hand, it features 16 degrees of freedom and 16 hand joints, enabling it to perform various complex grasping actions and gesture demonstrations. After the integration of the intelligent dexterous hand with Vihero's 3D stereo vision intelligent system, the vision system can locate it and track the spatial position and movement path of the palm in real time through the 2 Mark points assembled on the hand, thereby enabling the intelligent dexterous hand to perform picking, placing, and moving items in various complex environments.

This manual is designed to introduce the specifications, precautions, usage and other relevant details of Vihero products.

Trademark



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Other companies' trademarks, product logos, and product names mentioned in this manual are the property of their respective owners.

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Declaration

Before using this product, please read this manual thoroughly. Vihero suggests that you use this manual under the guidance of professionals. Once you start using the product, it indicates that you have fully read, understood, acknowledged, and accepted all the terms and contents of this manual. You undertake to assume full responsibility for the use of the product and any consequences that may arise.

This manual is only for use as an instruction guide for the relevant products. All data in this document is derived from Vihero Laboratory. Due to the influence of environmental and test condition changes, there may be differences from the actual products. Some functions are still under upgrade and development, so please refer to the physical product for the most accurate information.

Vihero has handled the content of this manual carefully, aiming for detail and accuracy. However, there may still be errors or omissions, and Vihero will not be held accountable for any consequences resulting therefrom. Vihero is committed to continuously improving the quality of its products and reserves the right to modify the manual at any time without prior notice. If there are any changes to the information in this manual, no further notice will be given.

The final interpretation right of this manual belongs to Shaanxi Vihero Technology Co., Ltd.

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1. Introduction

Vihero intelligent dexterous hand is designed on a 1:1 scale of a real human hand, featuring 16 degrees of freedom and 16 hand joints. It highly simulates the structure of a real human hand and can complete various complex grasping actions and gesture demonstrations. The control system adopts a current feedback control method and can intelligently adjust the grasping force according to the material and weight of the item. The fingertip pressure of a single finger can reach 12N. After the integration of the intelligent dexterous hand and Vihero's 3D stereo vision intelligent system, the vision system can locate and track the spatial position and movement path of the palm in real time through the 2 Mark points assembled on the hand, thereby enabling the intelligent dexterous hand to perform the actions of picking, placing, and moving items in various complex environments.

This chapter introduces information such as the product features, specification parameters, mechanical structure, and range of motion of the Vihero dexterous hand.



Figure 1-1 Vihero Dexterous Hand

1.1. Features

● Humanoid Design, Futuristic Aesthetics

Crafted to the exact proportions and contours of a human hand, the intelligent dexterous hand blends human-like familiarity with a sleek, futuristic look. Driven by high-precision motors and linkage transmissions, its joints move in seamless synchronization, delivering smooth, precise motions. It effortlessly performs a wide range of gestures – greetings, photo poses, or task-specific actions – adapting to various scenarios and creating an engaging, delightful user experience.



Figure 1-2 Examples of Dexterous Hand Gestures

● Free and Flexible, Stable in Grasping

The mechanical structure of the intelligent dexterous hand is driven by a linkage mechanism and has 16 hand joints. It is designed to simulate the structure of the five-finger joints of a real human hand and can achieve postures such as finger flexion, abduction, adduction, and extension, enhancing the mobility of the finger joints. In addition, the fingertip pressure of a single finger of the dexterous hand can reach 12N, and the fingertip load capacity of a single finger can reach 1.2kg. These features greatly improve the degrees of freedom, bearing capacity, and flexibility of the dexterous hand and enable stable grasping.



Figure 1-3 Dexterous Hand

● Adapt to Changes, Intelligent Grasping

The control system adopts the current feedback control method. The intelligent dexterous hand can adaptively adjust the grasping force for items of different materials and weights, enrich the types of grasped items, broaden the actual application scenarios, and make grasping more intelligent.

