

GS-Ecobot Scrubber

50

USER MANUAL



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INTRODUCTION

The Cleaning Robot Scrubber 50 by Gausium (alias "Gaussian Robotics"), Singapore, is a fully autonomous cleaning robot that can automatically charge, dispense, and refill all by itself.

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1. GENERAL

1.1. Product Overview

Scrubber 50 Pro is an AI-powered floor-cleaning robot that goes beyond the scope of “automation”. Deep-learning algorithms are integrated within a sensor fusion of 2D LiDAR, 3D, and RGB cameras, which grant the robot high-accuracy environmental perception and the ability to make advanced operation decisions according to the real-time situation.



NOTE:

- Additional requirements shall be specified in the Appendixes to this document which form an integral part thereof.

1.2. Product Introduction

Scrubber 50 Pro is an AI-powered floor-cleaning robot that goes beyond the scope of “automation”. Deep-learning algorithms are integrated within a sensor fusion of 2D LiDAR, 3D, and RGB cameras, which grant the robot high-accuracy environmental perception and the ability to make advanced operation decisions according to the real-time situation.



Minimal Human Intervention

Scrubber 50 cleans on schedule, requiring no human intervention in its cleaning operations.

Fleet Management System

Operators can monitor the Scrubber 50’s performance and access cleaning reports through a user-friendly and interactive dashboard.

Zone Cleaning

Scrubber 50 can be deployed into pre-selected areas for zone cleaning. Lift integration is an option that allows the robot to clean multiple levels of a building autonomously.

Integrated Working Station

Automatically docks itself, charges the batteries, empties, and rinses the dirty water tank. It also automatically refills the clean water tank so that it is ready for its next cleaning task.

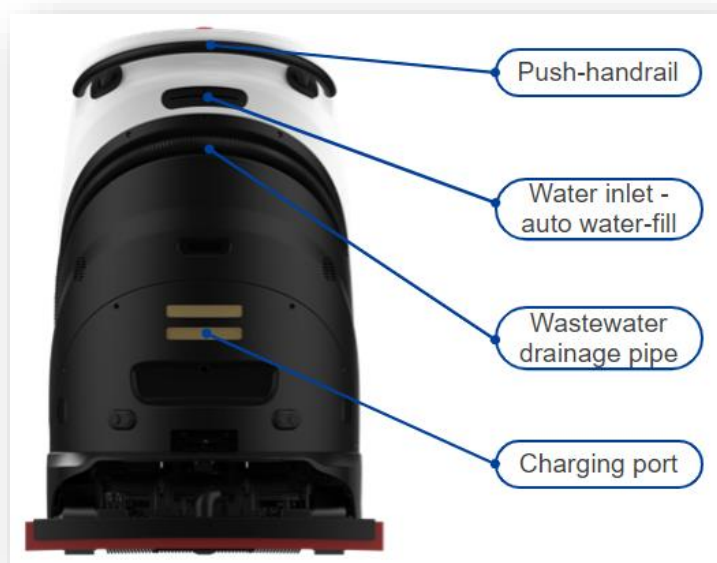
1.3. Component Checklist



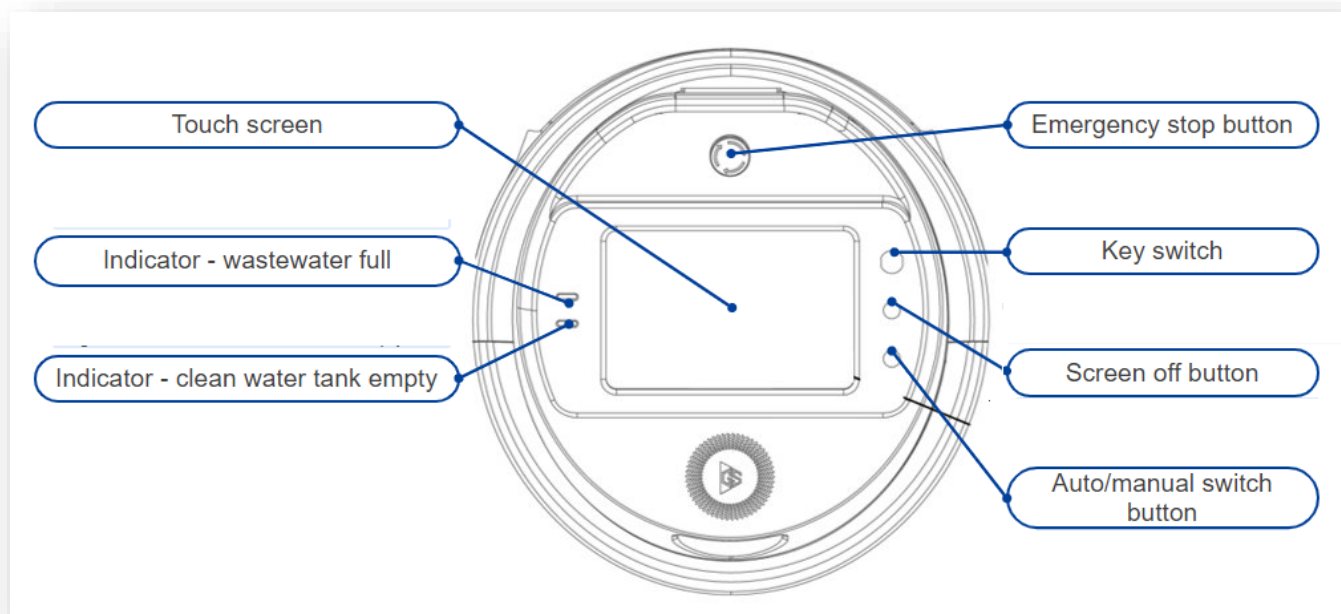
Name	Description
Front Cameras	Obstacle avoidance and obtaining real-time colored pictures.
Tile Camera	Obstacle avoidance and obtaining real-time colored pictures.
Horizontal Camera	Obstacle avoidance and obtaining real-time colored pictures.
Bumper	Buffer from a crash, avoiding secondary damage.



Name	Description
Ultrasonic Radar	Detect obstacles in the back and avoid them.
Manual Charging Port	For manual charging the robot.



Name	Description
Push-handrail	Push the robot to move
Water inlet - auto water-fill	Fill the water tank with clean water.
Wastewater drainage pipe	Drain wastewater
Charging port	Contact with workstation for auto charging



Name	Description
Touch screen	Robot operation and configuration。
Indicator - wastewater tank full	Light ON when the wastewater tank is full.
Indicator - clean water tank empty	Light ON when the clean water tank is empty.
Emergency STOP button	To stop the robot immediately after pressing it.
Key switch	Turn the robot ON/OFF.
Screen OFF button	Press the button to turn the display OFF.
Auto/manual switch button	Long press it for 3 seconds to do the mode switch.

1.4. Technical Specification

Parameter Type	Parameter	Value
ROBOTICS	Navigation Technology	Integrated Lidar-Visual SLAM
	3D LIDAR	No
	Primary Laser detection distance	25 m
	Laser scanning angle	270°
	Secondary Laser detection distance (level)	No
	Secondary Laser detection distance (inclined)	No
	Depth Cameras	3* Real sense camera
	Ultrasonic Sensors	Yes
	Anti-drop Sensor	by using an inclined laser
	Collision sensor	Yes
	Mapping Process	Easy onsite mapping (off-line, on-screen)
	Mapping Efficiency (e.g., 3,000 sqm)	1 hour
	Map Editing	On-site, Off-line, On-Screen
	Single map coverage	Max. 30,000 m ²
	Dynamic Map updating	Yes, a maximum of 30%
	Minimum distance close to the wall	7-10 cm
	Ability to detect thin poles and hanging obstacles	Able
	Dynamic path planning	Yes
	Obstacle avoidance strategy	Slow down-stop-wait-bypass-replan path
	Start the task anywhere on the map	Yes
	Continue the previous task after interrupting/switching to manual mode	Continue from where it stopped
	Ability to work in complicated and dynamic scenes	Able
	Can detect obstacles higher than N cm	10 cm
SOFTWARE & DIGITAL	Cloud Platform to check the statistics and monitor	Yes
	Task Reports and Alerts	Auto-generated and comprehensive email
	Mobile App	Yes
	Account with different access levels	Yes
	Scheduling function	Yes
	OTA	Yes
	Ability to work offline	Yes

CLEANING PERFORMANCE	Manual mode	Yes, Push behind
	Adjustable cleaning mode	Yes
	Working width	50 cm
	Water absorption width	72 cm
	Disc Brush RPM	270
	Cleaning down-pressure	12,5/15 kg
	Number of main brushes	2 pcs
	Optional Rolling brush	Yes
	Clean Water Tank Capacity	24 l
	Recovery Tank Capacity	18 l
	Filtration function	4-stage filtration system
	Cleaning speed	1.1 m/s
	Charging time	1-2 hours
	Is employed Operation time	2.5 hours
	Cleaning efficiency	800-1200m ² /h
	Max. cleaning area/Charge	2,000 m ²
KEY COMPONENTS AND OTHERS	Battery capacity	24V / 40Ah Li-ion
	The weight of the body (including the battery)	150 kg
	Warning lights	Yes
	Dimensions (mm)	860 (L) X 700 (W) X 1030 (H)

1.5. Structural Parameters

Parameter	Value	Remarks
Length	0.86 m	
Width	0.70 m	
Height	1.03 m	
GVW	Disc brush: 150kg Roller brush: 140kg	It indicates the weight of the scrubber in a no-load state, that is, the state in which both the freshwater tank and the recovery tank are empty. The weight includes the battery weight.
Transportation Weight	Disc brush: 150kg Roller brush: 140kg	
Battery weight	15 kg	
Water tank capacity	42 L	Recovery Tank: 18L Clean Water Tank: 24L
Vibration	ah \leq 2.5 m/s ²	
Noise	LpA \leq 70dB(A)	

LwA ≤82dB(A)

1.5.1. Electrical Parameters

Parameter	Value
Battery type	Lithium-ion battery
Maximum operating time	<ul style="list-style-type: none"> ➤ Floor washing mode: 2h ➤ Dust pushing mode: 6h ➤ Standby mode: 16h (Equipped with Charging Dock to realize unlimited endurance.)
Maximum power	1200W
Rated voltage	24 V
Rated power of drive motor	300 W
Rated power of brush motor	2 X 150 W
The rotational speed of the roller brush	Up to 270 RPM
The rotational speed of the disk brush	Up to 1000 RPM
Rated power of pumping motor	280 W
Maximum pumping pressure	18 kPa

	Frequency band	Maximum output power
2.4G Wi-Fi	2400-2483.5MHz	EIRP=18.01dBm
433MHz	433.03-434.79MHz	EIRP=9.35dBm
4G	LTE Band 1/3/7/8/20/28/40	EIRP=32.5dBm

Charging Dock	Value
Input: <ul style="list-style-type: none"> ➤ 100-240V~ ➤ 50-60Hz ➤ 8.1A 	Output: <ul style="list-style-type: none"> ➤ 23A
Battery Charge	IC0650-024
Input: <ul style="list-style-type: none"> ➤ 100-240V~ ➤ 50-60Hz ➤ 720W 	Output: <ul style="list-style-type: none"> ➤ 24V ➤ 27, 1A ➤ 650 W

1.5.2. Cleaning Parameters

Parameter	Value
Cleaning width	460mm (Roller brush)

	500mm(Disc brush)
Cleaning efficiency	Up to 1656 m ² /h
Safety system	<ul style="list-style-type: none"> ➤ Laser radar*1 ➤ depth camera*3 ➤ ultrasonic sensor*6 ➤ fender wheel ➤ anti-collision sensor ➤ foot guard sensor
Traveling speed	0-1 m/s

1.5.3. Atomization Disinfection Parameters

Parameter	Value
Quantity of Atomization Cartridge	8 PCS
Min. Atomization Rate	1.5L/h
Max. Atomization Rate	1.8L/h
Battery Life	6h-Disinfection Mode 3h-Scrub & Disinfection Mode
Atomization Particles	1~5μm
Atomization Distance	1m
Atomizer Gasket Life Span	≥5000h
Recommended Disinfectant	Hypochlorous Acid
Requirement of Water Quality	Purified Water/Distilled Water
Disinfectant PH Value	4~12
Water Tank Capacity	5L (Water Added Shall Not Exceed 3L)

1.5.4. Other Specifications

Parameter	Value
Operating Temperature	0°C ~ +45°C
Operating Humidity	20% ~ 75% RH
Storage Temperature	-20°C ~ +45°C (Note: if it is necessary to store at a low temperature (lower than 0°C), the water tank and all water pipes shall be drained to ensure the storage without water.)
Storage Humidity	20% ~ 93% RH
Operation Noise	55 ~ 70 dB(a)
Operating Slope	Less than 8 degrees (Note: The scrubber is not recommended to climb a slope under the automatic mode. It can climb a slope ≤8 degrees when it is pushed manually.)

2. SAFETY INSTRUCTIONS

For safety reasons, please operate Scrubber 50 (Sprayer) as per the following provisions:

1. Do not operate the scrubber:

- ✓ until you have received formal training or authorization
- ✓ until have carefully read and fully understand the user manual
- ✓ if you are drunk or unconscious under the influence of drugs
- ✓ if you are not physically and mentally able to operate the scrubber according to the user manual
- ✓ if no filter is installed or the filter is blocked
- ✓ if the scrubber is under conditions not suitable for work, such as charging, filling, or draining the water tanks
- ✓ if the accessories or consumables installed are not authorized by AROS as risks may arise if unauthorized consumables or accessories are installed
- ✓ if the environment in which the scrubber is placed is not suitable for operation. For example, the material of the ground does not meet the requirements, the state of the ground does not meet the cleaning standards, or objects may fall from a high altitude.
- ✓ This machine is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge.
- ✓ Children should be supervised to ensure that they do not play with the appliance. Cleaning and user maintenance shall not be done by children without supervision.
- ✓ Do not use this machine at altitudes exceeding 2 000 m.

2. Before starting up the scrubber, make sure:

- ✓ the scrubber has been charged
- ✓ all parts of the scrubber are kept in good conditions
- ✓ the water tank level meets the requirements
- ✓ the emergency stop button is released
- ✓ there is no abnormal warning.

3. In the process of manual operation:

- ✓ raise the brush and squeegee blade of the scrubber
- ✓ when adding water, please pay attention not to exceed the floating ball on the top of the water tank to prevent the robot from entering the water and causing failure
- ✓ when moving the machine manually, pay attention to the remainder of the full sewage. When prompted, please stop cleaning, and discharge the sewage
- ✓ move and operate the scrubber in strict accordance with the user manual
- ✓ press the red emergency stop button to stop the scrubber in case of emergency
- ✓ on a slope (≤ 8 degrees), at least two people are required to move the machine in cooperation to avoid danger

- ✓ operate the scrubber at a slower speed if the ground is slippery
- ✓ check the rear of the machine is safe when moving the scrubber backward
- ✓ report for repair in time when the scrubber is faulty.

4. When the cleaning task is finished:

- ✓ cut off the power completely unless it is charging
- ✓ drain the recovery tank and clean the filters effectively
- ✓ clean the water tanks regularly
- ✓ park the machine at the designated location, the parking area must be flat ground.

5. When maintaining the scrubber, please make sure the power is cut off:

- ✓ use accessories and consumables specified by the manufacturer for replacement
- ✓ do not disassemble the scrubber without permission. If it needs maintenance, please contact professional maintenance personnel designated by the manufacturer
- ✓ do not change the original design or configuration of the scrubber without authorization.

6. Manual duty during robot operation:

- ✓ when the robot performs cleaning tasks, the operator does not need to accompany or follow the robot all the time. However, some designated staff should be ready to receive any warning messages from the robot to deal with some potential problems. It is required that this role should be trained through AROS so that the staff in this role can know how to deal with any potential problems.



WARNING:

- The machine must be disconnected from its power source during cleaning or maintenance and when replacing parts or converting the machine to another function.

2.1. Description of Non-applicable Scenarios

Scrubber 50 (Sprayer) is only suitable for working in standard-compliant scenarios. To maximize the efficiency of the Scrubber 50 (Sprayer) and ensure it is functioning well, please do not use the product on non-applicable grounds, such as on soil surfaces, grassland, artificial turf, and carpeted floors. Also, do not use the product in scenes with poor ground conditions, such as uneven floors, floors with holes, leaves, paper scraps, and others. Please clean the floor first and then the Scrubber 50 (Sprayer) can be used to start cleaning.

The sensors of Scrubber 50 (Sprayer) will not function properly if the floor is surrounded by glass walls or other high-transparency materials. Therefore, we do not recommend Scrubber 50 (Sprayer) to be used in the above environments to avoid unnecessary dangers.

If the floor is on a slope with an angle greater than 8 degrees, please do not use the scrubber. Scrubber 50 (Sprayer) can only automatically work on flat floors.

If you are not sure whether the scrubber can be used in your scenario, please contact AROS Technical Support for more information.



WARNING:

- Do not use for cleaning purposes on surfaces having a gradient exceeding that marked on the machine.

To satisfy RF exposure requirements, a separation distance of 20cm or more should be maintained between this device and persons during device operation.

2.2. Usage Precautions

- ✓ Do not pour liquid into the battery connector; otherwise, it will cause a short circuit.
- ✓ If there is a place or object less than 10cm from the ground in the working environment of the robot, please remove or draw a virtual wall to isolate it.
- ✓ It is recommended that after a single continuous use of the machine for 3 hours, let the machine stop moving and get enough rest to ensure the best work effect. Long-term use will affect the overall life of the machine.
- ✓ The scrubber is not waterproof, so it is prohibited to directly splash water on the machine or wash the machine.
- ✓ Please charge the scrubber in time after the cleaning task is finished.
- ✓ The cleaning effect of warm water is better. If warm water is used for cleaning, please note that the water temperature should not be higher than 70 °C, otherwise, it will cause irreversible damage to the filter element.
- ✓ Machines left unattended shall be secured against unintentional movement.



WARNING:

- Always ensure that the safety support is installed before working beneath the hopper.
- Operators shall be adequately instructed on the use of these machines.



CAUTION:

- This machine is for indoor use only.
- This machine shall be stored indoors only.

2.3. Machine Transport

If you need to transport the scrubber to other places, please pay attention to the following:

1. Ensure that the scrubber is powered off.
2. To reduce weight and avoid spilling or leakage during transport, please be sure to empty the water tanks before transporting the scrubber.
3. Before packing, please wrap the important sensors, such as the LiDAR sensor and camera, and the cover of Scrubber 50 (Sprayer) with a sponge, to avoid scratches and bruises that may affect their functions.
4. If the scrubber is to be transported by vehicle, please pack and protect the scrubber with the packing strap, carton, wooden pallet, sponge, etc. to avoid unnecessary damage that may happen during transportation. Place a wooden board between the front and rear wheels to avoid damage caused by excessive inertia during transport. When fixing the scrubber with packing straps, do not directly touch the surface of the scrubber to avoid rubbing off the paint and affecting the appearance. Angle boards or other soft materials can be used to protect the product.
5. When loading and unloading the robot, please do not move the machine lying flat.

2.4. Machine Storage

After each use of the scrubber, please empty the water tanks of the scrubber in time and park the scrubber in a dry and ventilated place with a proper temperature and humidity. Do not store the scrubber in a humid and unventilated place to avoid its service life from being affected.

When you do not use the scrubber for a long time, in addition to meeting the above requirements, please fully charge the battery and unplug the power supply plug. After that, be sure to charge it every 1 month to ensure sufficient power to avoid long-term non-use of the battery. If the machine is used without unpacking (and the air switch is turned off), it must be fully charged once every 3 months.

2.5. Anti-freezing Protection

If the scrubber is used in areas or seasons in which frost may occur, the scrubber shall be protected from being damaged.

When the scrubber is not working, the water tanks must be emptied in time, to avoid freezing or cracking of the water pipe. The scrubber shall be stored in a dry and warm place.

2.6. Maintenance Precautions

It is prohibited to dismantle the scrubber without authorization. Once found, users will no longer have the services in the warranty policy.

