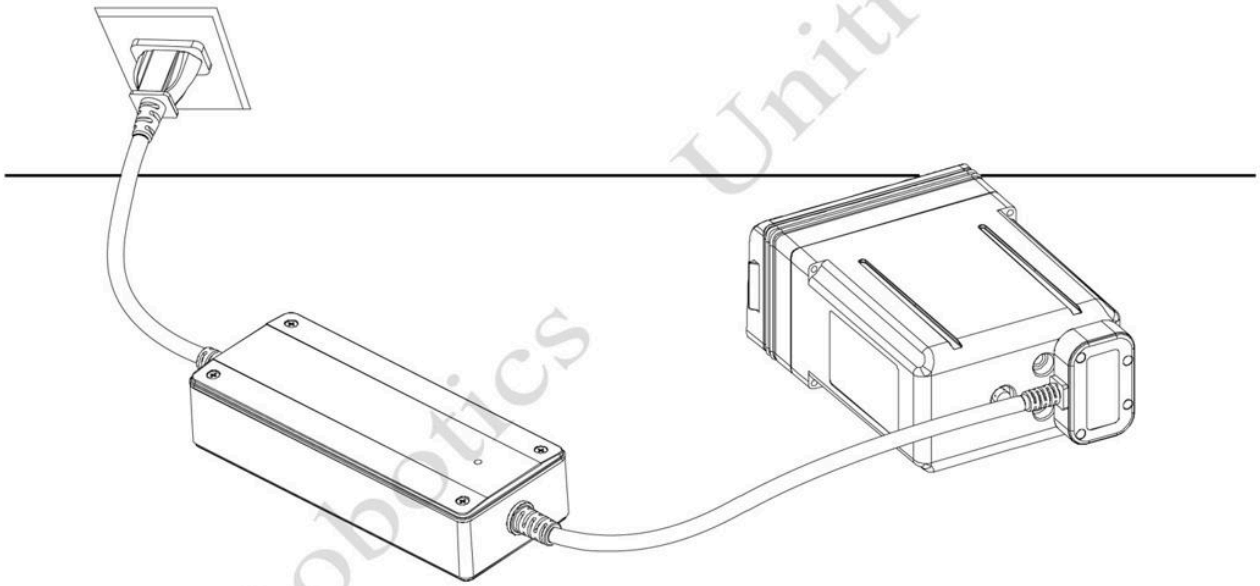
As2 Battery and Charger

User Manual V1.0



Unitree

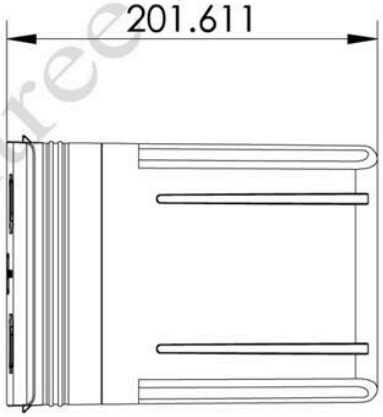
This product is a civilian robot. We kindly request that all users refrain from making any dangerous modifications or using the robot in a hazardous manner.

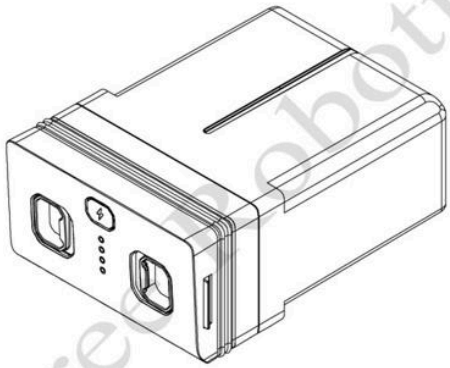
Please visit Unitree Robotics Website for more related terms and policies, and comply with local laws and regulations.