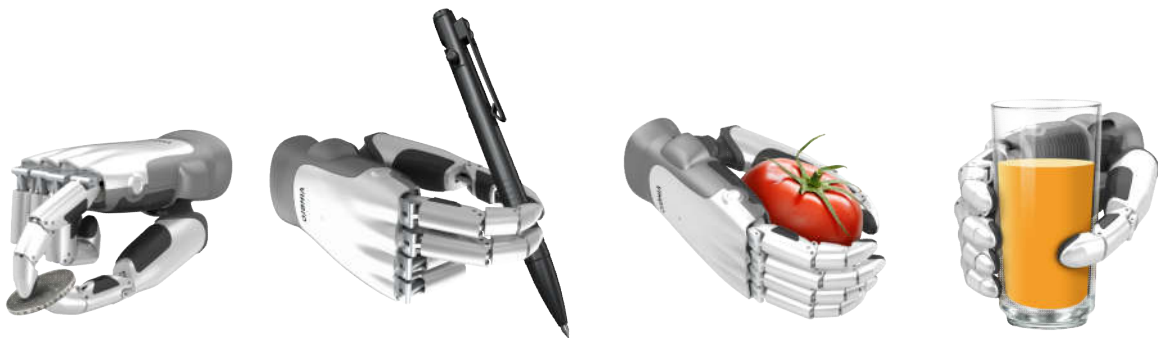


Figure 1-4 Dexterous Hand Grasping Scenarios

● Hand-eye Servo, Collaborative Operation

The intelligent dexterous hand is equipped with 2 unique Mark points of Vihero on the side and back of the palm. After being integrated with Vihero's stereo vision intelligent system, the vision system can locate and track the palm's spatial position and movement trajectory in real time through the Mark points. With the assistance of the vision system, the control system can precisely control the position and posture of the palm, thereby achieving the picking, placing, and moving of items in various complex environments, achieving hand-eye servo and collaborative operation.

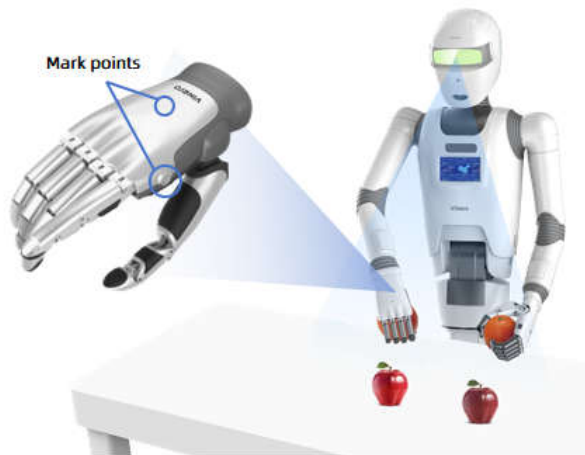


Figure 1-5 Hand-eye Servo

1.2. Specifications

Product	Dexterous Hand
Size (L×W×H)	233mm × 89mm × 45mm
Weight	780g
Number of Fingers	5
Degree of Freedom	16
Number of Joints	16
Pressure at Fingertip of Single Finger	12N
Load of Single Finger	1.2kg
Drive Mode	Motor
Transmission Mode	Linkage
Repeat Positioning Accuracy	±0.1 mm
Working Voltage	24V
Communication Interface	CAN FD