If the scrubber cannot work properly and the problem cannot be solved by routine troubleshooting, please contact local distributors or Gaussian Robotics' technical support team in time for warranty issues.

2.7. Safety Tips

The following figure shows the scrubber components that need to be noticed and the corresponding safety tips. Please fully understand the following matters before use.

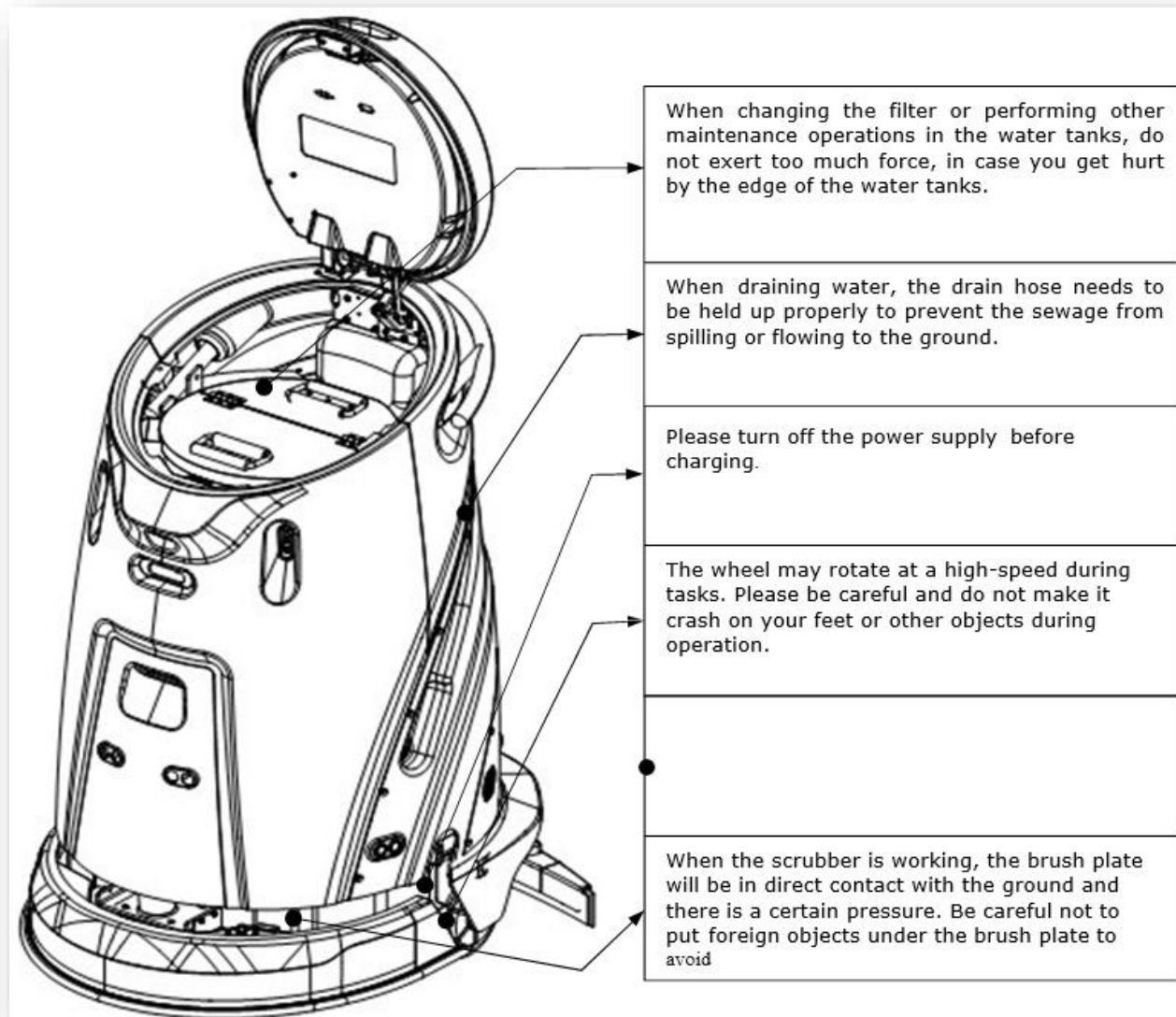








Figure: Safety Tips for Scrubber 50 (Sprayer)

2.8. Safety Signs

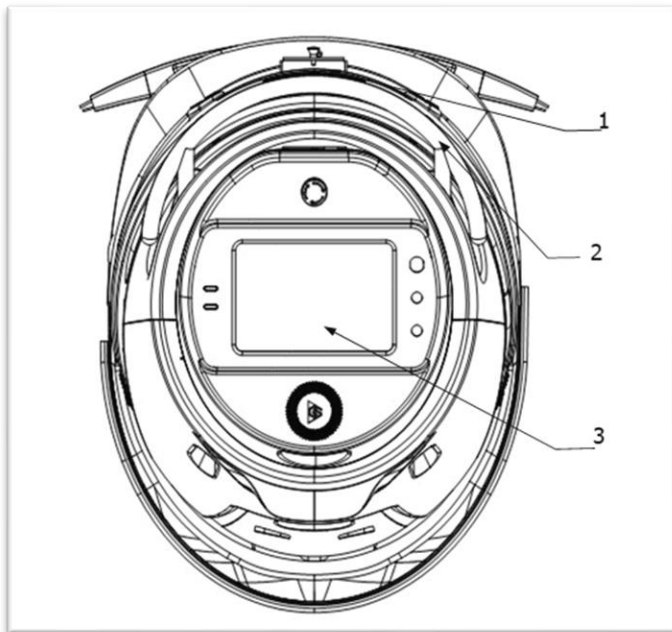
The table below displays the safety signs of Vacuum 50. Please refer to it and comply with safety specifications to avoid dangers. If the robot vacuum is not operated according to the warning, you shall bear the losses and risks brought to your company or individual.

Safety Sign	Description
 WATCH YOUR HAND	Watch your hand: Do not put your hand in the place where the sign is attached to avoid dangers.
 WARNING AUTOMATIC START-UP	The robot is automatic and intelligent. Please stay away from it before it automatically starts to work.
 NO PUSHING	Pushing the robot manually is prohibited. It is only allowed to move the robot manually during task operation.
 WARNING NO STEPPING ON SURFACE	It is prohibited to step on any part or surface of the robot to avoid dangers.
 WARNING PLEASE PARK THE MACHINE AT FLAT PLACE AFTER POWER OFF	This robot must be stored on flat ground.
 8 %	The max climbing angle is 8 degrees.

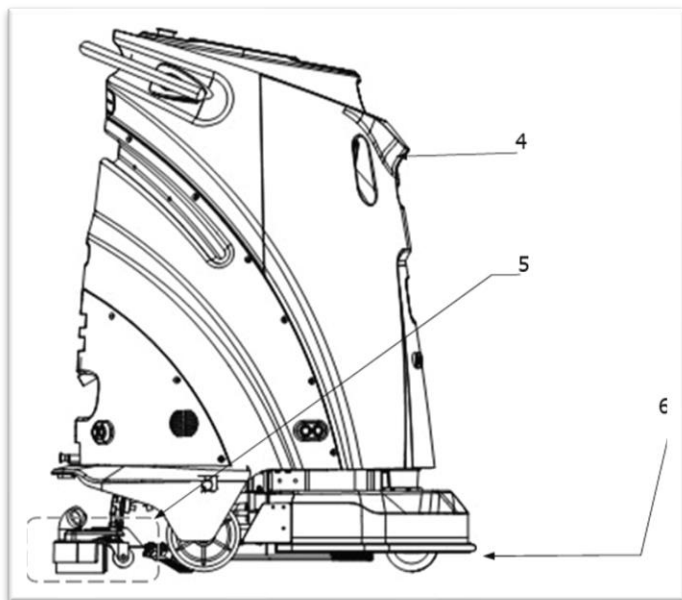
3. STRUCTURE DESCRIPTION

3.1. External View of Scrubber 50 (Sprayer)

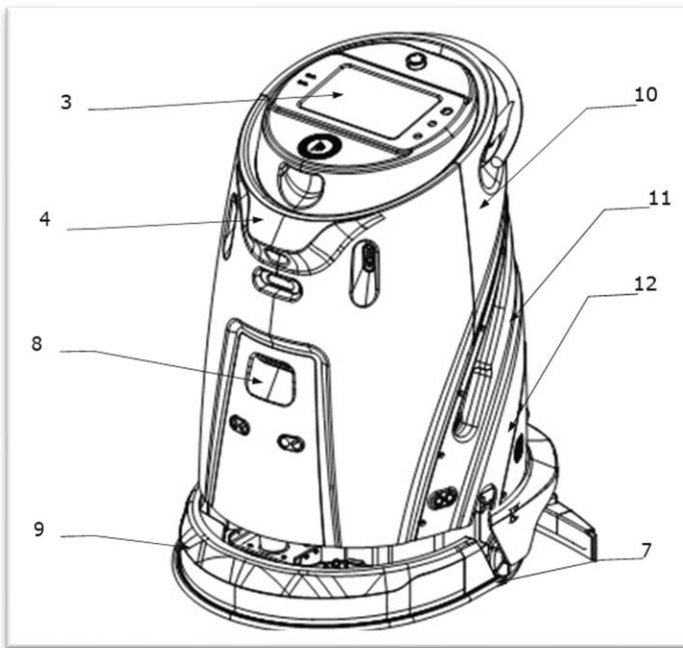
Vertical View



Side View

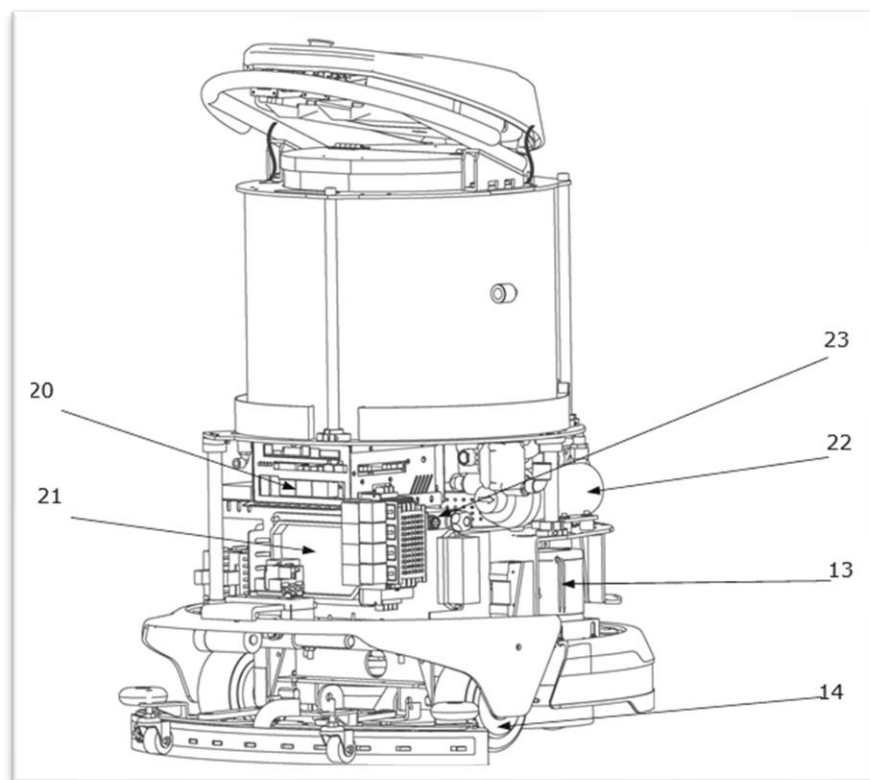
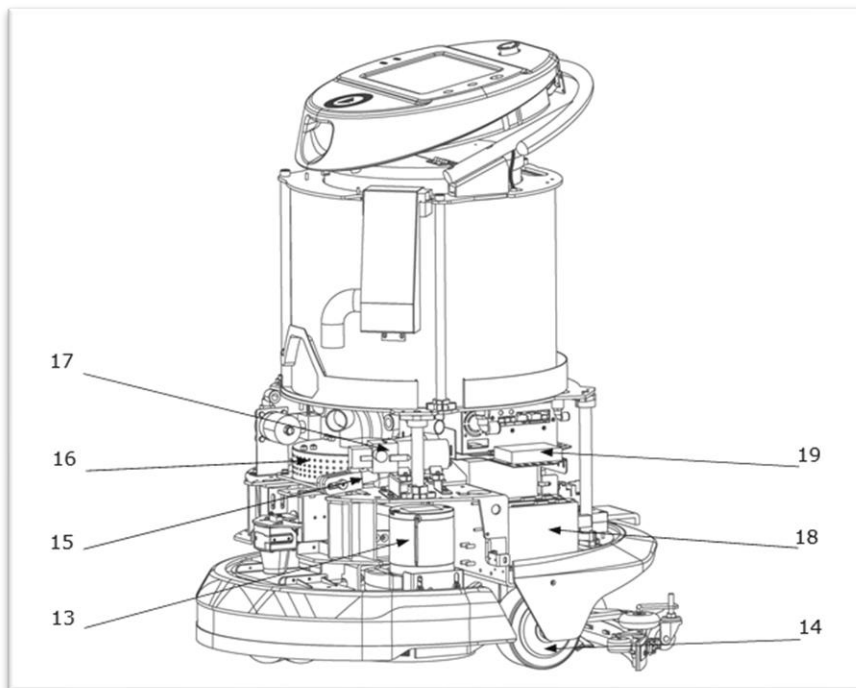


Axonometric View



No.	Name	Remarks
1	Pedal	Standard
2	Handle	Standard
3	Tablet	Standard
4	Front cover	Standard
5	Squeegee Mount	Standard
6	Brush	Standard
7	Back Wheel	Standard
8	Front Door	Standard
9	Front Bumper	Standard
10	Upper Back Cover	Standard
11	Back Cover	Standard
12	Lower Back Cover	Standard

3.2. Structure of Electrical System | Power & Battery



No.	Name	Remarks
13	Brush Motor	Standard
14	Hub Motor	Standard

15	Actuator Motor	Standard
16	Vacuum Motor	Standard
17	Water-Spray Motor	Standard
18	Servo Driver	Standard
19	Ultrasonic Module	Standard
20	Control Box	Standard
21	Motor Controller	Standard
22	Filtration Motor	Standard
23	Battery	Standard

1. The control box processes all data efficiently and records all running logs.
2. The driver accurately controls the information transmission and feedback of each motor and the control box during the operation.
3. Intelligent scrubbers can automatically finish all cleaning tasks through the control of the electrical system, which can improve efficiency and ensure the quality of cleaning at the same time.

3.2.1. Charging Socket

The charging socket is placed in the lower right-side shell.

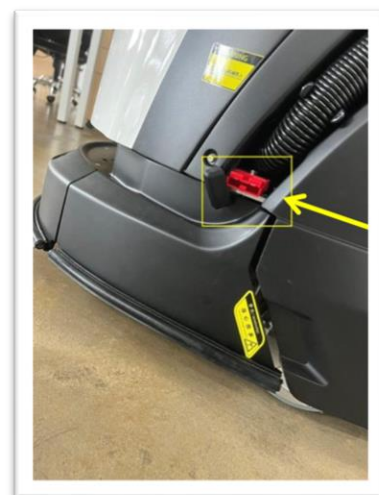
Purpose:

The charging socket is employed for manual charging (no matter whether the robot is ON or OFF).

3.2.2. Main Power Air Switch

Check if the air switch is turned ON:

- Switch placed vertically: switch towards up means ON.
- Switch placed horizontally: switch towards left means OFF.





3.2.3. Battery

Position:

- Remove the left lower shell to get access to the battery.

Purpose:

- Main power supply to the whole machine.

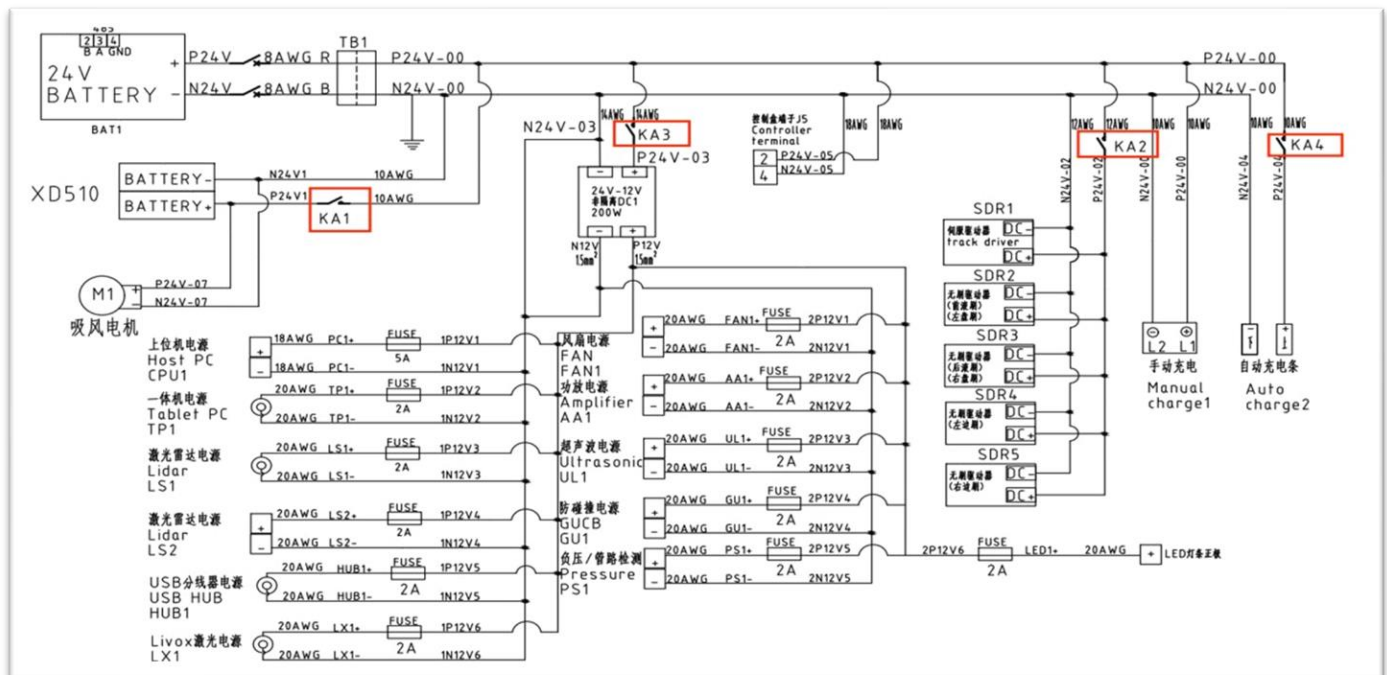
Output Voltage:

- 24V



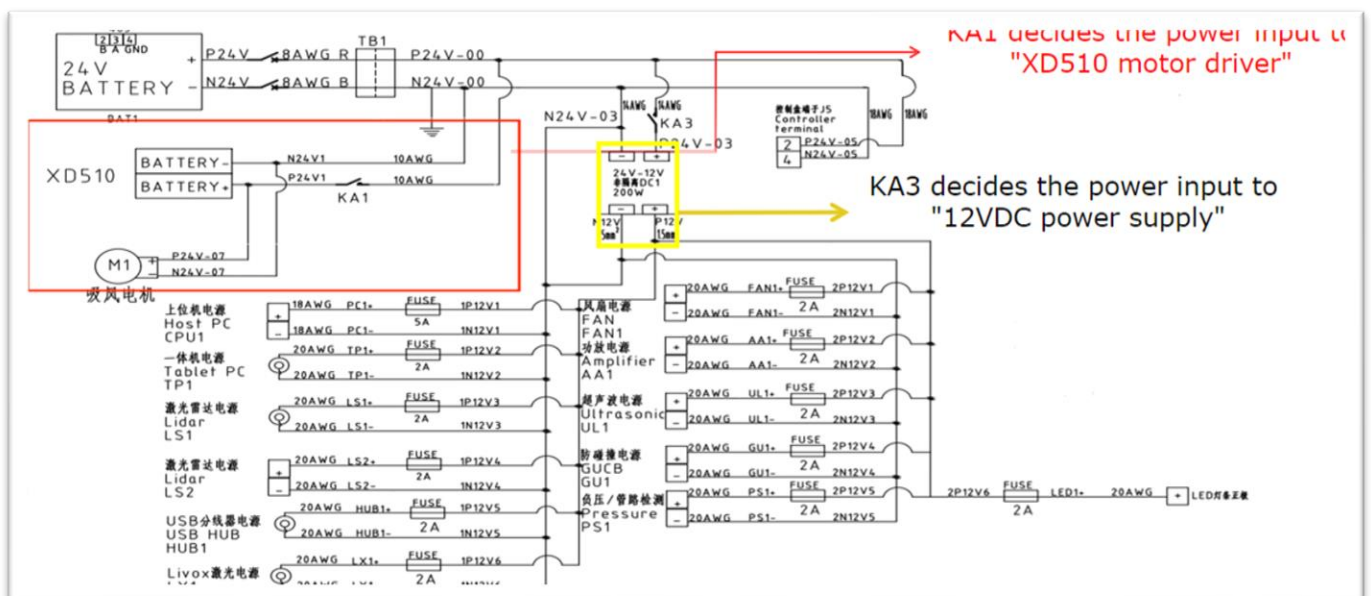
3.2.4. Main Power Distribution

The main 24VDC power is distributed to 4 respective circuits through 4 KA relays.



