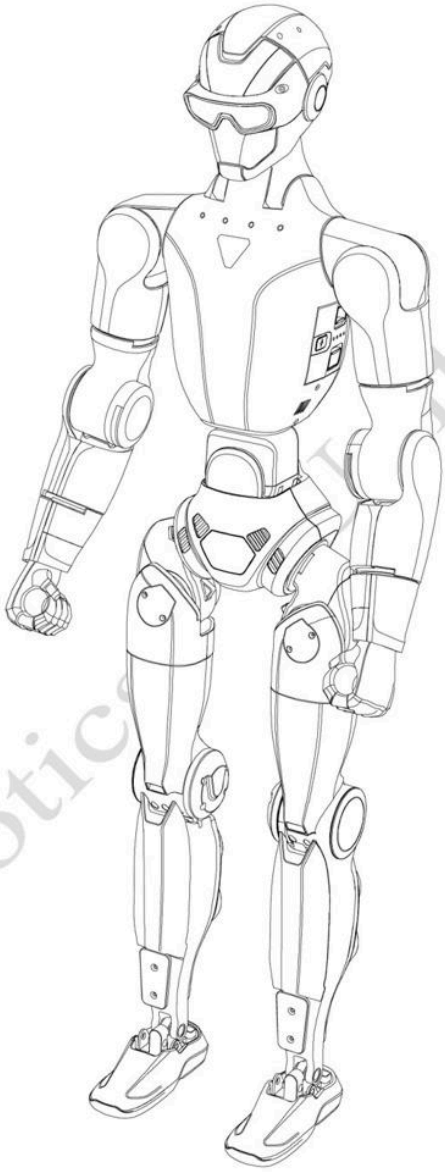
R1

User Manual V1.3



Unitree

This product is a civilian robot. We kindly request that all users refrain from making any dangerous modifications or using the robot in a hazardous manner.

Please visit Unitree Robotics Website for more related terms and policies, and comply with local laws and regulations.

Unitree Robotics

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Unitree Robotics

1.Disclaimer

To avoid illegal behavior, potential harm, and loss, it is essential to adhere to the following regulations:

1) Please be sure to read this article carefully before using the product, understand how to use the product correctly and your legitimate rights, responsibilities, and safety instructions. Otherwise, it may bring property damage, safety accidents and personal safety hazards. Once used this product, you are deemed to have carefully read, understood, recognized, and accepted all the terms and contents of this article. Users are responsible for their own actions and the consequences thereof. Users undertake to use this product only for legitimate purposes and agree with these terms and any relevant policies or guidelines that Unitree may establish.

2) The laws of some countries may prohibit the exemption of guarantee clauses, so your relevant rights may vary in different countries.

3) Subject to legal compliance, Unitree reserves the right of final interpretation of the above terms. Unitree has the right to update, amend or terminate this term without prior notice.

4) Unitree Robotics does not provide any explicit or implied commercial and technical guarantees not involved in this article.

5) Unitree Robotics does not guarantee that the products / services provided are completely free from defects and fully meet the customer's requirements. It also does not guarantee that Unitree Robotics can completely repair these defects.

6) In any case, Unitree Robotics shall not bear legal liability for direct or indirect economic losses to the customers due to this service specification, and the maximum compensation amount of Unitree Robotics for losses to the customers caused by its own product liability shall not be higher than the amount paid by the customers for the products/services.

7) The purchased parts are not within the scope of services included in this service specification.

8) No on-site services are provided for terminal products and accessories. The maintenance service provided by Unitree Robotics for more than one year is an optional service. The customers can choose whether to purchase related services and choose when to terminate them. If the customers choose to purchase related services, it means that the customer allows Unitree Robotics to access, collect and process information related to faults, detection, positioning and debugging when providing services. Unitree Robotics will access and process relevant information in accordance with the customers' request under the premise of the customers' consent, and the information will only be used to provide maintenance services. Since the users are the controller of such information, Unitree Robotics cannot confirm whether such information contains customers' confidential information or personal data, and the customers shall guarantee that it will obtain or retain all necessary consents, licenses, authorizations ("Agree") is used to allow Unitree Robotics to provide this service, so that Unitree Robotics will not violate applicable legal requirements, the customers' privacy policy, or the

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agreement between the customer and the user when providing related services. Unitree will take reasonable measures to ensure the security of such users information, but Unitree Robotics is not responsible for direct or indirect responsibility for the act of obtaining and processing such information in the process of providing services.

2.Safety Instructions

R1 is an extremely lightweight, freely customizable humanoid robot with 20-40 degrees of freedom and advanced multimodal AI interaction capabilities. With its out-of-the-box, high cost-performance advantages, it targets the research, education, and entertainment markets, promoting the popularization and innovation of humanoid robot technology.

1) This product is not a toy and is not intended for use by persons under the age of 18. Keep out of reach of children and be careful when operating in the presence of children.

2) You are obliged to be aware of the laws in your area and to comply with relevant laws and regulations.

3) This chapter is an introductory chapter for new users to manipulate robots. New users can quickly master how to use the Remote Control to control the robot to show excellent movement performance by reading this section. This chapter is also a chapter that old users often need to refer to. Old users can read this chapter repeatedly to grasp the essentials of operating the robot, and then they can draw inferences from case, and know what kind of movements are not recommended.

4) When the users run the program developed by themselves in the developer mode: The remote control commands are still valid when the high-level (application layer) is developed. At this time, if the high-level API commands and the remote control commands are sent to the robot, both commands will be executed by the robot. It may cause the robot to become unstable. Please be sure to judge whether the users need to use the remote control according to the running state of the robot. Remote control commands fail during low-level development.

5) During use, maintain visual contact with the robot while controlling it, keep a safe distance from the humanoid robot, and do not touch the robot with your hands after it is powered on!

6) When the robot is in motion, ensure the surrounding area is clear or use a safety tether to prevent tripping accidents that could cause it to fall onto objects or people.

7) When moving the robot or when the robot is in motion, do not touch the joint areas of the robot to prevent pinching.

8) When the last battery indicator is flashing, promptly stop and shut down the robot, remove the battery for charging, to prevent the robot from losing power and falling due to low battery, which could cause damage!

9) This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

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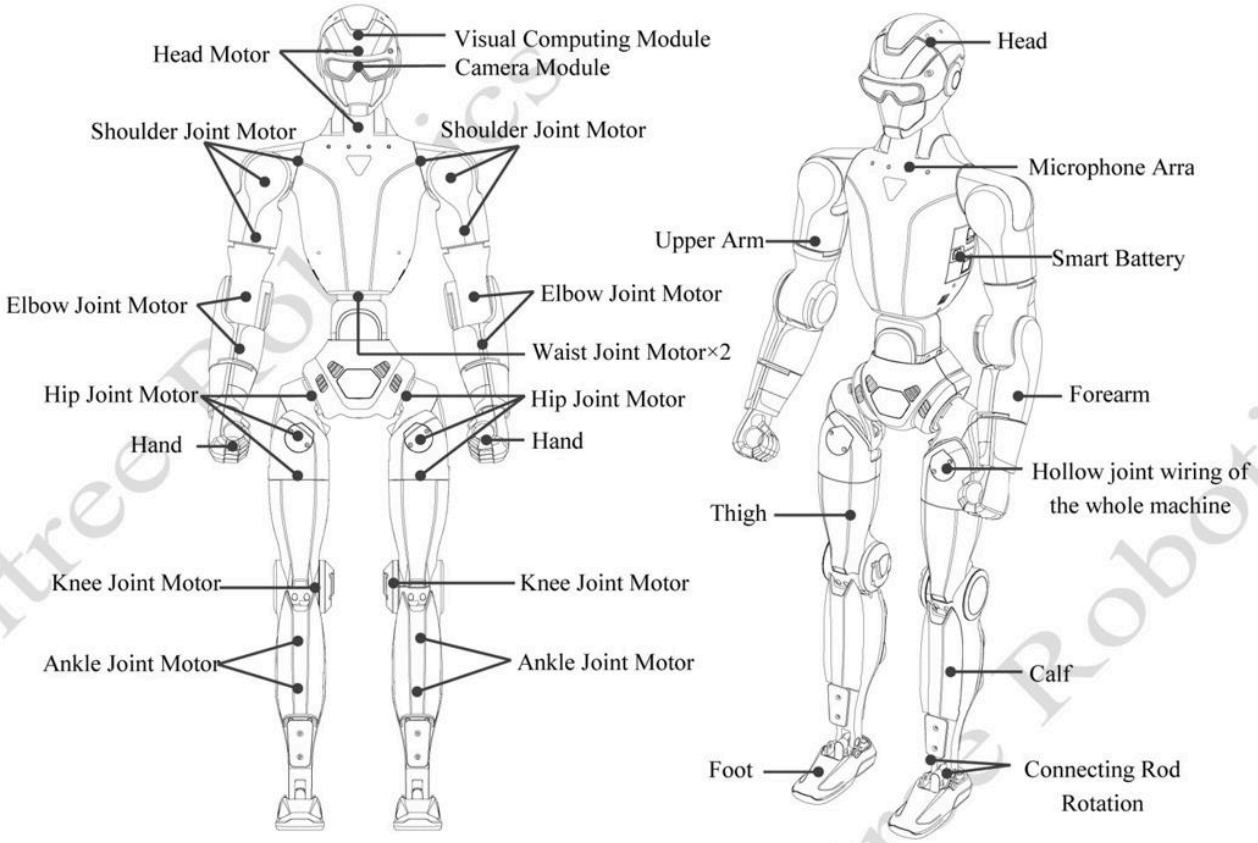
3.Product Overview

3.1 Introduction

Unitree R1 is a humanoid robot centered on extreme lightweight design and freedom of modification. Its overall height is ≤123cm, with a lightweight body structure. The weight of the R1 Base version and the R1 EDU version is only about 29kg, making it easy to maintain. It deeply integrates intelligent technologies, incorporating a multi-modal large model for speech and vision, and is equipped with bionic binocular cameras, a 4-array microphone, and stereo speakers, enabling vivid AI interaction. Its core is driven by a vision module with 10 TOPS computing power and an 8-core high-performance CPU, ensuring real-time data processing capabilities. Upholding the philosophy of "Open Hardware," the R1 EDU version provides fully open control interfaces for joints and sensors, supporting mainstream ecosystem simulation platforms. The whole machine offers configurable degrees of freedom ranging from 20 to 40, ensuring diverse motion and agile movements in complex scenarios. It makes humanoid robots enter the world more easily.

3.2 Parts Name

The R1_26-DOF humanoid robot body is as shown in the figure below. Please refer to the actual product for specifics!

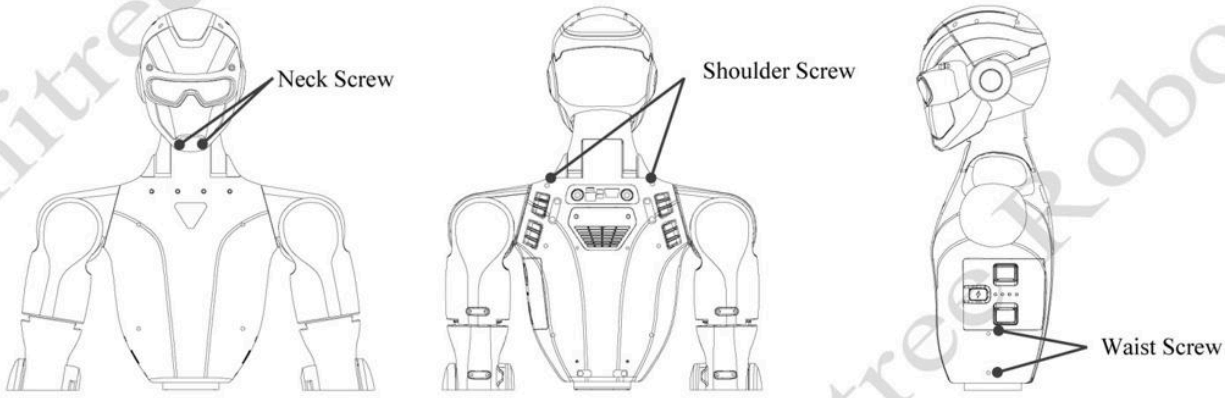


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● Please scan the QR code to visit the Unitree Documentation Center for **Installation Hole Instructions and Usage** videos.