Table 1-1 Specifications

1.3. Mechanical Structure

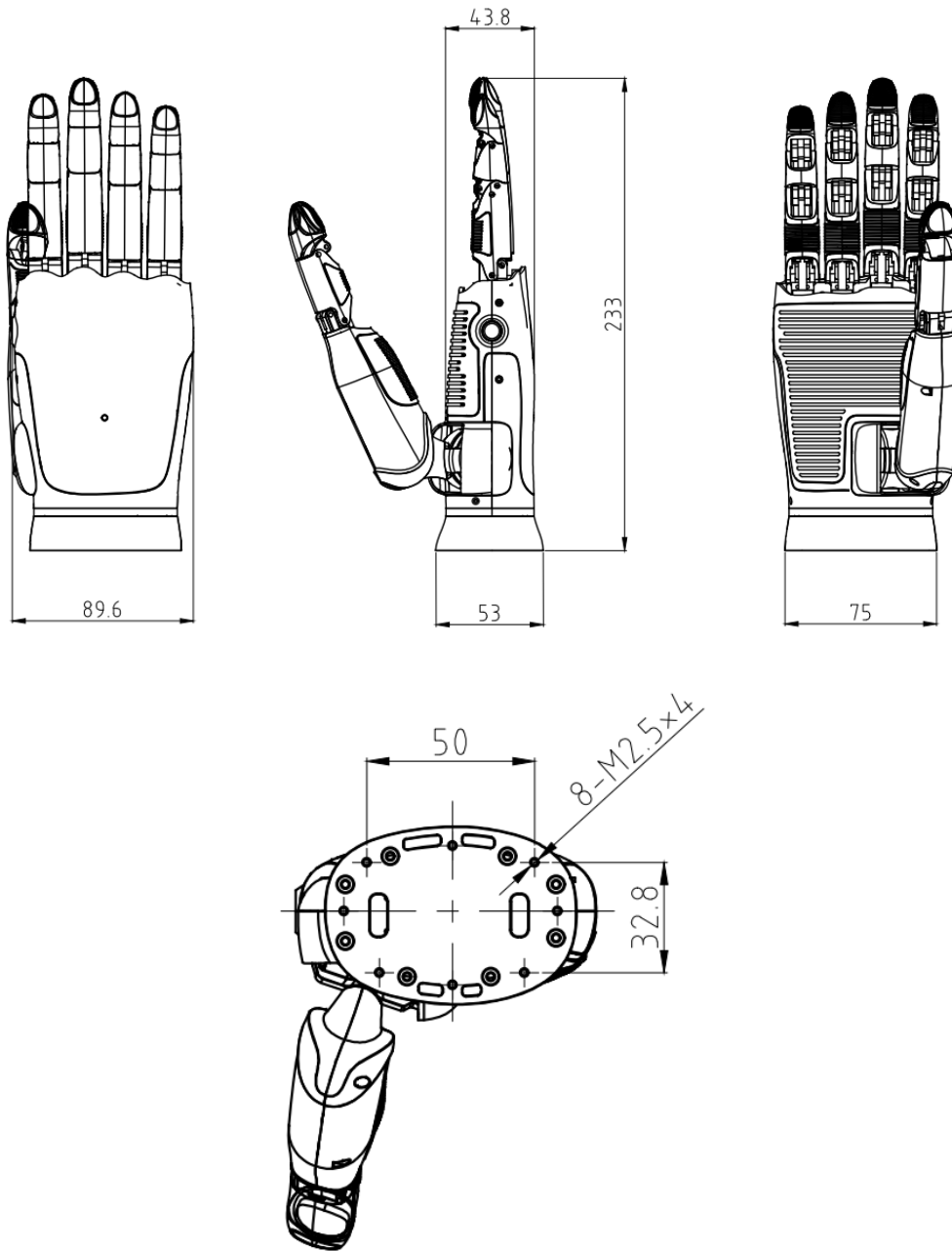


Figure 1-6 Mechanical Structure

1.4. Range of Motion

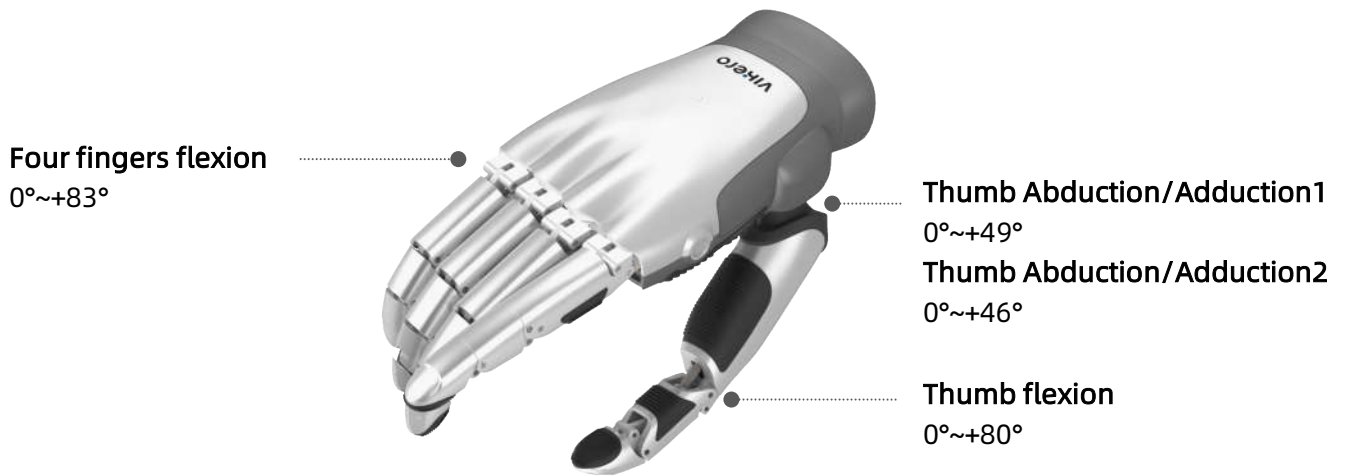


Figure 1-7 Dexterous Hand

Joint	Min	Max
Index finger flexion	0°	83°
Middle finger flexion	0°	83°
Ring finger flexion	0°	83°
Little finger flexion	0°	83°
Thumb Flexion/Extension	0°	80°
Thumb Abduction/Adduction1	0°	49°
Thumb Abduction/Adduction2	0°	46°

Table 1-2 Range of Motion of Dexterous Hand

2. Warranty

Vihero provides quality assurance and warranty services for products. This chapter introduces the warranty conditions and coverage for the dexterous hand.

2.1. Quality Assurance

The Vihero dexterous hand product is covered by a warranty period.

During the warranty period, Vihero will provide component replacement or repair services for damages caused by product quality issues (excluding human-caused factors). Any replaced equipment or components shall become the property of Vihero.

For damages occurring outside the warranty period, Vihero will charge fees for component replacement or repair services and will not be liable for any resulting losses.

2.2. Warranty Exclusions

The warranty does not cover damage caused by:

- (1) Human not resulting from product quality issues.
- (2) Installation, use, or operation that violates industrial standards or fails to follow this manual's guidance.
- (3) Unauthorized disassembly, repair, or modification without official guidance.
- (4) Using non-Vihero original components or accessories.
- (5) Disregarding product specifications and precautions in this manual.
- (6) Forcing operation despite component damage or aging.
- (7) Inadequate or improper packaging, transportation, storage, or maintenance.

(8) Using the product for non-intended purposes.

(9) Force majeure.

(10) Other non-Vihero liabilities.

Additional Exclusions:

(1) Expired warranty period.

(2) Inability to provide invoices or purchase proof.

(3) Altered, defaced, or forged invoices/purchase proof.

