



Direct Drive Tech Diablo Self Balance Robotic Platform User Manual

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Direct Drive Tech Diablo Self Balance Robotic Platform



Product Information

DIABLO V1.1

The DIABLO V1.1 is a development kit that has not been officially released for external sales. It is intended for internal use only. The DIABLO is a robot designed for various functions and tasks.

Product Usage Instructions

Safety Precautions

Precautions for use

- Before using the DIABLO, carefully read the DIABLO User Manual and Safety Precautions to understand the robot's features and potential risks. In case of unsafe conditions, such as slipping, falling, or losing control, immediately stop using the robot and follow the Emergency Stop Procedure Card.
- Operating the DIABLO is prohibited for children under 14. Minors between 14 and 18 years old should be accompanied by an adult guardian while using the DIABLO.
- Use the DIABLO in open areas away from flammable or heat sources. Always keep the DIABLO within sight and away from crowds, obstacles, and potential collision objects that may cause damage. Avoid using the DIABLO on crowded streets to prevent injury to others.
- Do not use the DIABLO in rainy or snowy conditions or in contact with liquid. If the robot gets wet, immediately stop it, press the emergency stop switch, and wipe it down with a soft dry cloth.
- Use only the provided battery and adapter. Using chargers other than those supplied by the factory is prohibited.
- Ensure the DIABLO has sufficient power before operation. Operating the DIABLO while charging is prohibited. If the warning light on the tail of the DIABLO illuminates, do not use or immediately stop using the DIABLO.
- If any of the joints, actuators, structure, wiring harness, tires, or other components are affected by sharp objects, overheating, loose structure, broken wiring harness, damaged tires, strange noises, excessive running noise, or any other anomalies, stop using the DIABLO and contact customer service.

Battery and Charging

Ensure that the DIABLO is fully charged before use. If the robot is not fully charged, it is recommended to charge it to full capacity before use. Use only the provided battery and adapter for charging. Do not use chargers other than those supplied by the factory.

Storage and Transportation

When storing or transporting the DIABLO, ensure it is kept in a safe and secure manner to prevent damage. Follow the guidelines provided in the user manual for proper storage and transportation procedures.

Use DIABLO Legally

Use the DIABLO in compliance with all applicable laws and regulations. Ensure that the usage of the DIABLO does not violate any legal restrictions or requirements.

FCC Statement

The DIABLO complies with FCC regulations and has been tested for electromagnetic interference. However, any modifications or unauthorized changes to the DIABLO may void the user's authority to operate the equipment.

Introduction of DIABLO

The DIABLO is a versatile robot designed for various tasks and functions. It comes with a comprehensive package of contents and includes different parts that are essential for its operation.

Package Contents

The DIABLO package includes all the necessary components for its operation. Please refer to the product packaging or user manual for a detailed list of package contents.

Description of Parts

The DIABLO consists of different parts that contribute to its functionality. Refer to the user manual for a detailed description of each part and its purpose.

Product Specifications

The DIABLO has specific specifications that define its capabilities and performance. Please refer to the user manual or product specifications document for detailed information regarding the DIABLO's specifications.

Instructions for Use

Prepare to Turn On the Robot

Before turning on the DIABLO, make sure to follow the necessary preparation steps outlined in the user manual. These steps may include checking the robot for any damage, ensuring it is fully charged, and verifying other prerequisites.

Description of the Remote Control

The DIABLO comes with a remote control that allows users to operate and control its movements. The user manual provides a detailed description of the remote control's features and functions.

Operating Instruction

The user manual provides step-by-step operating instructions for controlling and maneuvering the DIABLO. Follow these instructions carefully to ensure proper usage and functionality.

Instructions for Shutting Down the Robot

When you have finished using the DIABLO, follow the instructions provided in the user manual to shut down the robot properly. It is essential to follow the correct shutdown procedures to avoid any potential issues or damage.

Instructions for Charging

To charge the DIABLO, follow the instructions provided in the user manual. Ensure that the robot is placed on the charging dock correctly and connected to the provided adapter. Charging the DIABLO with any other charger is strictly prohibited.

Description of the Robot

Description of Tail Lights

The DIABLO features tail lights that serve specific purposes. Refer to the user manual for a detailed description of the tail lights and their indications.

Description of the Detachable Upper Cover

The DIABLO has a detachable upper cover, which provides access to internal components or serves other functions. The user manual provides a detailed description of how to detach and reattach the upper cover.

Safety Notice

Legal Notice

Before using this product, please read the User Manual carefully and operate the product accordingly. If any property damage or personal injury occurs as a consequence of not following the instructions in this User Manual while using the product, the company will not assume any responsibility.

We have made every effort to include the descriptions of various functions and the product's usage instructions in this Manual. However, due to the continuous iteration of the product, there may be discrepancies between the User Manual and the actual product purchased by the user. Users who require the latest version of the User Manual should contact with customer service to obtain a download link. The color and look of the drawings in this Manual may differ from the real product. Please refer to the actual product.

Usage Restrictions

Before using this product, make sure that you are familiar with its functions and operating procedures. It is unsuitable for: This product should not be used by persons with physical, sensory, or intellectual disabilities and persons without relevant experience and knowledge (including minors under the age of 18). Children under the age of 14 are prohibited from operating this product; Minors between the ages of 14 and 18 shall be accompanied by an adult guardian when using DIABLO.

Operating environment: Do not use this product in harsh environments such as high temperatures, high pressure, humidity, sand, rain, and snow. Please use this product in a safe and open environment.

Note for cleaning: This product cannot be washed with water, stains should be wiped off with a clean rag.

Safety check

Please check the product carefully before using. If any damage is discovered, do not use it and contact with customer service immediately.

After turning on the product, please check whether it is fully charged, if not, we recommend charging it to full capacity before use.

If the robot cannot function properly in standing mode and it is not due to the site or human factors, the user can refer to the chapter4 for trouble shooting.

