



Rough Ranger

Autonomous Mower

User Manual

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Read Before Use:

	To avoid or reduce the risk of injury, the user must read and understand this user manual before using this product. Please keep this user manual properly.
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This symbol indicates important safety instructions. Failure to follow these instructions may endanger the personal safety or property of the operator and others. Read and understand all instructions in this manual before attempting to operate the lawn mower.

Assess the level of risk associated with this product according to the meanings of the following signal words.		
	Danger	Indicates an imminent hazardous situation which, if not avoided, will result in death or serious injury.
	Warning	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Caution	(Without the safety alert symbol) Indicates a situation that may cause property damage.

	Before using this machine, be sure to read and understand all safety instructions in this manual, including the contents of the safety alert symbols. If you do not understand the warnings and instructions in this manual, do not use this product. This machine may only be used by persons who have read, understood, and complied with this manual and the safety labels printed on the lawn mower, and who meet the age requirements of local regulations.
	When using this machine, always follow basic safety precautions to reduce the risk of explosion, electric shock, fire, and other serious personal injury.
	California Proposition 65 Warning: (Cancer and Reproductive Harm www.p65warnings.ca.gov) Battery cables, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash your hands after handling the machine.
	Failure to strictly follow operating procedures may cause injury to the operator or others. The machine owner must understand all instructions and may only authorize persons who understand them to operate the lawn mower. Lawn mower operators must be physically and mentally fit and must not be under the influence of mind-altering substances (such as medication, alcohol, or drugs).
	This machine must be operated in accordance with the safe operating procedures in this manual. Carelessness or operator error may result in serious injury. This lawn mower presents a risk of cutting hands and feet and ejecting debris during operation. Failure to follow the safety instructions in this manual may result in serious injury or death.
	Persons wearing electronic medical devices such as pacemakers should consult a doctor before using this product. Operating electric equipment near a pacemaker may cause interference or failure of the pacemaker.
	Service must be performed only by qualified service technicians. We recommend contacting your nearest dealer for service. When servicing, use only identical replacement parts.

Operator Requirements

Persons under 18 years of age or who do not meet the age requirements of local regulations are prohibited from operating the machine.

Operating Environment

- ① Operate in an open area away from crowds, and ensure there are no unrelated persons or vehicles in the operating area.
- ② Keep away from crowds, livestock, obstacles, power lines, tall buildings, signal transmission towers, etc. to avoid signal interference and impact on operation.
- ③ Do not operate in extreme weather conditions such as heavy rain, dense fog, snow, lightning, or strong winds.
- ④ When the system is testing, calibrating, adjusting, or automatically steering, ensure there are no people or obstacles near the route of operation to prevent personal injury or property damage.

Inspection

- ① Ensure the vehicle has sufficient battery power before use.
- ② Before smart operation, ensure that the relevant parameters in Rough Ranger have been calibrated.
- ③ Ensure the antenna and other related components are properly installed. If they have been moved, recalibrate them before use.
- ④ Ensure all connecting cables are in good condition. If any are damaged, stop using the machine and replace the cable before use.
- ⑤ Do not disassemble this product yourself, so as not to affect warranty service.
- ⑥ Damage to the equipment caused by force majeure (lightning strike, high voltage, collision, etc.) is not covered by the company's free repair service.
- ⑦ Connect the equipment strictly in accordance with the requirements in this manual. For data cables and other cables, hold the plug base and insert/remove it gently. Do not pull hard or twist it, as this may easily bend or break the pins.

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1 Overview

1.1 Notes for Users

The purpose of this manual is to assist owners and operators in maintaining and operating this lawn mower. Please read the manual carefully. The information and instructions provided in this manual can help you obtain reliable machine performance. Owners shall ensure that operators and mechanics read and understand this manual. Before operating this machine, first read the manual and all safety labels. Owners shall ensure that operators and mechanics are qualified and capable of operating this equipment. Mechanics at all dealers must be familiar with the safe operating methods of this equipment. Never allow children or untrained persons to operate or service this equipment. Please note that local regulations may restrict the age of operators.

1.2 Using This Manual

This manual applies to the Rough Ranger series and provides users with an overview of basic lawn mower operation, installation, adjustment, and maintenance guidelines. Due to significant differences in operating conditions, this manual cannot cover all situations. Unless otherwise specified, directions such as "right" and "left" in this manual refer to the directions when the operator stands facing away from the front of the lawn mower. The photos and illustrations used in this manual were the latest versions at the time of printing, but due to subsequent production adjustments, the actual machine may differ slightly. FJ Dynamics Technology Co., Ltd. (hereinafter referred to as "FJDynamics") reserves the right to redesign and modify the machine as needed without prior notice. If you find any changes to the machine that are not mentioned in this manual, please consult a FJDynamics product dealer for the latest information on current parts.

1.3 Intended Use of the Product

This 48 V intelligent lawn mower is intended for mowing only.

1.4 General Information

1. Before assembling and operating the equipment, read, understand, and strictly follow all instructions and warnings in this manual. Keep this manual properly for reference at any time.
2. Be sure to familiarize yourself with all controls and their correct operation, and learn how to quickly stop the equipment and disengage the controls.
3. Children or untrained persons are strictly prohibited from operating or servicing this equipment. Please note that local regulations may restrict the age of operators. Strictly comply with the age requirements specified by applicable laws and regulations.
4. If you encounter a situation not covered in this manual, remain cautious, avoid blind operation, and promptly contact after-sales service for professional assistance.

1.5 Equipment Modification

If you need to improve equipment performance, you may contact FJDynamics for official modification. Do not change the product configuration on your own; otherwise, no legal claim can be made based on this manual for the modified product. Only original factory parts may be used for modifications. Using other parts will void the warranty. Without permission from FJDynamics, do not install non-standard devices on the equipment, so as to avoid danger or equipment damage.

1.6 Maintenance Service

1.6.1 Warranty Card

The owner must register the equipment by completing the "Warranty Registration Form" provided in the package. As the new equipment owner, the form must be completed and signed by both the authorized dealer and the original purchaser.

1.6.2 Serial Number

The nameplate is located at the front of the complete lawn mower and includes the following information:

- Machine name, model, and serial number;
- Key parameters and important symbol markings;
- Manufacturer and date of manufacture.

When you need to replace or repair parts, the serial number and model must be recorded on the "Warranty Registration Form."



	Caution: Unauthorized modifications or the use of unapproved accessories will void the warranty. FJDynamics assumes no liability for any consequences arising from subsequent use of the equipment. All warranty, repair, and service work must be handled by authorized FJDynamics product dealers.
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	Reference: Warranty Policy section.
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2 、 General Power Tool Safety Warnings

2.1 Work Area Safety

- Keep the work area clean and well lit. Cluttered or dark environments are likely to cause accidents.
- Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Sparks generated by power tools may ignite these flammable materials and cause danger.
- When operating a power tool, keep children and bystanders away from the work area. Distractions may cause you to lose proper control of the tool and lead to accidents.



Read all safety warnings, instructions, illustrations, and specifications provided with this power tool. Failure to follow all instructions listed below may result in electric shock, fire, or serious injury.

Save all warnings and instructions for future reference.

The term "power tool" in the warnings refers to a mains-operated (corded) power tool or a battery-operated (cordless) power tool.

2.2 Electrical Safety

- Power tool plugs must match the outlet. Never modify the plug in any way. Do not use adapter plugs with earthed power tools. Unmodified plugs and matching outlets will reduce the risk of electric shock.
- Avoid body contact with grounded objects such as pipes, radiators, refrigerators, and similar grounded surfaces during operation. Body grounding increases the risk of electric shock.
- Do not expose power tools to rain or wet conditions. Water entering the tool will increase the risk of electric shock.
- Do not abuse the cord. Never use the cord to lift, drag, or unplug the power tool. Keep the cord away from heat, oil, sharp edges, and moving parts. Damaged or entangled cords greatly increase the risk of electric shock.
- When operating a power tool outdoors, use an extension cord suitable for outdoor use. Using a compliant cord can effectively reduce the risk of electric shock.
- If operating a power tool in a damp location is unavoidable, use a power supply protected by a residual current device (RCD). An RCD significantly reduces the risk of electric shock.

2.3 Power Tool Use Practices

- Stay alert, focus on the current operation, and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.
- Use personal protective equipment. Always wear eye protection. Protective equipment such as a dust mask, non-slip safety shoes, hard hat, or hearing protection used under appropriate conditions will reduce personal injuries.

- Prevent unintentional starting. Ensure the switch is in the off position before connecting to the power source and/or battery pack, picking up, or carrying the tool.
- Carrying tools with your finger on the switch or charging tools with the switch on may cause accidents.
- Remove any adjusting hex keys or wrenches before turning on the power tool. A wrench or hex key left attached to a rotating part of the power tool may result in personal injury.
- Do not overreach. Keep proper footing and balance at all times. This enables better control of the power tool in unexpected situations.
- Dress properly. Do not wear loose clothing or jewelry. Keep hair and clothing away from moving parts. Loose clothes, accessories, or long hair may be caught in moving parts.
- If devices are provided for the connection of dust extraction and collection facilities, ensure that these are properly connected and used. The use of dust collection can reduce dust-related hazards.
- Do not let familiarity gained from frequent use of tools cause you to become complacent and ignore tool safety principles. Any carelessness may result in serious injury in an instant.

2.4 Power Tool Use and Precautions

- Do not misuse the power tool. Be sure to select the appropriate tool according to the intended use. Operating within rated parameters ensures efficient and safe tool operation.
- Never use a power tool if the switch does not work properly. A tool that cannot be controlled with the switch is extremely dangerous and must be repaired immediately.
- Before adjusting, changing accessories, or storing power tools, always disconnect the power and remove any detachable battery pack. This preventive measure effectively avoids accidental tool start-up.
- Store idle power tools out of the reach of children. Do not allow persons unfamiliar with the tool or these instructions to use the power tool. Power tools are dangerous in the hands of untrained users.
- Maintain power tools and accessories regularly. Check for misalignment or binding of moving parts, breakage of parts, or any other condition that may affect operation. If damaged, have the power tool repaired before use. Many accidents are caused by poorly maintained tools.
- Keep cutting tools sharp and clean. Properly maintained sharp cutting tools are less likely to bind and are easier to control.
- Use the power tool, accessories, and blades in accordance with these instructions, taking into account the working conditions and the work to be performed. Using the tool for operations different from those intended could result in a hazardous situation.
- Keep handles and grasping surfaces dry, clean, and free from oil and grease. Slippery or greasy gripping surfaces impair safe handling and control of the tool, increasing accident risk.