(4) Irreproducible malfunctions.

3. Precautions

This chapter introduces the operational guidelines for the Vihero dexterous hand. Before use, conduct a risk assessment, read this chapter thoroughly, and strictly adhere to all instructions. Non-compliance may result in reduced product lifespan, equipment damage, property loss, or severe safety hazards.

3.1. Legal Compliance

Prior to operation, ensure full compliance with:

- All applicable laws and regulations of your jurisdiction.
- Safety protocols and mandatory standards set by relevant authorities.
- Ethical and responsible usage practices.

Failure to adhere to legal requirements may lead to legal consequences and void warranty coverage.

3.2. Safety Symbols

Please carefully read and strictly comply with the following safety symbols and their explanations as they appear in this document.

Symbol	Name	Definition
	Information	Provides supplementary details or clarifications about critical information.
	Caution	Indicates a hazardous situation that may cause machine faults or data loss if ignored.
	Danger	Indicates potential machine damage, personal injury, or death if ignored.

Table 3-1 Safety Symbols

3.3. Operational Precautions

3.3.1. Usage Guidelines

- (1) Prior to initial operation, inspect the dexterous hand for damage, review all documentation, and complete professional training.
- (2) Only trained personnel may operate the dexterous hand. Unauthorized operation is strictly prohibited.
- (3) When using the dexterous hand, refer to its dimensions and range of motion, reserve proper space and take obstacle avoidance measures.
- (4) Ensure correct and secure cable connections and use official accessories as recommended.
- (5) Do not forcefully bend or twist joints.
- (6) The dexterous hand is a precision device. Care should be taken to avoid

collisions or drops during use, storage and transportation.

- (7) All maintenance and repairs must be performed by trained technicians. Unauthorized disassembly or modification is prohibited.