If you need to use the R1 front chest mounting holes:

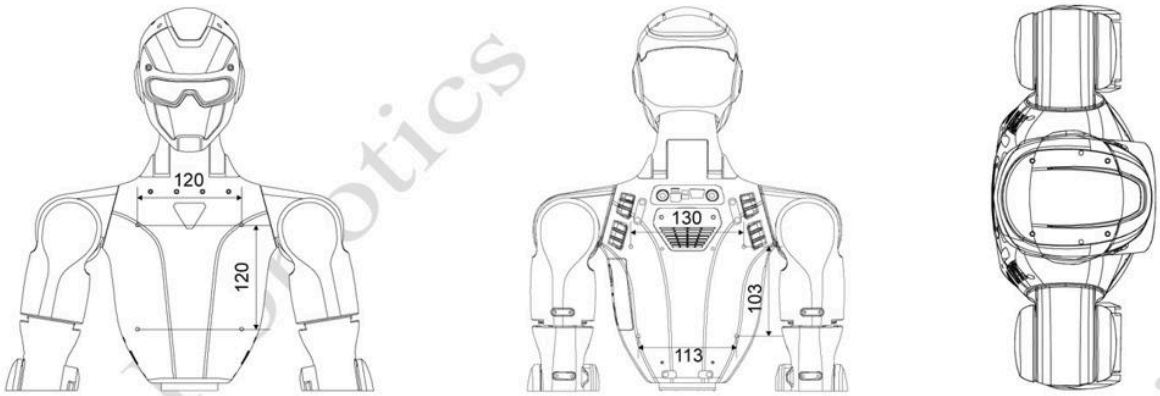
1) First, remove the two neck fixing screws from the front, the two shoulder fixing screws from the back, and the four waist fixing screws from the sides, as shown in the figure.



2) Then, from inside the front panel, use a 3.3mm drill bit to drill through the front panel screw holes.

3) Finally, from inside the front panel, use an M4 tap to thread through the front panel along the existing M4 threads (be careful not to damage the threads).

R1 Mounting Hole Dimension Diagram: M4 threaded hole, unit mm.



3.3 Specification Comparison

MODEL	R1 AIR	R1	R1 EDU
Height, Width and Thickness(Stand)	1230x357x190mm	1230x357x190mm	1230x357x190mm
Weight (With Battery)	About 27kg	About 29kg	About 29kg
Degree of Freedom (Total Joints)	20	26	26~40

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Single Leg Degrees of Freedom	6	6	6
Single Arm Degrees of Freedom	4	5	5
Waist Degrees of Freedom	/	2	2
Head Degrees of Freedom	/	2	2
Dexterous Hand	/	/	Optional
Joint output bearing	Crossed roller bearings, Double Hook Ball Bearings	Crossed roller bearings, Double Hook Ball Bearings	Crossed roller bearings, Double Hook Ball Bearings
Joint motor	Low inertia high-speed internal rotor PMSM (permanent magnet synchronous motor,better response speed and heat dissipation)	Low inertia high-speed internal rotor PMSM (permanent magnet synchronous motor,better response speed and heat dissipation)	Low inertia high-speed internal rotor PMSM (permanent magnet synchronous motor,better response speed and heat dissipation)
Maximum Torque of Arm Joint	2kg	2kg	2kg
Calf + Thigh Length	600	600	600
Forearm + Upper Arm Length	420	420	420
Joint Movement Space	Knee Joint:-10°~+139° Hip Joint:Y:±157° P:-168° ~+146° R:-60° ~+100°	Waist Joint:Y±150° R±30° Knee Joint:-10°~+139° Hip Joint:Y:±157° P:-168° ~+146° R:-60° ~+100°	Waist Joint:Y±150° R±30° Knee Joint:-10°~+139° Hip Joint:Y:±157° P:-168° ~+146° R:-60° ~+100°
Electrical Routing	Hollow + Internal Routing	Hollow + Internal Routing	Hollow + Internal Routing
Joint Encoder	Dual Encoder	Dual + Single Encoder	Dual + Single Encoder
Cooling System	Local air cooling	Local air cooling	Local air cooling
Power Supply	Lithium battery	Lithium battery	Lithium battery
Basic Computing Power	8-core high-performance CPU	8-core high-performance CPU	8-core high-performance CPU
Microphone Array	4-Mic Array	4-Mic Array	4-Mic Array
Speaker	YES	YES	YES
WiFi 6 、Bluetooth 5.2	YES	YES	YES
Camera	Monocular camera	Binocular camera	Binocular camera
Upgraded Intelligent OTA	YES	YES	YES
Secondary Development	/	/	YES
High-Power Computing Module	/	/	Multiple brands and models available such as Orin(40-100TOPS), etc.

● Please visit the Unitree documentation center to obtain the R1-EDU secondary development guide.

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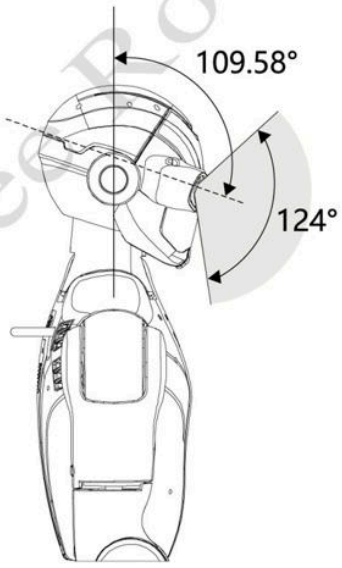
R1 Camera Parameters:

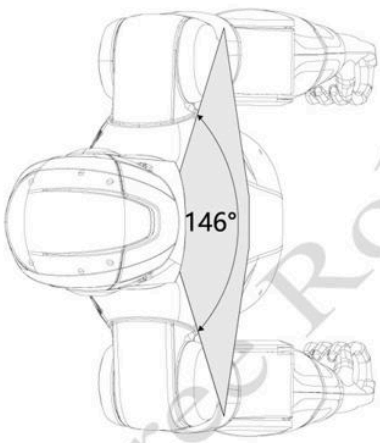
RGB Full Resolution	1270*720
Depth Resolution	544*448
Depth Map Frame Rate	10Hz
RGB Frame Rate	30Hz
Resolution	13 million
Features	● Global Shutter ● High Photosensitivity ● Supports High Dynamic Range Output ● High Signal-to-Noise Ratio ● 850nm/940nm Near-Infrared Enhancement ● Supports External Exposure Control and Multi-Sensor Synchronization ● Automatic Exposure/Gain Control, Supports Exposure Less Than One Line ● Supports LED STROBE ● Horizontal/Vertical Window Adjustment ● 15.5x Analog Gain, 16x Digital Gain ● 1PC Interface Register Programming
Dynamic Range	● Normal mode: 66dB ● HDR mode: >100dB

R1 Camera Field of View:

The R1 AIR version is equipped with a monocular camera in the head, with a horizontal FOV of up to 146° and a maximum vertical FOV of 110°.

The R1 basic version is equipped with a depth camera in the head, with a horizontal FOV of up to 146° and a maximum vertical FOV of 124°.

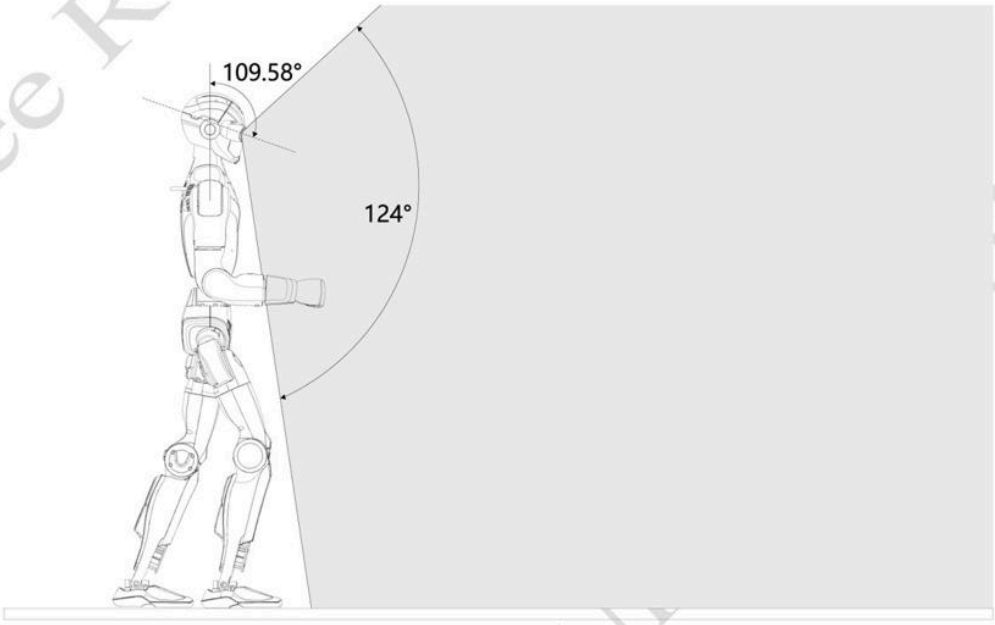




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Vertical Horizontal

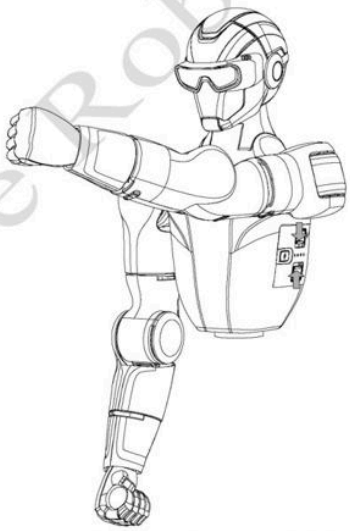
The wide field of view provides the robot with exceptional visual perception, enabling it to accurately understand its surroundings, achieve high-precision spatial awareness and obstacle detection, and thus interact and respond more intelligently and flexibly in diverse scenarios.



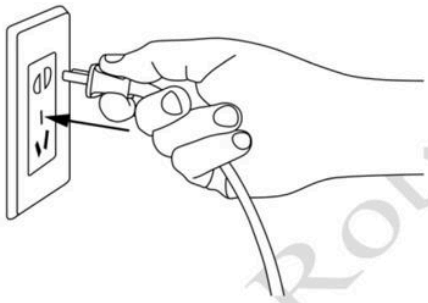
4.How to charge

Due to factors such as battery self-discharge during transportation and storage, it is normal for the battery to have low or no power when first used. You can charge it as follows.