2.5 Battery Tool Use and Precautions

- Recharge only with the charging station (charger) specified by the manufacturer. A charging

station (charger) that is suitable for one type of battery pack may create a fire risk when used with another battery pack.

- Use only the battery packs specifically designated for the power tool. Use of unmatched battery packs may cause personal injury or fire.
- Keep an idle battery pack away from metal objects such as paper clips, coins, keys, nails, and screws, which may short the battery terminals and cause burns or fire.
- Under abusive conditions, liquid may be ejected from the battery. Avoid contact with this liquid. If contact occurs accidentally, flush with plenty of water. If liquid enters the eyes, seek medical attention immediately. Liquid ejected from the battery is corrosive and may cause irritation or burns.
- Do not use a damaged or modified battery pack or tool. Such batteries are unstable and may cause fire, explosion, or personal injury.
- Do not expose a battery pack or tool to fire or excessive temperature. Exposure to fire or temperatures above 130 °C may cause an explosion.
- Follow all charging instructions strictly. Do not charge the battery pack or tool outside the specified temperature range. Improper charging or abnormal temperature may damage the battery and increase the risk of fire.

2.6 Service

- Service power tools using the same spare parts and qualified maintenance personnel. This will maintain the safety of the power tool.
- Do not repair a damaged battery pack yourself. The battery pack should be repaired by the manufacturer or an authorized service provider.

3 、 Precautions

3.1 Notes for the Operator

- When using the machine, approved personal protective equipment must be used, including at minimum a safety helmet, eye protection, hearing protection, compliant workwear, safety shoes, etc. Personal protective equipment cannot eliminate the risk of injury, but it can reduce the degree of injury if an accident occurs.
- Only responsible, trained, physically fit persons who are familiar with the manual are allowed to operate the machine.
- Do not mow while wearing unsafe clothing such as scarves, loose clothing, shorts, or open-toed shoes, to prevent parts from catching them during operation. Do not operate the machine barefoot.
- When operating the lawn mower in dusty environments, always wear a full face shield or dust mask.
- Always wear gloves when handling the cutting blade.
- Use hearing protection when operating the machine to avoid hearing damage. Do not use a radio

or wear music headphones.

- To ensure safe operation, the operator must remain attentive, focus on the mowing task, keep eyes on the intended path, and be aware of the surroundings.
- Observe the equipment carefully and pay attention to any abnormal conditions that may arise.
- Ensure first aid equipment is available nearby when using the machine.
- Do not operate the lawn mower when fatigued.
- Do not operate the lawn mower under the influence of medication, alcohol, drugs, or similar substances.

3.2 Lawn Mower Operation

- Read, understand, and follow all content on the machine and in the manual before starting operation.
- It is recommended to inform relevant persons that you are mowing so that assistance can be provided in the event of injury or an accident.
- Persons who operate, maintain, or repair this machine must first read and understand this manual. Comply with the user age requirements stipulated by local laws. The machine owner is responsible for training persons who use this machine.
- The owner and operator of this machine shall prevent accidents and be responsible for accidents or injuries involving themselves, others, or property.
- Do not place hands or feet near rotating parts or under the machine, and always stay clear of the discharge opening.
- Ensure there are no bystanders or animals in the area before operation. If anyone enters the area, stop the equipment.
- Do not mow in reverse unless absolutely necessary. When using the remote control to operate the lawn mower, observe the direction of travel and the surrounding environment.
- Do not operate the equipment unless all safety devices are fully installed and undamaged.
- Never operate poorly maintained equipment.
- Slow down before turning.
- Never attempt high-speed maneuvering, especially in crowded areas or on slopes.
- Do not carry passengers.
- Do not operate on slopes greater than 20 degrees.
- Do not leave a running machine unattended. Always park the machine on level ground, engage the parking brake, and turn off the power.
- Watch road conditions when operating near or crossing roads.
- Clean up spilled oil before operating or storing the machine.
- If the lawn mower begins to vibrate abnormally, stop the machine and inspect the cause immediately. Abnormal vibration is usually a sign that the lawn mower is not operating properly.

- Stop the cutting blade when not mowing. Turn off the power and wait until all parts have completely stopped before cleaning the machine. After the machine is turned off, the cutting blade will continue to rotate for a few seconds. Do not place any part of your body in the blade area until you are sure the blade has stopped rotating.
- If the lawn mower strikes a foreign object, stop the machine immediately and check for damaged parts when safe to do so.
- If a situation not covered in this manual occurs, use caution and sound judgment, and contact the dealer for assistance.

3.3 Operating Area

- Before mowing any area, thoroughly inspect it for hazards, holes, dropped items, or hidden objects that could cause danger. Clear debris that may be thrown by the blade, such as stones, toys, wires, etc.
- Do not operate near people or animals. Do not mow when children or others are nearby.
- Plan the mowing pattern to avoid discharging grass clippings toward roads, sidewalks, bystanders, vehicles, windows, etc.
- Do not cut anything other than grass.
- Do not let the cutting blade pass through leaves or other debris that may cause buildup.
- Stop the cutting blade when crossing dirt roads, gravel roads, or paved surfaces.
- Use extreme caution when approaching blind corners, entrances, shrubs, trees, or other objects that may block your view, as they may obstruct the lawn mower's movement.
- To reduce the risk of electric shock, never operate the lawn mower in rain, on wet surfaces, or in wet grass.
- To avoid loss of control or rollover, do not operate near the edge of steep slopes or near water. Reduce speed and use extra caution on slopes.

3.4 Slope Operation

- Slopes are a major cause of loss-of-control and rollover accidents and may cause serious injury or death. Extra care is required when operating on slopes. If you cannot determine whether slope conditions are suitable for operation, do not mow it.
- Avoid starting or stopping on slopes.
- When mowing slopes, the recommended operating slope does not exceed 20 degrees.
- Do not operate the machine under conditions where tire traction, steering, or stability is compromised. Even when parked on a slope, the tires may slide.
- Keep the machine running when going downhill. Do not coast downhill in neutral.
- Watch for holes, ruts, rocks, or other obstacles that are difficult to see, especially tall grass that can hide obstacles. Uneven terrain and obstacles may cause the machine to overturn.
- Choose a low travel speed so that you do not have to stop on slopes.

- Do not mow on slopes when the grass is wet; the tires may slip.
- Move slowly and steadily on slopes. Do not suddenly change speed or direction, or the machine may overturn.
- Use extra caution when the machine is equipped with a grass collection attachment or other accessories, as they affect machine stability.

3.5 Child Safety

- Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the machine and mowing activity.
- Keep children away from the mowing area and under the supervision of an adult other than the operator.
- Stay alert and shut down the machine if children enter the area.
- Ensure there are no children nearby while mowing or while moving the lawn mower.
- Do not allow children to operate the machine.
- Use extra caution near blind spots, shrubs, trees, or other objects that may block your view.

3.6 Battery and Charging Safety

	If used improperly, the battery may present a risk of fire or chemical burns. Do not overheat, disassemble, or incinerate the battery. Under conditions of excessive use, charging, or extreme temperature, or if the battery is damaged, crushed, or punctured, the battery may leak. Such leakage indicates battery failure. Dispose of the battery properly.
	Caution: Only replacement batteries and charging stations (chargers) provided by FJDynamics may be used. Charging by other means may damage the lawn mower or remote control.

3.6.1 Safety Specifications for Using the Charging Station (Charger)

- Never use the charging station (charger) in rain, damp environments, or places with flammable liquids or gases. Do not install it outdoors or in areas prone to water accumulation or containing flammable or explosive substances.
- Be sure to verify the applicable voltage marked on the charging station (charger). Do not connect it to an incompatible AC power supply.
- Do not use an extension cord unless necessary. If one must be used, ensure its rated current meets the needs of the charging station (charger) to avoid voltage drop, power loss, or overheating due to insufficient current, which may lead to fire or electric shock. Do not use multiple power extension cords simultaneously.
- Regularly inspect the power cord and extension cord of the charging station (charger). If the insulation is damaged, cut, or cracked, disconnect it from both the outlet and the equipment immediately. Damaged power cords must not continue to be used and should be repaired or replaced promptly.
- Use the power cord properly. Do not drag the cord to move the charging station (charger), and keep the cord away from heat, oil, water, sharp edges, and moving objects. When plugging or unplugging the power, hold the plug. Modifying the plug or power cord is strictly prohibited.
- Avoid placing the charging station (charger) where it may be stepped on, tripped over, or damaged. Store it in a cool, dry place to prevent liquid ingress.
- Do not allow small metal objects (such as steel wool or aluminum foil) or other foreign objects to enter the ports of the charging station (charger). Do not cover the charging station (charger), so as to prevent overheating.
- When the battery or charging station (charger) overheats, wait for it to cool down before operating it again. Charging temperature must be controlled within 0 °C to 40 °C (32 °F to 104 °F), and charging must not be carried out in narrow or poorly ventilated spaces.
- During charging, do not smoke or use open flames near the battery to prevent sparks from causing a fire.

3.6.2 Battery Use and Safety Precautions:

- When a battery-powered lawn mower is operating, do not connect it to AC power for charging. It may only be powered by the battery to reduce the risk of electric shock, explosion, or personal injury.
- When charging or discharging the battery, safety glasses, protective clothing, and insulated tools

must be used.