3.3.2. Environmental Requirements

- (1) Ensure sufficient space is reserved during the dexterous hand's operation to avoid collisions.
- (2) Do not use the dexterous hand in environments with rain, snow, lightning, dust, strong wind, explosive/corrosive fumes, or electromagnetic interference.
- (3) Do not use the dexterous hand under non-compliant specifications or in inappropriate scenarios.

3.3.3. Power Supply Precautions

- (1) Do not frequently switch on or off the power supply, as this may reduce the dexterous hand's lifespan or cause damage.
- (2) Pay attention to the definition of the dexterous hand's power interface to avoid incorrect connection between the interface and the cable.

3.3.4. Safety Warnings

- (1) When the dexterous hand is in operation (including stationary states due to signal waiting or poor network), do not enter its operational area to prevent injury or damage.
- (2) Do not insert hands into joints or gaps to avoid pinching.

4. Usage

This chapter introduces the product unpackaging and usage procedures. Follow this manual strictly during operation, and pay special attention to precautions marked with safety symbols.

4.1. Unpackaging

Step 1 Preparation before unpackaging

Place the product upright on a flat surface according to the "UP" indicators on the packaging. Ensure adequate clearance around the product for safe unpackaging.



Retain the original packaging and protective foam for future transportation.

Step 2 Check the List

Verify the contents against the product list to confirm:

- This is the model you purchased.
- No damage, moisture, or missing items.
- All components listed are included.

Contact us immediately if discrepancies or damages are found.

No.	Content	Quantity
1	Dexterous hand (left/right)	×1
2	Power adapter	×1
3	Communication cable	×1
4	Product manual	×1

Table 4-1 Product List

Step 3 Unpackage and take out the dexterous hand

Open the product package and take out the dexterous hand and related accessories.

4.2. Electrical Connections

4.2.1. Pin Definitions

The power port of the dexterous hand uses a PH2.0-4pin terminal, with pin definitions as follows:

Pin	Definition
1	+24V
2	+24V
3	GND
4	GND

Table 4-2 Pin Definition for the Dexterous Hand's Power Port

The communication port of the dexterous hand uses a GH1.25-3pin terminal, with pin definitions as follows:

Pin	Definition
1	CAN-H
2	CAN-L
3	GND

Table 4-3 Pin Definition for the Dexterous Hand's Communication Port

5. Storage and Transportation

After using the dexterous hand, please restore it to the initial position according to the normal procedure, disconnect all connections, and ensure it is clean and dry. Then store it in a safe environment with specified temperature, appropriate humidity, no electromagnetic interference, non-flammable and non-explosive properties, and cleanliness.

When the dexterous hand needs to be transported over a long distance, to ensure its intactness, the product should be packed in a box before handling and transferring.



1. When packing, use protective foam to fill gaps and edges around the dexterous hand, ensuring proper placement to prevent damage from shifting or impacts during transportation.

2. Seal the packaging securely to prevent the dexterous hand from dislodging during transit.

6. Maintenance

To ensure safe and reliable operation of the dexterous hand, perform regular cleaning, inspections, and maintenance on the dexterous hand. Replace aging or damaged components promptly to extend the dexterous hand's service life.

6.1. Cleaning

Affected by the operating environment, dust or dirt may accumulate on the surface of the dexterous hand after a period of operation. To ensure its normal operation, regular cleaning of the dexterous hand is required. It is recommended to wipe the surface with a soft, dry cloth and clean the joint gaps with a soft brush.

-
1. Before cleaning, disconnect the power supply and other external connected devices according to the normal procedure.
-  2. Do not use damp cleaning tools to clean the dexterous hand, to avoid moisture entering the interior and causing damage to it.
-

6.2. Routine Inspections

The dexterous hand may experience component loosening, wear, or other abnormalities due to external factors (temperature, humidity, vibration) and internal mechanical friction during operation. Regular inspections are recommended based on actual usage to ensure personal safety and proper product operation.

Inspections should cover aspects such as component wear and aging, smooth mechanical movement, and proper system functionality.



If a fault occurs or an alarm is generated, promptly contact official technical support.

7. Appendix

7.1. Glossary

No.	Terminology	Explanation
1	DoF	Short for Degree of Freedom, referring to the number of independent movement directions and angles a dexterous hand can achieve in space.

8. Revision

No.	Version	Date	Changes
1	V1.0.0	2025.08.05	Initial release.

9. Contact Us

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