NOTE:

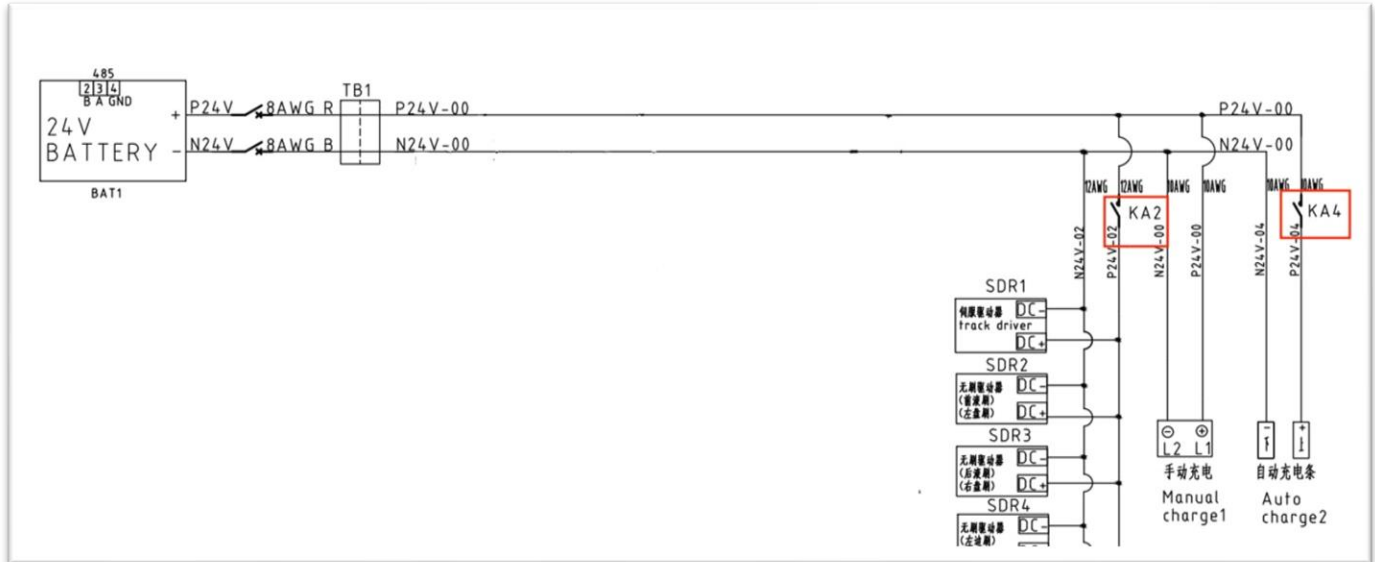
- KA1 decides the power supply to the "XDS10 motor driver".
- KA3 decides the power supply to "12VDC power supply".



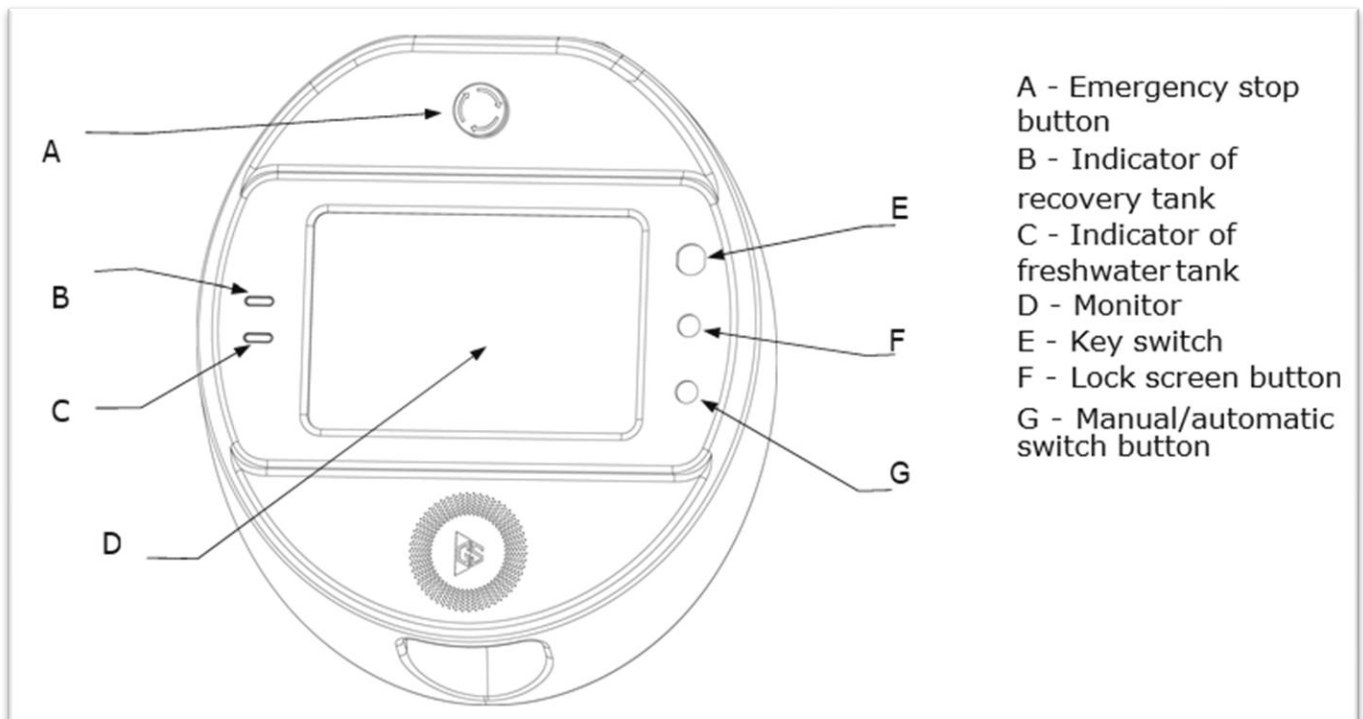


NOTE:

1. Relay - KA2 decides the power supply to motor drivers, side brush & disk brush.
2. Relay - KA4 is employed for auto-charging. It will be activated when starting auto-charging.



3.3. Structure of Control System



3.3.1. Monitor

The main area of the Scrubber 50 (Sprayer) operation panel is a touch display screen that automatically loads the GS User App after the scrubber is started. Through this application, you can select cleaning tasks for the scrubber to execute and perform a series of advanced settings and deployments for the scrubber.

3.3.2. Key Switch

The start-up keyhole of Scrubber 50 (Sprayer) is located in the upper right corner of the scrubber control panel. The operator can insert the start-up key into the keyhole, switch the key from Off to On, wait about 30 seconds for the scrubber to start, and then conduct cleaning operations.

When the scrubber is to be stored in the storeroom after completing its cleaning tasks, please switch the start-up key from On to Off to shut it down. Do not move the scrubber until it is completely shut down. Then the operator can pull out the key and store it.

3.3.3. Manual/Auto Switch Button

The manual and auto switch button of Scrubber 50 (Sprayer) is located at the lower right of the scrubber control panel. This button is used to switch between the two modes of controlling the scrubber to cope with different usage scenarios. The automatic mode is turned on by default after the scrubber is turned on. If you need to turn off the automatic mode, you need to log in to the APP and then press and hold the button for 3 seconds. When the button light ring goes out, the automatic mode is off, and the scrubber switches to manual mode.

For non-cleaning tasks, such as moving the scrubber from the storeroom to the area to be cleaned or moving the scrubber back from the cleaned area to the storeroom, cleaners can manually push the scrubber to its destination in manual mode; for cleaning tasks, the operator can switch the scrubber to the auto mode, then select the cleaning task in the control panel and execute it.



NOTE:

- When manual mode is activated, the scrubber does not have an automatic obstacle avoidance function, so the movement control of the scrubber depends on the operator's observation and control. At this time, the operator shall pay attention to the conditions of the surrounding environment and respond in case of an emergency.

3.3.4. Emergency Stop Button

The emergency stop button is easy to use. Simply press the button to stop the scrubber and the light ring of the cover changes from blue to red. At this time, the scrubber cannot be pushed artificially, and no other operations can be performed. If necessary To resume the operation of the scrubber before pressing the emergency stop button or perform other operations on the scrubber, please turn the emergency stop button clockwise and release it. After the scrubber is restored, you can continue to run or work.

**NOTE:**

- Do not press the emergency stop button randomly but only in case of emergencies. The emergency stop button works normally both in manual and auto modes. In addition, since the robot does not support the operation on the sloping ground, operators are not advised to perform emergency stop operations on slopes, to achieve the expected emergency braking effect and avoid unnecessary personal and property losses.

3.3.5. Water Level Indicator of Recovery Tank

The full-tank indicator of the recovery tank of Scrubber 50 (Sprayer) is located on the upper left of the scrubber control panel. When the indicator blinks red, it indicates that the recovery tank is full, and the scrubber is unable to continue cleaning work at this time. It is necessary to manually control the scrubber to discharge sewage at designated places before moving to the next operation.

3.3.6. Water Level Indicator of Fresh Water Tank

The water level indicator of the freshwater tank of Scrubber 50 (Sprayer) is located on the lower left of the scrubber control panel. When the indicator blinks red, it indicates that there is no clean water in the freshwater tank. At this time, the scrubber cannot continue cleaning work. It is necessary to add clean water at the designated place before proceeding with the next step.

3.3.7. Screen Lock Button

The screen lock button is located on the middle right of the Scrubber 50 (Sprayer) panel. The operator can turn the screen on or off with the switch. Turning the screen on makes it convenient for operators to control the scrubber or complete cleaning tasks by using the tablet mobile application through the tablet mobile application and turning off the screen. It can save power, on the other hand, it can prevent the operator from accidentally touching the screen and causing maloperation.

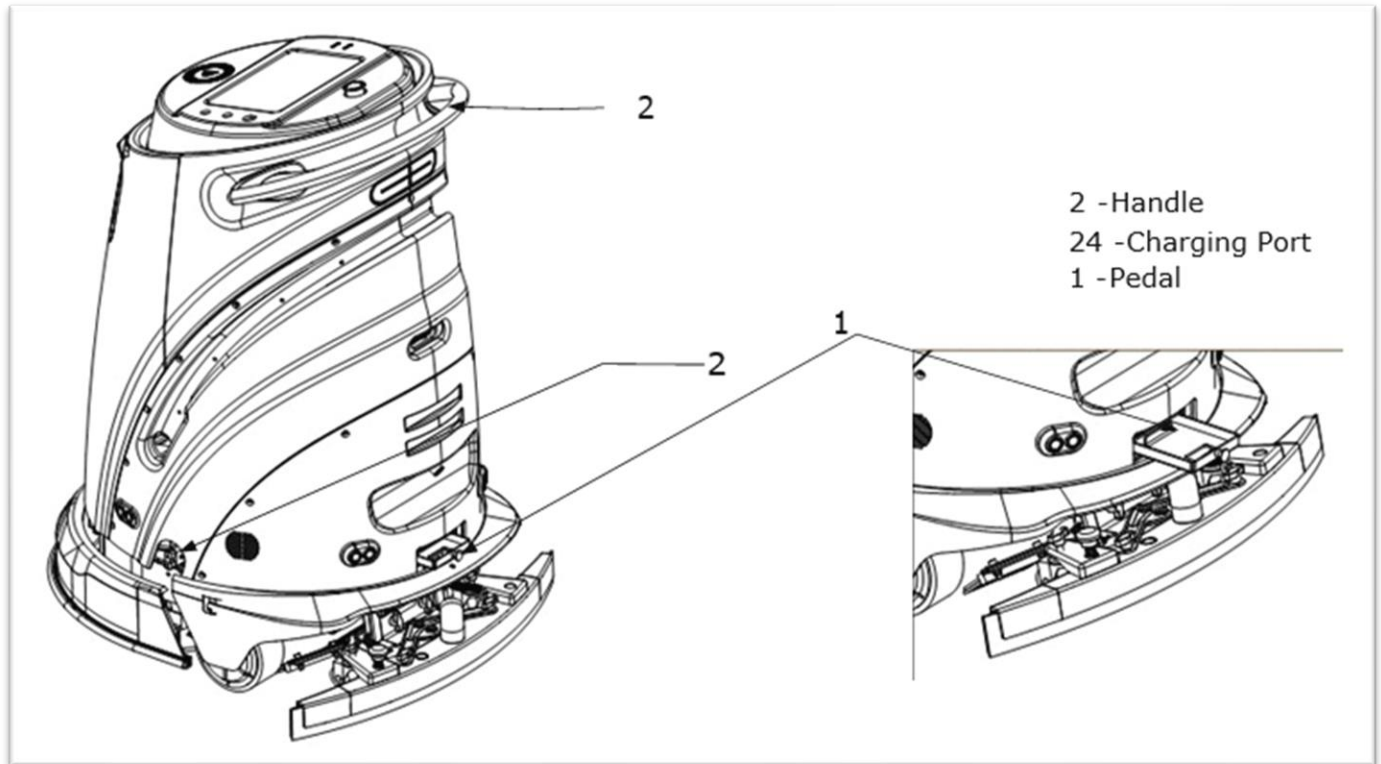


Figure: Pedal and Handle of Scrubber 50 (Sprayer)

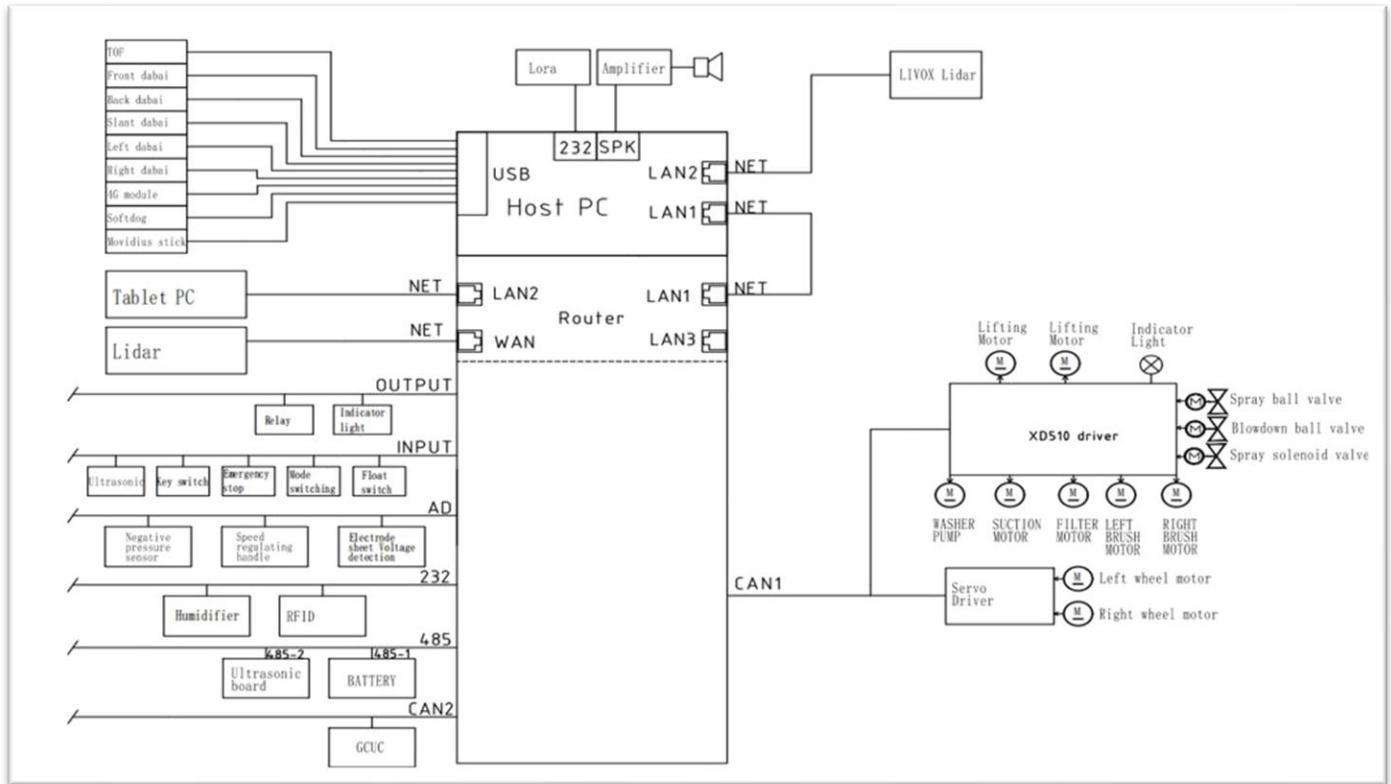
3.3.8. Pedal

The pedal is located at the lower rear of the scrubber, as shown in the Figure above. It is generally used in manual mode when the operator pushes the scrubber through uneven ground. And it should be retracted when it is not used. When using the pedal, please pull the pedal out manually. Then hold the handle tightly with both hands, step on the pedal with one foot, gently lean back about 10 degrees, control the scrubber to slowly cross the obstacles, and then loosen the pedal slowly. If there is more than 80% water in the tank, please do not execute this operation, which may cause water to overflow, leading to further dangers.

3.3.9. Charging Port

The charging port is located on the lower right-hand side of the scrubber, as shown in the Figure above. When charging the scrubber, please turn off the scrubber through the key switch, and charge it following the steps: plug in the DC output plug of the charger → plug in the AC input plug of the charger.

3.3.10. Topological Graph



3.3.11. Overall Control Module | Tablet

Position:

- The Tablet is located in the center of the top lid.

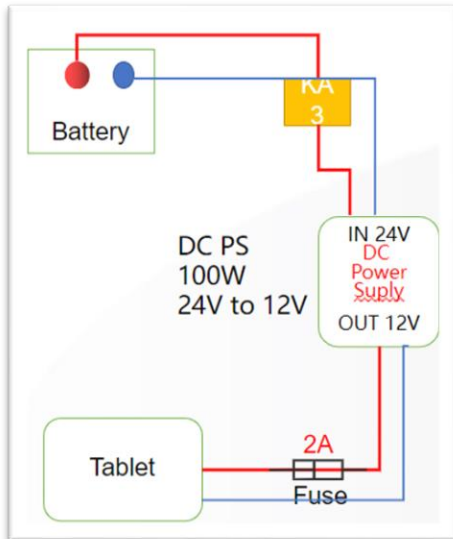
Purpose:

- For robot operation, config adjustment, as well as sending specific instructions.