Safety Precautions

Precautions for use

- Before use, please ensure that you have carefully read the “DIABLO User Manual” and the “Safety Precautions” and have a sufficient understanding of this robot. If unsafe conditions such as slipping, falling, or losing control occur, please immediately stop using and follow the steps on the “Emergency Stop Procedure Card”. If you have any questions, please contact with customer service immediately.
- Children under the age of 14 are prohibited from operating DIABLO. Minors between the age of 14 and 18 should be accompanied by an adult guardian when using DIABLO.
DIABLO can only be used in an open area and must be away from inflammables or heat sources. While in use, please always keep DIABLO within your sight and away from crowds, obstacles, and other objects that it might collide with and cause damage. Do not use DIABLO on crowded streets, for it may cause injury to others.
- It is prohibited to use DIABLO in rainy or snowy conditions or wading through water, and it must not come into

contact with liquid. To avoid user injury or damage

to DIABLO, it is strictly prohibited to turn on the power immediately after the robot is drenched with rain or water. If your DIABLO accidentally gets wet, stop it immediately, press the emergency stop switch, and wipe it down with a soft dry cloth right away.

- Please use the battery and adapter included in the box correctly. It is prohibited to use chargers other than that supplied by the factory. If you have any questions, please get in touch with customer service immediately.
- Please ensure that DIABLO has sufficient power. It is prohibited to operate DIABLO while charging. If the warning light on the tail of DIABLO illuminates, please do not use or immediately stop using DIABLO.
- Please immediately cease using the DIABLO and get in touch with customer service if the joints actuators are affected by sharp objects, overheating, loose structure, broken wiring harness, damaged tires, strange noises, excessive running noise, or any other anomalous circumstances.
- Do not operate DIABLO on terrain that challenges its terrain adaptive capabilities to the extreme or use it on complex terrains, such as stepping on it or lying it on hard, sharp, uneven ground or dragging it sideways, etc.; such actions could cause the outer layer of the tire to wear out or cause DIABLO to turn over and get damaged.
- Do not operate DIABLO on slippery ground, such as a wet tiled floor, to avoid damage to the body of the robot.
- To avoid injury, do not put your hands into DIABLO's body, the connection points between its joints, or the gaps between its legs, and do not touch the joint motors.
- It is prohibited to place any part of your body or valuables directly under DIABLO.
- When the robot is used for a long time and the system is overheated, please stop using the system immediately and shut down for 15 minutes. During this period, it is forbidden to touch the robot. .
- If your DIABLO accidentally comes into contact with sand, soil, vegetation, dirty water, etc., please clean it up immediately after use.
- When pressing the emergency stop switch, please grasp the handle tightly to avoid DIABLO being suddenly deactivated and losing control.
- DIABLO's maximum weight-bearing capability is 4 kg in standing mode and 80 kg in creeping mode. When placing items on top of DIABLO, please make sure the items are secure to avoid property damage. To prevent damaging the loaded items, it is prohibited to use the emergency stop function while the robot is carrying a load.
- When DIABLO is in a half-creeping mode and carries a load of more than 5 kg, the automatic battery protection might be triggered. DIABLO will directly enter the power-off protection state, and the user should press the emergency stop switch immediately.
- DIABLO is not designed to transport people; to avoid injury, no one is allowed to ride on it.
- After use, please make sure DIABLO is shut down and stored properly.

Battery and charging

- Please correctly use the battery and adapter included in the package.
- When charging the battery, please place the battery charging station and the power adapter in a flat, dry, and cool place, away from flammables or heat sources, and do not touch the power adapter.
- It is prohibited to operate DIABLO while charging. Before charging, please ensure that DIABLO is shut down or in a deactivated state.
- The ambient temperature for charging is 0-45°C.
- To prevent the risk of electric shock, it is strictly prohibited to immerse wires, plugs, and other parts of DIABLO

in water or other liquids.

- In order to avoid fire or other damage caused by improper operation, make sure you have carefully read the instructions (precautions) of the battery and the adapter before charging.

Storage and transportation

- DIABLO should be stored in a dry and cool environment, away from direct sunlight, flammable substances, fire sources, and strong electromagnetic environments.
- Please use the handle when transporting DIABLO. Do not pull the wiring harness, and handle it with care; avoid dropping or throwing, which may damage its parts.

Use DIABLO legally

- It is prohibited to use this product for any illegal, criminal, or inappropriate activities (including but not limited to espionage, military operations, illegal investigations, etc.).
- It is prohibited to use this product to infringe on the privacy of others and any other personal and property rights.
- It is prohibited to send DIABLO into the vicinity of sensitive buildings and facilities. These may include national borders, power stations, substations, prisons, traffic arteries, railway and road transportation hubs, government buildings, military bases, facilities, etc.
- Robots will be used in the manner permitted by local laws if the rules and regulations of the user's region and country permit their use, and the user is required to be aware of and abide by the laws and regulations of the region.

Note: All obligations deriving from secondary development, alteration, etc. are the user's responsibility.

