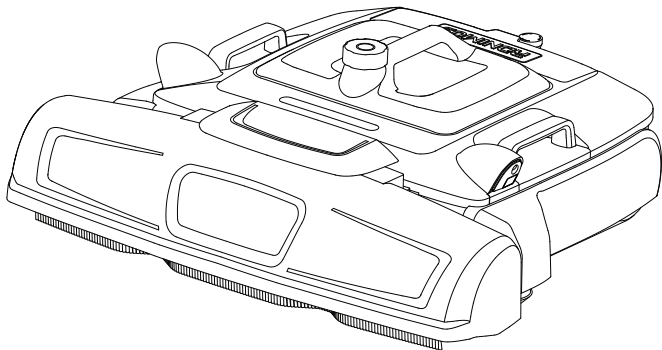


ROBO-TEK

USER GUIDE

Instructions for photovoltaic cleaning robot



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WARNINGS:

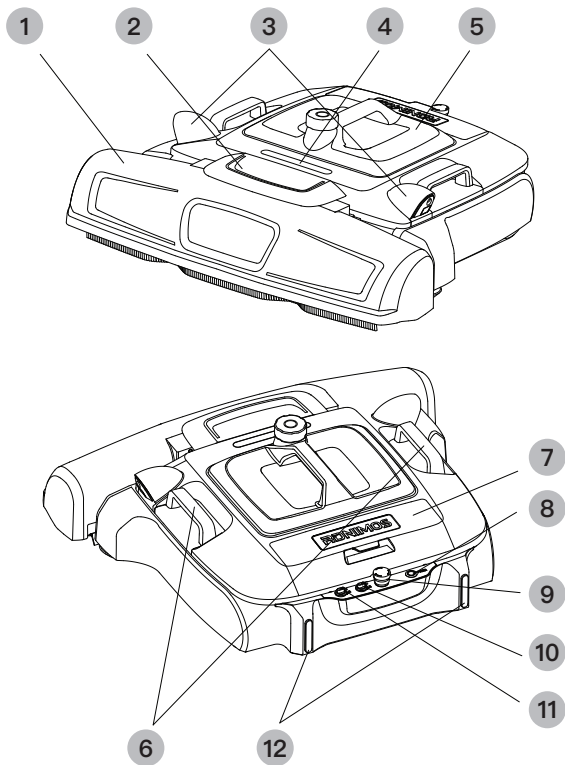
These warnings apply to this product, all tools and accessories, and any chargers or power adapters you may need.

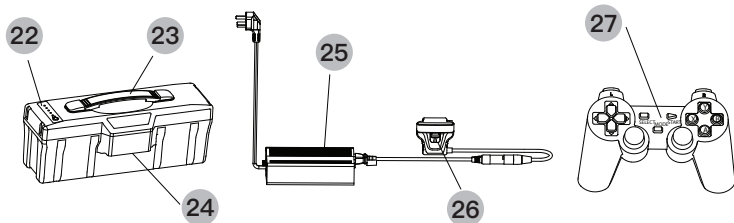
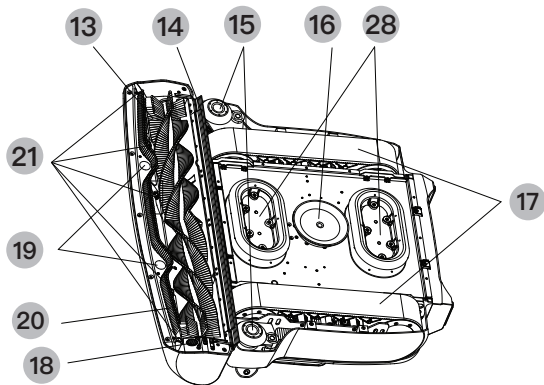
To reduce the risk of fire, electric shock and injury:

- This product cannot be used by people with physical, sensory or intellectual disabilities, or people without relevant experience (including children), unless there is a guardian's care or guidance to ensure that they can use this product safely.
- Do not use this product as a toy; Close attention is especially needed when approaching children; Please take care of children to ensure that they do not use this product as a toy.
- To use the machine, please follow the instructions.
- Do not touch the connector with wet hands.
- Do not use if the cable or connector is damaged.
- Do not use this product in rainy days.
- If the product does not operate as designed, suffers serious impact, falls from high place, is damaged, or falls into water, please do not use it, and please contact the after-sales help hotline.
- Contact the after-sales hotline for maintenance or repair. Do not disassemble the product. Improper disassembly may cause electric shock or fire.
- Warning: Do not operate machine at temperature above 35 °C or below 5 °C, or at the surface temperature of PV module above 50 °C or below 5 °C. Otherwise, the machine may slip and fall.
- Warning: Use and store the machine with care to avoid strong impact, which may cause vibration damage to internal structural components and electrical components.
- Do not burn the product even if it is badly damaged. Batteries and electrical components may explode in the fire.
- It is strictly forbidden to stop the machine for cleaning operation in situ, which may damage the panel surface.
- List of product accessories and parameters of the machine.

List of product accessories and parameters of the machine

– Product list





| | | | | |
|---|----------------------------|--|-------------------------------------|-----------------------------------|
| 1. Nose lamp | 2. Nose cover plate | 3. Cameras | 4. Status display light | 5. Portable water tank |
| 6. fixed handle | 7. Battery cover | 8. Power switch | 9. Emergency stop switch | 10. Left and right startup switch |
| 11. Horizontal and vertical mode startup switch | 12. Rear cover support pad | 13. Cleaning roller brush | 14. Adaptive scraper | 15. Sensor group |
| 16. Center adsorption | 17. The tracks | 18. Roll brush quick-removal module | 19. Front sensor | 20. Front brush |
| 21. Spray nozzle | 22. Battery power display | 23. Battery pack handle | 24. Battery pack charging interface | 25. The charger |
| 26. Adapter | 27. Remote controller | 28. Fore and aft adsorption (optional) | | |

List of product accessories and parameters of the machine

– Parameters of the machine

| | |
|--|--|
| Product name | Photovoltaic cleaning robot |
| Ambient temperature | 5 ~ 35°C |
| Operating voltage range | DC: 25V ~ 29.4V |
| Power of the machine | 350W |
| Cleaning efficiency | 300m ² /h |
| Moving speed | 0.15 m / s |
| Array angle | Standard version $\leq 20^\circ$ High configuration version $\leq 30^\circ$ |
| Remote control | Remote control within 30 meters |
| The charger | Maximum charging voltage 29.4V, charging current 5A |
| Charging time of battery pack | 5.5 hours |
| Battery pack capacity | 25.6 Ah |
| Weight of product | Net weight : 28kg, water tank capacity: 8L |
| Endurance | Battery endurance time: photovoltaic panel angle ≤ 20 degrees, endurance time is 6 hours; photovoltaic panel angle >20 degrees, endurance time is 3 hours |
| | Water endurance time: 60% of water pump speed regulation, about 75 minutes; 80% of water pump speed regulation, about 45 minutes |
| Obstacle passing ability | Component gap, array spacing ≤ 50 mm, Component height difference ≤ 15 m |
| Complete machine protection and service life | IP55 /5 years |



Please read the instructions and precautions carefully before using the machine.

Non-professional personnel are not allowed to operate the machine or enter the working area. Please keep a safe distance to prevent danger. It is not recommended to use this product on rainy days.

Note: Be sure to be familiar with the machine's ability to pass obstacles, and arrange it to run in appropriate scenarios.