- The battery contains toxic liquid and explosive gases. Contact with skin, eyes, or clothing may cause chemical burns, and gas leakage may result in serious injury or death.
- Incorrect battery cable routing may damage the lawn mower and cause battery sparks or even explosion, resulting in serious personal injury.
- Do not expose the battery to open flames or temperatures above 60 °C (140 °F) to prevent explosion. Keep idle batteries away from metal objects (such as paper clips and coins) to avoid shorting the terminals and causing sparks, burns, or explosion.
- Do not use or charge batteries that are damaged, leaking, or corroded. Do not throw batteries into fire to prevent explosion.
- Hot batteries or conductors may cause burns. Use caution during operation.

3.6.3 Emergency Response for Battery Leakage:

- If leaking liquid splashes onto skin or eyes, immediately flush the skin with plenty of cold water, rinse the eyes for at least 20 minutes, and seek medical attention as soon as possible.
- If leaking liquid gets on clothing or shoes, remove and wash them immediately.
- If respiratory irritation occurs when opening the battery, move to a ventilated area immediately. If symptoms persist, seek medical attention promptly.
- If the battery emits smoke or gas during use, charging, or storage, ventilate immediately and evacuate the area to avoid health hazards from gases in enclosed spaces.

3.7 Loading, Unloading, and Transportation

- Use extra caution when loading the machine onto a truck or trailer using a ramp. If the machine falls off the ramp, serious injury or death may result.
- Use a ramp with sufficient width to load the machine onto the trailer or truck.
- Use an approved trailer to transport the machine. Set the power switch to the off position and ensure the indicator light is off. Secure the front and rear wheels and the machine body with heavy-duty straps to prevent vertical or fore-aft movement; otherwise, the machine may be damaged.
- During transport, the parking brake alone is not sufficient to lock the machine in place. Ensure the machine is firmly secured level on the transport vehicle and move the cutting deck height to the highest position.
- The angle between the ramp and the ground must not exceed 20 degrees.
- Use a ramp of sufficient strength and slowly remote-control the lawn mower onto the truck or trailer. Never lift the machine by hand.
- Before driving the lawn mower up or down a slope, familiarize yourself with the controls of the lawn mower.
- Do not operate this machine on public roads.
- Before transporting the machine on roads, check and comply with local traffic regulations.

3.8 Storage



Store properly, and always turn off the lawn mower before cleaning.

- Store only after the machine has cooled down.
- When the lawn mower is not in use, store it in a dry place out of the reach of children and away from direct sunlight for extended periods.

3.9 Maintenance

- Before servicing, cleaning, or removing parts from the lawn mower, first remove the battery or disconnect the power.
- Do not reach under the blade guard. Keep hands, feet, and clothing away from the rotating blade.
- Be sure to use only accessories approved by FJDynamics.
- Electrical maintenance may only be performed by trained professionals.
- Maintain the lawn mower by keeping the cutting blade sharp and clean to ensure optimum performance and safe operation.
- Check the daily and weekly maintenance lists to ensure electrical connections are secure and bolts are tightened.
- Never remove or tamper with safety devices. Regularly inspect them for proper operation. Never do anything that interferes with the intended function of a safety device or reduces its protective function.
- Repair or replace all damaged components before restarting and operating the lawn mower.
- Inspect the lawn mower cables regularly. If damaged, have them repaired by an authorized service center.
- When replacing the cutting blade, wrap the blade or wear gloves. Replace damaged blades; do not repair or modify them.
- Keep the lawn mower free of grease, dirt, and any other accumulation of potentially flammable materials.
- To avoid personal danger and machine damage, never use a high-pressure washer for cleaning.
- Do not use a battery-powered lawn mower in the rain.
- For tire pressure, be sure to inflate the tires to the specified pressure listed in this manual. Overinflation may cause a tire burst, which could result in injury or death. If a tire has cuts or cracks, do not use it, as there is a risk of tire rupture. In such cases, be sure to contact FJDynamics or the dealer to replace or repair the tire, inner tube, rim, etc.

4 、 Symbols

The following are some of the symbols that may be used on this product. Please read and understand their meanings. Correctly understanding these symbols will enable you to operate the product better and more safely.

V	Volt	Unit of voltage
A	Ampere	Unit of current
Hz	Hertz	Unit of frequency
W	Watt	Unit of power
min	Minute	Unit of time
—	Direct Current	Type or characteristic of current
Km/h	Kilometers per hour	Travel speed of the lawn mower
	Safety Alert	Indicates a potential personal injury hazard.
	Wet Condition Alert	Do not expose to rain or use in damp locations.
	Read User Manual	To reduce the risk of injury, the user must read and understand the user manual before using this product.
	Eye Protection	Always wear safety goggles or safety glasses with side shields.
	Keep Hands and Feet Away	Do not place your hands or feet under the mower deck.
	Slope Caution	Do not operate on slopes greater than 20 °.
	Keep Bystanders Away	Keep all bystanders at least 100 feet away.
	Beware of Thrown Objects	Beware of thrown objects. Keep away from the machine while the motor is running.
	Keep People Away	Keep people away.
	Vehicle Warning	No Riding or Carrying Items
	Prevent Electric Shock	Turn off the power before operating this machine.
	No Foot Stepping	Foot stepping is not permitted.
	Beware of Hand Injury	Do not open or remove the safety guard while the motor is running.

	Beware of Pinching Hands	Moving parts can easily pinch or cut hands. Keep away.
	Beware of Pinching Hands	Beware of pinching hands.

5 、Product Introduction

5.1 Specifications

Machine Weight	Total weight (including 2 batteries)	195 kg (430 lbs.)
Overall Dimensions (excluding charging station)	Overall length	1345 mm (53 inches)
	Overall height	980mm (39 inches)
	Overall width	842mm (33 inches)
Cutting Deck Specifications	Number of cutting blades	1
	Cutting deck size	635 mm (25 inches)
	Mowing height	20~120mm (0.79~4.72 inches)
Vehicle Performance Parameters	Climbing angle	≤20°
	Forward speed	0~6 km/h (0~3.7 mph)
	Battery voltage	48VDC
	Battery capacity	4kWh
	Maximum runtime	5h
	Maximum operating area every three days	90000 m ²(22 Acres)
	Maximum operating area per single charge	13000 m ²(3.2 Acres)
	Waterproof rating	IPX4
Intelligent module	Automatic path planning function	Yes
	Operating modes	Remote control mode
		Intelligent operation mode

5.2 Lawn Mower Overview



1	GNSS antenna	9	Drive motor
2	Navigation control assembly	10	Rain sensor
3	LiDAR	11	Anti-collision bar
4	Power switch	12	Cutting deck lift electric actuator
5	Emergency stop switch	13	Emergency charging port
6	Vehicle light		
7	Charging port		
8	Mowing motor		

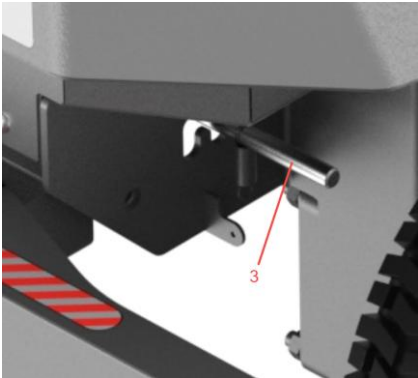
5.3 Vehicle light



5.4 Roller



5.5 Manual Release of Electromagnetic Brake



1	Right drive motor electromagnetic brake manual release lever position
2	Left drive motor electromagnetic brake manual release lever position
3	Brake manual release lever

!	Caution: After maintenance is completed, adjust the drive motor electromagnetic brake back to the normal operating state.
	Never drive the lawn mower while the manual release of the drive motor electromagnetic brake is engaged. Before operation, be sure to adjust the drive motor electromagnetic brake to its normal operating state! Failure to restore the drive motor electromagnetic brake to the normal operating state may severely damage the lawn mower and void the lawn mower warranty!

6 、 Assembly

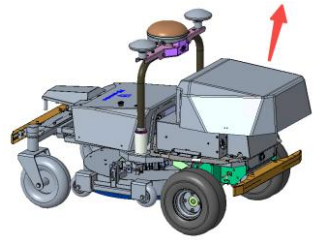
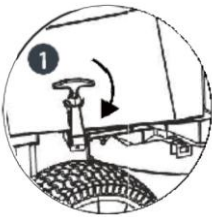
6.1 Packing List

The specific shipping list shall be subject to the actual shipment.

Serial No.	Name	Quantity	Remarks
1	Medium Intelligent Lawn Mower	1	
2	Charging Station	1	
3	Tablet Remote Controller	1	
4	General Tool Kit	1	
5	Crescent Wrench 68-80	1	Included in tool kit
6	Socket Extension Bar - 1/2 - 300 mm	1	Included in tool kit
7	Hex Wrench 4mm	1	Included in tool kit
8	Hex Wrench 5mm	1	Included in tool kit
9	Hex Wrench 6mm	1	Included in tool kit
10	Open-End Wrench 6×7	1	Included in tool kit
11	Open-End Wrench 13×16	2	Included in tool kit
12	Ratchet Wrench 13#	1	Included in tool kit
13	Ratchet Wrench 16#	1	Included in tool kit
14	Hex Socket - 1/2 - 17 mm	1	Included in tool kit
15	Hex Socket - 1/2 - 24 mm	1	Included in tool kit
16	Certificate of Conformity	1	
17	Warranty Card	1	

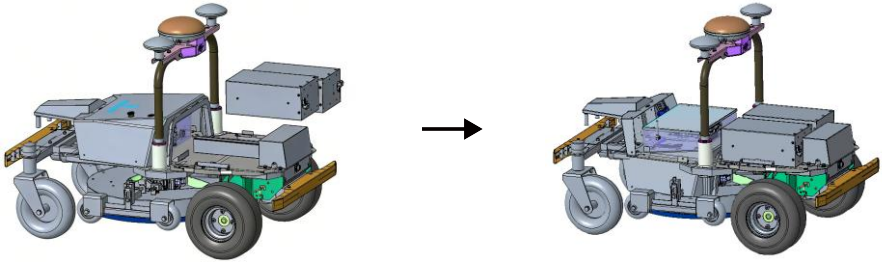
6.2 Install the Battery

1. Open the two latches on both sides of the rear hood of the vehicle and remove the hood.

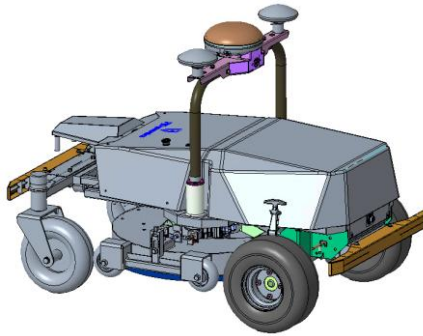


2. After placing the battery, fasten the elastic strap and connect the battery cable.

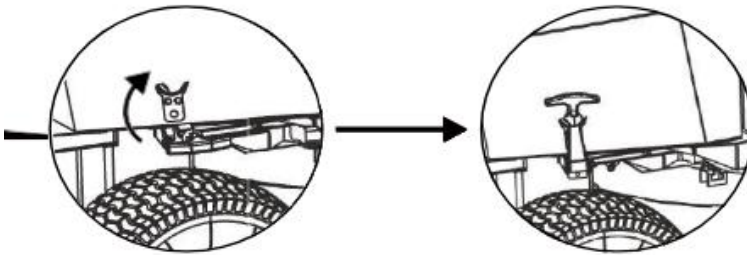
Caution: The battery output port should face the rear of the vehicle.