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

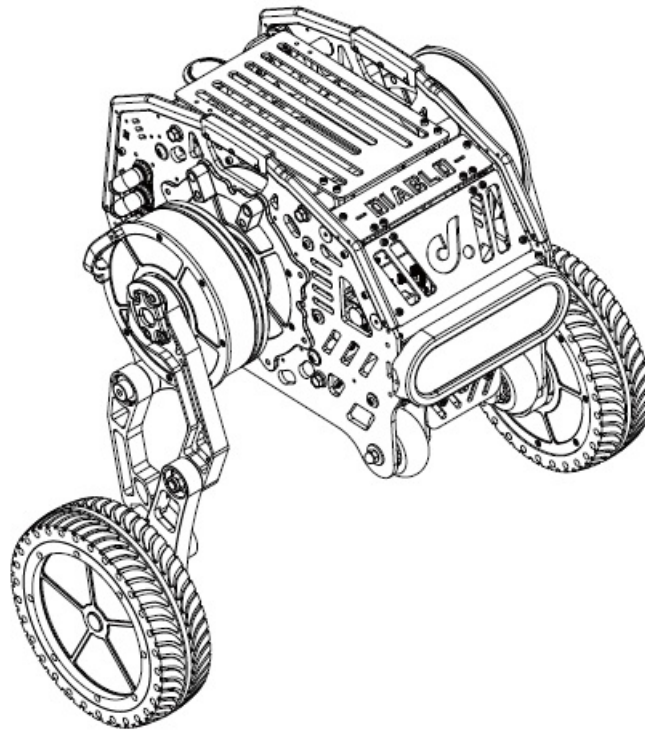
1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Introduction of DIABLO

DIABLO is a super agile & stylish two-wheeled-leg robot and an open development platform.

Powered by 6 M1502D free-moving direct-drive robot joints, the DIABLO boasts high power, smooth action, energy-saving, and high efficiency. Different from the traditional reducer scheme, the DIABLO is extremely quiet during operation and will not cause any noise concerns. Its unique transformation feature allows the robot to combine the agility of a legged robot with the robustness and speed of a wheeled robot.

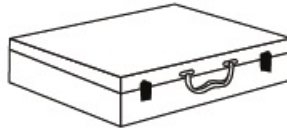
The open development ecology also provides perfect interfaces for various forms of applications. DIABLO is the perfect carrier whether you need quiet company, stealth patrol, dexterous maneuvers, or smooth transportation.



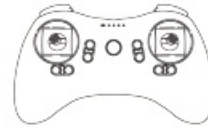
Package contents



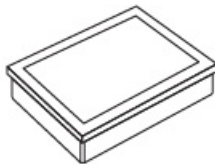
Two-wheeled robot DIABLO × 1



Portable aluminum case × 1



Remote control × 1



Accessory box × 1



Charger × 1

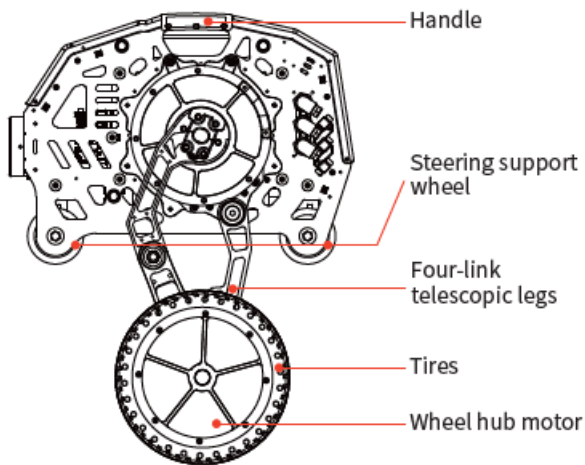


User manual × 1

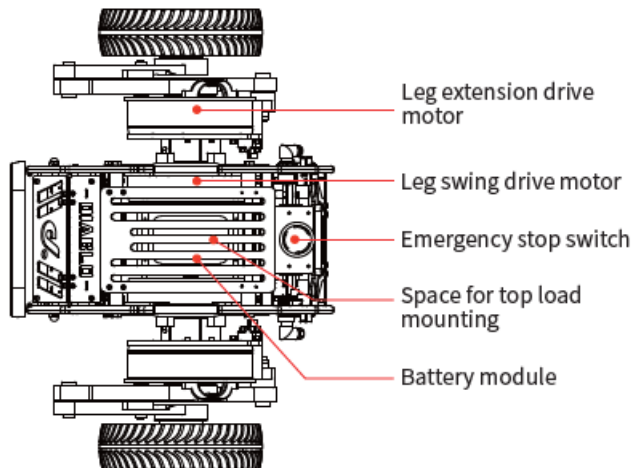
Special note: The accessories box contains M2.5 Allen wrench*1, M3 Allen wrench*1, M4 Allen wrench*1, Phillips wrench*1, M3 locking nut*5, M3 square nut*5, M3X20 Screw*5, M3X16 Screw*5, M3X10 Screw*10, M4X15 Screw*5, M3X12 Thumb Screw*5, M6X16 Flange Screw*2, M3X14 Gasket*5, M6X18 Gasket*2, M4 Flange lock nut*5, serial port module*1, serial port module cable*1 (Note: The serial port module and cable are only included in the Horizon X3 version)