Product assembly and usage scenarios

– Product assembly

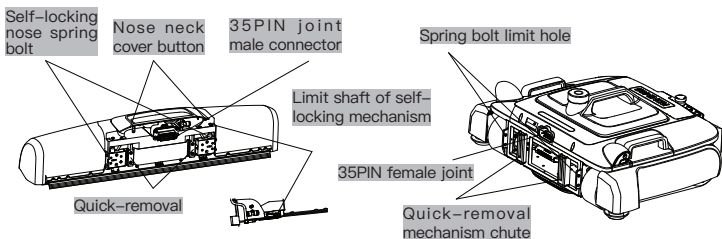
Be sure to remove the battery before assembly or removal.

This product consists of 4 parts:

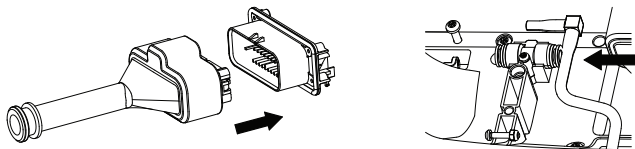
Body, battery pack, portable water tank and cleaning nose

The assembly of body and cleaning nose.

1. Press the buttons on both sides of the nose neck cover to open. Check that the spring bolt of the cleaning nose self-locking mechanism does not protrude. Align the quick-removal mechanism slide rail of the cleaning nose with the quick-release mechanism chute of the machine body and firmly push down the cleaning nose on both sides. After matching the position, pull up the limit shaft of the self-locking mechanism, extend the spring bolt off the locking limit, and fix the cleaning nose in the fixed space.



2. Insert the male harness quick-connector of the nose into the female connector of the body. If you hear an obvious clicking sound, it means that the connectors are matched.
3. Insert the water pipe of the nose into the water pipe quick connector of the machine body, and cover the nose neck cover. The assembly of the cleaning nose and the body is completed.

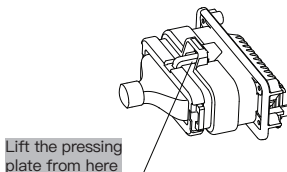


Quick installation of cleaning nose

Do not install and disassemble the nose frequently. The installation of the nose as described above.

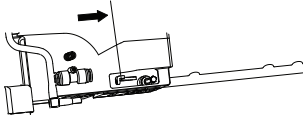
The step to remove the cleaning nose:

1. Open the cleaning nose compartment cover and pull out the water pipe from the quick connector.
2. Pull out the male connector of the harness quick plug connector in the cleaning nose. Before pulling out the plug, use a flat-head screwdriver to lift the press plate and open the latch of the male and female plug.

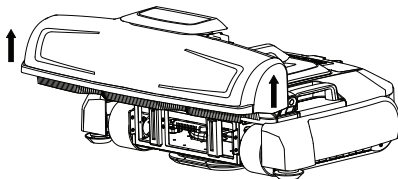


3. Pull the unlocking trigger of the self-locking mechanism on both sides of the nose outward, the limit shaft of the self-locking mechanism will spring up automatically, and the spring bolt will retract

Pull the self-locking mechanism to unlock the trigger lever

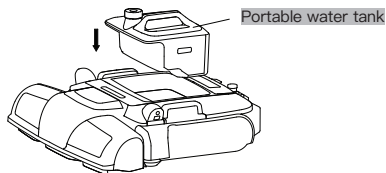


4. Hold the two ends of the cleaning nose with both hands and lift it up. If necessary, shake it slightly from left to right to prevent it from getting stuck up until the nose slide rail exits from the body chute.



Assemble the water tank into the machine body

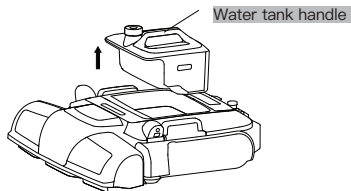
After the water tank is filled with water, tighten the water tank cover. Put the front end (one end of the water tank cover) into the tank cabin of the machine body, and then press the front end gently, so as to make the male and female connectors of the water tank outlet are reliably connected.