Circuit Diagram:

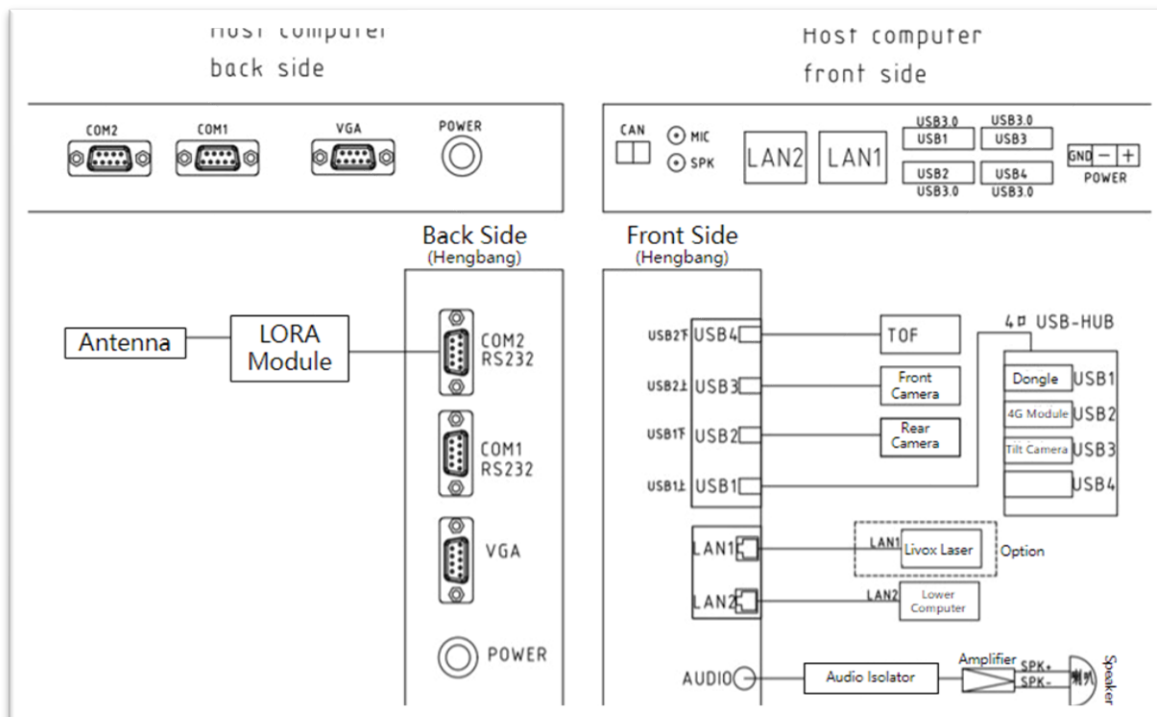
- The Tablet communicates to the lower computer via a LAN cable. It is powered by 12VDC and protected by a 2A fuse. (Use the right circuit diagram based on the robot version accordingly).



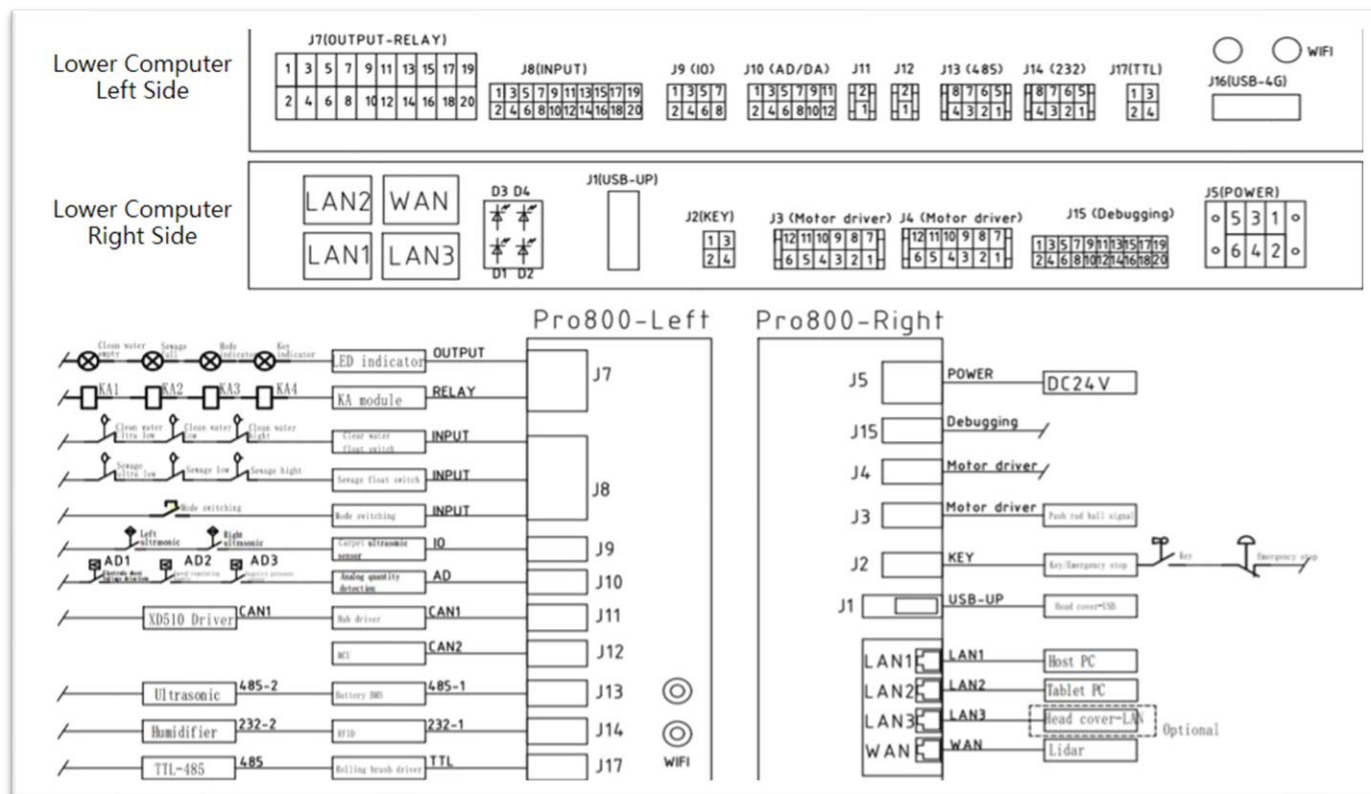


3.3.12. Overall Control Module | Upper Computer

1. Generally, COM-2 is for Lora Module.
2. It is a 4-core cable, 2 - for R232 data communication, and 2 - for a 5VDC power supply (equipped with an independent power adapter).



3.3.13. Overall Control Module | Lower Computer



3.3.14. Overall Control Module | Motor Driver (XD510)

Position:

- Remove the rear shell to get access to it.

Purpose:

- The motor controller (such as suction motor, disk brush, filter pump, etc.).

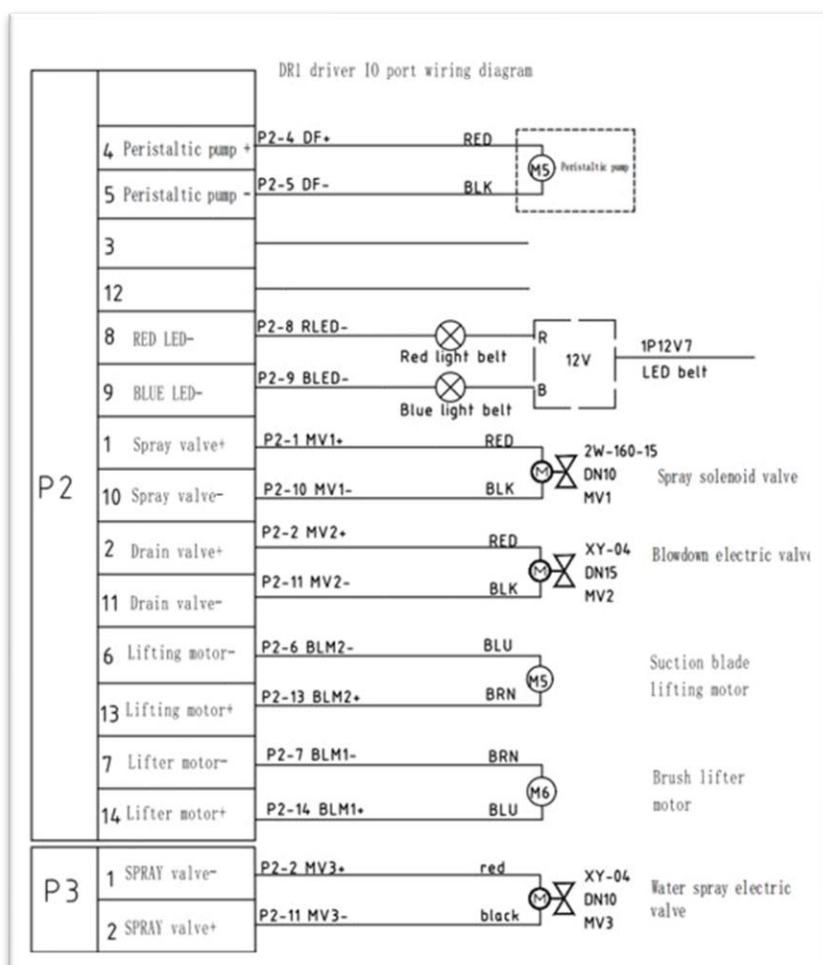
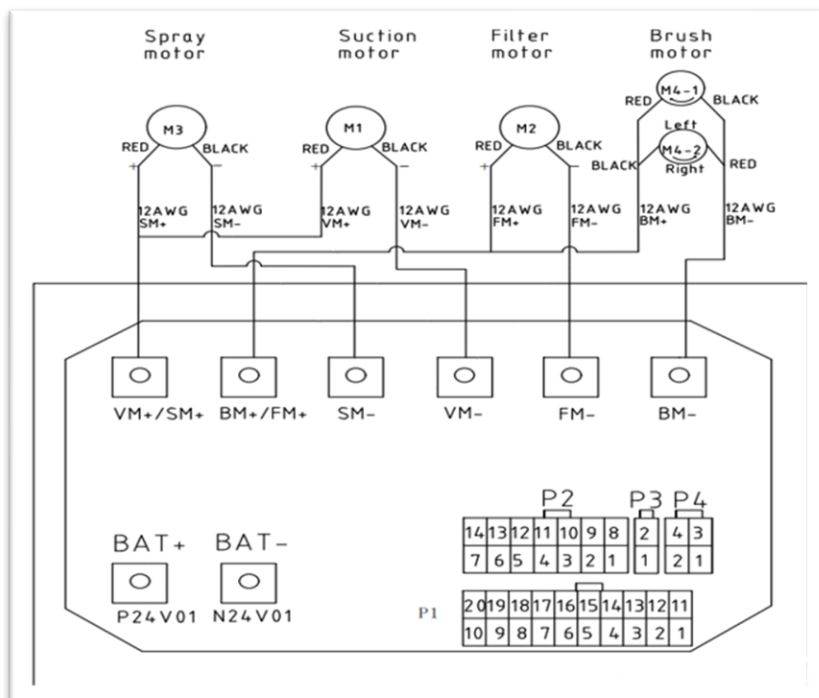
Circuit Diagram:

- BAT is for 24VDC power input.
- P1, P2, P3, and P4 are for data/instructions communication.



NOTE:

- P2 is for linear lights, the solenoid of water spray & drain, and lifting motors.
- P3 is just for the electric ball valve of the water spray.
- P4 is for debugging.



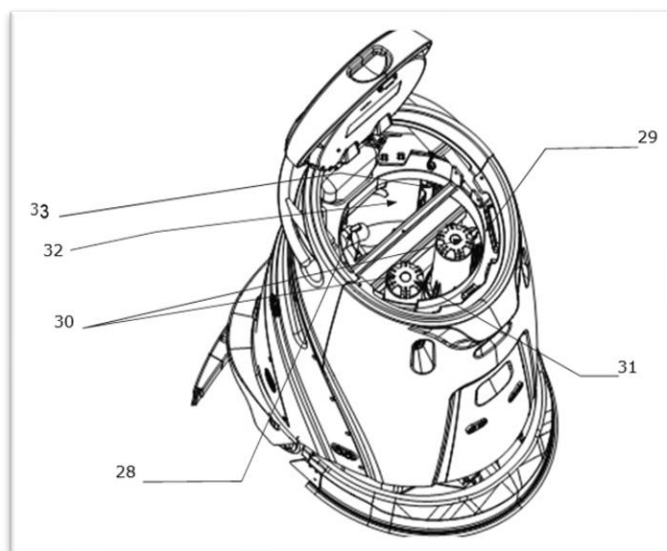
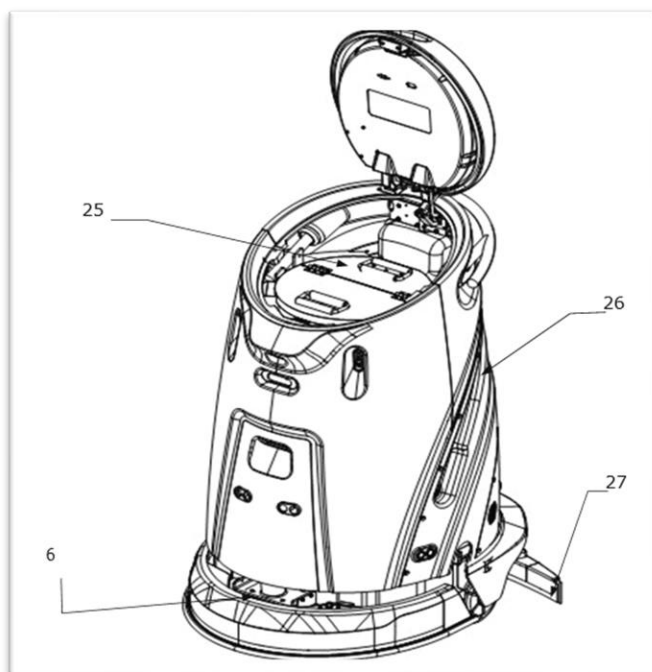
3.4. Structure of Cleaning System

Cleaning Mechanism

The water tanks are divided into a freshwater tank and a recovery tank.

When the cleaning operation starts, the water spray motor first transports clean water from the freshwater tank to the brush plate. The brush plate placed close to the ground cleans the ground through high-speed rotation. The squeegee blade at the back of the brush gathers the water and absorbs it into the recovery tank through the air suction hose.

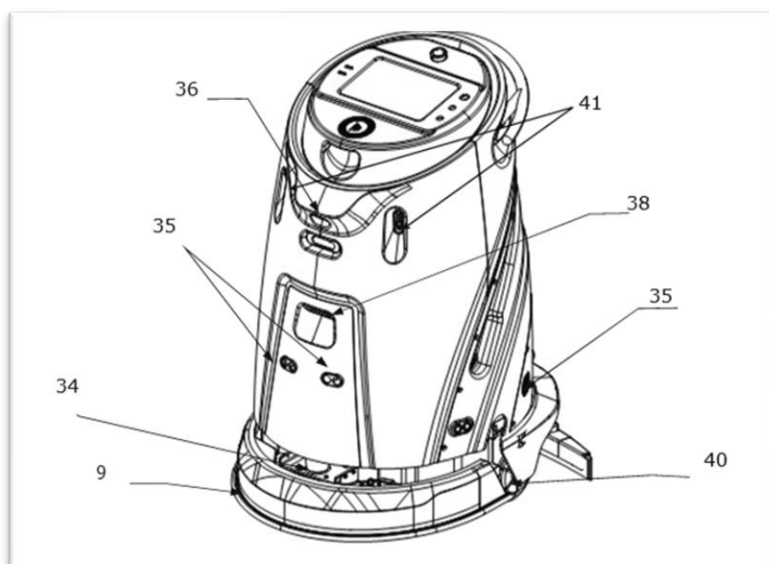
When the volume of sewage in the recovery tank reaches more than **80%** of the capacity of the recovery tank, the scrubber will automatically turn on the filter system. And the sewage will pass through the 3-stage filter element and enter the clean water tank to realize the recycling of water resources.

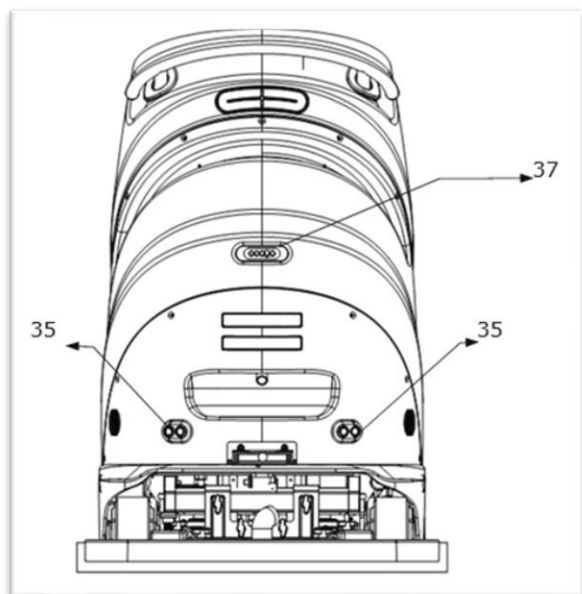


Item No.	Cleaning Device	Quantity	Description	Remarks
25	Tank Cover	1	The freshwater tank has a volume of 24 L, and the recovery tank has a volume of 18 L.	Standard
6	Brush	2	The brush is located at the bottom of the scrubber. It is used for spraying water and scrubbing the ground.	Standard
26	Drain Hose	1	There is 1 drain hose located at the back of the scrubber.	Standard

27	Squeegee Blade	2	The squeegee blade is located at the bottom of the front of the scrubber and the rear side of the brush. It is used to gather the water stains after the cleaning of the brush and absorb them into the recovery tank.	Standard
28	Sewage Filtering Steel Cartridge	1	It is located in the middle of the recovery tank, functioning as the second-stage filtration.	Standard
29	Clean Water Filtering Steel Cartridge	1	It is located on the right of the freshwater tank.	Standard
30	Filter	2	There are three filters in the freshwater tank, which constitute a complete 2-stage filtration circulation system, namely, the third-stage filtration and fourth-stage filtration.	Standard
31	Plug	1	It is the connection switch between the freshwater tank and the recovery tank.	Standard
32	Dirt Sieve	1	At the suction hose in the recovery tank, there is a dirt sieve. It is used for filtering sand, gravel, and other solid impurities.	Standard
33	Water Level Sensor	2	It is located on both the freshwater tank and recovery tank and is used to measure the water level of the freshwater tank.	Standard

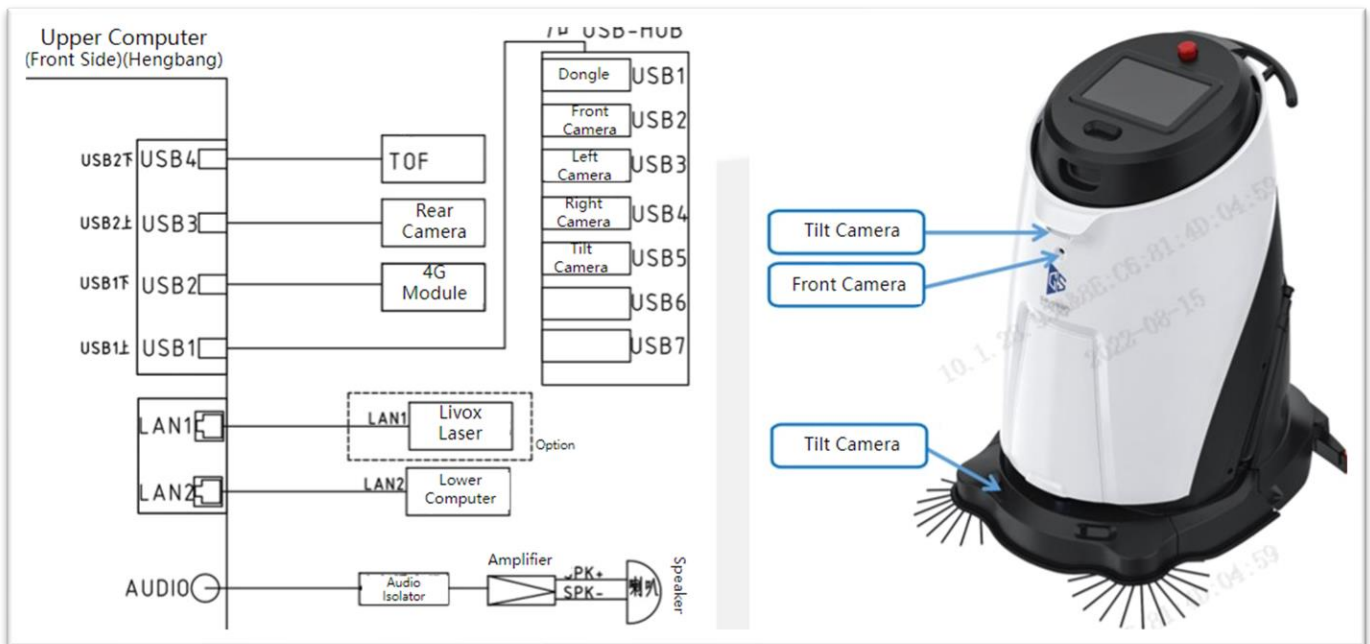
3.5. Structure of Safety System





Item No.	Sensor Type	Quantity	Description	Comments
34	Primary Laser	1	Type I: 25 meters, used for map scanning, positioning, and obstacle avoidance.	Optional
		1	Type II: 10 meters, used for map scanning, positioning, and obstacle avoidance.	Optional
35	Ultrasonic Probe	12	Obstacle avoidance	Standard
36	Front Camera	1	Obstacle avoidance and real-time color image	Standard
37	Rear Camera	1	Obstacle avoidance and real-time color image	Standard
38	Loudspeaker	1	Used for voice broadcasting to remind pedestrians to avoid it.	Standard
9	Front Bumper	1	Collision buffer: avoid secondary damage	Standard
39	Collision Avoidance Wheel	4	Collision buffer	Standard
40	Anti-presser foot switch	2	Touch switch, anti-presser foot	Standard
41	Left/right cameras	1	Obstacle avoidance and real-time color image	Optional

3.5.1. Sensors | Camera



Purpose:

- Recognize obstacles and increase recognition areas.