3. After ensuring the battery connection is secure, reinstall the hood.

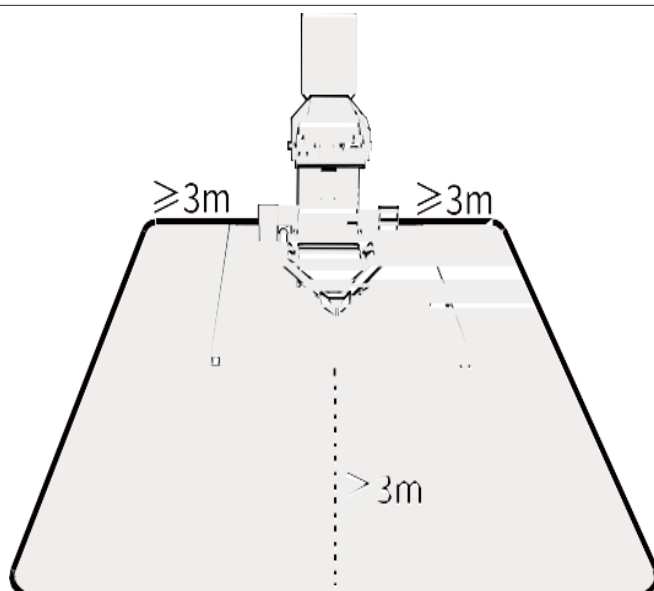


4. After confirming the hood is placed steadily and correctly, fasten the latches.



6.3 Install the Charging Station

- It should be placed on flat ground without bumps or inclines.
- Ensure there is at least 3 m of unobstructed space in front of and on both sides of the charging station.



7 、 Operation

7.1 Operating Recommendations

	Before operation, the operator should be fully familiar with the correct use of the equipment and have completely read the manual. Before attempting to operate at normal speed, operate slowly to become familiar with the equipment.
	Never drive the lawn mower while the manual release of the drive motor electromagnetic brake is engaged. Before operation, be sure to adjust the drive motor electromagnetic brake to its normal operating state! Failure to restore the drive motor electromagnetic brake to the normal operating state may severely damage the lawn mower and void the lawn mower warranty!
	When working underneath the lawn mower, you must shut the lawn mower off. Turn off the blade button on the screen and press the power switch to shut down until the indicator light goes out. Wear gloves when handling the cutting blade. If the lawn mower strikes rocks, branches, or other foreign objects while mowing, be sure to check whether the blade is damaged.

- Cooling the Motor

If the drive motor exceeds its protection temperature, motor speed will decrease. Allow the motor to cool for 30-60 minutes. If the temperature continues to rise, the driver will forcibly stop the motor.

7.2 First Power-On

Press the power switch button and wait for the vehicle to start up.

7.3 Download the App

FJDynamics is designed to work with the app. Please download the app first. You can obtain it by scanning the QR code below or searching for {FJD Landscaping} in the Android or iOS app store.



7.4 Register a FJDynamics Account and Log In

If you already have a FJDynamics account, please refer to Log In Only.

Mobile phone number registration is currently supported only in mainland China.

7.5 Register and Log In

After downloading the app, you can create an account according to the instructions below.

7.5.1 Register with Email

- 1) Click Register Now.
- 2) Enter your email address.
- 3) Click the Send Verification Code button. A verification email will be sent to your email address (if you do not receive it, check your spam folder).
- 4) Enter the verification code (the code is valid for 10 minutes; click Send again to get a new verification email).
- 5) Set a password (the password must be between 8 and 22 characters and include at least lowercase letters and numbers).
- 6) View the User Agreement and Privacy Policy.
- 7) Click Complete Registration and Log In.

19:22

<

**FORGOT
PASSWORD**

Email address

Verification code **Send**

Next

19:23

<

**SET NEW
PASSWORD**

8 characters to 22 characters password, at least
1 lowercase letter and 1 number

Enter a new password

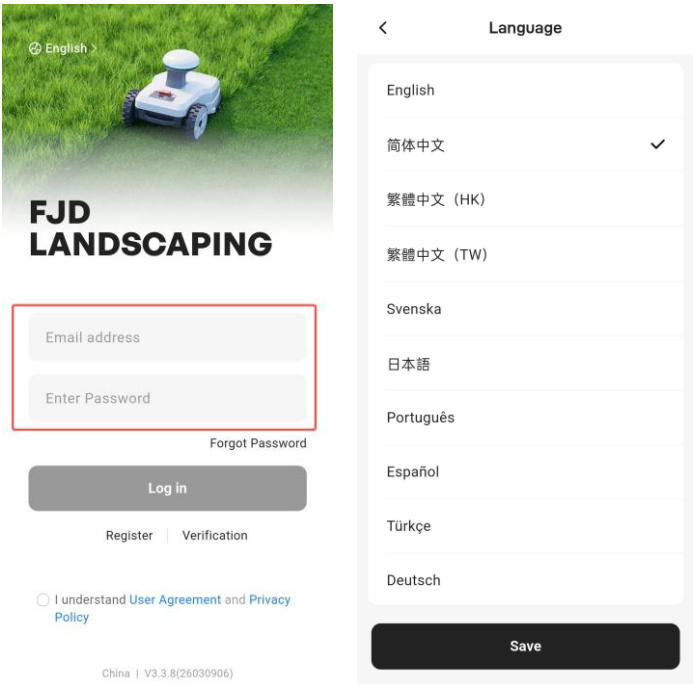
Confirm the new password

Confirm

☐ I understand [User Agreement](#) and [Privacy Policy](#)

7.5.2 Log In Only

- 1) First-time new users need to register an account. Click the "Register" button below Log In to enter the registration page, fill in "Email + Password + Verification Code + Agree to the User Privacy Agreement," and click Create Account to log in to FJD Landscaping.
- 2) If a registered user forgets the password, click "Forgot Password" on the page to enter the password reset page, fill in "Email + Verification Code + Agree to the User Privacy Agreement," click "Next" to enter the page for setting a new password, enter "New Password + Confirm New Password," then click "Confirm" to complete the new password setup.
- 3) If you need to select a language, click the upper-left corner of the page to choose a language, then click "Save."



7.6 Bind the Vehicle

Goal: Bind the Rough Ranger device to your account through the APP.

Note: This guide only covers the first core step of the binding process (network configuration and device connection). Completing this step means the device has been successfully added to the APP.

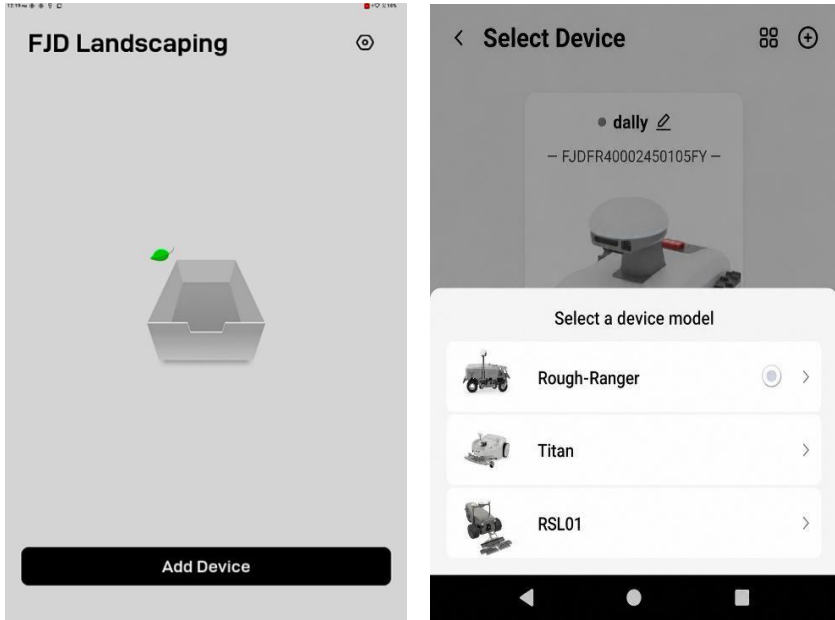
Step 1: Preparation and Device Startup

Power on the device: Please ensure your Rough Ranger device is correctly connected to power.

Confirm indicator status: After the device is powered on, observe the "mushroom head" indicator at the top of the device. When the mushroom head indicator lights up (usually flashing or steadily lit), the device is ready to be connected.

Step 2: Start Adding the Device

Open the APP: Open the application used to manage the Rough Ranger device on your phone.



Enter the add interface: On the home page or device list page of the APP, find and click the "+" button (usually the entry point for adding a device).

Select device model: In the pop-up device list, scroll down or browse to find and select the "Rough Ranger" device.

Step 3: Connect and Configure the Network

The system will guide you through a multi-step configuration process. We only need to complete the first step. The detailed operations are as follows:

Confirm device readiness: The page will prompt you to ensure the device is powered on and the mushroom head indicator is lit. After confirming again, click "Next" or "Connect."