Replace the water tank

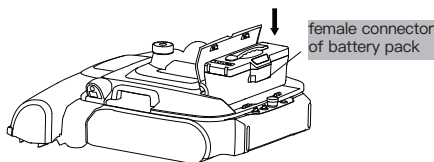
If the yellow and green lights flashes alternately when machine stop, please check the water in the tank.

Hold the water tank handle, lift the water tank vertically, pull out the water tank, replace the backup water tank, and reinstall it as described above.



Assemble the battery into the machine body

Open the battery compartment cover and put the battery pack into it. Insert the female connector of the battery pack into the male connector of the body, and enter the battery pack along left and right side chutes. Gently press the battery pack down to position and close the battery compartment cover.



Light display description

Description: As shown below, the light has 8 states

1. The green light flashes: the machine operates normally
2. The yellow light flashes: the machine is checking itself before moving
3. The red light flashes: the machine alarms due to fault
4. Steady blue light: the machine enters remote control mode
5. Steady blackish green light: the machine enters mobile APP manual mode
6. The purple light flashes: the machine is in emergency stop state
7. The green and yellow lights flashes alternately: the machine is short of water and needs water supply
8. Steady yellow light: The machine is short of power, and the battery needs to be replaced

Replace the battery

When the machine stop, if the yellow light is steady on, please check the battery power:

Power determination: Gently press the battery pack power indicator, and the current power will be displayed by 5 grids of light:

5 grids of green light: power is 100%

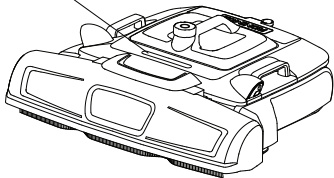
4 grids of green light: power is 80%

3 grids of green light: power is 60%

2 grids of green light: power is 40%

1 grid of green light: power is 20%

Status display light

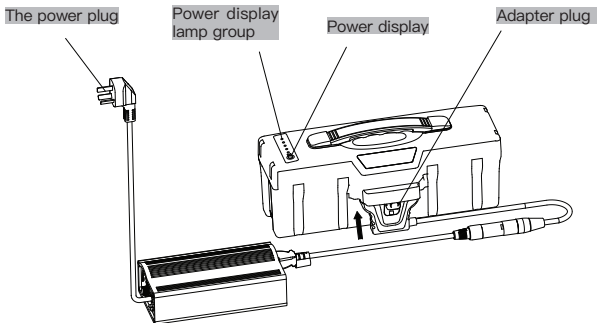


No green light: the battery power is low, please replace the battery pack, and charge in time.

This operation is the reverse operation of the battery assembly operation. Open the battery compartment cover, pull out the battery pack from the battery compartment of the machine body, and assemble the backup battery as described above.

Battery charger

1. When the battery pack is fully charged, the five indicator lights should be all on, and the indicator lights of the discharged battery will be all off.
2. When you press the light button on the top of the battery pack, if there is only one light left, it means that the battery pack has low power. At this time, connect the charger to charge it in time.
3. Open the protection cover of the adapter, and insert the male terminal of the adapter into the charging port of the battery pack.
4. Connect the power plug to the AC power supply.
5. When charging, the indicator light of the charging adapter is red, indicating that charging is in progress, while the indicator light is green, indicating that the battery is fully charged.



Note:

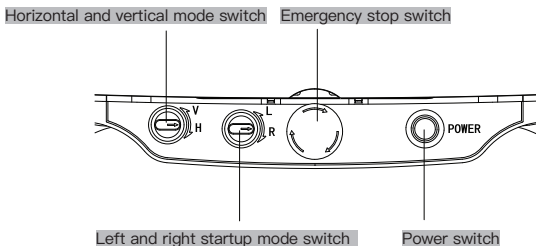
1. It is forbidden to charge in the outdoor or indoor humid environment.
2. After the battery is fully charged, first pull out the plug at the power end, and then pull out the adapter plug of the battery pack.
3. Do not run out of battery power, please charge it in time when there is 1 grid.