4.1 Charge the Battery



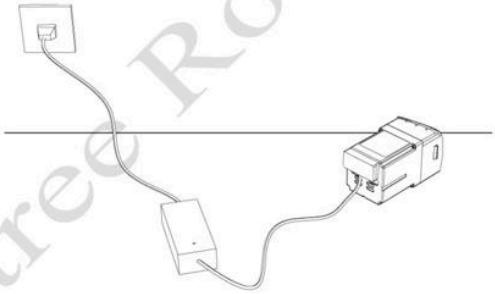
1) Remove the battery from the R1 body



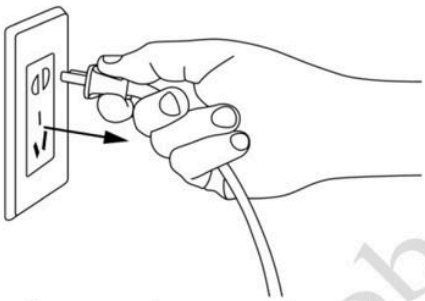
2) Charger input AC power
(100-240V, 50/60Hz)

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(press the two latches on the battery pack with both hands)



3) Connect the R1 battery



4) Manually disconnect the power when fully charged

1) Connect the charger to an AC power source (100-240V, 50/60Hz). It must be ensured that the external power supply voltage matches the rated input voltage of the charger before connecting. Otherwise, the charger will be damaged (the rated input voltage of the charger is marked on the nameplate of the charger).

2) Plug in the input AC power first before charging the battery, then connect the charger to the battery.

3) Before charging the battery, ensure that the battery pack is switched off. Otherwise, the battery and charger may be damaged.

4) The users need to remove the battery pack from the robot itself when charging the battery pack.

5) In the charging state, the battery indicator of battery pack will flash at a frequency of 1Hz (1 second/time) and indicate the current battery.

6) If the battery indicator is off, the battery pack is fully charged. Please remove the battery pack and charger to finish charging.

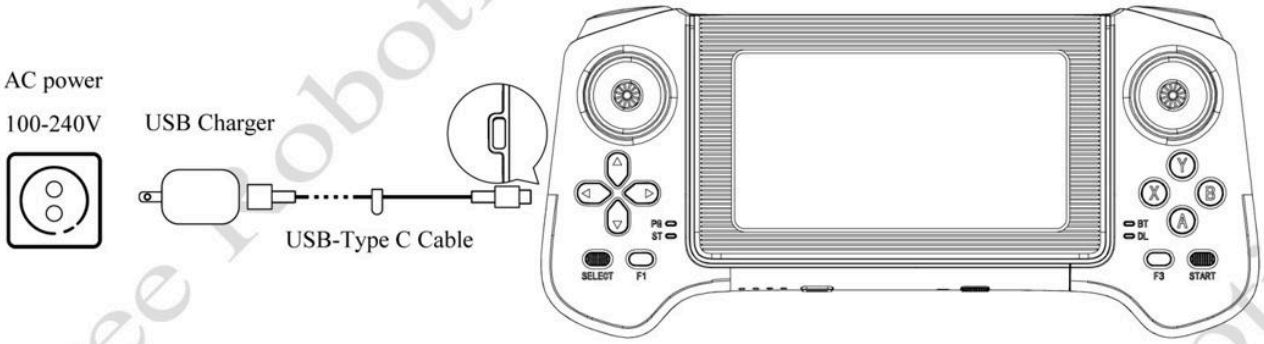
7) The temperature of the battery pack may be high after running, t, and the battery pack must be charged after the temperature of the battery pack has dropped to room temperature.

⚠ ● It is strictly prohibited to use unofficial chargers to charge R1 batteries. Please use official chargers for charging!

4.2 Remote Control Charging

When the battery indicator light of the companion remote control shows that the battery is low, you should connect the companion remote control to the charger as shown in the figure below:

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1) We recommend you to use a 5V/2A USB charger which meets FCC/CE standard.

2) Ensure that handheld remote control is switched off before charging it.

3) The power indicator light will flash at 1Hz (1 second/time) in charging status and indicate the current power level.

4) When the power indicator light is all on it means the battery pack is full, please remove the charger to finish charging.

Charging Indicator Light				
LED1	**LED2**	**LED3**	**LED4**	**Current Battery**
☼	○	○	○	0%-25%
☼	☼	○	○	25%-50%
☼	☼	☼	○	50%-75%
☼	☼	☼	☼	75%-100%
☼	☼	☼	☼	Full Charged

5.Instructions for use

5.1 Operating Environment Requirements

1) This product is intended to be used in industrial, commercial and other similar scenarios.

2) Operate in good weather conditions at temperatures ranging from 0°C to 40°C. Do not operate in adverse weather conditions, such as fog, snow, rain, thunderstorms, sandstorms, storms, tornadoes, etc. The robot is NOT waterproof. Do not operate on wet ground, in rain, snow, or humid environments! The robot is not dustproof. Do not operate on gravel ground or in dusty environments!

3) When using the robot, keep it within your field of vision and a safe distance of at least 2 meters from obstacles, complex terrain, crowds, water and other objects.

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4) Please do not run the robot in an electromagnetic interference environment. Sources of electromagnetic interference include but are not limited to: high-voltage power lines, high-voltage transmission stations, mobile phone base stations, and television broadcast towers.

5) Please do not run the robot in the Wi-Fi signal interference environment. Wi-Fi signal interference is usually caused by co-channel interference. In case of interference, be sure to turn off the Wi-Fi signals on some or all other wireless devices before using the remote control to operate the robot.

6) Due to the varying levels of proficiency among actual operators, for reliability and safety, please use the robot in an open, flat, and unobstructed environment. If the robot needs to travel on complex terrain or terrain with certain ups and downs and slopes, the operator should reduce the robot's walking speed and carefully control it to avoid tripping over obstacles.

7) The robot has certain requirements for the ground on which it walks. Do not use the robot on very low friction ground, such as ice. Do not use the robot on soft ground, such as thick spongy ground. If the robot is used on smooth ground, such as glass and ceramic tile, the users need to control the robot movement carefully and smoothly, avoid violent movement, and reduce the walking speed of the robot to prevent the robot foot from slipping and falling.

5.2 Unboxing

● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Unboxing** Video.

Place the case on level ground with the front side facing up, then open the top case and remove the included stand. Lift the entire robot out. Take the humanoid robot, the remote controller, the charger, and other accessories out of the case separately. Lay the humanoid robot flat on level ground, and then prepare to power it on.

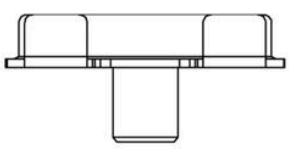
5.3 Bracket Installation

● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Bracket Installation** Video.

1) Bill of Materials:



Quick-Release Clamp



Bracket



Wave Washer

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Base Plate



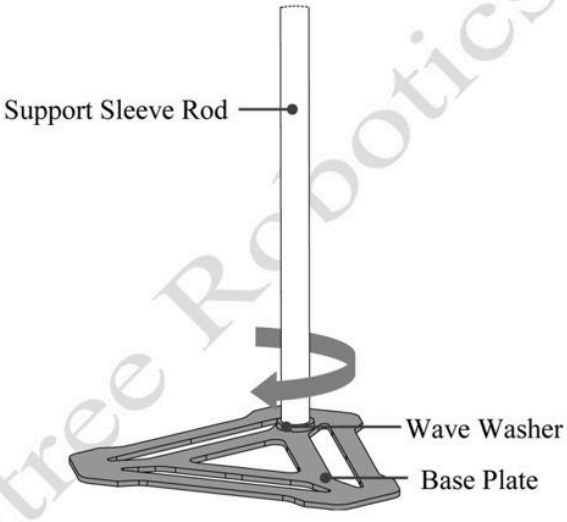
Protective Foam



Support Sleeve Rod

2) Installation Steps:

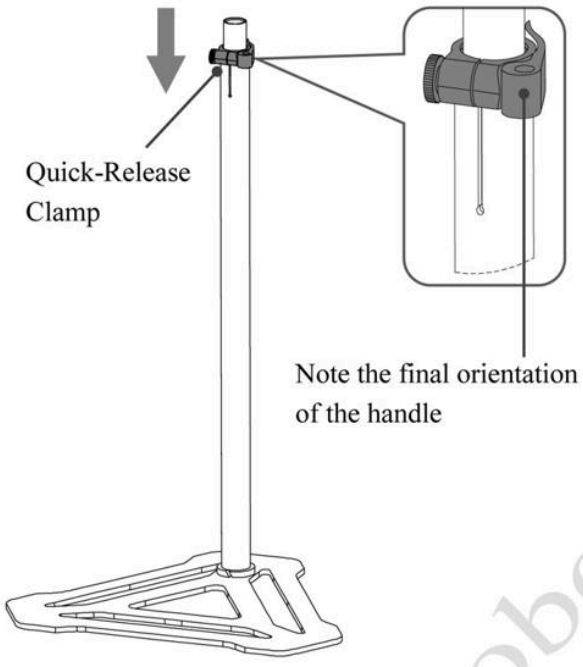
a) Tighten the support sleeve rod, wave washer, **and base together with all your strength!**



Step 1

c) After pulling the inner tube outward, slide the protective foam onto it.

b) Slide the quick-release clamp onto the support sleeve rod (note: the final orientation of the handle should be as shown in the figure).



Step 2

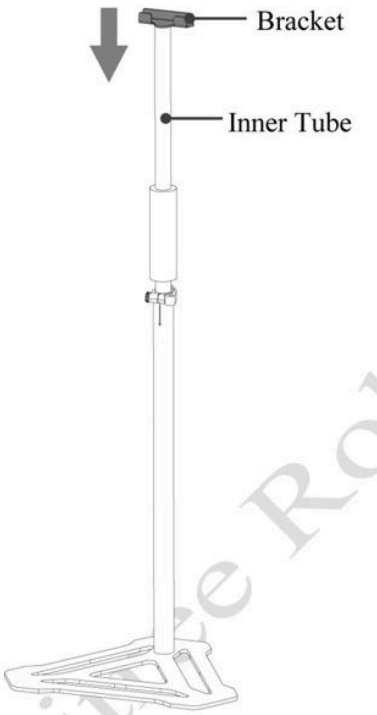
d) Tighten the bracket to the inner tube.

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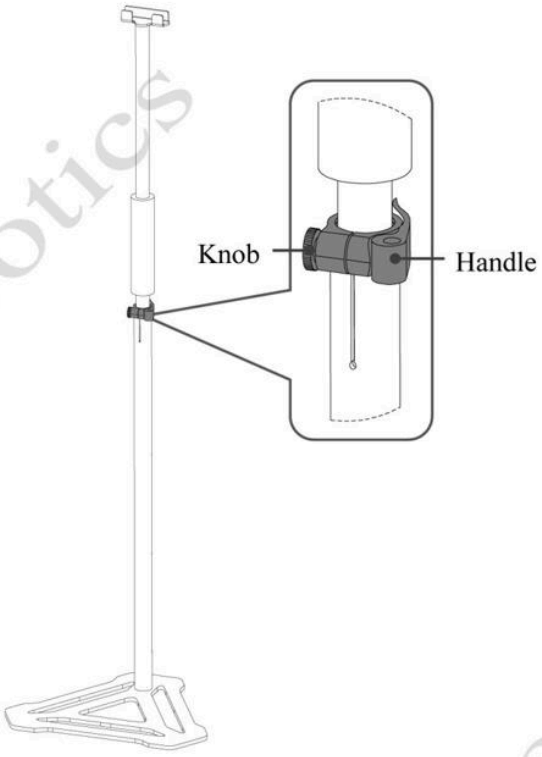


Step 3



Step 4

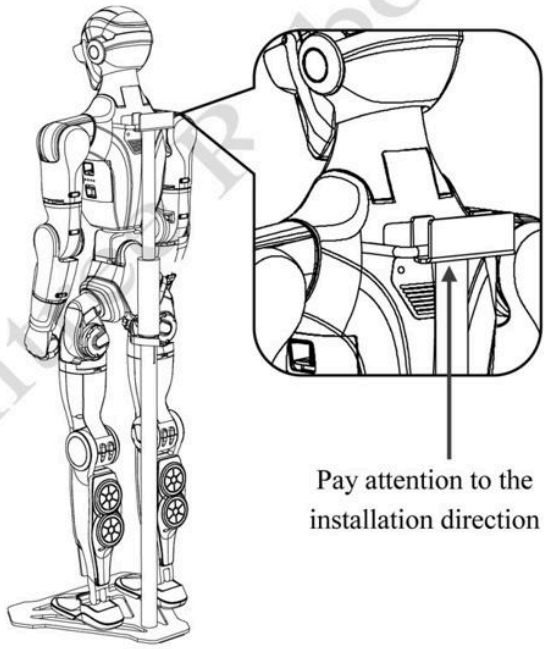
e) Fine-tune the locking force between the inner and outer tubes using the "knob adjustment," and adjust the bracket height by tightening/loosening the "handle."