Select the correct device (key step):

- 1) The APP will automatically search for nearby Rough Ranger devices.
- 2) The device SN code (serial number) will be displayed in the search results list.
- 3) Be sure to verify carefully and select the device whose SN code exactly matches the SN code on the label of the Rough Ranger machine in your possession. This is to prevent connecting to a neighbor's device of the same model by mistake.

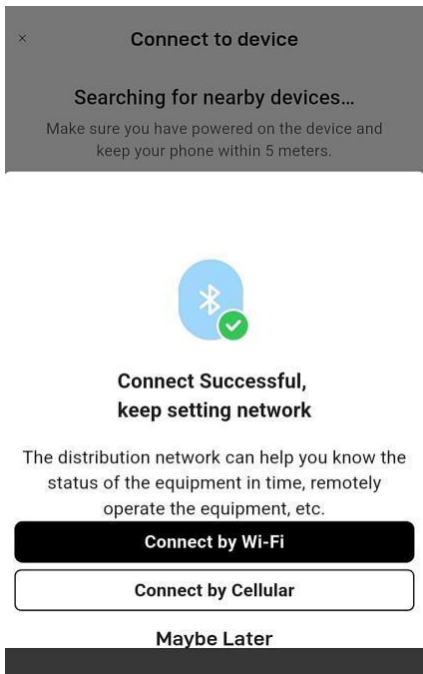
4) After selecting the correct SN, click "Connect."

Configure the network:

The system will ask how you want the device to access the network. Please choose according to your usage scenario:

SIM card network: If a SIM card is installed in your device and you want to use a mobile data network, select this option.

Wi-Fi connection: If the device is within Wi-Fi coverage and you want to connect it to your home or company wireless network, select this option.



According to the network type you selected, follow the on-screen prompts to enter the corresponding information (such as the Wi-Fi password).

Step 4: Complete Binding

Wait for configuration to succeed: After you click Confirm, the APP will begin sending the network configuration information to the device.

Successful jump: After the network configuration succeeds, the APP interface will automatically jump from the current page to the second-step page.

Binding complete: At this point, the APP has finished identifying the device, configuring the network, and establishing the binding. You have successfully added the Rough Ranger device to your APP account. The subsequent steps (such as function settings) can be performed later according to your needs.

8 、 Using the Cutting Deck

8.1 Precautions

- For first-time use, choose flat ground and mow slowly.
- The mowing method depends on the size and shape of the area. Please consider obstacles such as trees, fences, and buildings.
- To make the mowing pattern look nice, it is best to operate in the afternoon or evening when moisture is low.

8.2 Adjusting the Cutting Deck Height



Do not attempt to make any adjustment to the cutting blade while the power is on. Because the lawn mower blade is not visible and is close to the cutting deck housing, fingers and toes may be cut off immediately if they make contact.

The cutting deck height should be adjusted within the range of 20~120 mm (0.79~4.72 inches). During mowing, raise the cutting deck to prevent stumps, rocks, or other objects from damaging the lawn mower cutting deck.

8.3 Cleaning the Cutting Deck



Do not attempt to make any adjustment to the cutting blade while the power is on. Because the lawn mower blade is not visible and is close to the cutting deck housing, fingers and toes may be cut off immediately if they make contact.

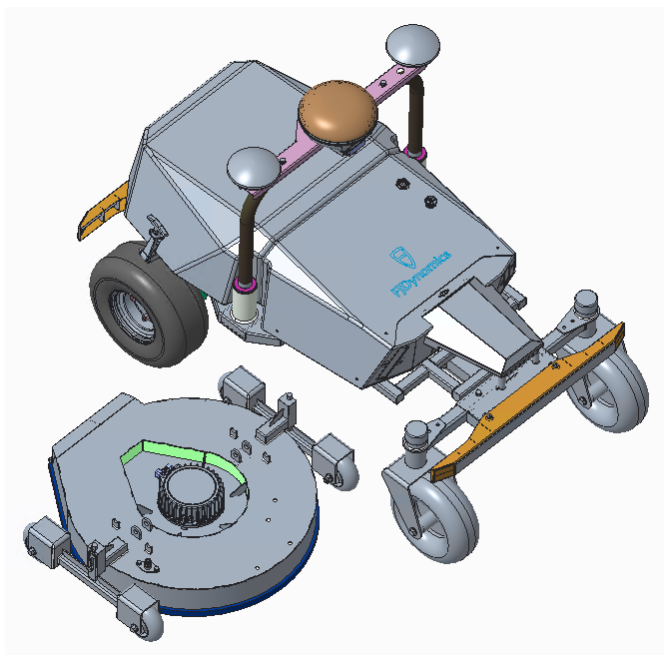


8.4 Installing the Cutting Deck

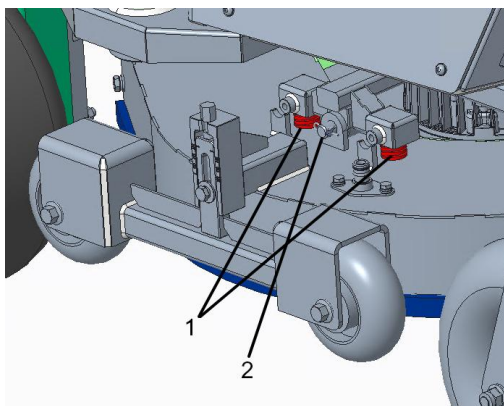


Be sure to turn off the lawn mower before removing the cutting deck.
Install or remove the cutting deck on firm, level ground, ensuring the parking brake is engaged.

1. Place the cutting deck on the right side of the machine and slide it under the lawn mower chassis in the direction shown. Note that the front wheels need to face forward.



2. Secure the cutting deck: As shown in the figure, place the springs on the left and right sides in sequence and insert the pins.



3. Install the roller bracket: Secure the roller mounting bracket with M8 bolts.
4. Install the roller: Use M12 bolts and bushings to pass through the roller and nuts to secure the roller.

8.5 Adjust the Cutting Deck Level and Height Position

After installing the cutting deck, check its levelness and height. If necessary, adjust the cutting deck height and levelness. When the cutting deck is not parallel to the ground, adjust the cutting deck connection height-adjusting rod to make it parallel to the ground. Check the cutting deck height. When the cutting deck is in the lowest position, the distance from the blade tip to level ground should be 20 mm (0.79 inches).



Caution: When checking the cutting deck height, first check the tire pressure and set it to the specified pressure. If the tire pressure deviates from the specified value, the cutting height cannot be adjusted correctly.

8.6 Removing the Cutting Deck

To remove the cutting deck, perform the above steps in reverse order.



Cutting deck removal and installation must be carried out by professionals using professional equipment.

8.7 Slope Operation



Caution: Operate only on slopes of 20 degrees or less. Slopes are a major factor in loss-of-control and rollover accidents, which may cause serious injury or death. All slopes require extra caution.

- Use extra caution when operating on slopes.
- Use extreme caution when changing direction on slopes.
- Keep moving forward slowly and turn slowly.
- Do not operate where the machine may slip or tip.
- To maximize traction, it is best to keep the front of the machine facing uphill.
- If it is necessary to go downhill, turn around slowly.
- Watch for holes, ruts, bumps, rocks, or other hidden objects. Rough terrain can overturn the machine.
- Be aware that taller grass may hide obstacles.
- Remove obstacles such as rocks and branches.
- Maintain slow and gradual movement on slopes. Do not suddenly change speed or direction.
- Avoid starting and stopping on slopes. If the tires lose traction, switch off the mowing motor and proceed slowly straight down the slope.
- When mowing, keep a safe distance from drainage ditches, retaining walls, embankments, water banks, and other hazards to prevent the wheels from dropping over edges or sinking into the soil.

This reduces the risk of sudden rollover and helps avoid serious injury or 

- When on slopes and near drainage ditches, retaining walls, embankments, or water banks, it is recommended to use a push mower or handheld grass trimmer to avoid machine rollover.
- Do not mow on wet grass. Reduced traction may cause slipping and loss of steering control.
- If the lawn mower tires lose traction while operating on a slope, turn off the lawn mower and seek assistance.
- Never start, stop, or turn suddenly, especially when operating on slopes.
- The lawn mower can operate laterally on moderate slopes. When operating on slopes of up to 15 degrees, the drive tires may lose traction, causing the machine to lose control.

Do not operate on slopes greater than 20 degrees.

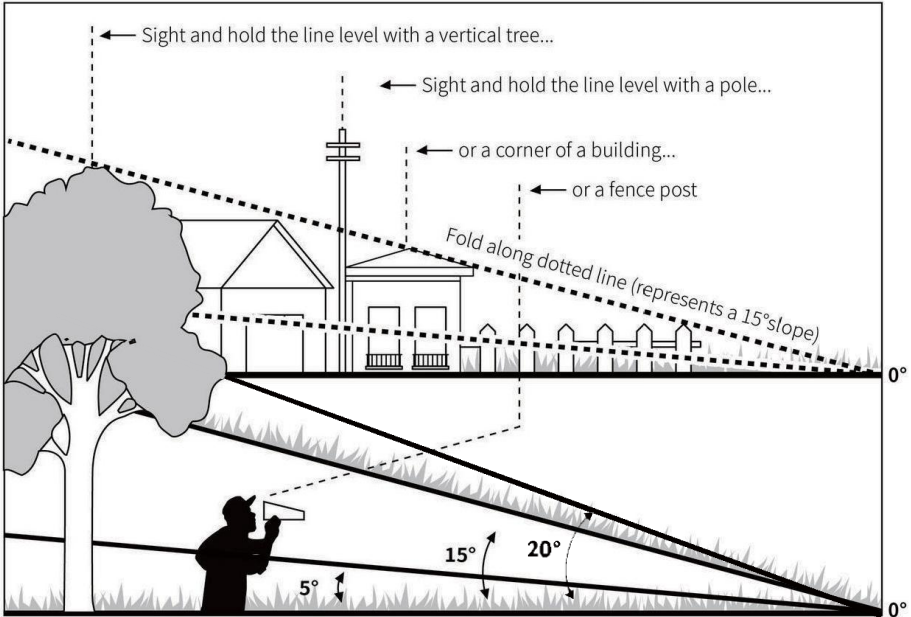
It is strongly recommended that the operator drive the machine off the slope with extreme caution whenever any sign of traction loss is detected. After the problem is resolved, attempt slope operation again. Terrain conditions may affect traction and cause loss of control. The following are some situations that require attention:

- Wet terrain
- Ground depressions (such as holes, ruts, erosion) soil piles
- Certain types of soil (for example, sand, loose soil, gravel, clay), as well as the type, density, and height of grass.
- Extremely dry conditions, tire pressure

These are just a few examples of situations that require caution when operating on slopes. There are many other possible issues that cannot all be listed. Exercise extra caution whenever working on any slope.