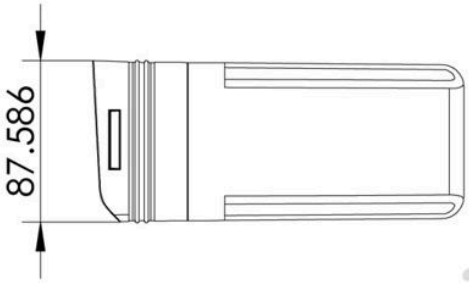
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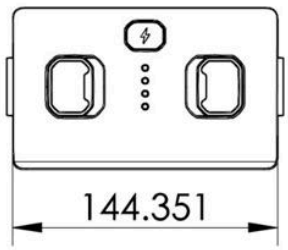
Introduction

The battery is specially designed for As2 robot with charge and discharge management function. The battery uses high-performance battery cells and advanced battery management system (BMS) independently developed by Unitree Robotics to provide sufficient power for As2 robot.

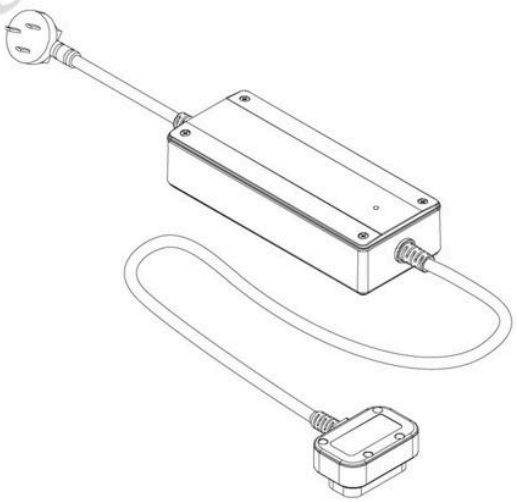








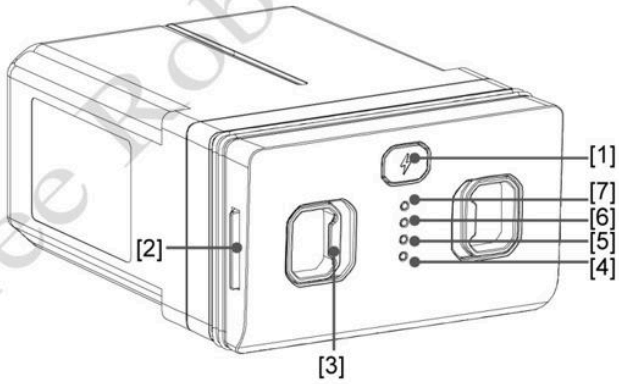
The battery charger is a charging device specifically designed for As2 batteries, with small size, light weight, and convenient portability, providing stable power to the battery.

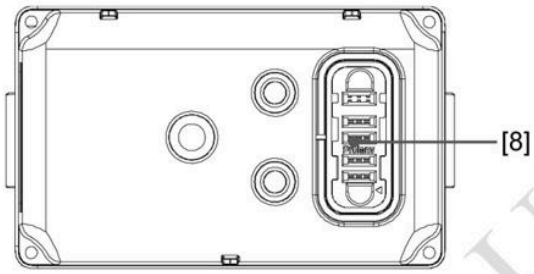


⚠ ● Before using the battery for the first time, make sure that the battery are fully charged before using at the first time!

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Parts Name





[1] Power Switch

[2] Buckle

[3] Latch

[4] LED1

[5] LED2

[6] LED3

[7] LED4

[8] Charging/Discharging Port

Technical Specification

Battery		
Parameters	**Standard**	**Extended Battery Life**
Size	144.4mm*201.6mm*87.6mm	144.4mm*201.6mm*87.6mm
Rated Voltage	DC 43.2V	DC 43.2V
Limited Charge Voltage	DC 50.4V	DC 50.4V
Rated Capacity	8000mAh, 345Wh	15000mAh, 648Wh
Runtime Duration	1-2h	2-4h

● The rated capacity of the battery pack is calibrated based on the nominal capacity of the battery cells. To ensure the optimal performance release of the entire machine while meeting the management requirements for long-term storage and extended service life of the battery pack, the Battery Management System (BMS) will reserve a portion of the energy. Furthermore, considering factors such as ambient temperature and actual discharge conditions, a deviation of 5% to 10% between the actual usable capacity and the rated capacity is considered normal.