NOTE:

- The front and rear cameras and the horizontal laser of GS50 are its eyes. If the surface of them is contaminated by drops, dust, or anything else, then intermittent lags and abnormal behaviors could appear during movement.
- If abnormal behaviors appeared, please check whether the surface of the cameras and laser are contaminated or blocked.
- Use a clean, dry, and lint-free wipe to clean the sensors. Do not clean them with your hands or wet wipes.

3.5.2. Sensors | Laser (Lidar)

Position:

- Placed underneath the front shell.

Purpose:

- Map scanning, locating.

Name	Description
Horizontal Laser - IP	10.7.5.100
Channels	Single beam
Wavelength	905nm
Ranging capability	25m (8m@10% remission)
Accuracy (typical)	max ±20mm (0.05m~8m@ 10% NIST)
Scanning range	270°
Divergence	0.33°



Name	Description
Frequency	15Hz
Data communication via Ethernet cable	network interface (TCP/IP, 100M Bit/s)
Power rate	3W
Working temperature	-25°C ~ +50°C
Safety classification	Class 1 eye-safe
Ingress protection	IP66



3.5.3. Sensors | Anti-collision Switch Sensor



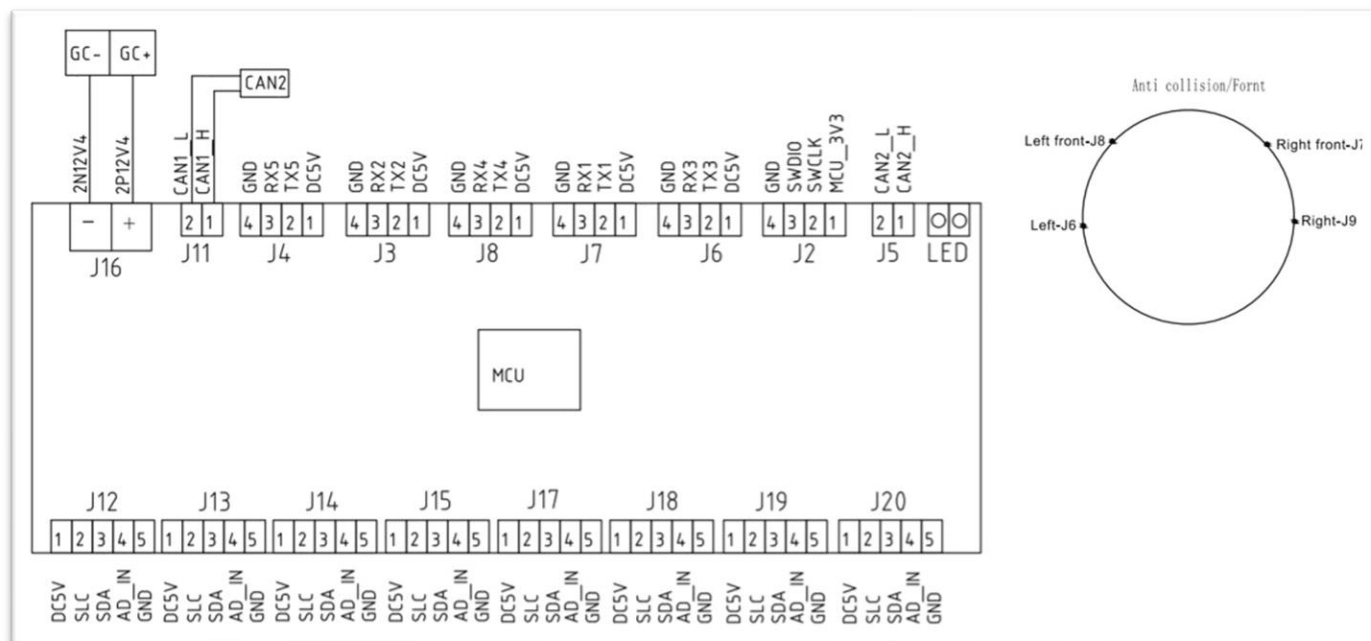
Position:

- Inside the anti-collision shell.

Purpose:

- Stop the robot after a collision, preventing a secondary crash.

3.5.4. Sensors | Anti-collision Switch Sensor - Circuit Diagram



3.6. Structure of Traction System

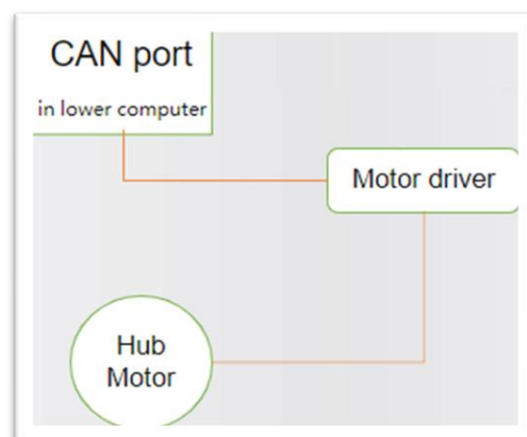
3.6.1. System Composition | Hub motor (Wheel)

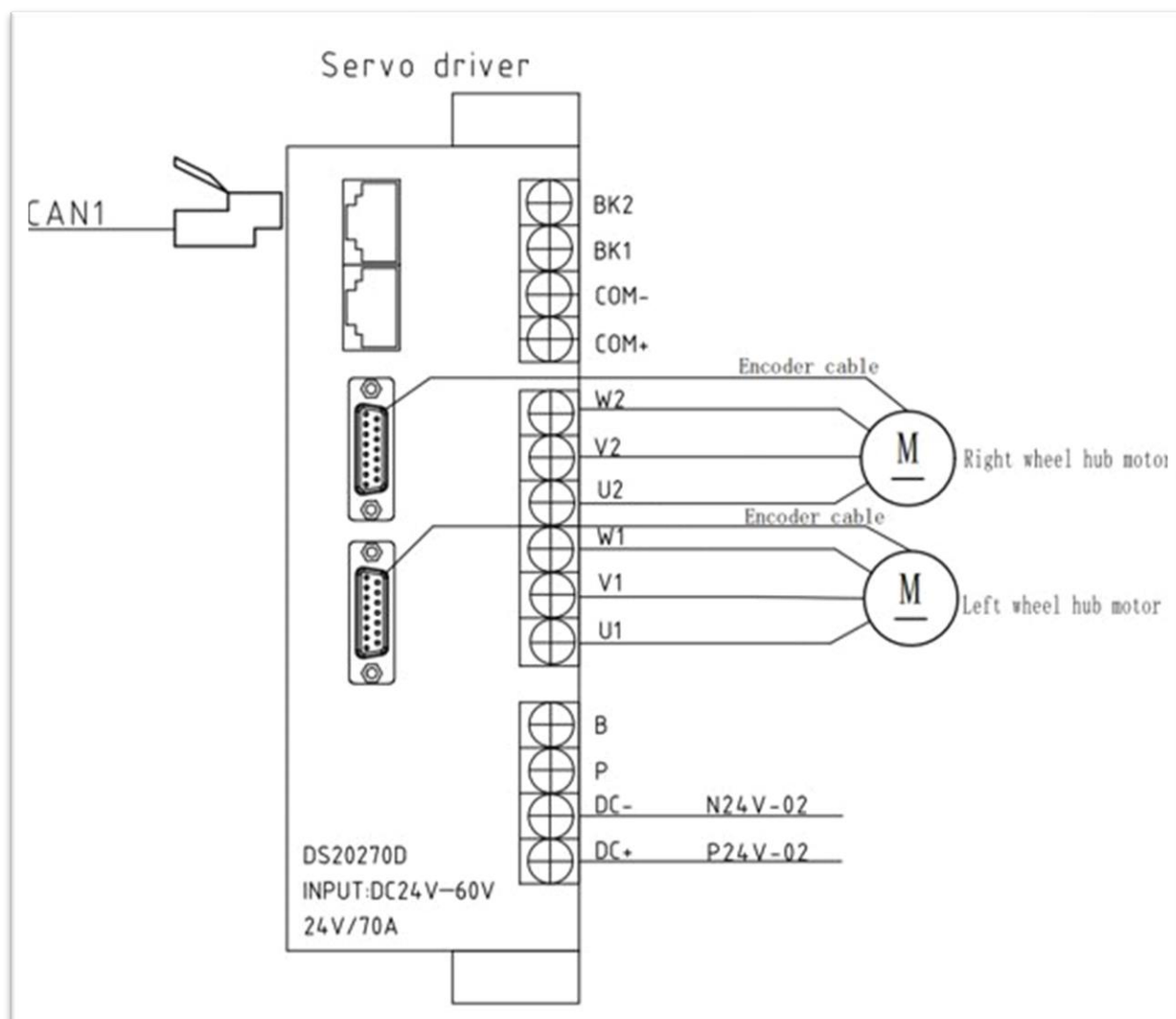
Position:

- Assembled with 2 hub wheels.

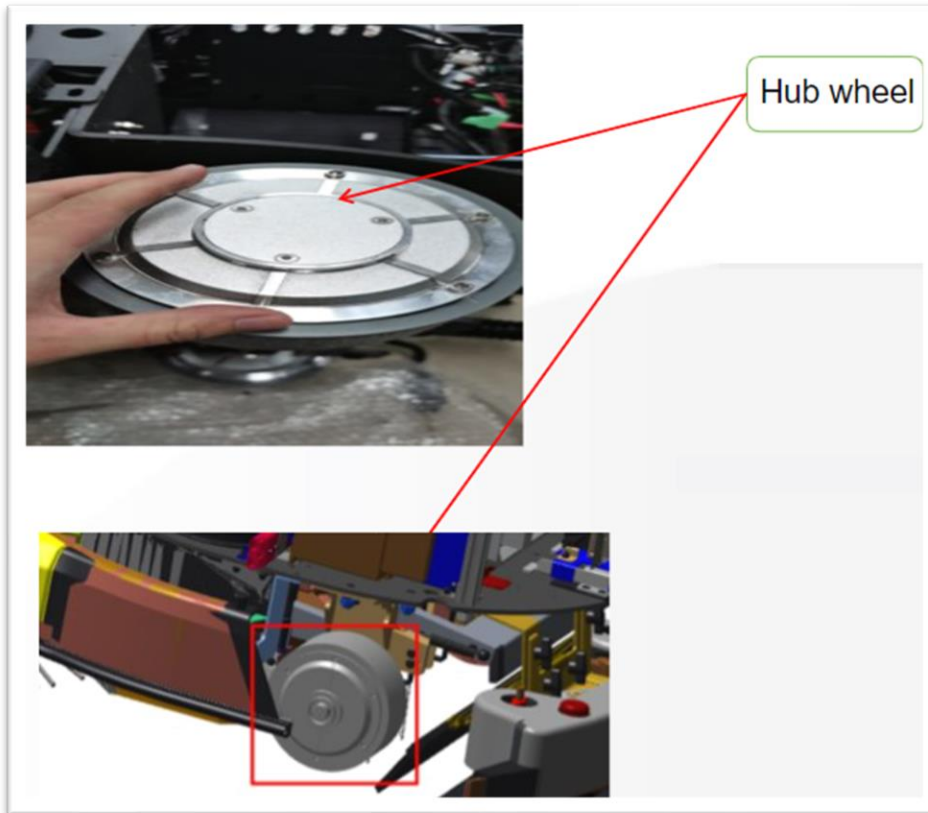
Purpose:

- Drive the robot to move, controlled by a motor driver.



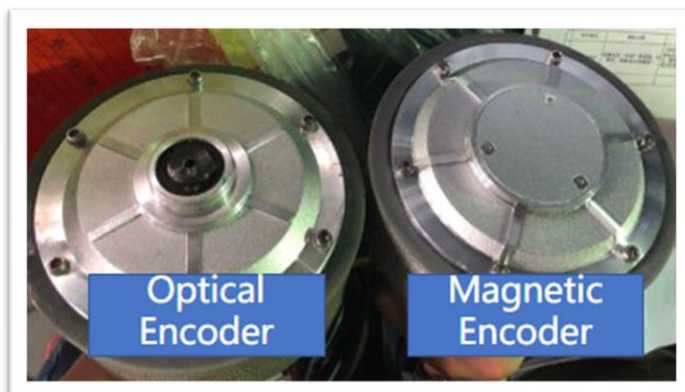


3.6.2. System Composition | Hub wheel



NOTE:

- An optical encoder and a magnetic encoder are not universal, and neither is the sensor type value.

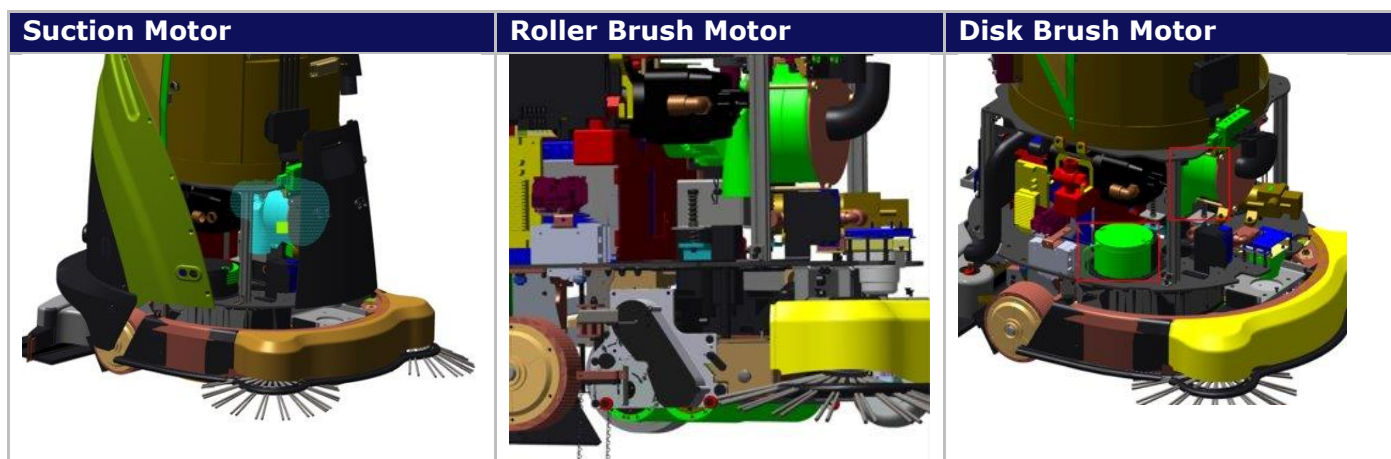


3.7. Structure of Suction System

3.7.1. Suction System Function

The main function of the Suction System is to absorb the ground particle wastes into the dust bag to enhance the cleaning effect.

The Suction System comprises



The suction motor generates a vacuum to absorb particle waste on the ground and is similar to a household vacuum cleaner. It gets a 24VDC power supply from the motor driver directly.

3.8. Structure of Sweep System

3.8.1. Sweep System Function

The main function of the Sweep System is to sweep the garbage on the ground.

The Sweep System consists of the tablet, lower computer, motor driver, roller brush, side brush, and other components, etc.



3.8.2. Sweep System Composition | Roller/Side brush motor

Position:

- The roller brush motor is located underneath the chassis, and side brush motors are placed on the L/R side.

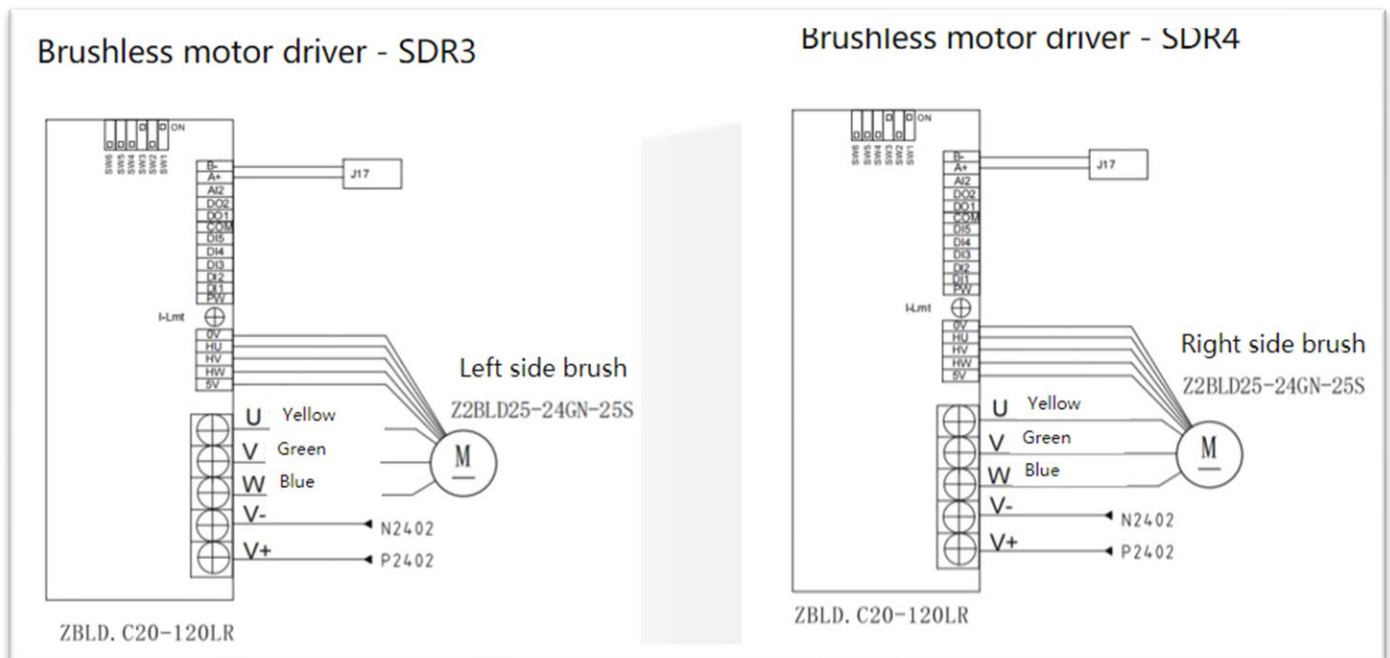
Function:

- Making the drive roller & side brush rotate.