Description of parts

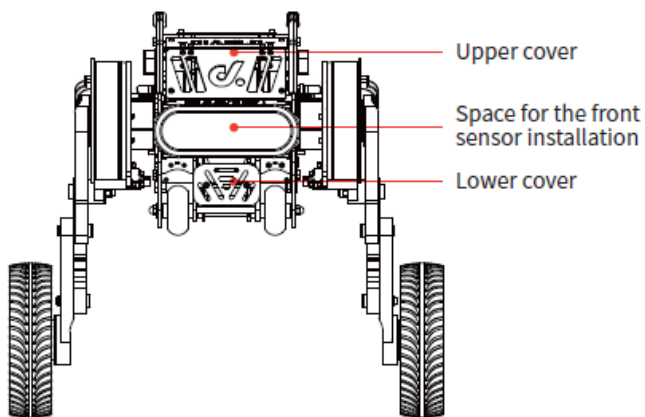
Side view of DIABLO



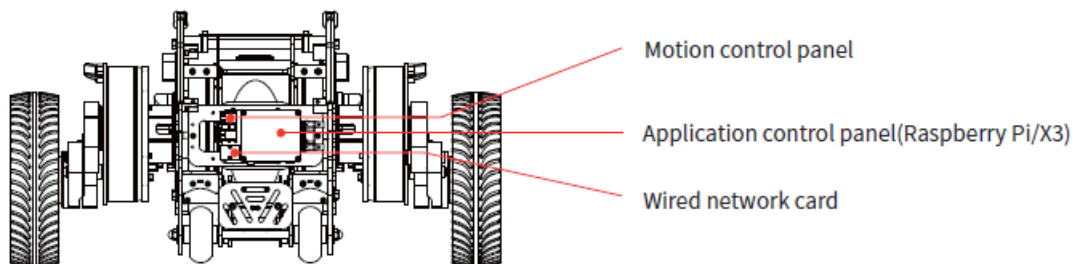
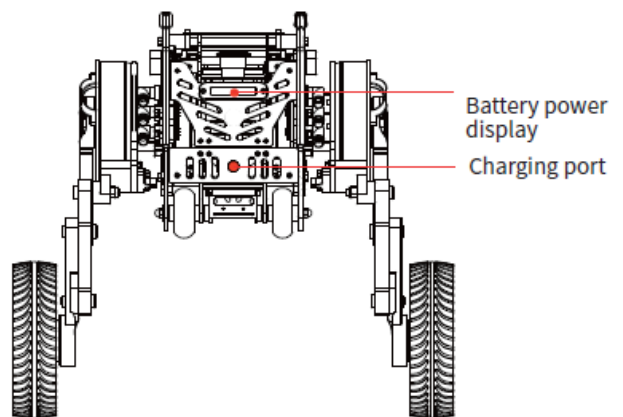
Top view of DIABLO



Front view of DIABLO

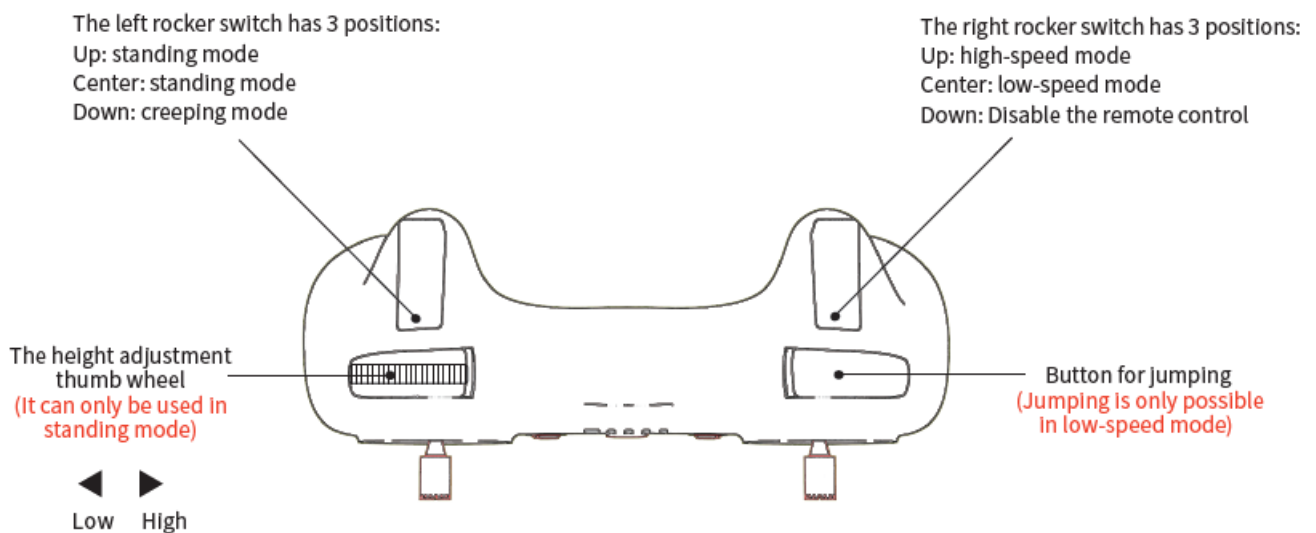
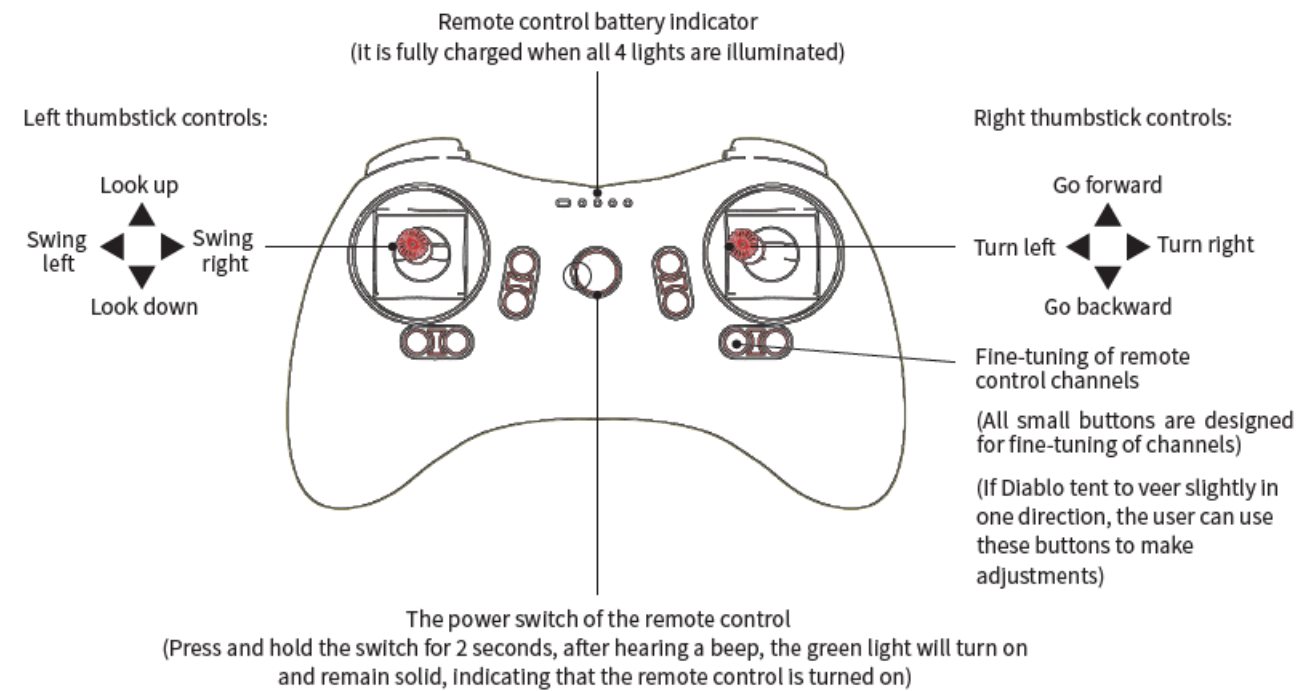