Mobile APP Application

For Apple phones, please search for PV-Robot in the app store. For And phones, please contact the supplier to obtain the installation package

Startup and shutdown

1. Place the machine on the photovoltaic panel and observe the type of module array; Determine the left and right starting modes or array horizontal and vertical arrangement.
2. Select a mode in the mode switch.
3. Check whether the emergency stop switch is open, and try to turn the emergency stop switch to the right.
4. Press and hold the POWER key of the power switch for 3 seconds to start the machine. The yellow light will flash after being turned on, and there will be a 30-second self-inspection program. Normally, the machine will not move in the self-inspection
5. After running, press the POWER key of the power switch to shut down the machine.



Emergency stop switch

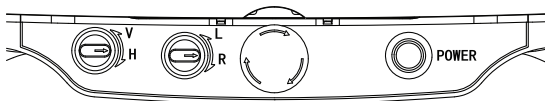
Press the emergency stop switch to stop the machine in case of safety risks or other emergency faults.

Release the emergency stop switch: turn the emergency stop switch to the right, and the emergency stop switch will pop up to reset.

Mode switch

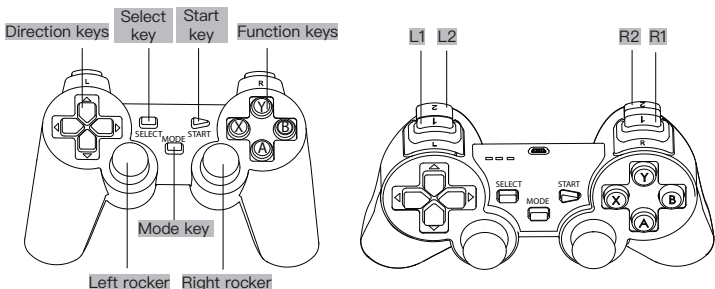
Left and right start mod: Left start, turn the knob to L, right start, turn the knob to R.

Horizontal and vertical mode switch: Horizontal array, turn the knob to H, vertical array, turn the knob to V.



The remote control

Description: Key functions are shown in the following chart:



| Key Name | Function | Remarks |
|----------------|--|--|
| Direction keys | Move the robot forward/backward/left/right | |
| Select key | Exit the remote cleaning mode | It can only be controlled after the remote cleaning mode is turned on, otherwise this button has no function |
| Start key | Remote control on/enter remote cleaning mode | |
| Mode key | Remote control on | |
| Function keys | “X”: central adsorption up “B”: central adsorption down | |
| Left rocker | Press to enter manual mode | |
| Right rocker | Press to exit manual mode | |
| L1 | The key has no function | |
| L2 | Backward in manual mode | |
| R2 | Forward in manual mode | |

Follow the steps below to turn the remote control on/off

1. Power on: Press MODE and press START.
2. Remote control indicator: Steady green indicates that the remote control works normally.
3. Press the left rocker to connect the remote control to the machine.
4. Observe that the status indicator of the machine is steady blue, and then start the remote control.
5. Press the right rocker and the remote control exits the connection.
6. Power off: When the robot is connected, press and hold the MODE key for 5 seconds to power off. When the robot is not connected, it will power off in 15 seconds automatically.

Note:

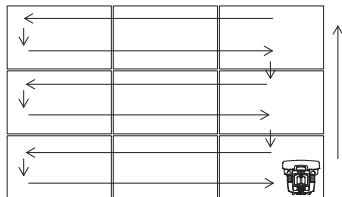
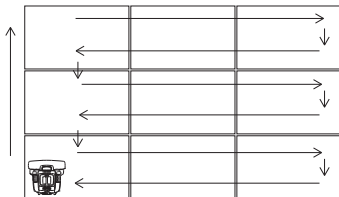
1. When the machine moves on the photovoltaic panel, please control machine to move within the safe area and shall not protrude out of the array boundary to prevent it from falling.
2. It is recommended that the distance of using the remote control to operate the machine should not exceed 25 meters.
3. When using the remote control, pay attention to the front and avoid obstacles.
4. There is a one-to-one correspondence between the remote control and the machine. Please confirm the match with the machine when using the remote control.