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Charger		
Parameters	**Standard Charger**	**Fast Charger**
Size	190mm*11mm*45.2mm	190mm*11mm*45.2mm
Input	100-240V~50/60Hz 6.0A	100-240V~50/60Hz 6.0A
Output	50.4V，4A，201W	50.4V，7.4A，373W
Standard Battery Charging Time	2.5h	1.5h
Extended-Range Battery Charging Time	4h	2.5h

Battery Function

1) **Battery Level Display:** The battery has a built-in power indicator light that shows the current battery level.

2) **Balanced Charging Protection:** Automatically balances the voltage of the internal cells to protect the battery.

3) **Overcharge Protection:** Overcharging can severely damage the battery. Charging will automatically stop once the battery is fully charged.

4) **Charging Temperature Protection:** Charging at temperatures below 0°C or above 50°C can damage the battery. The battery will trigger a charging abnormality under these temperature conditions.

5) **Charging Current Protection:** High-current charging can severely damage the battery. If the charging current exceeds 10A for standard batteries or 12A for extended-life batteries, the battery will trigger a charging overcurrent abnormality.

6) **Overdischarge Protection:** Overdischarging can severely damage the battery. When the battery discharges to 36V, it will cut off output. If the cell voltage drops below 35V, recharging will first use a pre-charge function with a current of approximately 300mA until the voltage recovers to 36V — this waiting period may be relatively long.

7) **Short Circuit Protection:** When a short circuit is detected, the battery will cut off output to protect itself. At the same time, the battery will indicate the fault using the indicator light.

8) **Battery Load Detection Protection:** The battery cannot be turned on when it is not inserted into the robotic dog. If a powered-on battery is removed from the robotic dog, the battery will automatically shut off.

9) **Abnormality Display:** The battery LED lights can display information related to battery self-protection caused by abnormalities.

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Battery Indicator

When the battery is off, briefly press the battery switch (Key) once to view the current power level.

Be used to display the battery power during the charging and discharging process of the battery. The indicator is defined as follows.

White Breathing Light | Blue light on solid | Blue Flashing Light | White/Red Alternating Breathing Light
Green Breathing Light | Green light on solid | Green Flashing Light | Green/Red Alternating Breathing Light
Red Breathing Light | Red light on solid | Red Flashing Light | Green/Red Flashing Light | LED Light is Off

Check battery level / LED status when powered off and not inserted into the robot body

LED1	LED2	LED3	LED4	Current Battery
○	○	○	○	75%~100%
○	○	○	◌	50%~74%
○	○	◌	◌	25%~49%
○	◌	◌	◌	6%~24%
○○	◌	◌	◌	0%~5%

Check battery level / LED status when powered off and inserted into the robot body

LED1	LED2	LED3	LED4	Current Battery
○	○	○	○	75%~100%
○	○	○	◌	50%~74%
○	○	◌	◌	25%~29%
○	◌	◌	◌	6%~24%
○○	◌	◌	◌	0%~5%

Power-on Discharge LED Indicator Status

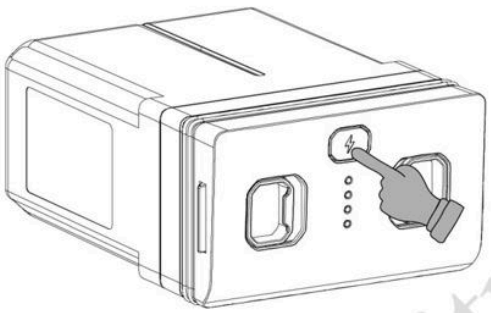
LED1	LED2	LED3	LED4	Current Battery
●	●	●	●	88%~100%
●	●	●	✺	75%~87%
●	●	●	◌	62%~74%
●	●	✺	◌	50%~61%
●	●	◌	◌	38%~49%
●	✺	◌	◌	25%~37%
●	◌	◌	◌	13%~24%
✺	◌	◌	◌	5%~12%
✺	◌	◌	◌	0%~4%

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Battery Turn on/ Turnoff

Turn on the battery: In the off state, briefly press the battery switch (Key) once, and then press the battery switch (Key) for more than 3 seconds to turn on the battery. When the battery is turned on, the indicator light is green and the current battery level is displayed.