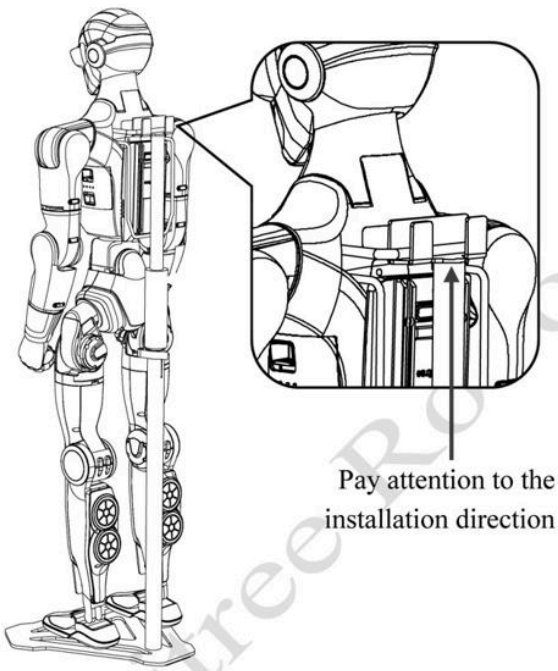
Step 5

f) The hanging methods for different versions of the R1 are shown in the figure below.

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R1 AIR / R1 Base Edition



R1 EDU

5.4 Check before Power on

1) Only Use Unitree Robotics authentic parts and ensure that all parts are in good working condition.

2) Ensure that the firmware has been updated to the latest version.

3) The users must make sure that he or she is not operating the robot under conditions such as, intoxicated, under the influence of drugs, and unable to concentrate.

4) Be familiar with the characteristics of each gait mode. Be familiar with the emergency braking method of the robot in case of instability / loss of control.

5) Ensure that there are no foreign objects (such as water, oil, sand, soil, etc.) inside the robot and its components.

6) Ensure that the remote control module and battery pack are fully charged.

5.5 Power on Procedures

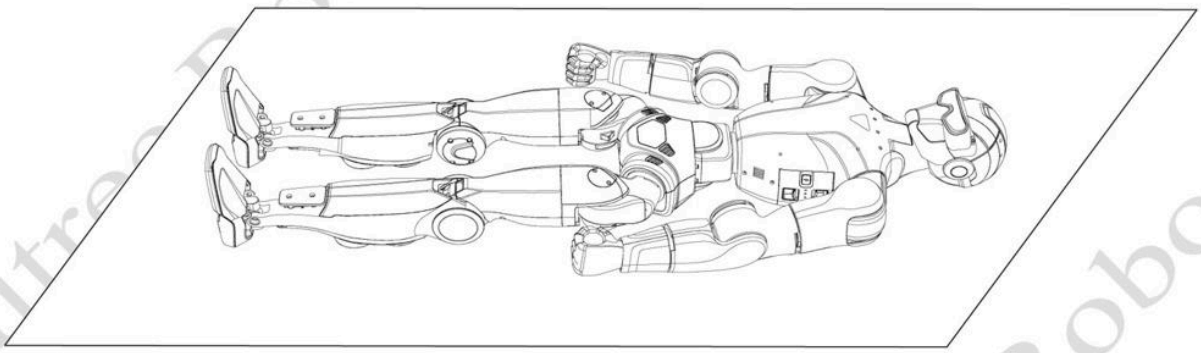
5.5.1 Powering On in a Supine Position

● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Startup Video (Lying Flat)**.

1) Lie Flat on Open Ground

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Place the R1 lying flat on the ground with its front facing upward. Ensure there are no obstacles around. Position the arms and legs naturally, as shown in the figure below.

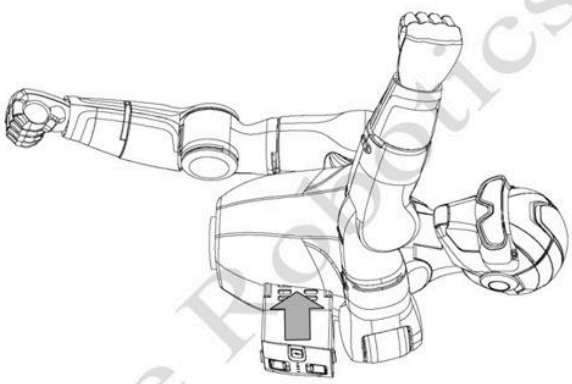


2) Power On

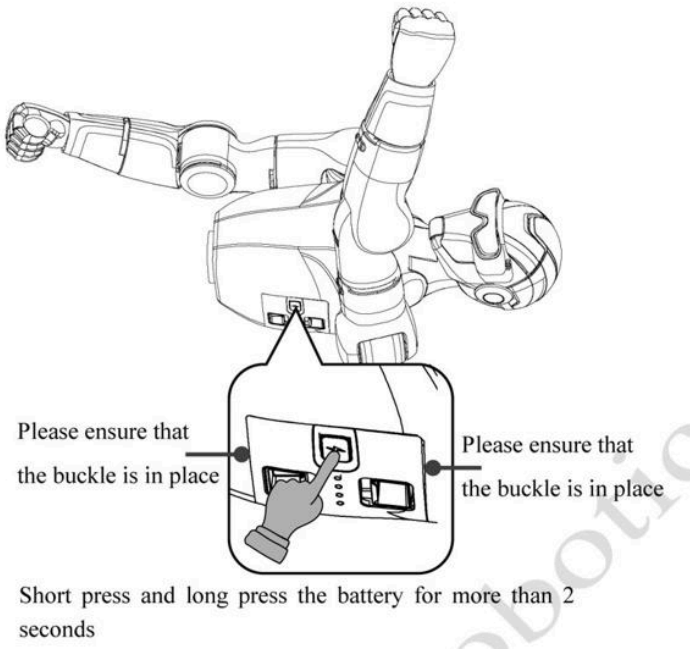
a) Lift the left arm and insert the battery. A "click" sound indicates it is properly installed. Ensure the latch is securely locked in!

b) Briefly press the battery power button for 1 second, then press and hold it for more than 2 seconds to power on.

c) The chest lights up with a purple light, and the voice prompt " Startup Complete" indicates the startup is complete.



Step1 Insert the Battery



Step2 Power On and Start

3) Transition the Robot from Lying Down to Standing

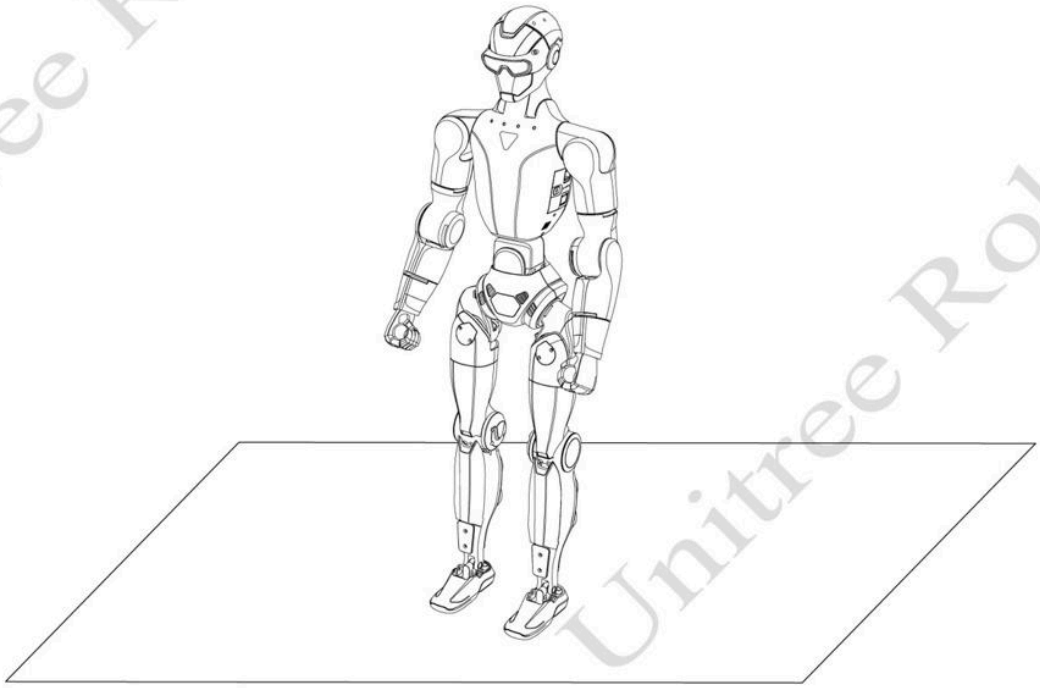
a) To power on the remote, briefly press the remote power button once, then press and hold it for more than 2 seconds.

b) The DL indicator on the remote control is steadily lit, indicating a successful connection. First, press

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[L2+  **]**, and the robot announces, "Standing Lock mode."

c) **(Note: The robot must lie flat facing the sky)**. Long-press **[L2+X]**, and the robot will automatically transition from lying down to standing up. The R1 enters stable standing mode.



4. Enter Walking/Running Mode

After the R1 stands steadily, press **[R2+A]** to enter walking/running mode.

⚠ ● Soft Emergency Stop: When the R1 enters an unexpected state, press and hold **[L2+B]** for more than 5 seconds. The R1 will enter a damped state and slowly fall to the ground.

● Hard Emergency Stop: When the R1 enters an unexpected state, press the **[Emergency Stop Button]**. The R1 will enter emergency stop mode, and the motors will power off.

● Cosmetic paint wear occurring during the power-on/off process is a normal phenomenon.

5.5.2 Powering On on the Bracket

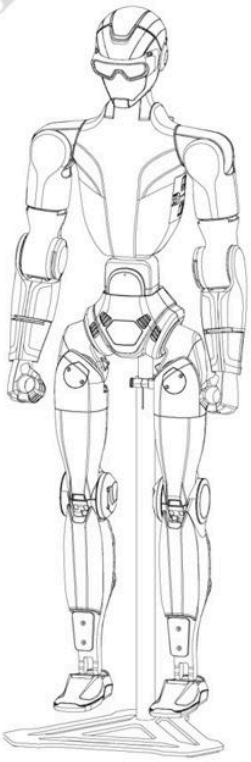
● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Startup Video on Bracket**.

1) Pre-startup Preparation

Before powering on, hang the R1 on the bracket with its front facing forward. Ensure there are no obstacles around, and position the limbs naturally, as shown in the figure.