8.8 Slope Reference Guide

When determining the slope to be mowed, you may prepare the following illustration (for reference only) for comparison.



9 、 Electrical System Safety

- Before operating the electrical system, place the power switch in the off position, ensure the lithium battery is disconnected, and read the manual before adjusting or servicing components.
- During transport, ensure the power switch is off and the lithium battery is disconnected.
- Keep the electrical control box free of grass clippings, leaves, and other debris. Do not spray water into the electrical control box with cleaning equipment.
- When working near the lithium battery, be sure to wear safety glasses and protective equipment, and use insulated tools.
- When cleaning dirt and debris from the battery compartment, electrical control box, cutting deck, etc., do not use solvents, harsh cleaners, or abrasives.
- Bystanders must keep a certain distance away when starting or stopping the cutting blade.

9.1 Charging Station

The lawn mower is equipped with a charging station approved by FJDynamics. Do not use a charger that is not designed for this product to charge the battery. The charging station must be connected to a protected outlet rated 110 V/20 A or 220 V/10 A.

During charging, the lawn mower indicator light status is as follows:

Status Indicator Light	Status	Handling Method
Red light flashes once every 1 s, green light off	Charging status	Normal status, no action required
Green light flashes once every 1 s, red light off	Battery level 80%-100%	Normal status, no action required
Green light steady on, red light off	Charging complete	Normal status, no action required
Red, Green, _ _ _ _	Hardware fault	Contact the local dealer for analysis and handling
Red, Green, Red, Green, Red, _	AC voltage fault	Check whether the AC input voltage is normal
Green, Red, Green, _ _ _	Device temperature protection	Stop charging and wait for the temperature to drop before continuing to charge
Red, Green, Red, Green, Red, Green	Battery not connected fault:	Check whether the battery is reliably connected
Green, Red, Green, Red, _ _	Output short-circuit protection	Check whether the output terminal is short-circuited
Green, Red, _ _ _ _	Battery temperature protection	Check whether battery overtemperature protection has been triggered
Caution: Place the charging station in a dry environment to avoid water ingress.		

9.2 Lithium Battery Charging

- The lithium battery has an internal BMS battery management module. It does not need to be fully discharged before charging. It takes about 5 hours to fully charge the battery.
- An uncharged battery will discharge slowly. Before first use after long-term storage, ensure the battery is fully charged before mowing.
- If the machine is not used and stored for a long period, the battery should be fully charged every 30 days to maintain battery life.
- During charging, ensure that the air inlet and outlet of the charging station (charger) cooling fan are not blocked.
- Charge the battery immediately in the following situations.
 - a) If $5\% < \text{battery level} \leq 10\%$, the vehicle terminal will prompt the user that the battery is low, and the lawn mower will automatically return to the battery charging area for charging.
 - b) If the battery level $\leq 5\%$, the cutting blade will stop automatically. Use the remote control to drive the lawn mower back to the battery charging area for charging.



Reference: Read and understand all safety warnings and instructions. Failure to follow these rules may result in electric shock or serious injury.

9.3 Removing and Installing the Lithium Battery

Refer to the Battery Installation section. Except for special situations such as maintenance, do not remove or install the lithium battery.

	Never open the battery, to prevent exposure of the internal structure of the battery module, which may cause battery damage and personal injury.
	Before performing any maintenance on the lawn mower, be sure to turn the power switch off and ensure the lithium battery is disconnected.

9.4 Faults

When the control system detects an abnormality, it automatically activates the protection mechanism, shuts down the machine or components, and displays the fault information on the screen. Most faults can be resolved by recording the cause, restarting the machine (press the power switch), or adjusting the operating method. You may refer to the table below to understand the meaning of the faults. If the problem is still not resolved, contact the local dealer.

Battery charging low-temperature protection	Battery charging high-temperature protection	Battery discharge overcurrent protection
Battery total undervoltage protection	Battery cell undervoltage protection	Battery charging overcurrent protection
Battery total overvoltage protection	Battery cell overvoltage protection	Battery discharge low-temperature protection
Battery discharge high-temperature protection	Battery ambient low-temperature protection	Battery ambient high-temperature protection

Battery module overtemperature protection	Low battery level protection	Battery voltage sampling fault
Battery short-circuit protection	Battery temperature sampling fault	Battery charging low-temperature alarm
Battery charging high-temperature alarm	Battery discharge overcurrent alarm	Battery total undervoltage alarm
Battery cell undervoltage alarm	Battery charging overcurrent alarm	Battery total overvoltage alarm
Battery cell overvoltage alarm	Battery discharge low-temperature alarm	Battery discharge high-temperature alarm
Battery ambient low-temperature alarm	Battery ambient high-temperature alarm	Battery overtemperature alarm
Low battery level alarm	Battery software communication fault	Left drive motor does not match controller
Left drive motor overvoltage protection	Left drive motor undervoltage protection	Left drive motor communication fault
Left drive motor stall protection	Left drive motor voltage abnormality	Left drive motor overtemperature protection
Left drive motor reset	Left drive motor Hall sensor fault	Right drive motor does not match controller
Right drive motor overvoltage protection	Right drive motor undervoltage protection	Right drive motor communication fault
Right drive motor stall protection	Right drive motor voltage abnormality	Right drive motor overtemperature protection
Right drive motor reset	Right drive motor Hall sensor fault	Mowing motor does not match controller
Mowing motor overvoltage protection	Mowing motor undervoltage protection	Mowing motor communication fault
Mowing motor stall protection	Mowing motor voltage abnormality	Mowing motor overtemperature protection
Mowing motor reset	Mowing motor Hall sensor fault	VCU communication timeout
VCU communication timeout	VCU cutting deck lift sensor fault	VCU cutting deck not calibrated
VCU cutting deck lift sensor fault	VCU cutting deck not calibrated	ECU communication timeout
VCU mowing motor communication timeout	VCU left drive motor communication timeout	VCU right drive motor communication timeout
VCU drive motor stall protection	BMS communication timeout	VCU cutting deck rise timeout
VCU cutting deck lowering timeout		

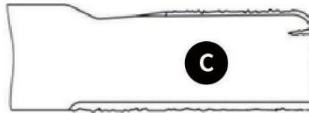
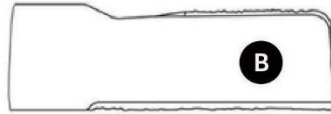
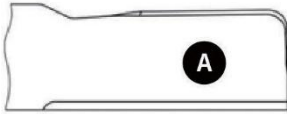
- ①VCU (Vehicle Control Unit)
- ②ECU (Electronic Control Unit)
- ③BMS (Battery Management System)

10 、Maintenance

10.1 Maintenance Schedule

10.1.1 Daily or Before Each Use

- (1) Check for any fault prompts at startup
- (2) Observe whether the tires are leaking air
- (3) Check blade sharpness (the blade must be sharp)
 - A: Normal
 - B: Please sharpen the blade
 - C: Please replace the blade



Always wear sturdy safety goggles when grinding and polishing lawn mower blades.

- (4) Check whether the blade bolts are loose and tighten them with a wrench
- (5) Check whether components such as screws, nuts, or bolts are damaged, missing, or loose. Ensure that all guards are installed in place and functioning properly.
- (6) To keep the operating system and application up to date, check whether any software update is available and install it promptly if so.

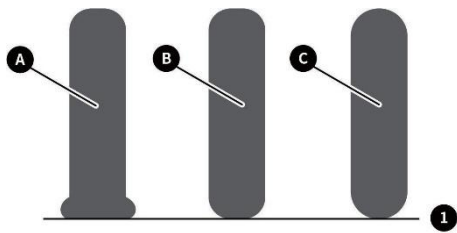
10.1.2 After Each Use

The cutting deck must be cleaned after each use of the lawn mower (for detailed steps, refer to the operation video in the mobile APP).

- Connect a water hose of suitable diameter to the cutting deck water inlet and start the blade rotation so that the water flow cleans debris inside the cutting deck and prevents blockage.
- Tilt the lawn mower and use a water hose to rinse the inside of the cutting deck, then use cleaning tools to remove debris and avoid blockage.

10.1.3 Every 25 Hours

Check whether the tire pressure is normal (the recommended tire pressure value is printed on the tire surface)



- A: Tire pressure is low; the tire tread contact area with the ground is wide
- B: Tire pressure is normal; the tire tread contact area with the ground is normal
- C: Tire pressure is too high; the tire tread contact area with the ground is small

Tires		
Front wheel	—	Solid tire
Rear wheel	13x6.50-6	MAX20 PSI
Caution: Check the tires daily. If damaged, replace them immediately.		