3.8.3. Sweep System Composition | Side brush motor

Circuit diagram:

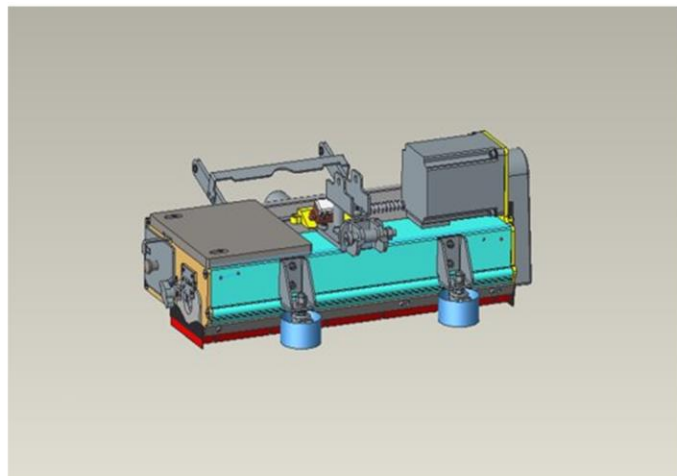
- The motor driver controls the motor of the roller/disk brush.



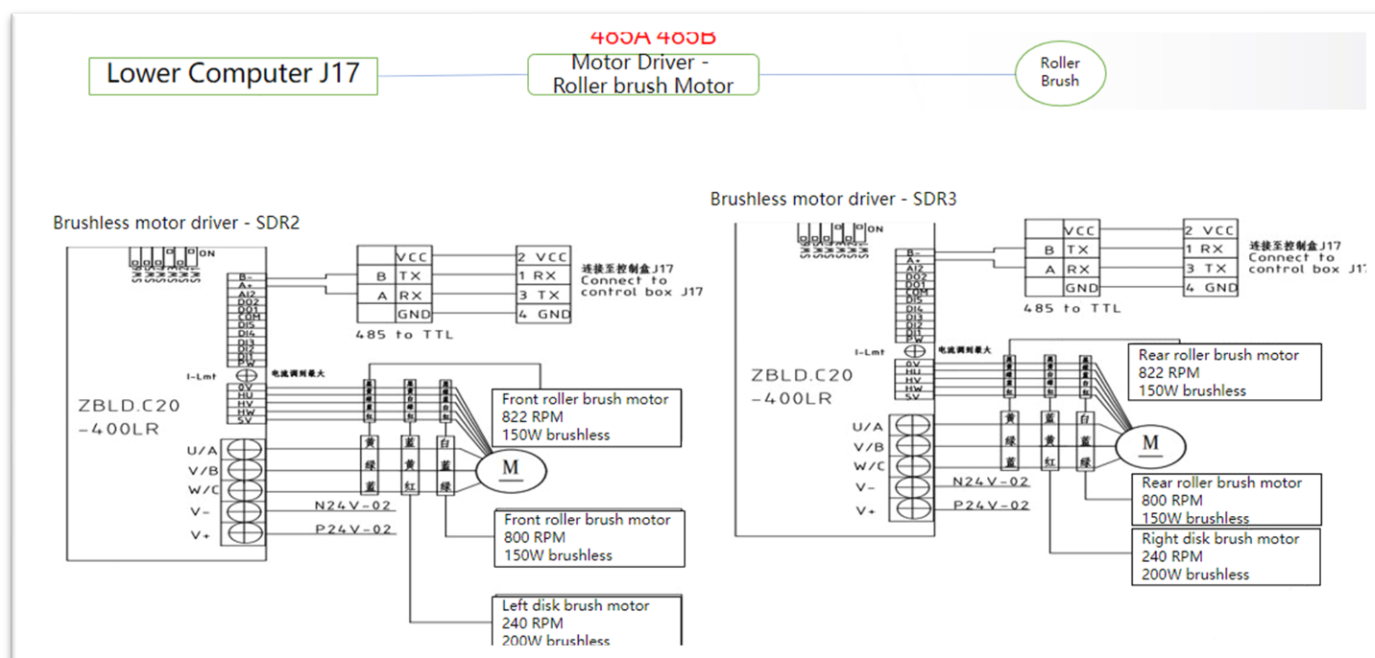
3.8.4. Sweep System Composition | Roller brush

Circuit diagram:

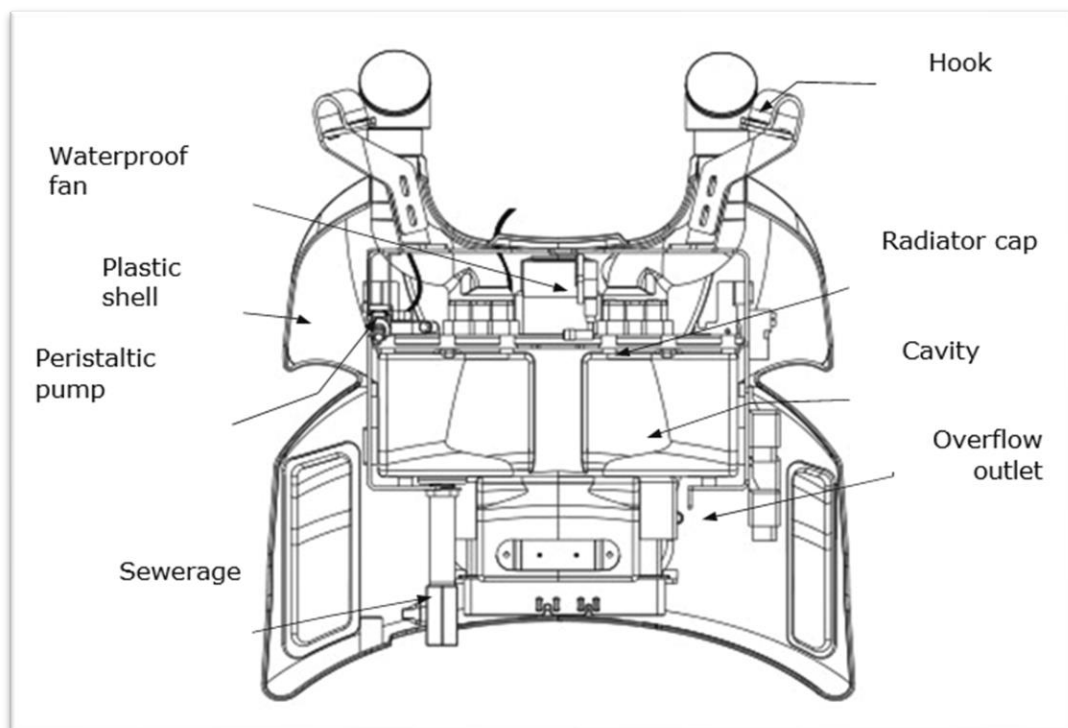
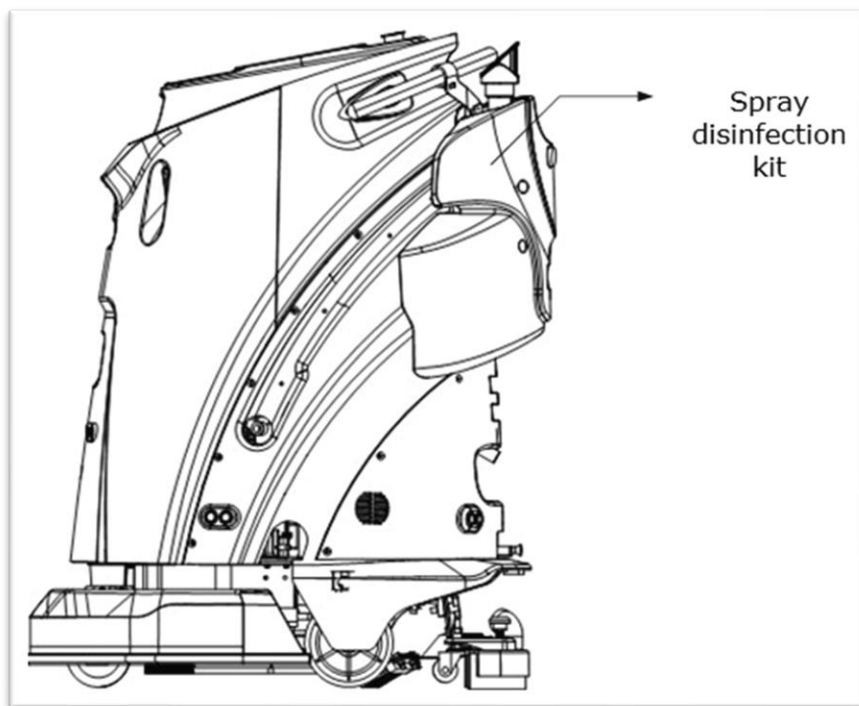
The lower computer sends instructions to the motor driver via the **TTL485** module. Then the motor translates the instructions and controls the roller brush motor performance.

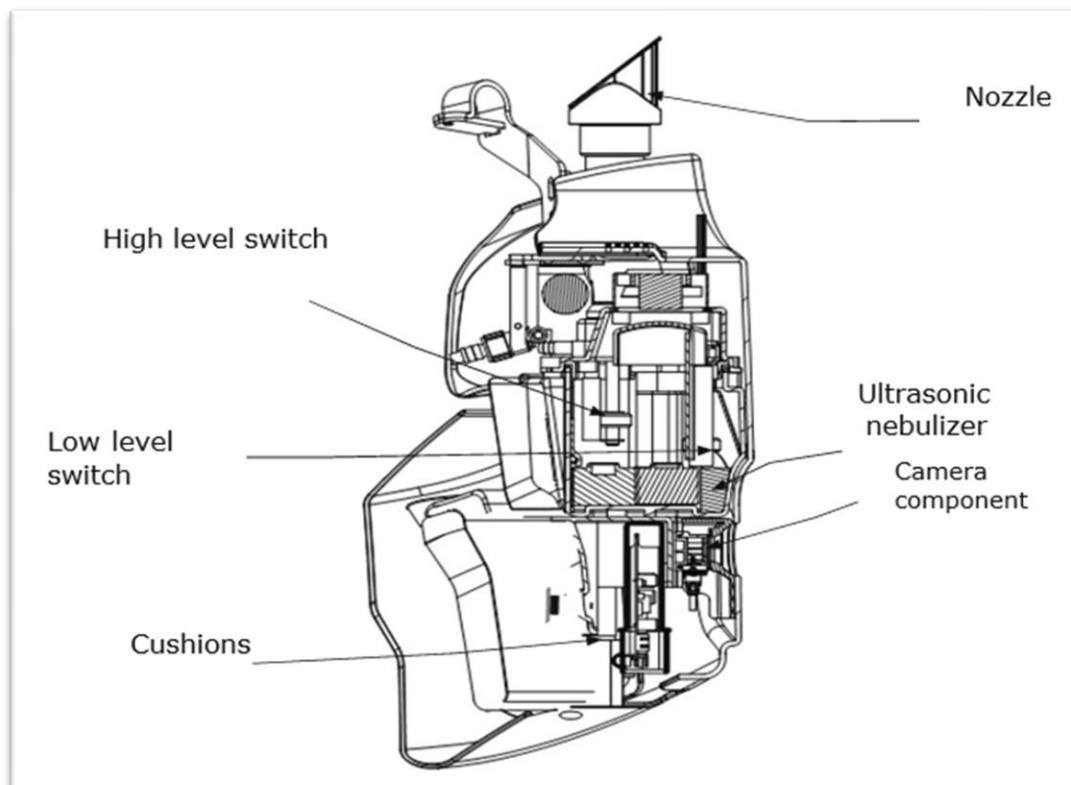


3.8.5. Sweep System Composition | Roller brush motor controlled by the motor driver directly



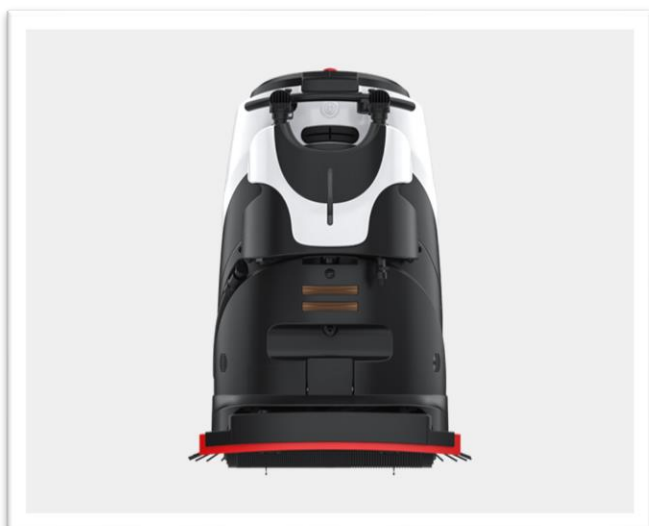
3.9. Structure of Disinfection System



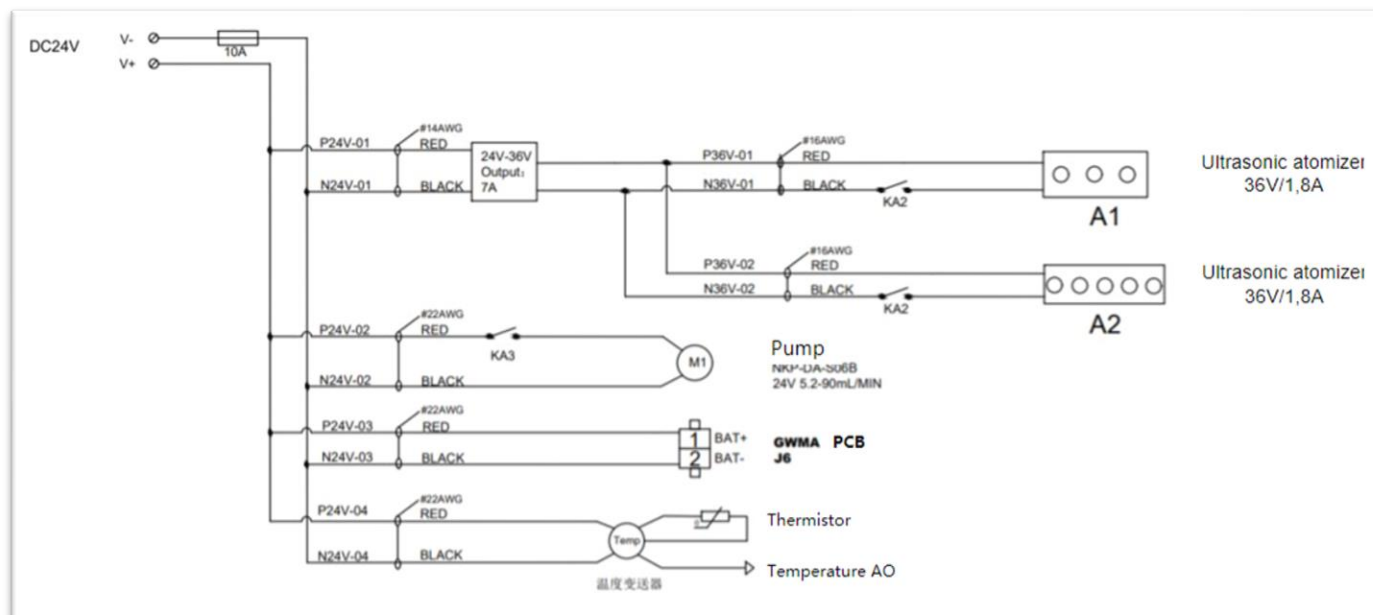


3.9.1. Disinfection System | Disinfection package

There is a PCB to run disinfection features, such as mist spray, liquid level, alarm, etc.



3.9.2. Disinfection System | Circuit Diagram



4. DELIVERY & UNPACKING INSTRUCTIONS

Before the delivery acceptance, check the crate, and the robot's appearance, and confirm the robot functions well. If there is anything abnormal, please take photos and contact a product service representative.

1. Place the packing crate in an open area.
2. Remove the wooden board on the side of the box with a tail sign by removing all the screws, and then take the wooden board off.



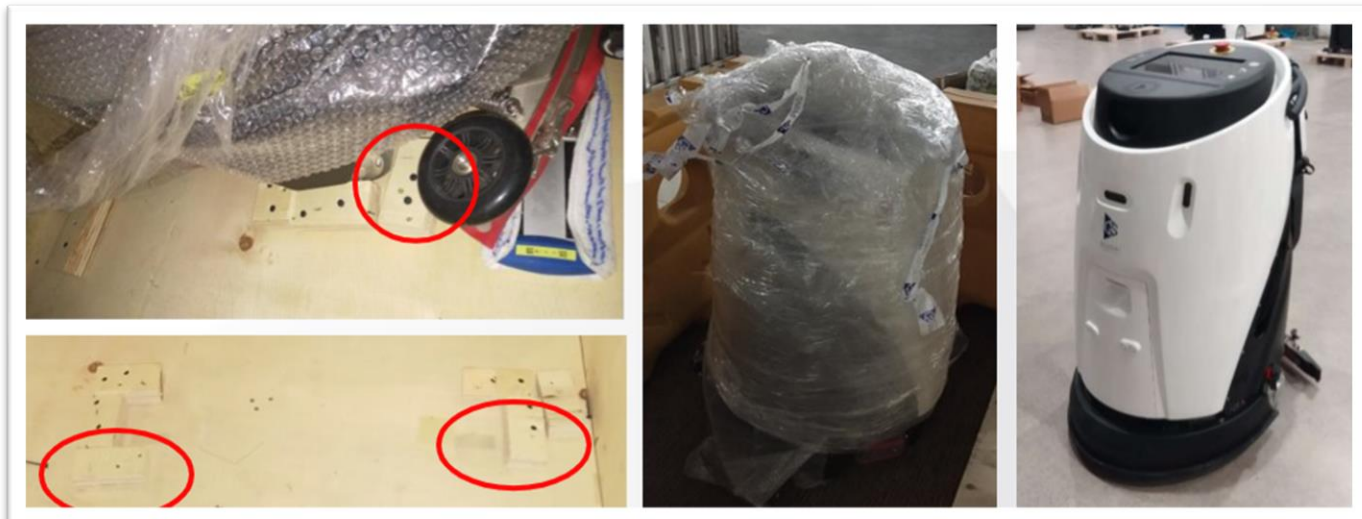
3. Use the electric screwdriver to remove the screws on one side of the crate, so that the wedge-shaped wooden ramp can be available.



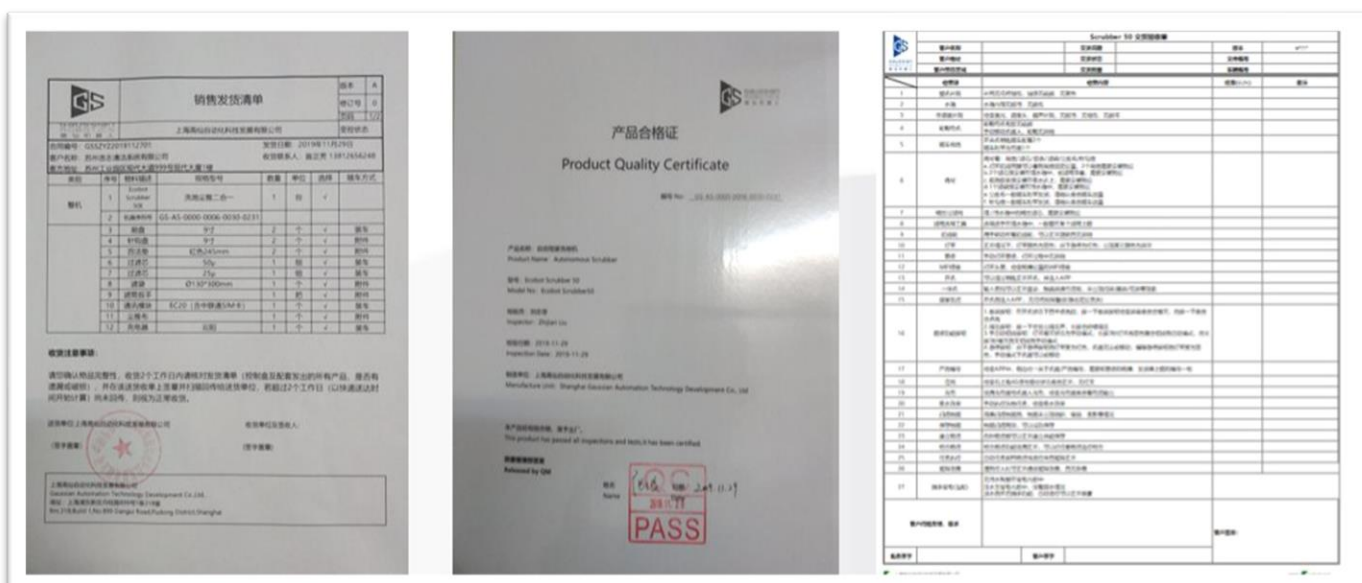
NOTE:

- An electric screwdriver with an M5 crosshead bit may be required.