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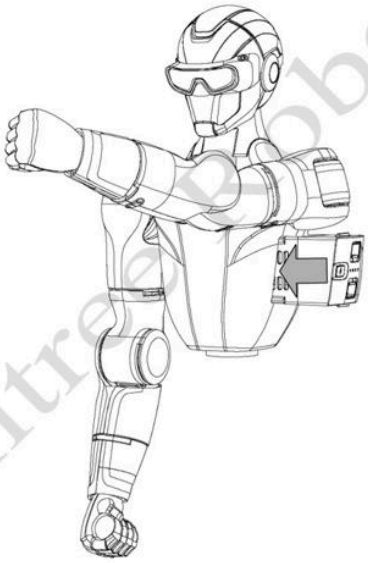


2) Power On

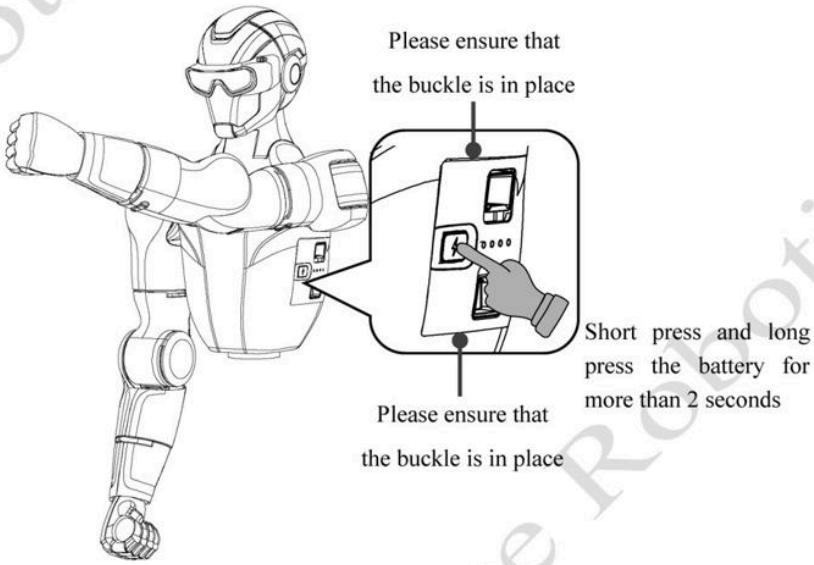
a) Lift the left arm and insert the battery. A "click" sound indicates it is properly installed. Ensure the latch is securely engaged!

b) Briefly press the battery power button for 1 second, then press and hold it for more than 2 seconds to power on.

c) The chest lights up with a purple light, and the voice prompt " Startup Complete " indicates the startup is complete.



Step1 Insert the Battery



Step2 Power On and Start

3) Start the Robot

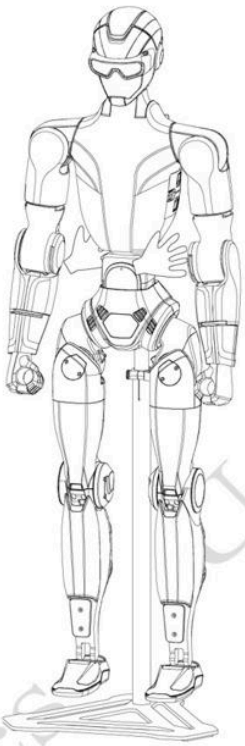
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a) To power on the remote, briefly press the remote power button once, then press and hold it for more than 2 seconds.

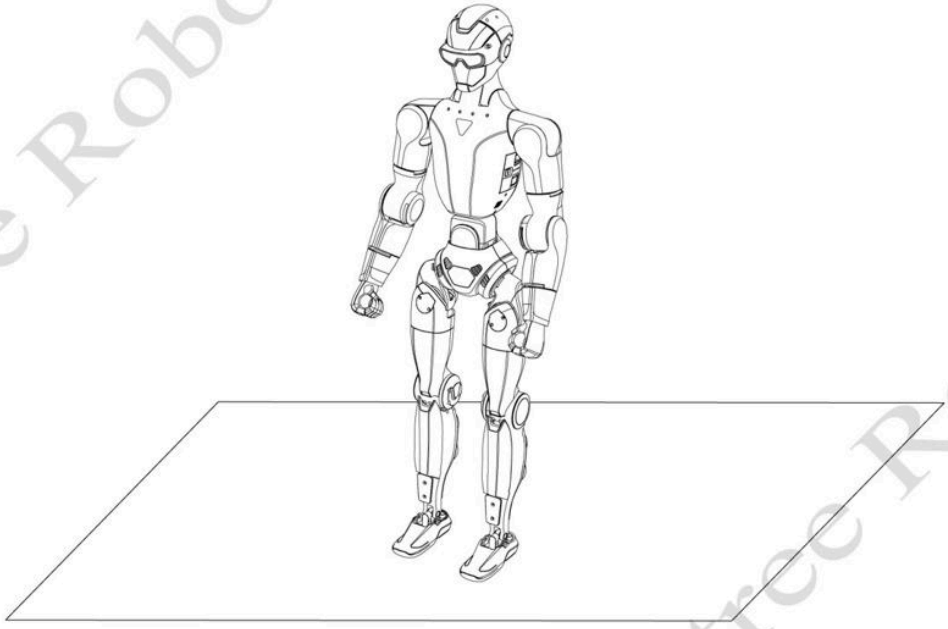
b) The DL indicator on the remote controller stays on, indicating a successful remote connection.

c) Press the **[L2+**  **]** on the remote control, and the robot will announce, "Standing Lock mode."

d) With both hands, **support the robot's waist from the front** and lift the robot off the bracket (as shown in the figure). Do not let go, as the robot cannot balance independently at this point.



4) After both feet touch the ground, press [**R2+A**] to enter walking/running control mode. You can now release your hands, as the robot can maintain balance autonomously.



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⚠ ● Soft Emergency Stop: When the R1 enters an unexpected state, press and hold **[L2+B]** for more than 5 seconds. The R1 will enter a damped state and slowly fall to the ground.

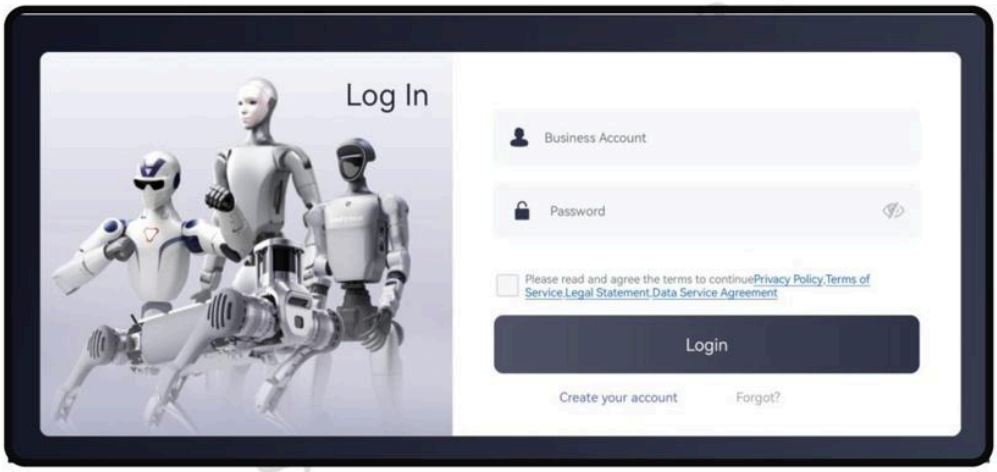
● Hard Emergency Stop: When the R1 enters an unexpected state, press the **[Emergency Stop Button]**. The R1 will enter emergency stop mode, and the motors will power off.

● Cosmetic paint wear occurring during the power-on/off process is a normal phenomenon.

5.6 Connecting to the Unitree Explore App

1) Scan the QR code to download and install the Unitree Explore App, register an account, and complete the login.

Unitree Explore App Download Link



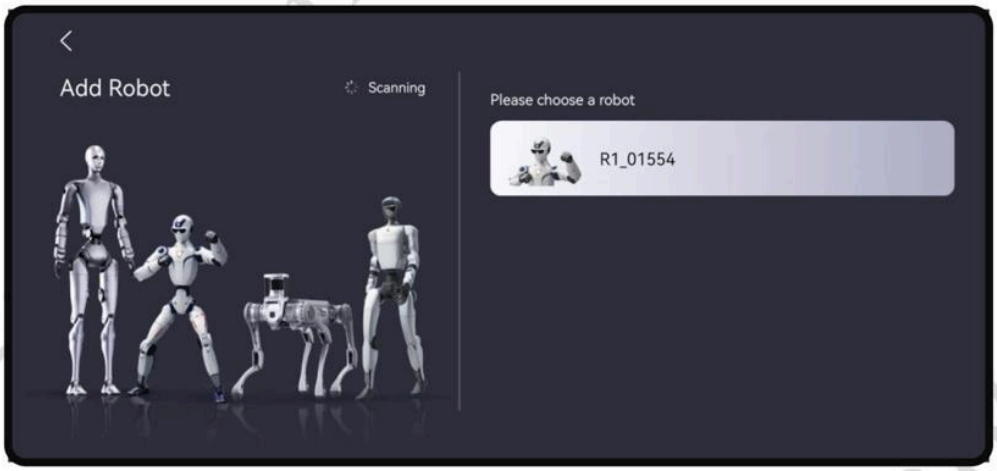
● The Unitree Explore App is specifically designed for the B2, H1, G1, and R1 series robots, providing an excellent control experience and feature support!

2) After the R1 is powered on, click "Add Robot."



3) Click on the device you want to add.

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⚠ ● Please keep your phone's Bluetooth turned on during the connection process!

● Bluetooth connection error: The Unitree Explore App requires Bluetooth permissions. Please enable Bluetooth permissions for Unitree Explore in your phone's app settings.

● If you forget the bound account or lose the account, please contact Unitree personnel!

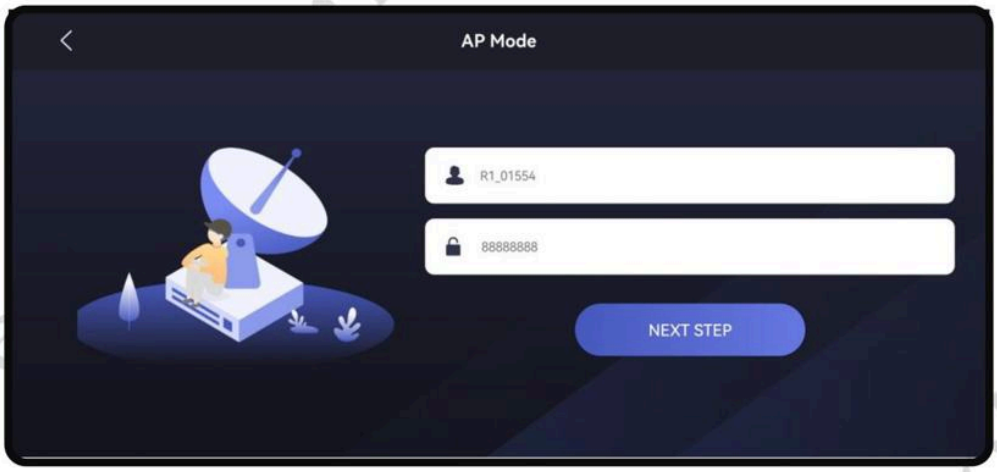
4) AP Direct Connection Mode

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **AP direct connection robot** instruction video.