10.1.4 Every 100 Hours

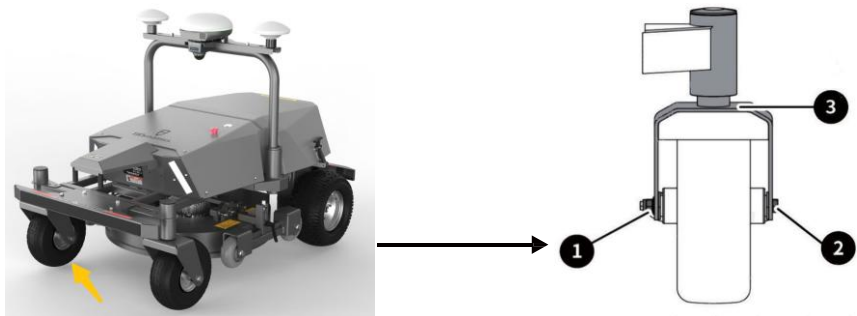
Check the rear wheels and ensure all nuts are tightened to the recommended torque.

	lb-ft	N m
Wheel fastening bolt	33.2 ±3.7	45 ±5
Cutting blade fastening bolt	99.6~110.6	135~150
After replacing a wheel, tighten the bolts to 45 ±5 N m (33.2 ±3.7 lb-ft). Then drive about 200 m and check the torque again.		

It is recommended to lubricate the moving parts of the lawn mower every 100 working hours or every quarter, using appropriate lubricant to reduce wear (for detailed steps, refer to the operation video in the mobile APP).

10.1.5 Every 200 Hours

Check the front wheels to ensure they can rotate freely



Front wheel removal steps:

- a. Park the lawn mower on a flat surface.
- b. Press down the emergency stop switch to cut off power to the whole machine.
- c. Lift the front of the lawn mower using professional and safe methods.
- d. After removing lock nut ①, pull out front wheel bolt ②.
- e. Remove the front wheel from front fork ③.

Serial No.	Name	Serial No.	Name
1	Lock nut	2	Front fork
2	Front wheel bolt		

The wheel fastening bolts should be checked once after the first 2 hours of operation, and then every 100 hours thereafter, with timely repair or replacement as needed.

10.1.6 Monthly

Inspect all wiring harnesses and connectors every month to ensure there is no damage, looseness, or corrosion, and repair or replace them immediately if problems are found.

10.1.7 Yearly

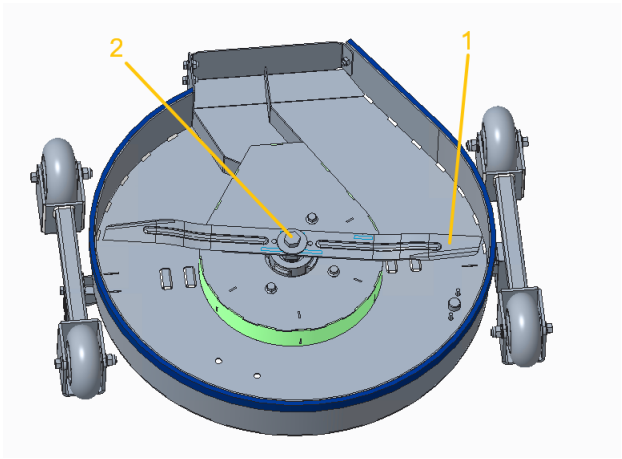
Inspect the parking brake system to ensure there is no damage, looseness, or corrosion, and repair or replace it immediately if problems are found. It is recommended to have an annual inspection and maintenance performed by a FJDynamics lawn mower agent.

10.2 Replacing the Lawn Mower Blade

Follow the steps below when replacing the lawn mower blade:

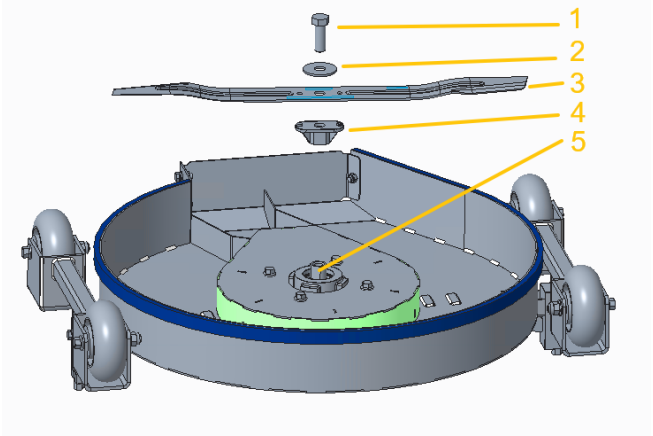
- a. Press the emergency stop switch, and the main power indicator light of the vehicle will go out.
- b. Remove the cutting deck from the machine, then turn its underside upward to replace the blade.

- c. After putting on leather gloves, use a 15/16" socket wrench to loosen bolt ② securing the blade ①.
- d. Turn the bolt counterclockwise to loosen it and clockwise to tighten it.



Serial No.	Name	Serial No.	Name
1	Lawn mower blade	2	Bolt

- e. First place blade seat ④ onto the mowing motor ⑤, then place new blade ③ on the blade seat. Pay attention to aligning the holes, and place disc spring ② between new blade ③ and bolt ①, as shown in the figure below. Tighten the bolt to a torque of 135~150 N m (99.6~110.6 lb-ft).



Serial No.	Name	Serial No.	Name
1	Bolt	4	Blade seat

2	Disc spring	5	Mowing motor
3	Cutting blade		

Blade Maintenance Notes:

Blade Safety	1. Regularly inspect the blade for wear or damage 2. Carefully inspect and maintain the blade. Wear gloves and avoid straightening or welding the blade. 3. On multi-blade machines, note that one rotating blade may drive other blades to rotate.
Maintain Blade Plane	1. The factory default mowing height is 50 mm, and the blade rake is 7.9 mm. 2. The blade assembly is designed to withstand impact and will not deform. Inspect the blade after hitting a solid object.
Check Blade Plane	1. Mark one end of the blade and check all heights 2. Measure the blade edge height, compare it with the setting, and ensure accuracy
Adjust Blade Plane	Remove the mowing height bracket and insert the appropriate shims to achieve the required height

	Check blade balance. Most hardware supply stores provide commercial balancing tools, or you can perform a balance test by placing the blade on an inverted straight punch or a 1/2 bolt. The blade should not tilt. When the blade is slowly rotated, it should not wobble. If the blade is out of balance, correct it before reinstalling. Place the blade on a flat surface and check for deformation. Replace any twisted blade.
	The bent portion of the blade must point upward toward the inside of the cutting deck to ensure proper cutting.
	After installation, rotate the blade to ensure that the blade tip contacts the bottom surface of the lawn mower cutting deck.
	If the bolt torque is incorrect, the blade may come off and cause serious injury.

10.3 Cleaning the Lawn Mower

10.3.1 Cleaning the Body

The body can be wiped with a cloth. Directly rinsing with water may cause the following damage.

1. Damage or breakage of electrical wiring, which may cause fire.
2. Damage to rubber or resin parts such as tires and oil seals.
3. Peeling of the coating film on painted surfaces.
4. Battery damage.

	Do not rinse electrical equipment and instruments with water, and do not allow water to enter the machine.
---	--

After use, carefully clean the cutting deck (especially the bottom). Grass clippings, leaves, dirt, and other debris will accumulate at the bottom of the cutting deck, resulting in rust and corrosion. Before cleaning the machine, first turn off the lawn mower. When removing grass and leaves accumulated on or around the motor cover, keep away from water and wipe with a dry cloth. If debris accumulates at the bottom of the lawn mower during use, turn off the cutting blade, shut down the whole machine, and scrape it clean with an appropriate tool.

If the lawn mower is used under very severe conditions (tall grass or very low mowing height), it is recommended to remove and clean the cutting deck. At the same time, it is recommended to inspect the condition of the cutting blade and fastening bolts as necessary.

10.3.2 LiDAR Maintenance and Cleaning:

- Clean the LiDAR regularly to maintain optimum performance
- Its optical components and sensors are very precise. Improper cleaning may cause scratches, coating damage, or performance degradation.
- It is recommended to use a microfiber cloth to wipe the lens.

10.4 Battery Maintenance

	During servicing, use only the batteries specified by FJDynamics for replacement. Using any other parts may cause danger or product damage.
	Do not smoke when servicing the battery.
	Be sure to wear safety glasses and protective clothing near the battery. Use insulated tools.
	Compressed dry air is not recommended as a cleaning method for the charging station. If cleaning with compressed air is the only available method, always wear safety goggles. If the environment is dusty, also wear a dust mask.

Your lawn mower is battery powered. If properly maintained, the battery will provide many years of service life. For proper care, follow the instructions below:

- When the lawn mower is not in use, disconnect the vehicle power switch in time to reduce unnecessary battery power loss.

	Charge using a charging station (charger) approved by FJDynamics. Incorrect battery charging will void the warranty and may cause equipment damage or serious injury or death.
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- Each time the battery is serviced, check that the battery cables are securely fastened to the battery.
- Prevent grass, dirt, and debris from accumulating near the battery terminals.
- After low-voltage protection, do not keep the battery in a discharged state for a long time, otherwise the battery will be damaged.
- Charge the battery in a ventilated, dry place away from sparks or airflow. Never let the charging station (charger) come into contact with rain, steam, or liquids.

- The charging station (charger) recommended by FJDynamics is only for charging batteries provided by FJDynamics.
- Do not touch uninsulated parts of the charging station electrodes or output connector.
- To extend the life of the battery pack and keep the modules in good condition, follow the instructions below.
- Excessive discharge of the battery pack means the battery life will be shortened and the battery may be permanently damaged.
- When the battery is completely discharged and shut down, charge it as soon as possible. Even charging it for 5-10 minutes is beneficial; it does not need to be fully charged. After the battery is fully discharged and shut down, it is best to charge it within 24 hours.
- If the battery pack is not used for a long period (days or weeks), disconnect the power switch on the vehicle to reduce standby loss and extend the storage time of the battery pack.
- If the battery must be stored for a long time, ensure it has about 50% charge before storage, and every three months recharge it back to more than 50% to keep the battery in a healthy state.
- When the battery pack needs long-term storage, it is recommended to store it at 25 °C (77 °F). When the storage temperature is within -20 °C to 45 °C (-4 °F to 113 °F), the recommended storage time should not exceed one month; when the storage temperature is within 0 °C to 35 °C (32 °F to 95 °F), the recommended storage time should not exceed six months.
- The optimum discharge operating ambient temperature is -15 °C to 50 °C (5 °F to 122 °F). Use within the above temperature range.
- The battery pack should avoid severe vibration during storage.
- Battery Maintenance Tips:
 - ◆ Recharge the battery in time before the battery level is completely exhausted
 - ◆ Avoid recharging a fully charged battery
 - ◆ Charge at a suitable room temperature and recharge only after the battery has cooled down

10.5 Storing the Lawn Mower

If you plan not to use this machine for an extended period, store it according to the following steps.