4. Place it as close as possible to the pallet for pushing the robot to the ground.



5. Use the electric screwdriver to remove the wooden block fixed around the rear wheels and take out the accessories in the box shipped with the robot. Push the robot out through the ramp.
6. Remove the wrap and check the robot for any damage. If any scratches, dents, dirt, or other cosmetic issues are found, please notify the product service representative accordingly.



7. Check the "**Packing List**," and make sure there is no shortage of shipments for the listed stuff.
8. Ensure the "**Product Quality Certificate**" is provided along with the robot, and that all the information mentioned is accurate.

- Complete and forward to the after-sales department a copy of the signed "**Delivery Acceptance Form**" based on the actual findings.

4.1. Preliminary Check

Check accessories:

- Check if the material objects are consistent with the records on the invoice.

Robot appearance inspection:

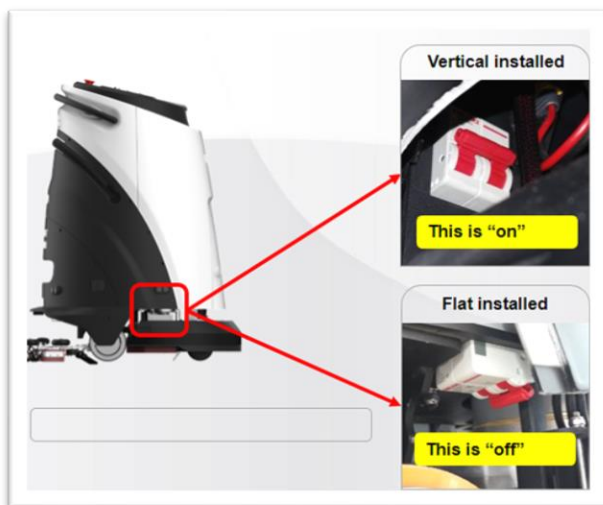
- Check if the robot's body is scratched.
- Check if there are any scratches on the surface of the sensors.

Device inspection:

- Check if the control panel can control all cleaning devices normally.

Steps to reproduce:

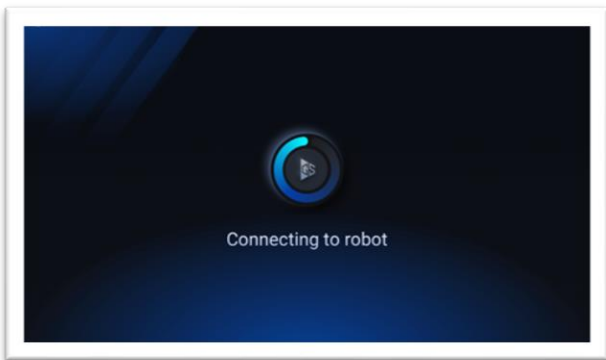
- Turn on the **air switch** positioned under the chassis on the right side of the robot. Check if it is switched on. (*Vertical installed*: toward up is "ON." *Flat installed*: toward the left is "ON").



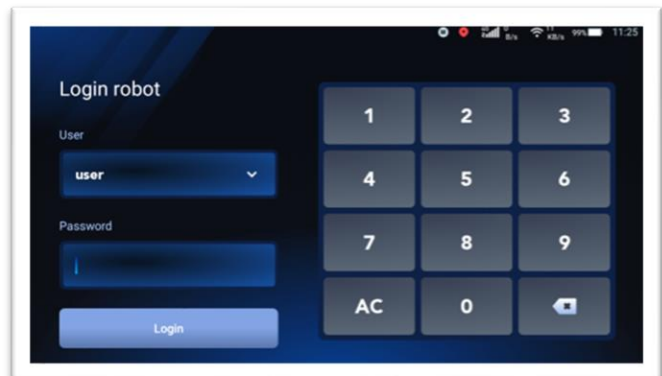
- Switch the circuit breaker on, boot the robot up by turning the key (next to the screen) clockwise, and check if the boot sequence is normal.



3. The **"Connecting Robot"** screen will appear, as shown in the figure below:



4. Please wait for the screen to reload.
5. Select the corresponding account and enter a password to log in for entering the APP.
6. Log in to the **"admin"** account with password **"314159"** (or Account: **"user"**/Password: **"123456"**) to enter the main interface of the APP.



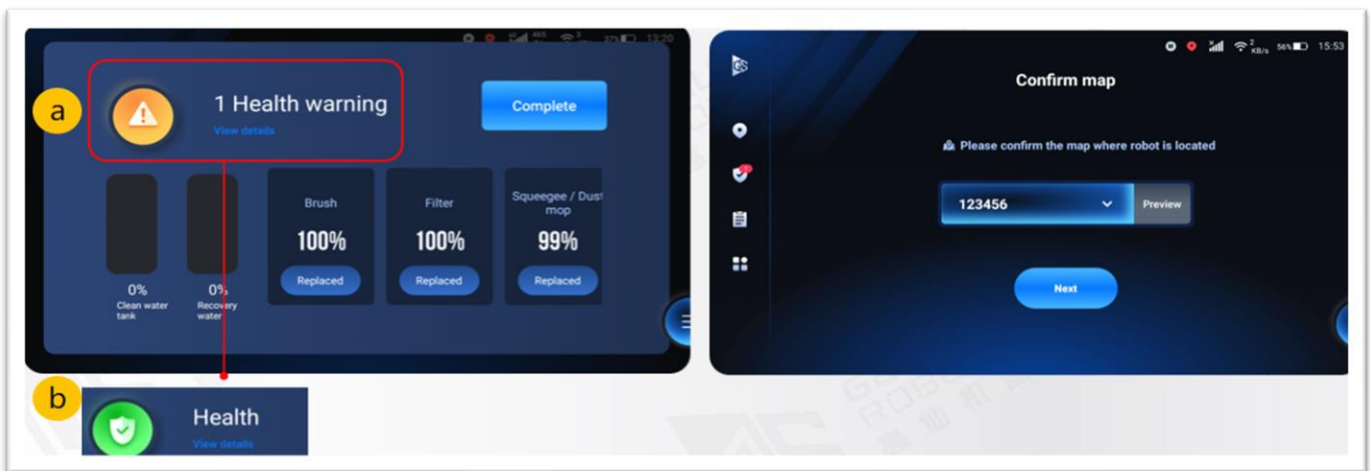
7. Check the robot's health status.



IMPORTANT:

- If the battery level is less than 50%, please charge it immediately to ensure that the machine can be used normally during deployment).

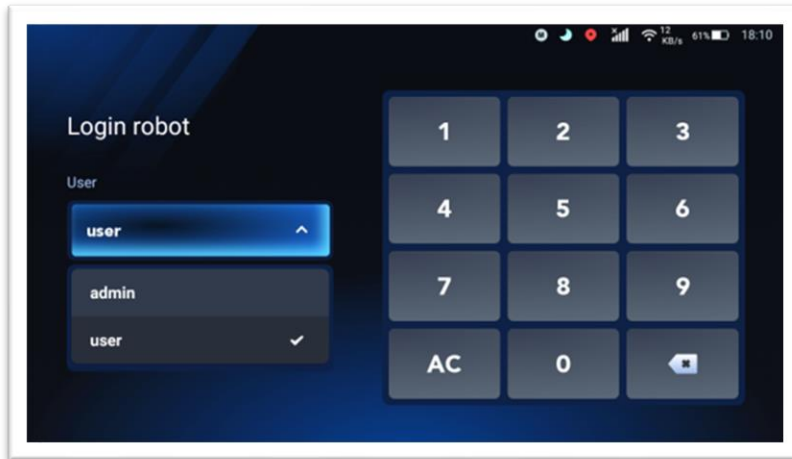
8. After entering the APP, the screen will show information such as health status, consumables usage, water level, etc.
 - a. If there is no fault, it will display the "healthy" status. Confirm the power of the machine by clicking on "Complete" to get into the UI.
 - b. If there is a fault, it will display the status of "health alarms."



9. If there are issues, they will be displayed on the screen. Click "**Preview**" and try to resolve the issue.
10. Click "**Back**" & "**Complete**" after issues have been successfully resolved.

4.2. Unpacking Inspection

1. Remove the outer packaging of the machine and check its appearance.
2. If the appearance is damaged or dirty, please contact the after-sales staff.
3. Turn on the air switch, use the key to turn on the machine, and check whether the machine can start normally.
4. Input account & password.



5. Log in to the "admin" account with password "314159" (or Account: user/Password: "123456") to enter the main interface of the application.



NOTE:

- Account: **admin** | Password: 314159
- Account: **user** | Password: 123456

6. A window pops up showing the water left in the water tank and the lifespan of consumables.
7. Check whether the screen and menu are normal and confirm the power of the machine (if the battery level is less than 50%, please charge it immediately to ensure that the machine can be used normally during deployment).
8. Confirm health status by clicking on "**Confirm**" to continue.
9. Check the whole vehicle after unpacking and fill in the "**Tracking Card**."
10. For abnormal record checks, check the machine history, whether there is an abnormal record.
11. Check the risk items and whether they have been solved.
12. Check the whole vehicle according to the inspection standard. If there is any abnormality, please record it in the Tracking Card.
13. Check the "**Packing List**," and make sure there is no shortage of shipments for the listed items.
14. Ensure the "**Product Quality Certificate**" is provided along with the robot, and that all the information mentioned therein is accurate.
15. Complete and forward us a copy of the signed "**Delivery Acceptance Form**" based on the actual findings.

5. DEPLOYMENT INSTRUCTIONS

5.1. Applicable Cleaning Area Investigation

Suitability:

Suitable scenario: Retail & shopping mall, Office building, Supermarket, Bank, Hotel, Hospital, Factory, and other small to medium-sized indoor areas with hard flat ground.

Unsuitable scenario: carpet area, underground parking lot, outdoor area, residential road, wooden floor, glass floor, other large indoor and outdoor scenes, special scenarios, etc.

The ground flatness:

$-1.5\text{cm} \leq \text{flatness} \leq 1.5\text{cm}$.

Minimal clearance:

The minimum width for GS-50 to run through is 95cm, while the minimum width for a U-turn is 130cm.

Slope:

It is not recommended to run through any slopes in auto mode, and no greater than 8° by manual push.

Laser detection:

Obstacles with black, highly reflective, transparent, and thin (2.5cm) surfaces are likely to cause light absorption or light drifting. Therefore, to have a better scanning result, laser stickers shall be applied.

Falling risk:

In areas with falling risk, such as stairs, up/down escalators, slopes, and holes in the ground, extra measures need to deploy infrared stickers.

5.2. Communication with Customers

Cleaning area:

Walk along with the customer to observe the entire cleaning area, while photos and notes may be taken for memo.

Find out the following:

- Reasonable route for mapping.

- Find a proper starting point for mapping.
- Determine whether a forced closed loop should be used depending on the complexity of the cleaning area.

Cleaning mode:

- scrubbing,
- dust mopping,
- scrubbing plus dust mopping,
- disinfection,
- disinfection plus dust mopping/scrubbing,
- roller brushing, etc.

Cleaning time:

- Create On and Off timeslots,
- set up do-not-disturb mode or scheduled task.

Landmarks:

- Where the robot shall be maintained and parked,
- charged,
- short-term and long-term stored.

Site environment:

Mark the environment with high change frequency and restricted area in advance. Bypass these places/obstacles when creating cleaning paths.

For example:

- Glass door opening and closing,
- booth relocation, shelf changes,
- stairs,
- escalators, etc.

Reflective and infrared stickers:

Communication with customers is required. Try to deploy stickers in all the places with potential hazards.

On-site assistance:

Request support from the customer. Check if temporary charging is needed, plan a field for testing, and even open the fire door for inspection, etc.

5.3. Special Environment Treatment

5.3.1. Laser Stickers

Deploy laser stickers as the solutions for the following environments:

Laser scanning at black/high-reflective/transparent/slim pole (2.5cm in diameter) obstacles is prone to omissions. Stickers must be attached 16-17cm high above the ground (both sides).

Traffic cones:

Generally used in a large area with risks → glass doors, temporary construction areas, stairs/escalators, etc.

Set-up method:

Place traffic cones around risky areas to prevent the robot from entering. (the distance between every two cones should not exceed 4m). Once the robot detects them, it will identify the area between the two cones as a “no entry” zone.



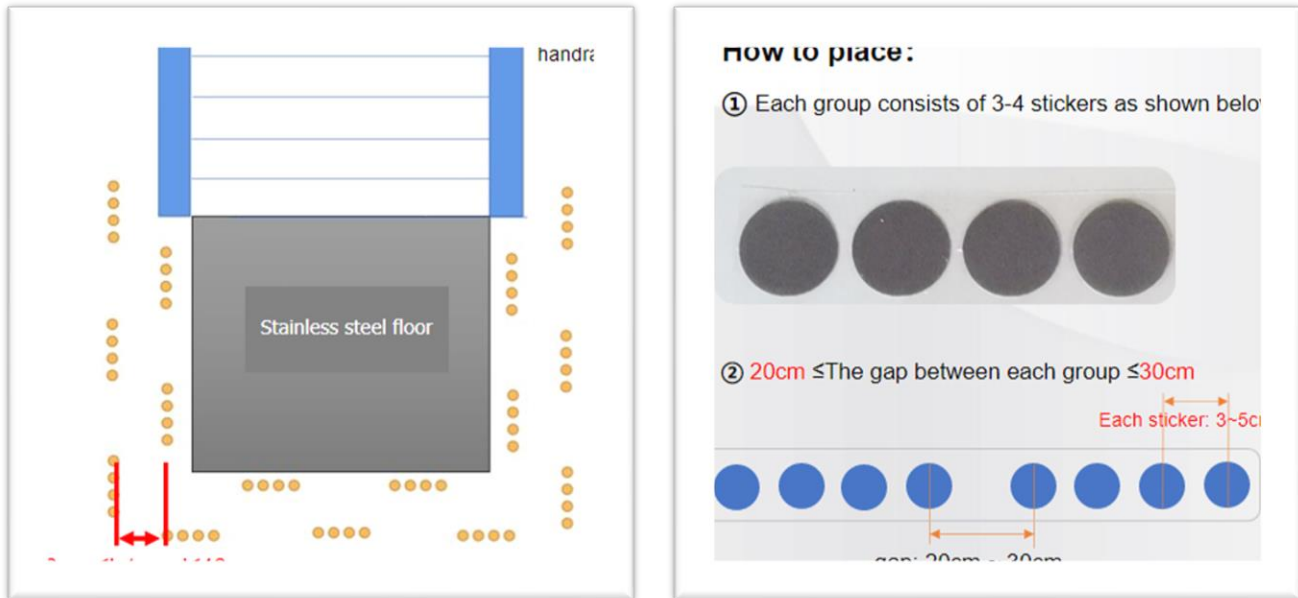
5.3.2. Infrared Stickers

Prevent falling:

Escalators (Going up or down), Stairs (Going down), and other potential areas with such risk.

The file path of infrared sticker settings:

/strategy/ir_sticker_enable



As the figure above shows, place an infrared sticker at least 50cm away from the risk area. Stickers in inner and outer rings should be interlaced. The distance between the inner and outer rings should be 30-40cm.



NOTE:

- The sticker must be well attached in a straight line.
- Please replace stickers if they are damaged or missing.
- Periodical check is mandatory.
- Place the stickers behind virtual walls as the last defense.
- Remember to tear off the plastic covers of the stickers.

5.3.3. Reflective stickers

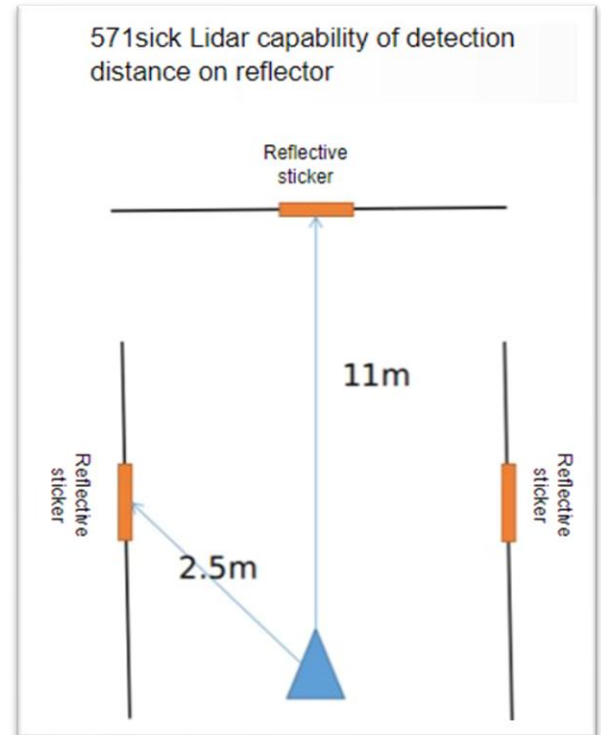
The capability of detection (distance)

The detectable range of laser on reflective stickers varies according to the viewing angle from which the laser reaches the reflector.

As shown in the right figure, the distance that the reflector can be effectively detected is 11m when the laser reaches the reflector vertically.

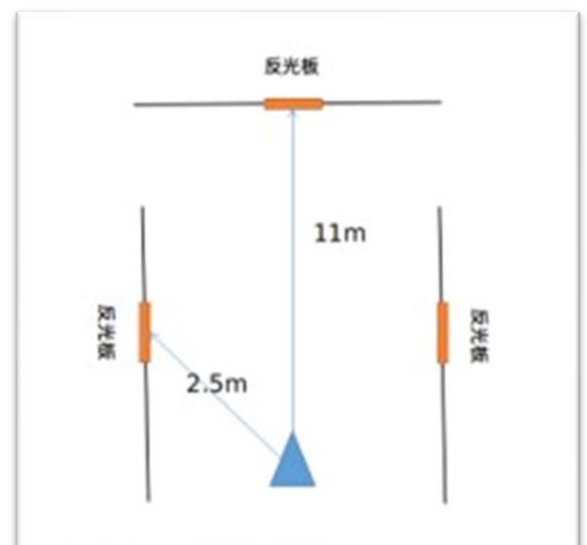
When the reflector is parallel to the laser, the effective detectable range is 2.5m.

Reflective board



Deployment guide

- ① Make 3 reflectors as visible in the view of the laser as possible, as shown in the figure.
- ② Avoid not deploying stickers to the areas with highly reflective objects (1.5m), such as glass and smooth metal objects as far as possible.
- ③ The distance between two reflectors should not be less than 1.5m, and the recommended distance is 3m.
- ④ The reflector must be attached to a permanently fixed object, and the length of the reflector should be 10-15cm.