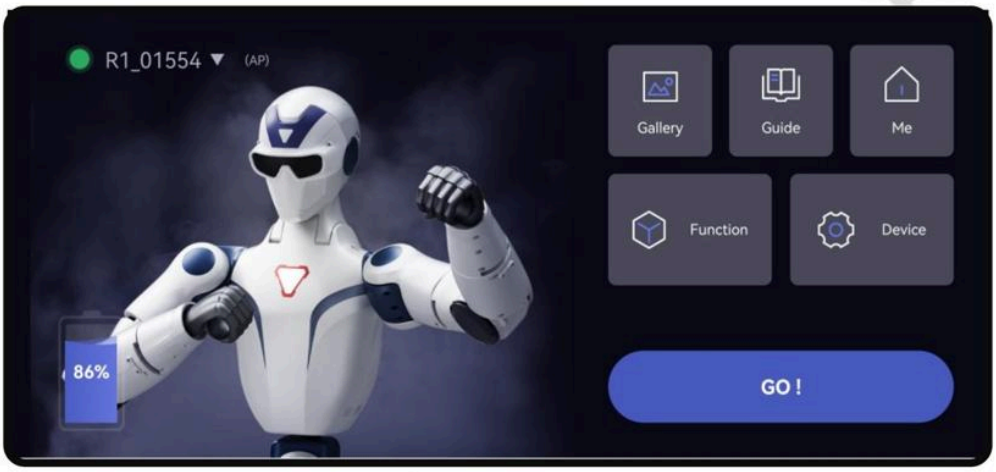


Step1: Click on "AP Direct Connection"

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Step2: The robot account will be read



Step3: Connection successful

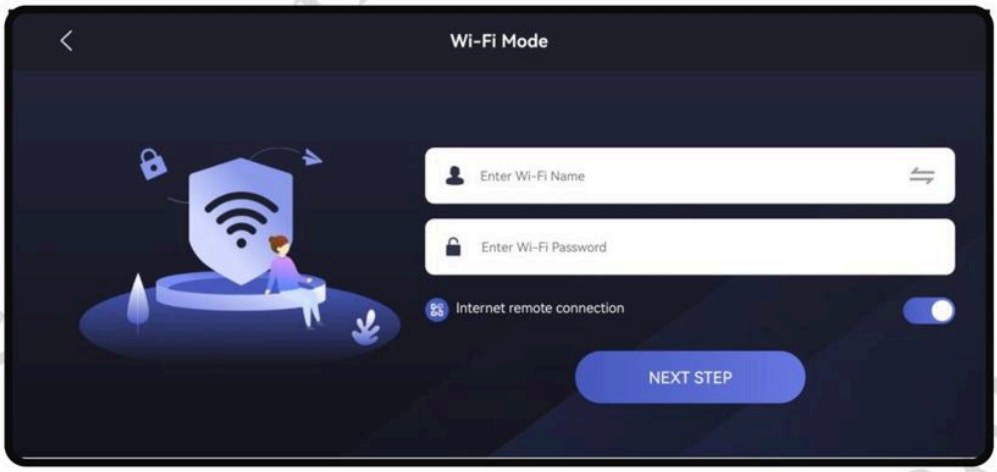
5) Wi-Fi Connection Mode

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **Wi-Fi connection robot** instruction video.



Step1: Click on "Wi-Fi Connection Mode"

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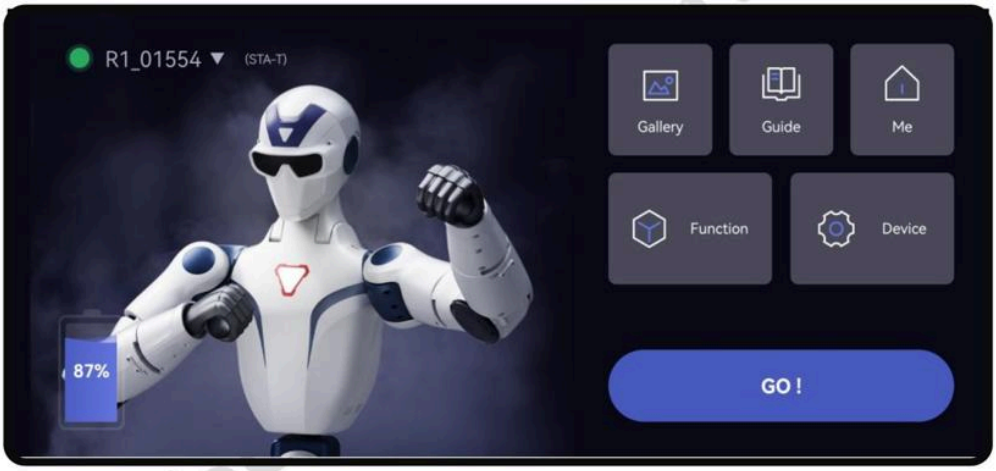


Step2: Select the Wi-Fi network, enter the password, and click "Next"

(The phone needs to be connected to the target Wi-Fi first; the App can recognize it automatically)

(After enabling public network remote connection,

you can connect to the public network, which can be used to upgrade the robot's software)



Step3: Connection successful

6) How to Change Account Binding

On the home page, click [Settings] - [Robot Settings], select and click "Unbind" to unbind a robot that is already bound. After the robot is unbound, it can be bound by another account.

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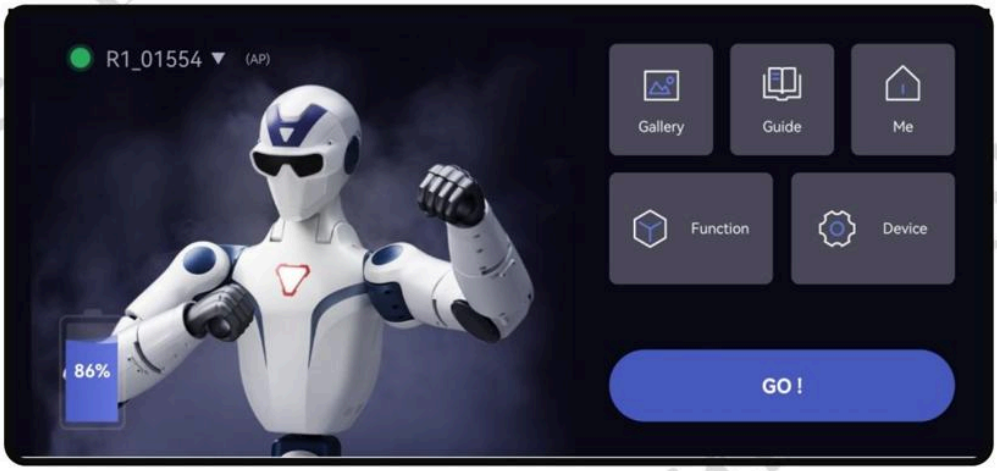
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5.7 Operate your R1

5.7.1 Using the Unitree Explore App to Operate the Robot

Click [GO] to enter the first-person perspective operation interface.



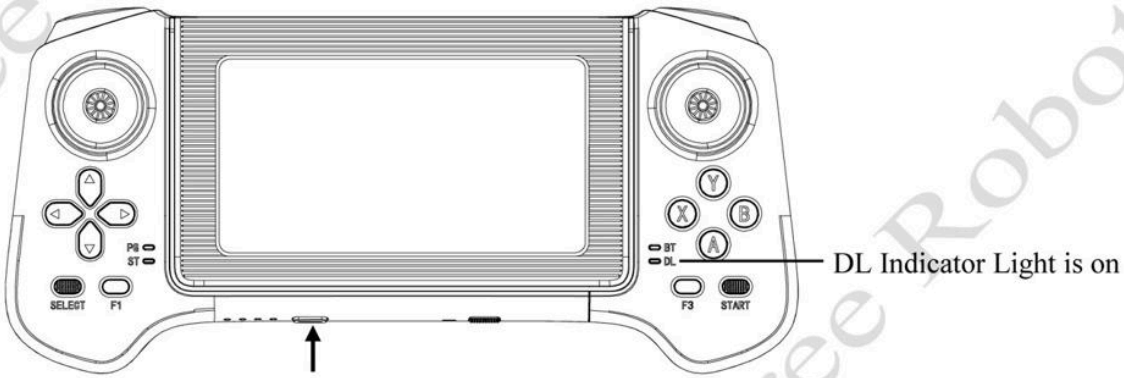
5.7.2 Using the Remote Controller to Operate the Robot

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **remote controller operation instruction video** for the robot.

(Note: Old and new versions of the remote controller will be shipped randomly; please refer to the physical product received! Thank you for your support.)

1) First, briefly press the power switch for 1 second, then press and hold it for more than 2 seconds. Upon hearing a 'beep~' sound, the remote controller is powered on.

2) After the remote controller successfully connects to the R1, the DL indicator on the right stays on, indicating a successful connection. You can now control the robot to perform corresponding actions according to the instructions on the [Remote Controller Sticker].



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5.8 Emergency Stop

1) Soft Emergency Stop

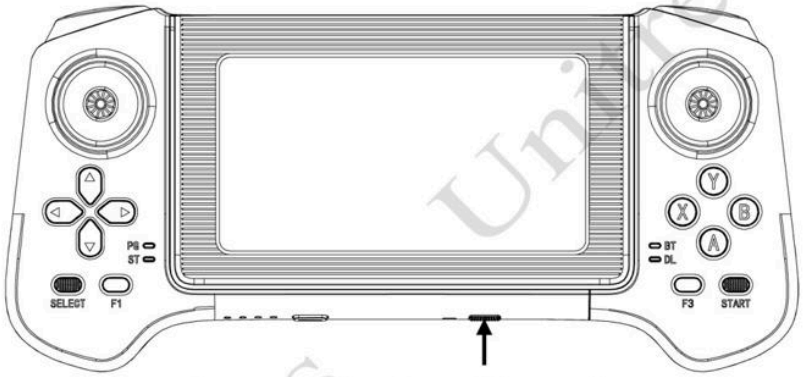
Press and hold **[L2+B]** for more than 5 seconds. The R1 will enter a damped state and slowly fall to the ground.

After activating the soft emergency stop, you can enter locked standing mode by pressing **[L2+**  **] - >** then proceed to use the robot normally.

2) Hard Emergency Stop

Press the **[Emergency Stop Button]** on the remote control, R1 enters emergency stop mode, the robot's joints are powered off, and the robot will lose power and fall to the ground directly.

After activating the hard emergency stop, you need to restart the robot's power before you can use the robot again.



Emergency Stop Button(New version remote control)

3) Dance Pause

During the dance, double-click **[START]** to pause the robot's dance movements.

> ● After pressing the **[Emergency Stop Button]**, you must wait for 3 seconds or more before restarting the robot.

5.9 Switching off R1

> ● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Shutdown Video**.

Before powering off, first control the R1 to stand in an open area, ensuring sufficient space is retained around the robot.

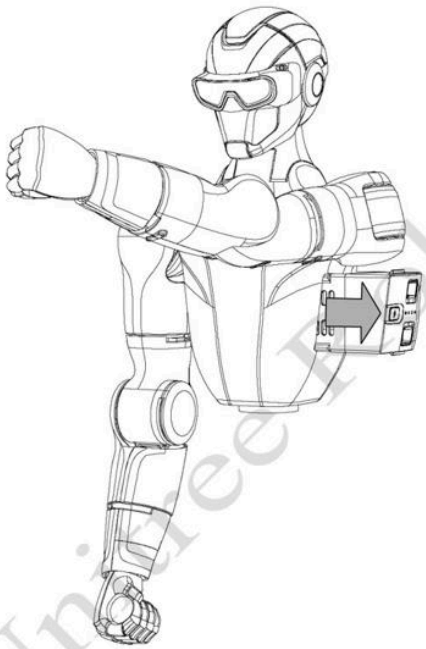
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1) Long-press **[L2+X]** on the remote control, and the R1 will automatically lie down.

2) Briefly press, then press and hold the battery power switch for more than 2 seconds to power off.

3) First lift the left arm, then remove the battery as shown in the figure below.