- Clean the lawn mower as described in the previous section.
- Inspect the cutting blade and replace or sharpen it if necessary (see the Maintenance section).
- Store the lawn mower indoors in a dry, clean, well-ventilated place out of the reach of children. Do not place it near corrosive materials such as fertilizer or rock salt.
- Do not cover the lawn mower with a solid plastic sheet. Plastic coverings trap moisture around the lawn mower and cause rust and corrosion.
- Thoroughly inspect whether any worn or damaged parts need replacement, and order them from the dealer.
- Check tire pressure every month to prevent air leakage.
- For more information on battery pack maintenance, see the Battery Pack Maintenance section of

this manual.

10.6 Maintenance Notes

Pay attention to the following points when performing lawn mower maintenance.

- Park the lawn mower on level ground. Ensure the blade switch is in the "Off" position, raise the cutting deck, and press the emergency stop switch.

	Before adjusting, cleaning, or repairing, wait for all movement to stop. Repairs or maintenance requiring electrical power may only be performed by trained maintenance personnel. Read and follow the safety warnings in this manual.
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- Any maintenance operation requiring removal of a safety cover must be performed by a trained service technician.
- Use a stick or similar tool to clean the underside of the cutting deck. Keep your body away.
- Prevent the accumulation of trash, grass clippings, and other debris by keeping the battery compartment and cutting deck clean.
- Clean all dirt and debris from the battery compartment, electrical control box, cutting deck, etc. Do not use water, solvents, harsh cleaners, or abrasives.
- When servicing the battery, grinding lawn mower blades, or removing accumulated debris, always wear safety goggles. When the lawn mower is running, never attempt to make any adjustments or repairs to the cutting deck,
- cutting blade, or any attachment.
- Never work under the machine unless it is safely supported with jack stands. When the machine is raised and placed on jack stands, ensure any maintenance requiring removal of a safety cover is performed by a trained service technician.
- Before checking the underside of the cutting deck, ensure the power switch is in the "Off" position, that the indicator light is off, and that the cutting deck blade switch cannot be started accidentally.
- Use a cleaning brush or similar tool to clean the underside of the cutting deck. Keep your body away.
- Prevent the accumulation of trash, grass clippings, and other debris by keeping the battery compartment and cutting deck clean.
- Clean all dirt and debris from the battery compartment, electrical control box, cutting deck, etc.
- When servicing the battery, grinding lawn mower blades, or removing accumulated debris, always wear safety goggles. When the lawn mower is running, never attempt to make any adjustments or repairs to the cutting deck, cutting blade, or any attachment.

The battery used in this lawn mower contains the following toxic and corrosive substance: lithium ion.

	All toxic substances must be handled in a specific manner to prevent environmental pollution. Before disposing of damaged or worn lithium-ion batteries, contact your local waste disposal agency or local environmental protection bureau office for information and specific instructions. Take the battery to a local recycling or disposal center for lithium-ion treatment.
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If the battery cracks, whether it leaks or not, do not recharge or use the battery. Discard it and replace it with a new battery. Do not attempt to repair it! To avoid the risk of injury, explosion, or electric shock, and to avoid environmental damage, cover the battery terminals with insulating tape.

- Do not attempt to disassemble or damage any battery.
- Do not attempt to open the battery.
- If leakage occurs, the released electrolyte is corrosive and toxic. Do not let the solution flow into rivers or contact the skin, and do not ingest it.
- Do not dispose of these batteries with household waste.
- Do not incinerate.
- Do not place them in any landfill.

11 、 Troubleshooting

11.1 Cutting Deck Mowing Function Faults and Remedies

If uncertain, contact your dealer.

Grass is not discharged properly	The grass is wet	Operate after the lawn has dried
	The grass is long	Increase the cutting height and cut twice
	Cutting height is low	Increase the cutting height
	Operating speed is high	Reduce the operating speed
Residue remains after mowing	Operating speed is high	Reduce the operating speed
	The grass is long	Increase the cutting height and cut twice
	The cutting blade is worn or damaged	Replace with a new cutting blade
	Grass has accumulated inside the cutting deck	Clean the inside of the cutting deck
Cutting is uneven	Operating speed is high	Reduce the operating speed
	The cutting blade is not sharp enough	Sharpen the cutting blade
	The blade edge is bent	Replace with a new cutting blade
	The cutting deck is not level	Level the cutting deck according to the "Adjusting the Cutting Deck Level and Height Position" section of the manual
	The cutting blade is worn	Replace with a new cutting blade
	The roller setting is incorrect	Adjust the roller height
	Tire pressure is low	Inflate to normal tire pressure
Scalp the lawn (soil clumps)	Cutting height is low	Increase the cutting height
	Turning speed is high	Reduce the turning speed
	There are bumps in the ground	Change the mowing operation mode (cutting direction, etc.)
	The cutting blade is bent	Replace with a new cutting blade
	Tire pressure is low	Inflate to normal tire pressure
Excessive vibration	Grass has accumulated inside the cutting deck	Clean the cutting deck
	The cutting blade is bent or unbalanced	Replace with a new blade or balance the blade
	The cutting blade fastening bolt is loose	Tighten the cutting blade fastening bolt
The cutting deck has	Operating speed is high	Reduce the operating speed

a heavy working load	Grass has accumulated and wrapped around the cutting deck spindle	Clean the cutting deck
The cutting blade is serrated and grayish brown	The cutting blade is not sharp	Sharpen the cutting blade
	The cutting blade is worn	Replace with a new cutting blade
	The cutting deck is not level	Level the cutting deck
The APP displays an error message	Handle and maintain according to the displayed error message	Handle and maintain according to the displayed error message
The lawn mower cannot start	The power switch light is off	Check whether the power switch is on and the indicator light is lit
	The battery cable is not connected	Ensure the battery cable is connected
	The circuit breaker has tripped	Check whether the circuit breaker has tripped

11.2 Battery Faults and Handling

When handling the battery, carefully read the battery precautions.

Fault	Fault Status	Troubleshooting or Solution
The lawn mower cannot start	Battery depleted	Fully charge the battery
	Poor contact at battery terminals	Clean the terminals, then retighten the bolts and nuts
	Battery life has ended	Replace the battery
	Problem with wiring harness or switch	Have the dealer repair it
Cannot charge	Battery life has ended	Replace the battery
Severe terminal corrosion, terminal heating	Insufficient terminal tightening	Clean the terminals, then retighten the bolts and nuts
Sudden reduction in battery fluid	Battery has cracks and pinholes	Replace the battery
	Charging voltage too high	Check the charging station (charger)

11.3 Troubleshooting the Mowing Motor and Mowing Motor Controller

	Before starting these steps, make sure your digital multimeter can measure resistance up to 1.2 megaohms (Q).
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Before performing any maintenance or repair, be sure to disconnect the battery cable. After disconnecting the battery cable, wait 5 minutes before operating the machine.

- (1) Remove all debris accumulated on all cutting deck components.
- (2) Confirm that all power connections on the mowing motor and mowing motor controller are properly tightened. If you find that the locking screws on the motor controller are loose, tighten them to 8-10 N·m (5.9~7.4 lb-ft) and check whether the cutting deck works properly. If no loose connections are found, continue with the following steps.
- (3) Label the connection points on the mowing motor controller so they can be easily seen for correct reconnection.
- (4) To ensure correct reconnection, mark all wires with the corresponding connection point labels from step 3.
- (5) Remove all wire connections from the mowing motor controller.
- (6) Measure the mowing motor controller resistance (Q)
 - a. First set the multimeter to the short-circuit test range;
 - b. Place the positive probe of the digital multimeter on the positive terminal of the mowing motor controller; place the negative probe of the digital multimeter on the negative terminal of the mowing motor controller.
 - c. If the multimeter beeps at this point, the controller is damaged and needs to be replaced.
- (7) If no problem is found, reconnect and tighten the wiring and the motor of the mowing motor controller.
- (8) Measure the mowing motor resistance (Q):
 - a. First set the multimeter to the resistance range;
 - b. Place the positive probe of the multimeter on motor terminal U and the negative probe on motor terminal V, then observe the resistance reading;
 - c. Place the positive probe of the multimeter on motor terminal U and the negative probe on motor terminal W, then observe the resistance reading;
 - d. Place the positive probe of the multimeter on motor terminal V and the negative probe on motor terminal W, then observe the resistance reading;
 - e. If the resistance in the above three tests is greater than 5 ohms, the mowing motor needs to be replaced.
- (9) Place the negative (-) probe of the digital multimeter on pin 2 and the positive (+) probe on pin 3 to measure the resistance in the six-pin motor connector. The resistance reading should be between 800k(Q) and 1.2m(Q) ohms. The resistance between pin 2 and pins 1, 4, 5, and 6 should be 0 ohms. If the resistance is above or below these ranges, the mowing motor needs to be replaced.
- (10) If steps 1-9 are complete and the problem still exists, refer to the wiring harness troubleshooting flow below.

11.4 Lawn Mower Wiring Harness Troubleshooting

The lawn mower cannot start	Poor contact of the wiring harness terminal below the power switch	If the connector is loose, reconnect it to the switch. If the switch harness pin is loose, have the dealer repair it.
	The connector from the wiring harness to the battery is loose	Check and reconnect the connector
The motor does not work	Problem with the power wiring harness or communication wiring harness of the motors	Check continuity of the power and communication wiring harnesses and whether any connectors are loose. If so, have the dealer repair them.
The switch device does not work	The connector from the wiring harness to the battery is loose	According to the interface display, identify the faulty switch and then check whether the connector of that switch is abnormal. If so, have the dealer repair it.

12 、 Warranty Policy

For details, see the "2026 FJDynamics Rough Ranger Medium Intelligent Lawn Mower Dealer After-Sales Service Policy."