Back view of DIABLO



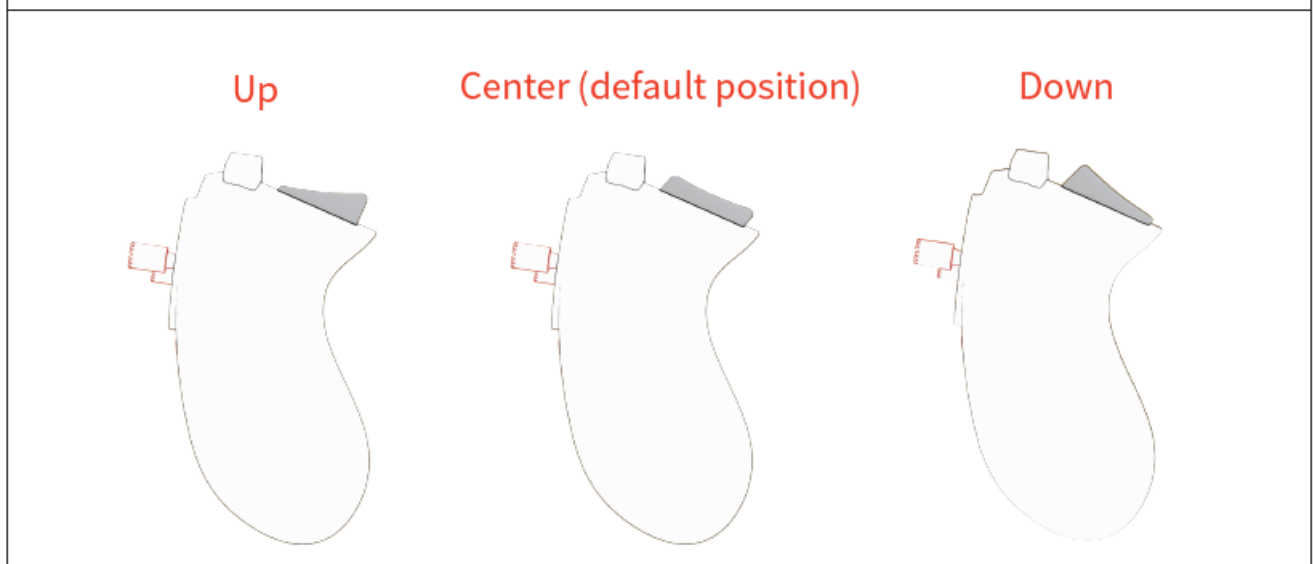
Product specifications

Description of the main control pins



Note : In order to ensure the user's safety, In the creeping mode of the robot, first reset the buttons of the remote control (the left trigger is down, the right trigger is in the middle, the joystick is in the middle, release the jump button), and then the left trigger is in the middle, DIABLO can stand. (The high-speed mode is a special mode that requires the user to have good controlling skills. The user should pay attention to safety when operating in this mode. It is prohibited to operate DIABLO in a complex road environment, such as one with too many people and vehicles. The user is responsible for any accidents involving equipment and people that occur in this mode)

Switching of rocker's switch position



Note : In order to ensure the user's safety, In the creeping mode of the robot, first reset the buttons of the remote control (the left trigger is down, the right trigger is in the middle, the joystick is in the middle, release the jump button), and then the left trigger is in the middle, DIABLO can stand.

Note : In order to ensure the user's safety, In the creeping mode of the robot, first reset the buttons of the remote control (the left trigger is down, the right trigger is in the middle, the joystick is in the middle, release the jump button), and then the left trigger is in the middle, DIABLO can stand.

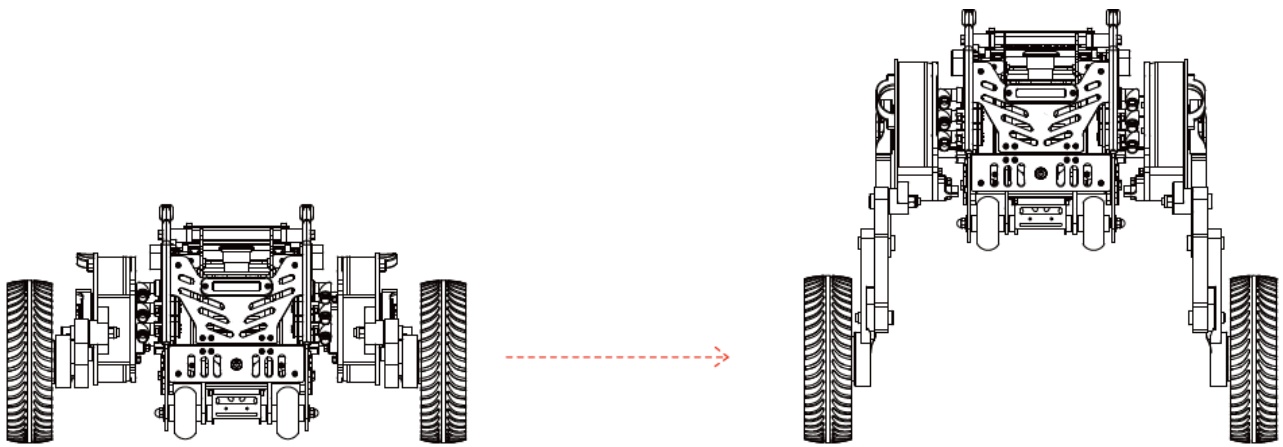
Operating instruction Creeping mode



In the creeping mode, the left thumbstick has no function, and the right thumbstick is used to control the forward, backward, turn left , and turn right movements. In the creeping mode, DIABLO cannot jump and the height cannot be adjusted.