⚠ ● Be careful to not get your hands pinched by the moving joints, please be careful!

5.10 Packing

● Please scan the QR code to visit the Unitree Documentation Center for the **R1 Packing Video**.

Packing Instructions:

1) Lay the R1 robot flat on the ground and prepare the accompanying transport case.

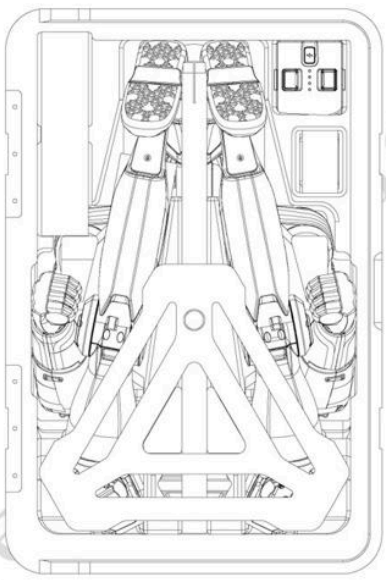
2) Two persons should lift the R1 robot by its thighs/calves and arms respectively.

3) Slowly place it into the transport case, allowing the R1 robot's buttocks to enter the case first, and then move it to the corresponding side of the case.

4) Place the R1 into the case lying on its back, with its head and back facing down. Please pay attention to the orientation.

5) Position the robot's arms at its sides, with the wrists rotated to a vertical orientation to ensure they fit inside the case.

6) Place the buffer liner on the R1's chest, securing it against the arms.



Robot placement

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7) Fold the legs back towards the body and place them inside the case, ensuring the soles of the feet and calves fit snugly against the liner.

8) Provide impact protection and buffering for all contact surfaces of the robot. Place related accessories such as the remote control, charger, and bracket into the case to complete the packing.

5.11 Remote Controller Binding

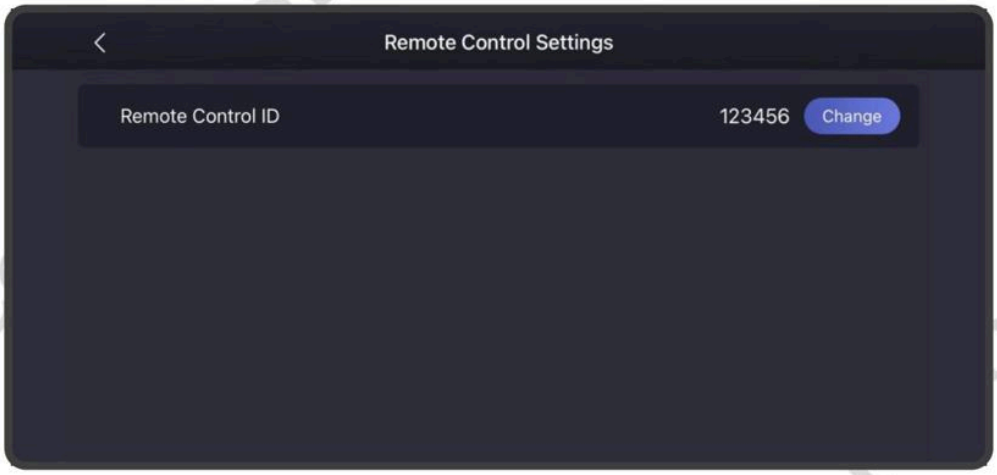
● Please scan the QR code to visit the Unitree Documentation Center for the **Remote Control Binding** instruction video.

When using a new remote controller, it needs to be bound via the App.

1) Click on [Settings] -> [Robot Settings] -> [Remote Controller Settings].



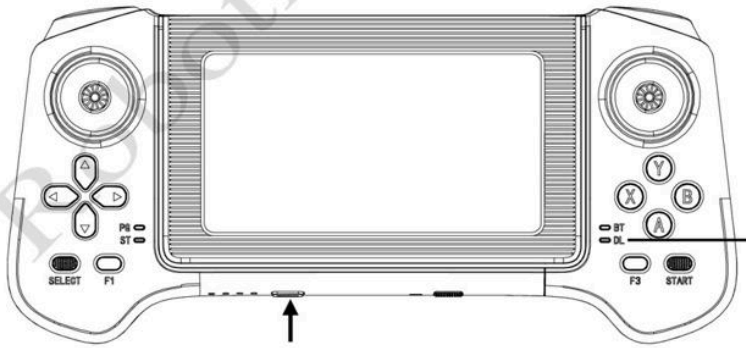
2) Click on [Enter the corresponding remote controller code] -> [Click Modify]. The remote controller ID is located on the white sticker on the back of the remote controller and is case-insensitive.



3) Bring the remote controller close to the robot's chest. Press and hold **[ELECT]** until you hear six consecutive beeps to enter binding mode.

The DL indicator stays on, indicating successful binding.

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5.12 R1 Chest Light Indicator Meaning

Color	Semantic Description
Cyan Breathing Light	Booting Up
Solid Purple	Zero Torque Mode
Solid Orange	Damping Mode
Solid White	**Running Mode**
Solid Dark Blue	Standby Mode
Solid Red	**Device Malfunction**
Blue Breathing Light	Recording Audio
Green Breathing Light	Voice Command Received After Wake-up
Solid Green	Seated Mode
Solid Yellow	Debug Mode

5.13 Robot Calibration

1) Joint Calibration Tutorial (20 Degrees of Freedom)

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **joint calibration tutorial (20 DoF)** video.

2. Joint Calibration Tutorial (26 Degrees of Freedom)

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **joint calibration tutorial (26 DoF)** video.

3. IMU Calibration Tutorial

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **IMU calibration** tutorial video.

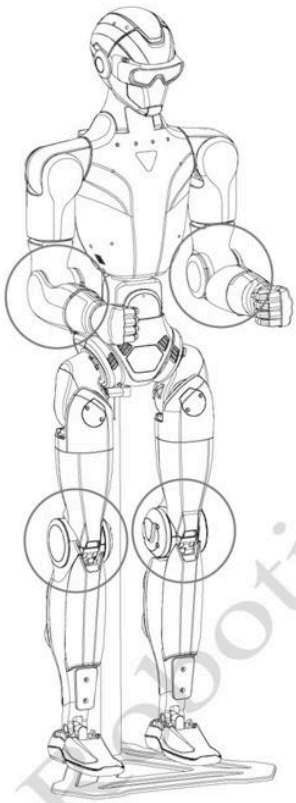
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6.R1 EDU

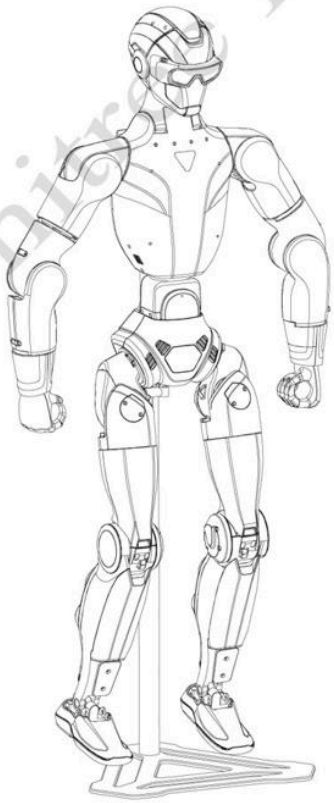
6.1 Debugging Instructions

● Please scan the QR code to visit the Unitree Documentation Center to obtain the **development and debugging** tutorial video.

When the R1 is in a suspended state and in the damped state (activated by pressing **[L2+B]**), simultaneously press and hold the **[L2+R2]** key combination on the remote controller. The R1 will then enter debug mode. At this point, pressing **[L2+A]** will cause the R1 to enter position mode and assume a specific diagnostic posture.



Diagnostic Posture



Damping State

Pressing **[L2+B]** again will put the R1 into a damped state. This process can be used to confirm whether the R1 has successfully entered debug mode or for hardware troubleshooting. You can then begin development and debugging using the SDK.

● Please control the robot according to the instructions on the remote controller sticker, or visit the Unitree Explore App to obtain the remote controller user manual. Under the current system version, once the R1 is powered on, the built-in motion control program starts automatically, even if you are not operating the remote controller. This program periodically sends commands with a speed of 0.

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However, if you use the SDK for low-level development in this state, it may cause command conflicts, resulting in jittering of the R1.

- Therefore, when you need to use the SDK for development and debugging, be sure to ensure that the R1 has entered debug mode to stop the motion control program from sending commands, thus avoiding potential command conflicts. You can press **[L2+A]** to confirm whether debug mode has been entered.
- If the behavior after pressing **[L2+A]** does not match the tutorial video, you can press **[L2+R2]** multiple times to ensure entry into debug mode.

6.2 R1 EDU Backpack Installation

- Please scan the QR code to visit the Unitree Documentation Center to obtain the **R1 EDU Backpack** installation video.

6.2 R1 EDU Dexterous Hand Installation

- Please scan the QR code to visit the Unitree Documentation Center to obtain the **R1 EDU Dexterous Hand** installation video.

6.3 R1 EDU Radar Installation

- Please scan the QR code to visit the Unitree Documentation Center to obtain the **R1 EDU Radar** installation video.

7.Abnormal Condition Description

When using the R1 robot, the robot may be abnormal. Most abnormal situations are controllable (there are solutions). The users should not panic when encountering these problems. Read the following contents in detail and solve the problems step by step.

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If you have any questions, please contact Unitree Robotics official technical support:support@unitree.cc.

1) Power-On Self-Test Unsuccessful

If the robot fails to power on, recheck the body according to the "Pre-Power-On Inspection" steps and try again.

2) Robot Fall Self-Protection

When using the official Unitree motion control program (controlling the robot's movement with the remote controller), if the robot loses balance and falls due to external environmental factors (e.g., insufficient ground friction) or improper user operation, the robot will automatically switch to self-protection mode. The robot's motors will automatically enter a braking state to protect all components.

3) App Connection Exception

If using AP direct connection mode, check if the phone is connected to the AP hotspot broadcast by the R1. If hotspot configuration fails, ensure the set hotspot name contains no special characters or spaces. Ensure the robot and phone are close to each other, then restart both the robot and the App before attempting to connect again.

If using Wi-Fi connection mode, check if the connected Wi-Fi network is functioning normally and can access the external network.

4) How to Power Off the Robot When the Remote Module Fails

If unable to use the remote module (e.g., due to remote controller or phone battery depletion) to put the robot in standby, you can only force a shutdown by pressing the battery power button.

Force Shutdown: Place the robot lying flat on the ground, maintaining a safe distance of at least 2 meters from obstacles, uneven terrain, crowds, water surfaces, etc. Briefly press the battery power button, then press and hold it for more than 2 seconds to power off.

5) Robot Easily Falls While Walking

If the robot easily falls during walking, and restarting the robot does not resolve the issue, please contact Unitree official technical support to recalibrate the robot's joints.

6) How to Maintain Standby for Extended Periods

If the robot needs to remain in standby for a long time, suspend the robot and control it to enter the damped state (by pressing the **[L2+B]** keys) to prevent the robot from automatically powering off due to low battery and falling, which could cause damage!

⚠ ● Attention! When lifting the robot, do not place your hands near joint areas, such as the hip joints, to avoid pinching! If the robot is powered off by force while standing without protective measures, it will fall flat to the ground after losing power.

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8.Precautions

1) **Regarding Battery Life: T**he robot's comprehensive operating battery life is approximately 1 hour, depending on the actual operating conditions. For instance, conditions such as prolonged walking at relatively high speeds, frequent and vigorous adjustment of the robot's posture while standing, standing with bent legs, operating with a load, walking at a lower body height, and navigating terrain with appropriate undulations and slopes will all reduce the battery life.