Product assembly and usage scenarios

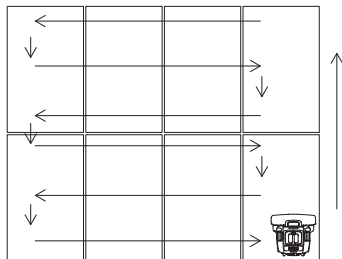
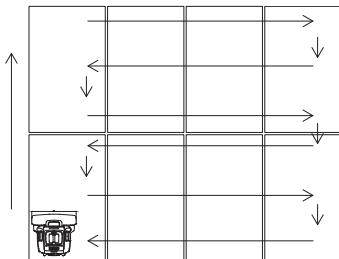
– Usage scenarios

This machine is wet sweep mode with water.

Horizontal cleaning path:



Vertical cleaning path:

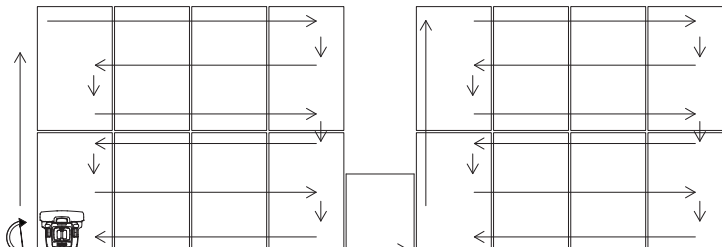


Horizontal and vertical cleaning steps:

(the arrangement in the figure is only for display, and the actual cleaning is not limited to quantity of the rows or columns)

1. Place the machine at the initial cleaning position of the photovoltaic array, and the machine nose position is shown in the figure. The machine edge is as close to the array boundary as possible, but not beyond it. The portable water tank is filled with water and assembled into the machine.
2. Set the horizontal sweep mode as described above.
3. Set the left-right startup mode as described above.

5. Turn the emergency stop button clockwise to release it.
6. Hold down the power button for 3 seconds, and the machine will automatically clean after it enters the 30S self-check time.
7. The cleaning path is shown in the figure. Considering different component lengths, vertical cleaning will adaptively increase the cleaning path.
8. After cleaning the whole panel, the machine will stop at the end of the cleaning path and need to be transported to other arrays manually.



Cleaning steps with bridge array:

1. The bridge is made of convenient installation aluminum plate.
2. Select the bridge mode in the APP.
3. Repeat the preceding steps for other operations.

The following steps should be taken when a running fault occurs:

1. If the path is abnormal, that is, the machine is faulty, and the machine will stop running.
2. Use remote control or mobile APP to control the machine to the safe position.
3. Check the fault status through APP. If necessary, contact the customer service department to eliminate the fault information.

Breakpoint cleaning step when the water tank needs to fill water:

1. When the water tank indicates that the water volume is too low, the machine status light will flash alternately in yellow and green, and it stops operation.
2. When the machine is in the process of going straight, use the remote controller to move it to a safe position.
3. Replace the water tank, and then use remote controller or mobile APP to move the

machine to the position of continuous cleaning.

4. Disconnect the remote control, and the machine will continue to work according to the track.

Breakpoint cleaning step when the battery needs to be replaced:

1. When the water tank indicates that the water volume is too low, the machine status light will flash alternately in yellow and green, and it stops operation.
2. When the machine is in the process of going straight, use the remote controller to move it to a safe position.
3. Replace the water tank, and then use remote controller or mobile APP to move the machine to the position of continuous cleaning.
4. Disconnect the remote control, and the machine will continue to work according to the track.