Standing mode

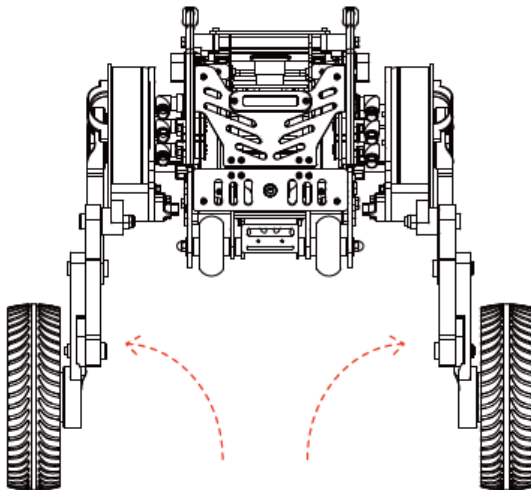
- The transition from creeping mode to standing mode



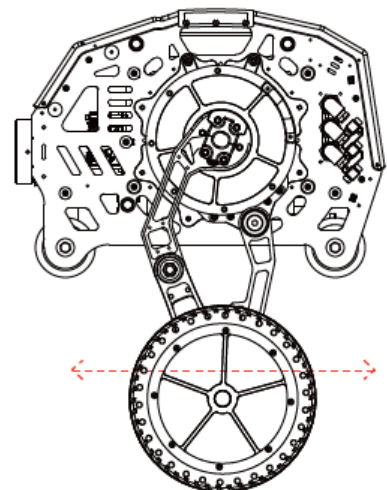
In order to ensure safety, In the creeping mode of the robot, first reset the buttons of the remote control (the left trigger is down, the right trigger is in the middle, the joystick is in the middle, release the jump button), and then the left trigger is in the middle, DIABLO can stand.



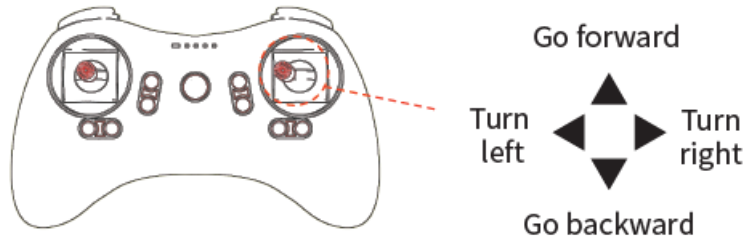
- The right thumbstick is used to control Diablo's traveling status



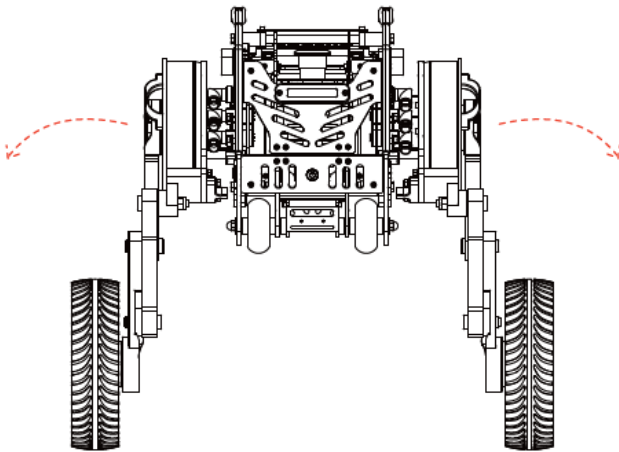
Turn left/turn right



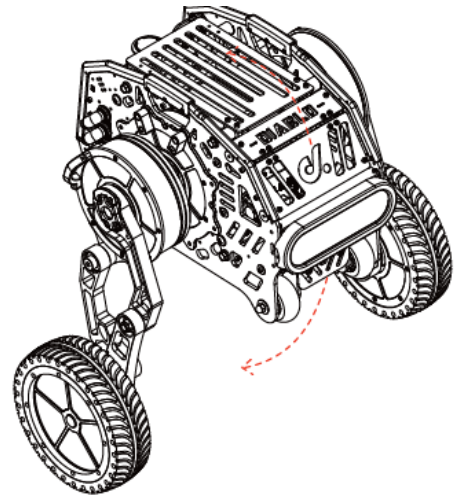
Go forward/backward



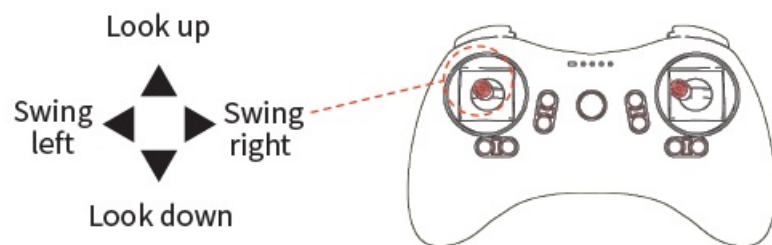
- The right thumbstick is used to control Diablo's pose