2) **Regarding Uneven Terrain:** When the robot walks on complex ground or terrain with certain undulations and slopes, the operator should reduce the robot's walking speed and control it carefully to prevent the robot from tripping.

3) Please ensure the surrounding area is clear when the robot is in motion to prevent tripping, which could cause damage to the machine, nearby personnel, or objects. Do not touch the robot while it is moving or being carried! Beware of pinching near joint areas, such as the knees and neck.

9.Daily Care and Maintenance

9.1 Whole Machine Clean

1) Cleaning: After using R1, if there are stains on the surface, please clean the surface of the body in time. Before wiping the body, please switch off the power, use a dry and clean soft cloth to wipe the body, pay special attention to the camera whether to wipe clean.

2) Storage: R1 is not dustproof or waterproof, it should be stored in a dry and cool room, avoiding sunlight and rain, so as not to shorten the service life of the parts due to water ingress and rust corrosion.

9.2 Inspection and Maintenance

Carrying out routine inspection before and after operation can greatly improve the reliable performance of products, reduce potential safety hazards and extend the service life span.

Uncharged checklist

Type	Main points
Appearance of the whole robot	1) Whether the appearance of the body is clean and free of damage or deformation marks. 2) Whether the lens on the camera surface has foreign matters.

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Structure	1) Visually and touch to check whether the body, joints, connections, and foot end parts are in good condition. If there are cracks or damages, replace them in time and contact Unitree Robotics after-sales service. 2) Ensure that the screws of all connecting parts are locked, especially the screws of joint connectors and battery locking knobs. 3) Check for any obstructions in the intake and exhaust of the cooling fan.
Foot end parts	Check whether there is obvious foot pad damage. If there is damage, please replace it in time.
Battery packs	1) Check the battery pack interface of the body for foreign matters and deformation. 2) Whether the battery pack is installed reliably to ensure that it will not loosen during operation. 3) Check whether the battery pack shell is obviously damaged. The battery pack with obvious damage is forbidden to be used.
Remote Control	1) Whether the remote control rocker is in the middle position and whether the rocker enters sand and other foreign matters. 2) Check whether each key of the remote control is lagged.

Charged checklist

Type	Main points
Remote control	1) Confirm whether the basic operation function of the rocker is normal. 2) Confirm whether the current power is sufficient
Battery	Confirm whether the current power is sufficient.
Cooling fan	Listen carefully with ears to confirm that the cooling fan works normally and there is no sound such as scratching.

Battery Pack Maintenance

1) Never charge the battery pack in an environment where the temperature is too high or too low

2) Never store the battery pack at room temperatures above 40°C.

3) Do not overcharge the battery pack as this will cause damage to the cells.

4) If you do not use the battery for a longer period of time, please check the remaining battery power regularly, if the power is less than 30%, please charge the battery to 70% before continuing to store. So as not to over-discharge the battery and damage the battery.

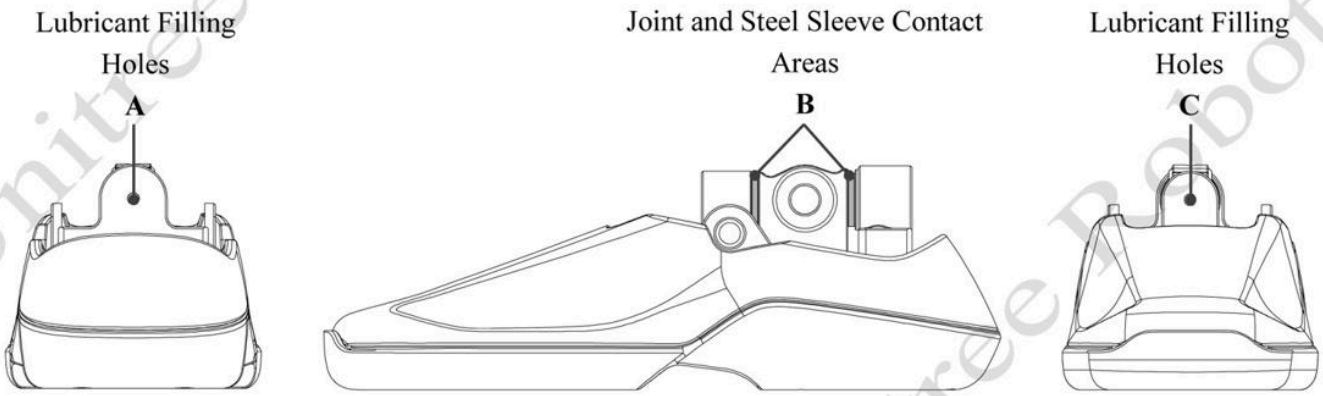
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Ankle Structure Maintenance

1) Grease has been applied to R1 from the factory. Regular maintenance should be carried out during subsequent use.

2) Add lubricating oil at positions A, B, and C to ensure smooth ankle movement, prevent abnormal noises, and extend service life.



- It is recommended to do the above inspection before each use!
- If any parts are damaged and need to be replaced, please contact Unitree Robotics after-sales service in time!

10.Product Warranty

10.1 Warranty Description

1) Unitree is introducing a warranty of up to 12 months for all of our products from the date of purchase (the period varies from models, please refer to commodity detail page). Unitree charges repair costs for the products out of warranty period.

2) Please ensure that the product is properly packed before its delivery. We are not responsible for any damage or loss during delivery.

3) Unitree reserves the right to refuse service or charge for repair and service fees if any of the following occurs, even if the product is within the warranty period:

a) Damage cause d by usage deviating from the product manual.

b) Damage caused by usage under abnormal conditions, such as heat, freezes, corrosion, fire, soak and sands.

c) Damage caused by equipment removal, repair, customization, or other operations undertaken by personnel or service providers without the authorization of Unitree.

d) Damage caused by operator error or negligence, natural disasters or theft.

e) Damage caused by defective equipment with damaged product label or natural wear.

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10.2 Free Appearance Modification - Special Warranty Terms

1) If the user modifies the robot's exterior shell through painting or aesthetic alterations without disassembling the unit or damaging the original structure, the entire machine will continue to be eligible for the official warranty service. However, the original painted appearance is not guaranteed to be restored during repair or part replacement.

2) If self-applied painting, sticker application, or other exterior modifications cause blockage of microphone holes, leading to abnormal voice recognition or sound pickup failure, the corresponding acoustic components will not be covered under warranty.

3) If self-applied painting, sticker application, or other exterior modifications cause contamination of the binocular lenses/camera lenses, reduced light transmittance, or abnormal field of view, the corresponding vision system components will not be covered under warranty.

4) If self-applied painting, sticker application, or other exterior modifications cause blockage of the speaker sound output holes, resulting in abnormal volume, sound distortion, or no sound, the corresponding audio components will not be covered under warranty.

5) If self-applied painting, sticker application, or other exterior modifications cause blockage of ventilation holes, reduced heat dissipation efficiency, or overheating of the body, subsequently leading to failures of the mainboard, motors, battery, etc., the corresponding damaged components will not be covered under warranty.

6) If self-applied painting, sticker application, or other exterior modifications seep into limb joints, reducers, or transmission structures, causing joint stiffness, abnormal noise, abnormal torque, or increased wear, the corresponding joint and transmission components will not be covered under warranty.

7) If any signs of disassembly, unauthorized disassembly, internal modification, flying wires (unauthorized wiring), or replacement with non-original parts are found on any part of the robot body, the entire machine will lose its eligibility for the official warranty.

8) Exterior issues such as scratches, color differences, paint peeling, or corrosion caused by self-applied painting, sticker application, or other exterior modifications are not covered under warranty.

9) Failures of circuits or motors caused by loss of sealing, water ingress, or dust ingress resulting from the user's modification process are not covered under warranty.

10) If official inspection confirms that a malfunction was directly or indirectly caused by user modifications, the official party reserves the right to deny warranty coverage and handle the case as a paid repair.

11) This supplementary terms document forms an integral part of the product warranty policy. In case of any conflict with the main warranty terms, these supplementary terms shall prevail.

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10.3 Warranty Coverage

	Warranty Coverage	Warranty Period
R1 AIR	Full Insurance	6 Months
R1	Full Insurance	8 Months
R1 EDU	Full Insurance	12 Months

Interface_Sensors Description

R1 exposed network interfaces and services via network interfaces in factory default state.

Network interface	**Network service**	**Description**
WLAN interface	Http web service on port 9991.	Serve as signal server for webrtc connection.
BLE interface	BLE one to one link between a mobile and our robot	Enable mobile app connection for wlan network configuration.
LoRaWAN interface	One to one LoRaWan between our remote controller and our robot	Enable remote controller connection for controlling the robot

Environment Sensors:

Sensor Name	**Function description**	**Sensing capabilities**
Microphone	The function of microphone is to record the voice command of users to realize the functionality of voice control.	5 meters in circle.
Camera	**The camera is mounted on the head of our robot to transfer the video signal to multiple mobile applications**.	1270*720

YuShuTechnologyCo.,Ltd.

306 Room, Building 1, 88 Dongliu Rd, Xixing Street, Binjiang District, Hangzhou, 310000 Zhejiang P.R. China.

Industry Canada

Operation is subject to the following Two conditions:(1) this device may notcause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de

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brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

RESTRICTIONS IN THE 5 GHZ BAND

Within the 5.15 to 5.25 GHz band, UNII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel Mobile Satellite System (MSS) operations.

RESTRICTIONS DANS LA BANDE DE 5 GHZ

Dans la bande de 5,15 à 5,25 GHz, les appareils UNII seront restreints aux opérations intérieures pour réduire toute possibilité d'interférence pouvant nuire aux opérations du Système satellite mobile dans le même canal(MSS).

RF exposure

RF Radiation Exposure Statement Caution: This Transmitter must beinstalled to provide a separation distance of at least 20 cm from all persons.

Déclaration d'exposition Attention: Cet émetteur doit être installé pour fournir une distance de séparation d'au moins 20 cm de toute personne.

FCC Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the Party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received,

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including interference that may cause undesired operation. Privacy of communications may not be ensured when using this device.

50 General Information

RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.

Industry Canada

Radio Frequency Specifications

Specifications

2.4GHz Wi-Fi (2412-2472MHz): 20dBm (EIRP)

Bluetooth(2402-2480MHz): 20dBm (EIRP)

2.4GHz SRD (2400.8-2480MHz) : 14dBm (EIRP)

Sub 1GHz Bands (865-868, 868-868.6, 869.4-869.65, 869.7- 870MHz): 14dBm (ERP)

5GHz Wi-Fi:

5150-5250MHz: 23dBm (EIRP)

5250-5350MHz, 5470-5725MHz: 20dBm (EIRP)

5725-5850MHz: 14dBm (EIRP)

Wi-Fi 5150-5350MHz frequency range is limited to indoor use in all EU/EFTA member states and Turkey.

BE	BG	CZ	DK	DE	EE
IE	EL	ES	FR	HR	IT
CY	LV	LT	LU	HU	MT
NL	AT	PL	PT	RO	SI
SK	FI	SE	UK (NI)	TR	NO
CH	IS	LI			

RF exposure

The equipment complies with radiation exposure limits set for an uncontrolled environment. To avoid the possibility of exceeding radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm during normal operation. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

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Revision History

Edition	Date	Modify Content
1.3	May 26, 2026	R1 camera parameters updated; emergency stop button updated, with added authentication parameters.
1.2	May 15, 2026	Add warning labels
1.1	Apr 24, 2026	Add to the "Inspection and Maintenance" section: Ankle Structure Maintenance.
1.0	March 23, 2026	Initial Version



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