Note:

1. It is strictly prohibited to start the machine at any position of the array at will; the position of this instruction must be referred to.
2. If the machine is shut down, it is required to use remote control or APP to control the operation. It is strictly prohibited to pull it by human force.

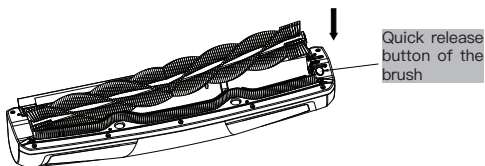
Product cleaning and maintenance

– Product cleaning

Cleaning and maintenance of the brush

Removal and installation of roller brush:

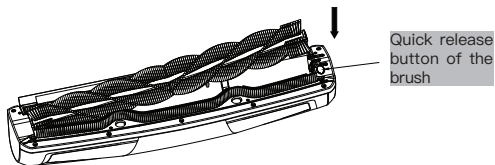
When the roller brush has been used for more than 1000 hours, it is recommended to replace the it. You can replace it yourself or contact the after-sales service.



Remove the roller brush:

1. Hold the roller brush with one hand and press the quick release button inwards to reach the limit position.
2. Move the roller brush (the side close to the quick release mechanism) outward, and the roller brush will move out of the cleaning nose.

Limit shaft Brush notch

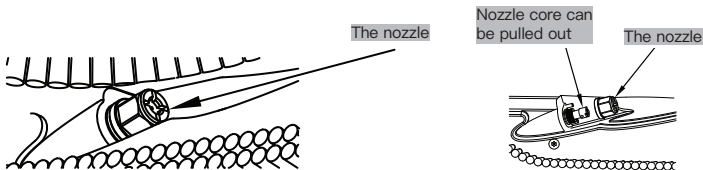


Install the roller brush:

1. Install the notch at one end of the roller brush to the limit shaft of the cleaning nose.
2. Press the quick release button of the roller brush inwards with one hand to push the movable side of the roller brush inwards.
3. Release the quick release button of the roller brush, fix the roller brush to the movable bearing. Rotate the roller brush manually to move freely, which indicates that the roller brush is installed OK.

Clean the nose nozzle

During the cleaning process, it is found that the cleaning effect is poor, please check whether the nose nozzle is blocked. If it is blocked, use a flat-head screwdriver to remove it, and then clean the nozzle and nozzle core.



Replace the track:

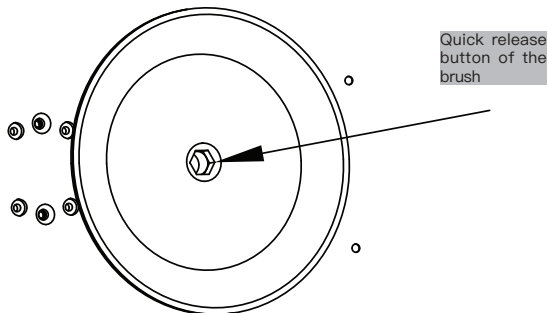
If the track has been used for more than 1000 hours, it is recommended to replace it. Please contact the after-sales service.

Replace the central sucker:

When the central sucker has been used for more than 1000 hours, it is recommended to replace the it. You can replace it yourself or contact the after-sales service.

Remove and install the central:

Put the equipment upright, insert the M12 external hexagon wrench into the fixed hole of the central sucker, and rotate it anticlockwise. Loosen the fixing nut and remove the central sucker. After replacing the sucker, reverse the operation and fasten the sucker.