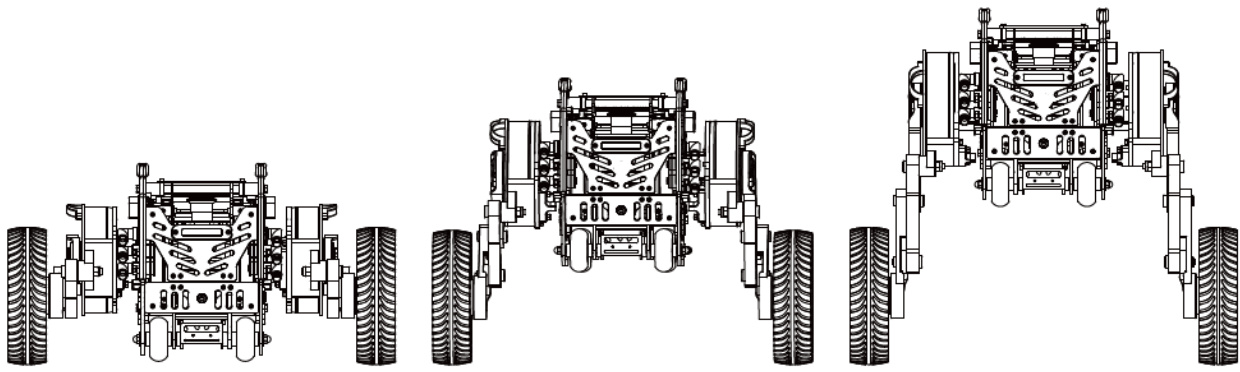
Swing left/right



Look up/down



- The height adjustment thumbwheel is used to adjust the height

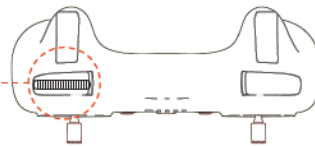


Creeping mode

Squatting mode

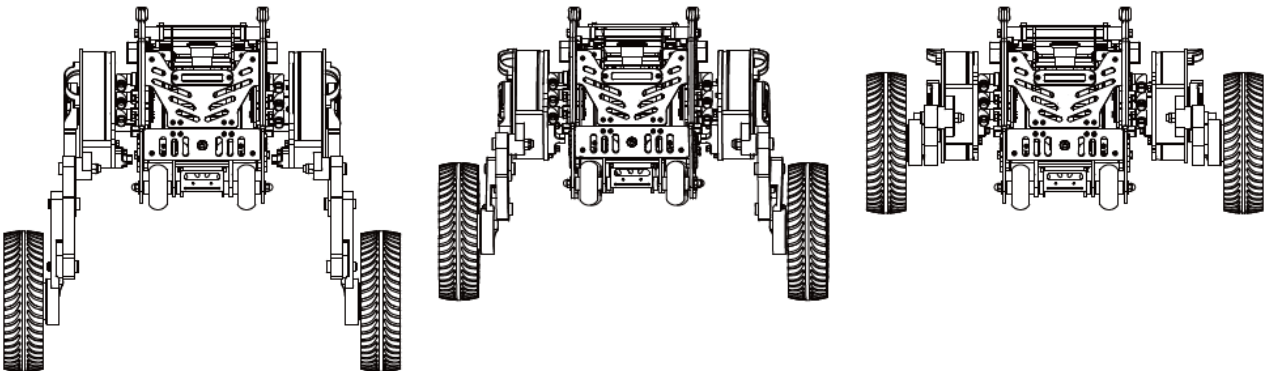
Standing mode

The height adjustment thumbwheel
(It can only be used in standing mode)



◀ ▶
Low High

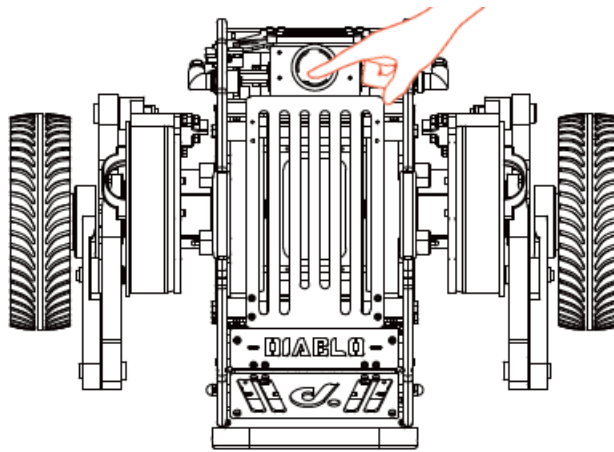
- The jump button is used to make DIABLO jump while in standing mode



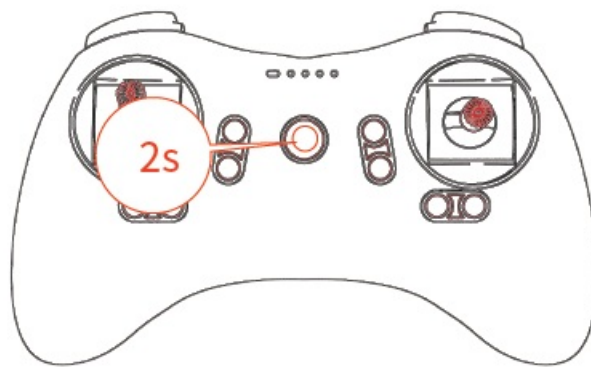
Button for jumping

- (1. Jumping is only possible in low-speed mode
2. When DIABLO's battery is <15%, the jumping action cannot be performed)

Instructions for shutting down the robot

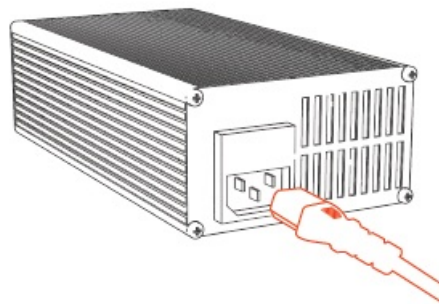


- Press the red emergency stop switch, the tail power indicator light goes out, and Diablo is turned of.