Turn off the battery: In the on state, briefly press the battery switch (Key) once, and then press the power switch (Key) for more than 3 seconds to turn off the battery. After the battery is turned off, the indicator lights go out.



Battery Charging

1) Connect the charger to the AC power supply (100-240V, 50/60Hz). Before connecting, ensure the external power supply voltage matches the charger's rated input voltage; otherwise, the charger may be damaged (the charger's rated input voltage is marked on its nameplate).

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

3) Before charging the battery, make sure the battery pack is in the off state; otherwise, both the battery and the charger may be damaged.

4) When charging the battery pack, it must be removed from the robot body.

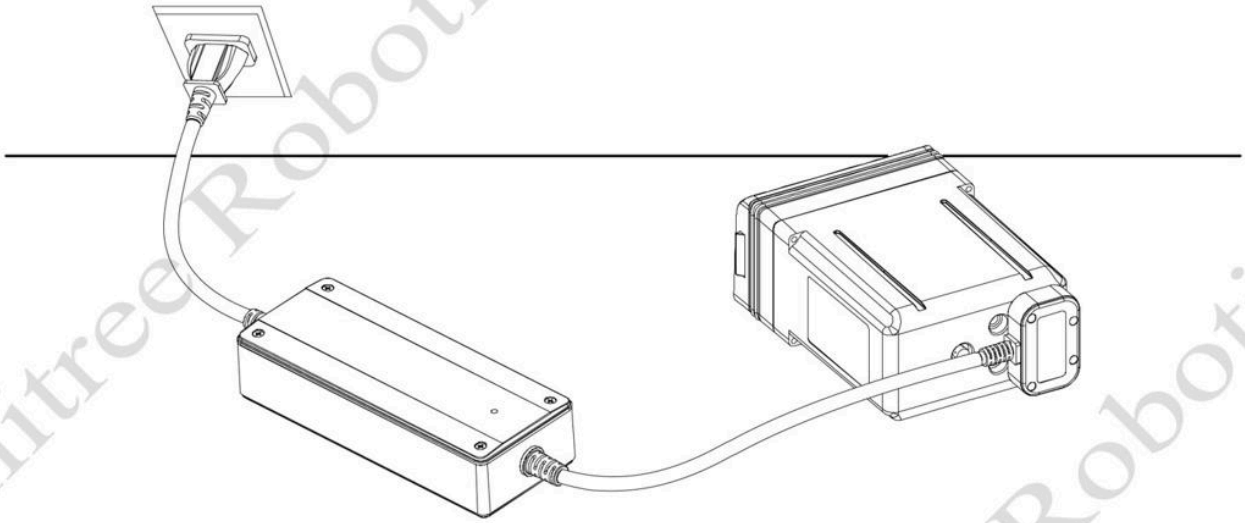
5) During charging, the battery pack’s power indicator lights will flash at a frequency of 1Hz (once per second) and indicate the current power level.

6) When all power indicator lights are off, it means the battery pack is fully charged. Remove the battery pack and charger to complete charging.

7) After the robot has finished operating, the battery pack temperature may be high. The battery pack must cool down to room temperature before charging.

8) Charging connection diagram:

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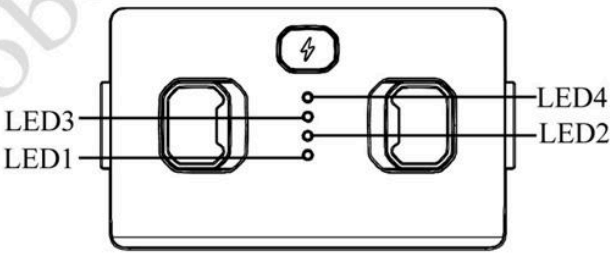


Battery Level Indicator

Charging battery indicator: The battery LED light shows the current battery while charging.