Product cleaning and maintenance

– Common faults and solutions

| The Faults | Probable Causes | Solutions |
|----------------------------------|--|---|
| The machine does not work | 1. Low battery | Charge in time |
| | 2. Power switch is not pressed | Press and hold the power switch |
| | 3. The fuse is blown | Stop using and contract after-sale service |
| Machine self –check failed | 1. The machine is in improper placement. | 1. Put it on the photovoltaic panel and restart |
| | 2. The machine is subject to external interference | 2.Restart or Stop using and contract after-sale service |
| Edge patrol time is too long | The machine has a little slip | Add a little water to wet the wheels |
| WIFI is disconnected | WIFI connection signal is weak | The distance between mobile phone and machine should be within 6 meters |
| The scraper is not raised | Scraper motor is failed | Stop using and contract after-sale service |
| Fan does not work | Debris or moisture enters the fan | Replace the adsorption component |
| The machine does not turn | The central sucker is leaking | Replace the adsorption component |
| The machine does not spray water | Nozzle is blocked | Clean the nozzle |
| Remote control doesn't work | 1. Low battery | 1. Charge or replace the battery |
| | 2. The remote controller is crashed | 2. Replace the battery and restart the machine |

– Description of hazardous substance elements of the product

| Component name | Hazardous Substance | | | | | |
|-----------------------------|---------------------|---------|---------|---------------------|--------------------------|-------------------------------|
| | Lead | Mercury | Cadmium | hexavalent chromium | Polybrominated biphenyls | Polybrominated diphenyl ether |
| Plastics | O | O | O | O | O | O |
| Motor | X | O | O | O | O | O |
| Circuit board and component | O | O | O | O | O | O |
| Adapter | O | O | O | O | O | O |
| Metal parts | O | O | O | O | O | O |
| Battery | O | O | O | O | O | O |
| Others | O | O | O | O | O | O |

This form is prepared in accordance with SJ/T11364.

O: Indicates that the content of the hazardous substance in the component is below the limit specified in 201165/EU (RoHS) and EU Directive of its annex I amendment 2015/863/, and test reference EN 62321-1:2013, EN 62321-2:2014, EN 2321-3-1:2014, EN 62321-4:2014a12017, EN 2321-5:2014, EN 62321-6:2015, EN 2321-7-1:15 15, EN 2321-7-2:17 7 and EN 2321-8:2017.

x: Indicates that the content of the hazardous substance in the component at least one material exceeds the limit specified in 201165/EU (RoHS) and EU Directive of its annex I amendment 2015/863/, and test reference EN 62321-1:2013, EN 62321-2:2014, EN 2321-3-1:2014, EN 62321-4:2014a12017, EN 2321-5:2014, EN 62321-6:2015, EN 2321-7-1:15 15, EN 2321-7-2:17 7 and EN 2321-8:2017.

(This product meets the ROHS environmental protection requirements, and the harmful substances contained in some components cannot be replaced under the current international technical standards. The environmental protection service life of the product refers to the safe life that the harmful substances or elements contained in the product will not leak under normal use conditions.)

(This table indicates the presence of these hazardous substances in our products, not all the products contained in the above parts.

NOTICES:

- This product contains lithium batteries. When this product is discarded, do not decompose the batteries and or put them together with ordinary household garbage to avoid environmental pollution. Please give it to the designated recycle station or professional staff for disposal.
- Do not disassemble the machine. If the nameplate is artificially damaged, the machine will not be guaranteed. If the machine is defective, contact the manufacturer.



Environmental protection is only restricted to EU countries.

Li-ion

Do not put any electric equipment into household garbage.

In order to comply with the European Directive 2012/19/EU on old electrical and electronic equipment and its implementation in their laws, used electric equipment must be separated from other wastes and disposed of in an environmentally friendly manner, such as being sent to a recycling station.

An alternative to recycling : As an alternative to returning the equipment to the manufacturer, the owner of the electrical equipment must ensure that the equipment is properly disposed of.

If he no longer wants to keep the equipment, the used equipment can be returned to the appropriate collection point and disposed of according to the national recycling and waste disposal regulations. This does not apply to any accessories or auxiliary equipment without electrical components in the used equipment.