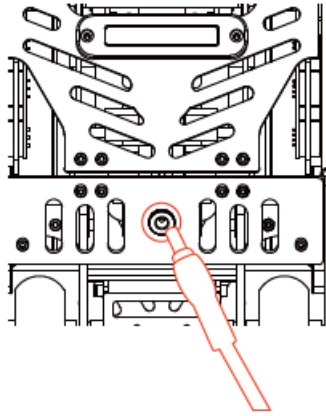


- Once the light turns off after pressing and holding the remote control power switch for two seconds, the remote control is off.

Instructions for charging



- First, connect the charger to the socket



- Then plug the charging cable into the rear charging jack

A red charger display light ● indicates that DIABLO is not fully charged.

A green charger display light ● indicates that DIABLO is fully charged.

Before charging, please ensure that DIABLO is shut down or in a deactivated state

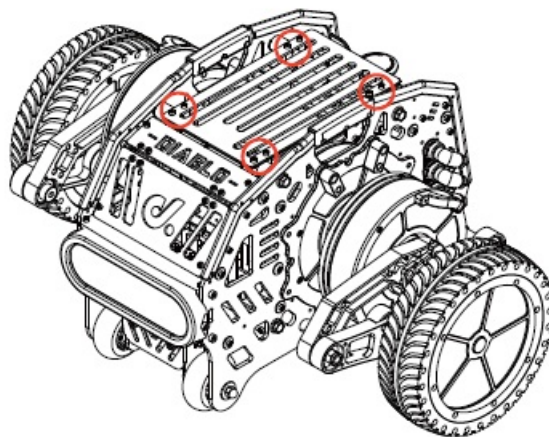
Description of the robot status

Description of tail lights

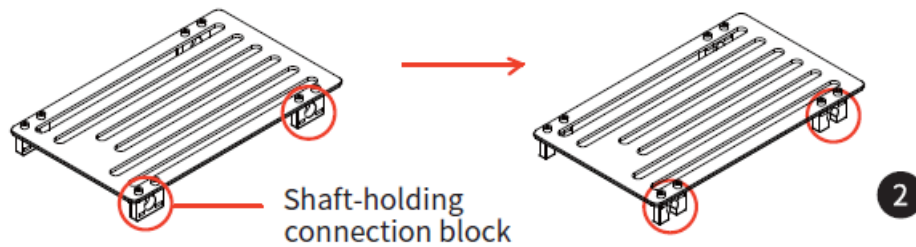
Note: DIABLO enters the fault code indication mode only when the aforementioned scenarios occur, to assist you in better operating the robot and determining the source of the fault. If a robot warning occurs, the warning can be cleared by disability and resetting the robot. If DIABLO fails to activate the fault code indication mode, please contact us.

Description of the detachable upper cover

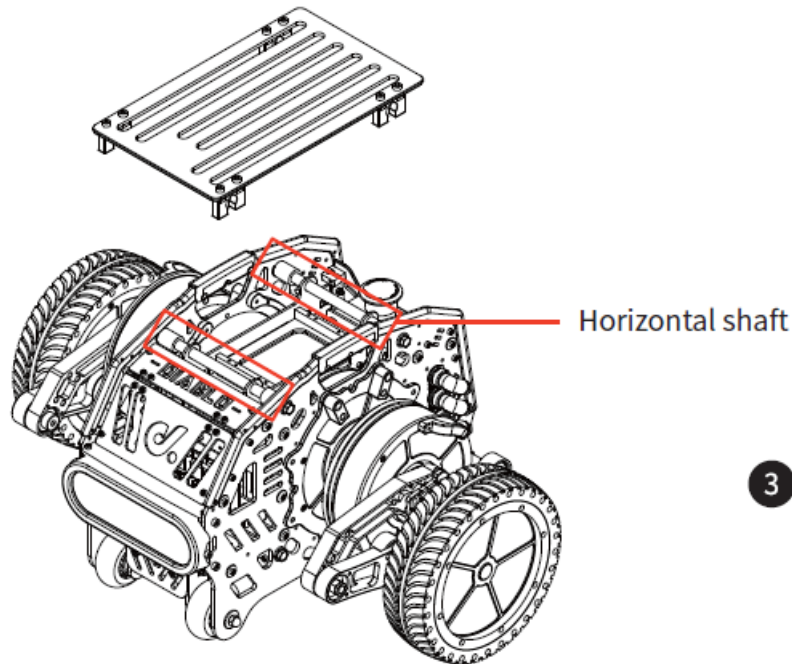
- Use an M3 wrench to remove the 8 screws from the upper cover



- Remove the Shaft-holding connection block and use the screws just removed to reverse install the holding shaft connection block in the upper cover plate (the notch faces away from the upper cover)



- Align the notch position of the shaft-holding connection block with the upper horizontal shaft on the robot, press down firmly, and snap the upper cover into the robot



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Manufacturer: Dong Guan Direct Drive Limited

Address: No. 206, 207, 208, 2nd Floor, Building 3, South District, Digital Technology Industrial Park, CIMC Industrial City, No.1, Yile Road, Songshan Lake High-tech Development Zone, Dongguan, Guangdong Province, China

Notice: The content of the user manual of Diablo will continue to update due to product iteration. Please scan the below code to get the latest electronic version of the Diablo user manual.

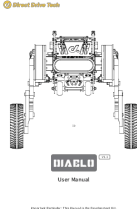


Operation Demonstration Video



DIABLO User Manual

Documents / Resources

	<p>Direct Drive Tech Diablo Self Balance Robotic Platform [pdf] User Manual</p> <p>Diablo Self Balance Robotic Platform, Diablo, Self Balance Robotic Platform, Balance Robotic Platform, Robotic Platform, Platform</p>
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Manuals+