Charging LED Status				
LED1	**LED2**	**LED3**	**LED4**	**Current Battery**
☼	○	○	○	0%~24%
●	☼	○	○	25%~49%
●	●	☼	○	50%~74%
●	●	●	☼	75%~99%
○	○	○	○	Full-Charged

Charging protection indication: The battery LED light can display battery protection information triggered by abnormal charging.



Protection Iindicator Light					
LED1	**LED2**	**LED3**	**LED4**	**Indication**	**Proction Item**
☼	○	○	○	Flashing	Battery damaged
●	○	○	○	Light on Solid	Battery damaged
○	☼	○	○	Flashing	Low temperature alarm
○	●	○	○	Light on Solid	High temperature alarm
○	○	☼	○	Flashing	Overvoltage alarm

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○	○	●	○	Light on Solid	Undervoltage alarm
○	○	○	☼	Flashing	Discharge overcurrent
○	○	○	●	Light on Solid	Charge overcurrent
◎	◎	◎	◎	Breathing	Battery short circuit
☼	☼	☼	☼	Flashing	Battery short circuit
☼	●	●	☼	1,4 Flashing 2,3 Light on Solid	If the robot dog turns on the battery without external power supply (e.g., plugged into an additional cable, lying on the charging pad), it indicates that the communication cable is damaged, and both the battery and the machine need to be returned to the factory for repair. If there is external power supply, remove it first, and then turn on the battery.

If LED 3 reports an error during charging, it indicates a charger fault. Please replace the charger and try again. For discharge faults, refer to the table above. If a fault occurs (such as excessive current, short circuit, overvoltage or undervoltage, excessively high or low temperature), you can first identify the specific cause of the fault. Use can only be continued after the fault has been resolved.

☼ ● After the battery firmware update is complete, the battery level will be displayed and the battery will automatically shut down.

● For safety reasons, batteries must be kept at a low charge level during transportation. To achieve this, discharge is required: insert the battery into the robot and operate it until the battery reaches a low charge level (e.g., around 65%).

Battery Safe Operation Guide

Improper use, charging or storage of batterys may result in fire or property and personal injury. Be sure to use the battery in accordance with the safety instructions below.

Recommended use

1) Make sure the battery has enough battery before each use.

2) When using, moving or charging, please be careful with the battery and charging plug to avoid being damaged by external force.

3) When the power of the battery is lower than 10%, stop using the robot as soon as possible, replace the battery with a new one or charge the battery.

4) It is normal for a battery that has just been used or charged to generate heat.

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5) It is forbidden to contact the battery with any liquid. Do not immerse the battery in the liquid or wet it. Short circuit and decomposition reactions may occur when the inside of the battery meets water, which may lead to spontaneous combustion of the battery or even explosion.

6) It is forbidden to use batterys not officially provided by Unitree Robotics. If the users need to replace it, please go to the official website of Unitree Robotics for relevant purchase information. Unitree Robotics is not responsible for battery accidents, operation failures and machine damage caused using batterys not officially provided by Unitree Robotics.

7) It is forbidden to use batterys with damaged packages and shells.

8) Before installing or unplugging the battery from the robot, please keep the power of the battery off. Do not plug and unplug the battery when the power supply of the battery is turned on, otherwise the power supply or the robot may be damaged.

9) The battery pack should be used within an ambient temperature range of -5°C to 55°C. Excessively high temperatures (above 60°C) may cause the battery pack to catch fire or even explode. Excessively low temperatures (below -20°C) will severely damage the battery pack's lifespan.

10) It is forbidden to use the battery in strong magnetic field or electrostatic environment. Otherwise, the batterys protection board will fail, resulting in the failure of the batterys and the robot.

11) It is forbidden to disassemble or puncture the battery in any way.

12) If the battery is seriously impacted by external forces, it cannot be used again until it is delivered to Unitree Technology for official inspection.

13) If the battery is on fire, use solid fire extinguishers. It is recommended to use fire extinguishers in the following order: sand, fire blanket, dry powder, and carbon dioxide extinguishers.

14) Do not place the battery in the pressure cooker or microwave oven.

15) Do not place the battery on the conductor plane.

16) Do not use any conductive material (such as wire or other metal objects) to short the positive and negative terminals of the battery.

17) Do not hit the battery. Do not place heavy objects on the battery or charger.

18) If there is dirt on the battery interface, please use a clean and dry brush, toothpick, or dry cloth to clean it. Otherwise, poor contact may be caused, resulting in energy loss or failure to charge.

Charge

1) The battery will automatically stop charging when fully charged. It is recommended to disconnect the charger after the battery is fully charged.

2) Please make sure that the battery is turned off before plugging in the charger.

3) When charging the battery, please ensure that the battery is charged within sight to prevent unpredictable accidents.

4) When charging, please pay attention to ensure that the environment around the battery has good heat dissipation, and there are no flammable and explosive items such as sundries.

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5) Please keep the intelligent battery closed when charging.

6) The intelligent battery must be charged with a special charger officially provided by Unitree Robotics. Unitree Robotics will not be responsible for all the consequences caused by using a charger not officially provided by Unitree Robotics.

7) When charging, please place the battery and charger on the cement floor and other surrounding areas without flammable and combustible materials. Please pay attention to the charging process to prevent accidents.

8) It is forbidden to charge the battery immediately after the robot runs. At this time, the battery is in a high temperature state, and forced charging will seriously damage the life of the battery. It is recommended to wait for the battery to cool to room temperature before charging. The ideal charging ambient temperature (5°C -40°C) can greatly prolong the service life span of the battery.

9) After charging, please disconnect the charger from the battery. Regularly check and maintain the charger, and regularly check the appearance of the battery and other components. Never use alcohol or other combustible agents to clean the charger. Do not use a damaged charger.

Storage and transportation

1) When the battery is not in use, please remove the battery from the robot and store it out of the reach of children.

2) It is prohibited to place the battery pack near heat sources, such as in direct sunlight or inside a vehicle on a hot day, near open flames, or close to heating stoves. The ideal storage temperature for the battery pack is 20°C to 25°C, and the ideal storage humidity is 45% to 75%.

3) During storage, please pay attention to ensure that the surrounding environment of the battery has good heat dissipation and is free of sundries and other inflammables and explosives.

4) The environment where the battery is stored shall be kept dry. Do not place the battery in water or where water may leak.

5) It is forbidden to mechanically impact, crush or pierce the battery. It is forbidden to drop or artificially short circuit the battery.

6) It is forbidden to store or transport the battery together with glasses, watches, metal necklaces, hairpins, or other metal objects.

7) Do not transport damaged batterys. Once the battery needs to be transported, be sure to discharge the battery to about 65% charge.

8) Do not store the battery for a long time after it is completely discharged to avoid the battery entering the state of over-discharge, which may cause damage to the battery cell and cannot be restored to use.

Battery Maintenance

1) Do not use the charger to charge the battery in an environment where the temperature is too high or the temperature is too low.

2) Do not store the battery in environments where the ambient temperature exceeds 0°C to 40°C.

3) Do not overcharge the battery, otherwise it will cause damage to the battery core.

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4) If you do not use the battery for a long time, please check the remaining battery power regularly. If the battery is lower than 30%, please charge the battery to 70% before saving. In order to avoid battery over-discharge and damage the battery.

Abandonment

Damaged batteries such as bulging, falling, water ingress and breakage shall be scrapped and shall not be used again to avoid safety risks. Be sure to completely discharge the battery before placing it in the specified battery recycling box. Batterys are hazardous chemicals, which are forbidden to be discarded in ordinary garbage cans. For details, please follow local laws and regulations on battery recycling and disposal.

Revision History

Edition	Date	Modify Content
1.0	May 29, 2026	Initial Version

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