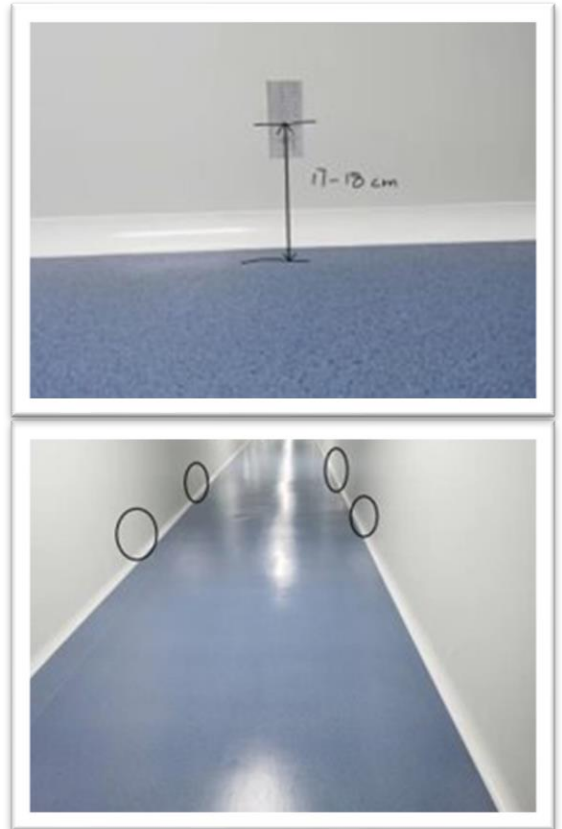
⑤ The reflector should be deployed as close as possible to the event point of the robot. Event points include turns, navigation points, and places where the robot can easily get lost.

⑥ In similar scenes, such as similar corridors, the position of stickers needs to be different to have the robot distinguish specific corridors.

⑦ To get a decent quality scan, ensure there is no ghost in the area near the reflector.

⑧ Deploy stickers alternately on both sides of the corridor. (For example: deploy stickers at an interval of 3 meters on the left side of the corridor, deploy the right ones between the 2 left ones.).

⑨ Scan the map with the reflective stickers deployed again. If the map was done before deploying the stickers, you need to expand the map to ensure that the reflective stickers are scanned by the laser.



Modify the parameter to enable the reflector function

Parameters related to reflector configuration are in gaussian_mapping_v5.yaml, the file's MAPPING and LOCALIZATION contain the following parameters.

Instruction for Parameters:

1. The distance between the two deployed reflectors must be greater than "outlier_reflector_dist."
2. Try to ensure that there are no other highly reflective objects within the outlier_reflector_dist distance, such as glass, highly reflective metals, transparent plastic films, etc.
3. The larger the "reflector_constraint_weight" is, the more trust the reflector owns, this increases the weight when the environment changes.
4. After turning "pub_visualize_message" on, observe "topic:/g_reflector_feature" in RViz, indicating that the optimized reflector is detected and added.
5. Configure the "laser_type" value as per the laser type.


```

1 reflector_options:
2   enable: false           #ture: enable reflector function, false: disable
3   merge_reflector_dist: 0.4      #unit: meter, the interval of merged reflector
4   outlier_reflector_dist: 0.8    #unit: meter, judge the interval outlier
5   loop_closure_dist: 5.0        #unit: meter, the searching scope of loop closure
6   loop_closure_merge_dist: 0.2  #unit: meter, the interval of merged reflector during loop closure
7   reflector_constraint_weight: 100 # the weight of reflector added into optimization
8   pub_visualize_message: true    #True: enable visualization, false: disable
9   min_obs_number: 5            #Determine the minimum times a reflector was detected
10  laser_type: "SICK_571"       #type of laser, else are WLR_76, SICK_571, SICK_681

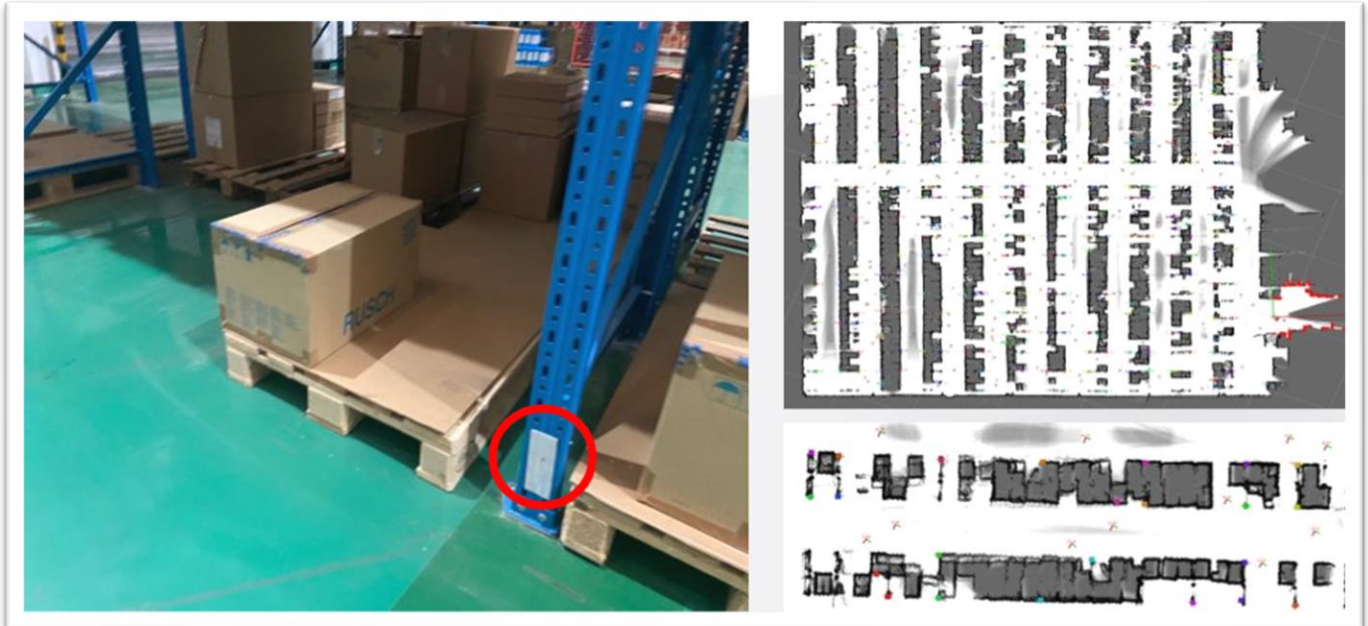
```

Add and Delete

1. An expanded map can add new reflectors, but it cannot delete the original reflectors and modify their positions.
2. At present, there is no editing interface for the reflector in the APP, and the reflector in the map cannot be deleted manually.
3. If the reflector that has been recorded on the map must be removed, and no other reflectors are added within 1.5m, it will not affect the positioning.

Deployment Effectiveness Verification

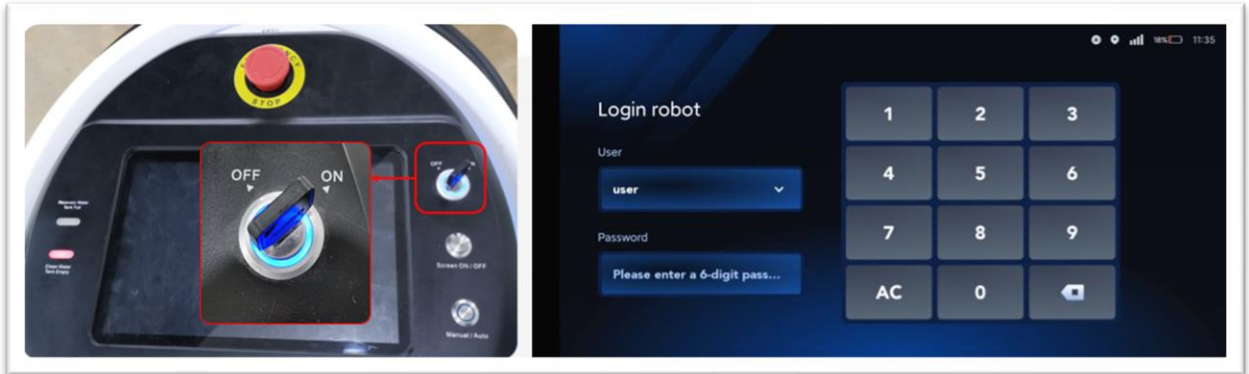
Observe reflectors in the map with RViz "topic:/landmark_poses_list," squares with assorted colors shown below. Lasers with an intensity greater than 220 will be detected as reflectors.



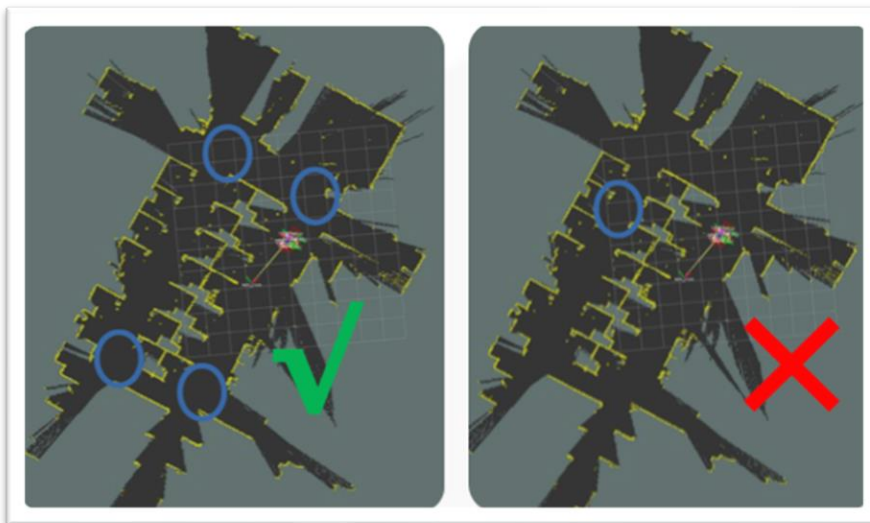
5.4. ROBOT DEPLOYMENT

5.4.1. Logging In

- Insert the key and turn it to "on" to start up the robot.
- Select the "user" account, enter password "123456", and log into UI.

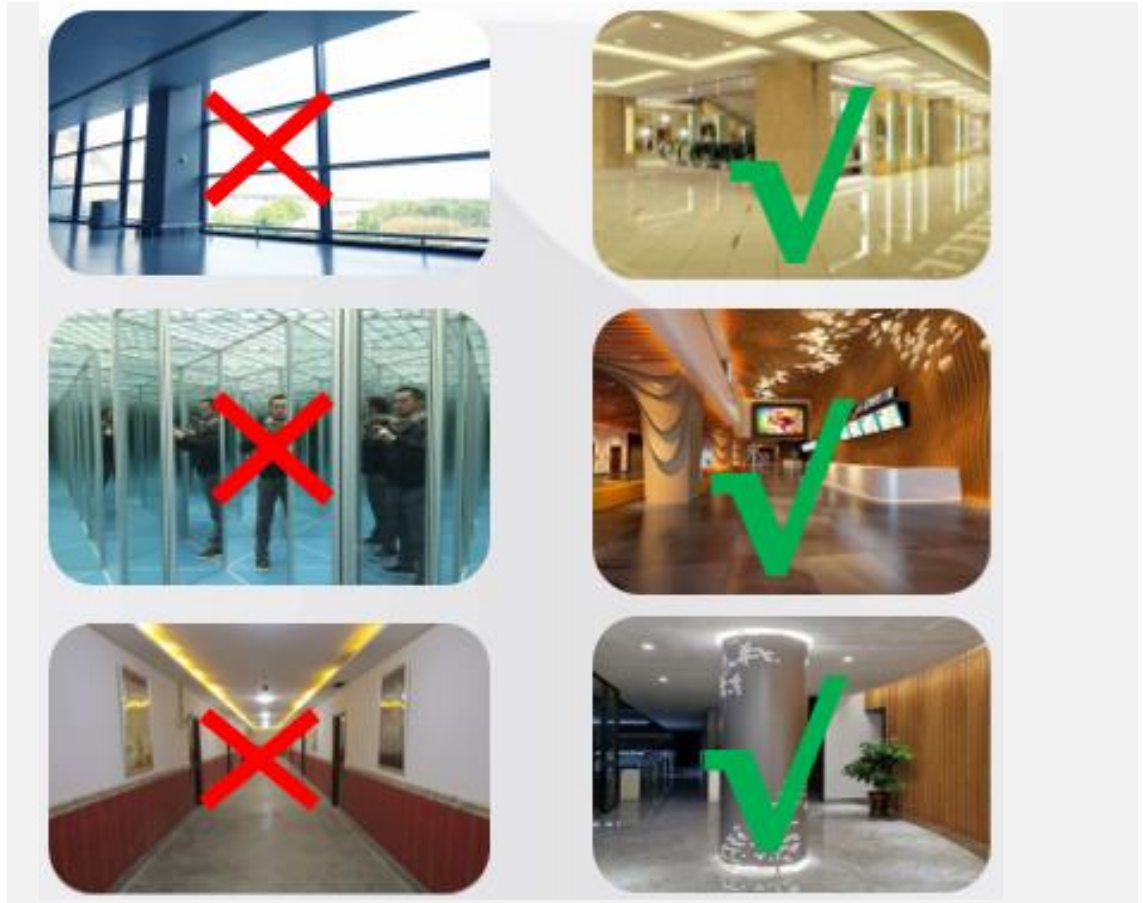


- Find a reasonable origin point before scanning.
- Before scanning, place the robot parallel or vertical to walls to reduce map jagging and improve narrow passability.
- As shown in the figure below, you should start scanning at the corner of the location contrasting with surrounding features.



NOTE:

- Glass walls and mirrors can easily cause interference with the laser and lead to poor scanning quality. There are not enough obvious features in the aisle, which make negative effects on locating.



5.4.2. Map scanning

5.4.2.1 Physical locating

If there are the following scenarios, physically position the robot first before scanning.

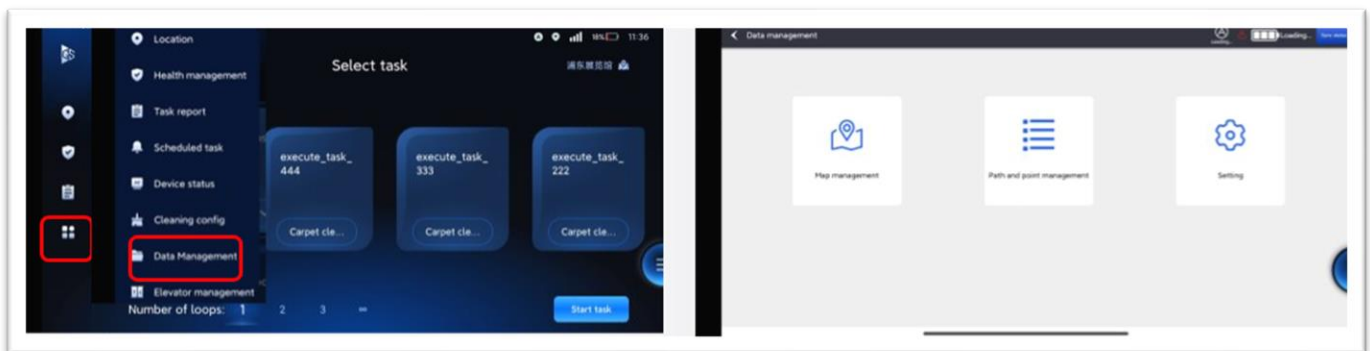
- A long corridor, symmetrical environment, environments with high similarity.
- Specific areas that the robot has to bypass with long paths.
- If the scene is relatively simple and there are many areas with obvious features, there is no need to force loop closure.



Before map scanning, find a floor tile gap (or custom position with a particular feature) within 1m of a reasonable origin point to make the left and right wheels align with the gap. In addition, stick the tape (or use a marker) to physically mark the position of the robot.

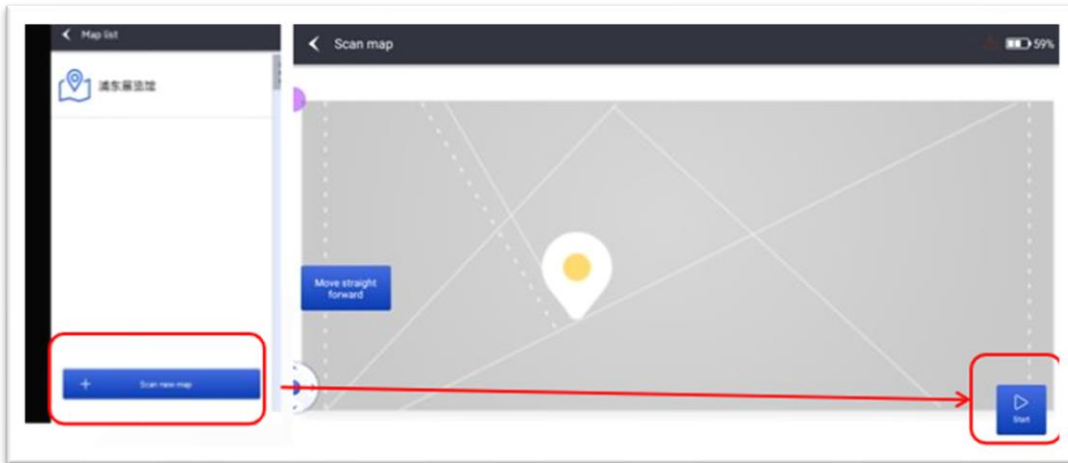
5.4.2.2 Enter scanning interface

1. Click the button on the left and select "**Data Management.**"
2. Click "**Map Management**" to enter the scanning interface.

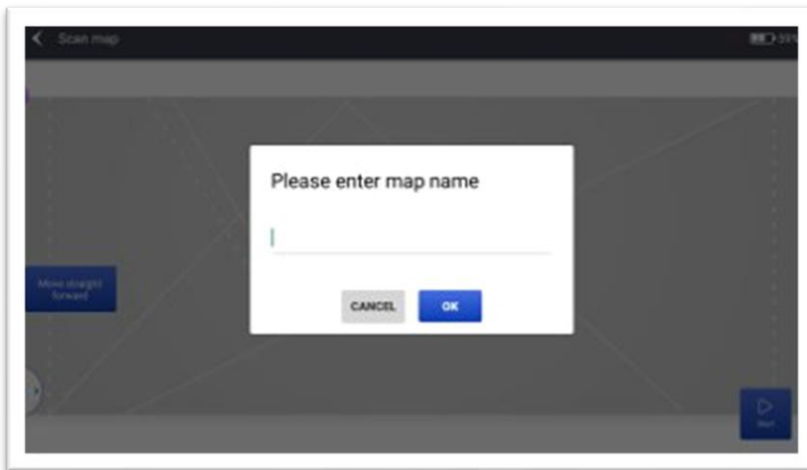


5.4.2.3 Create a new map

3. Click "**Scan New Map.**"
4. Click the "**Start**" button again.



5. Input the map name. (To facilitate customer identification, it needs to be named).



5.4.2.4 Create a new map - Route control

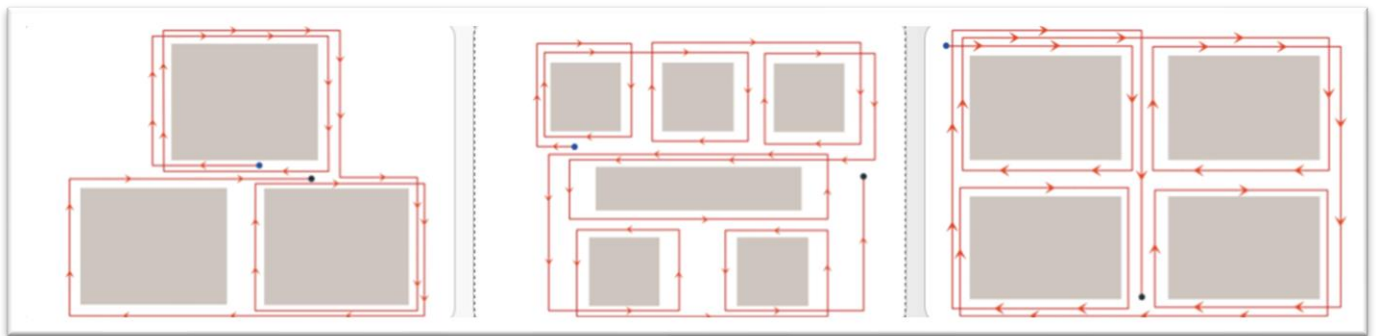
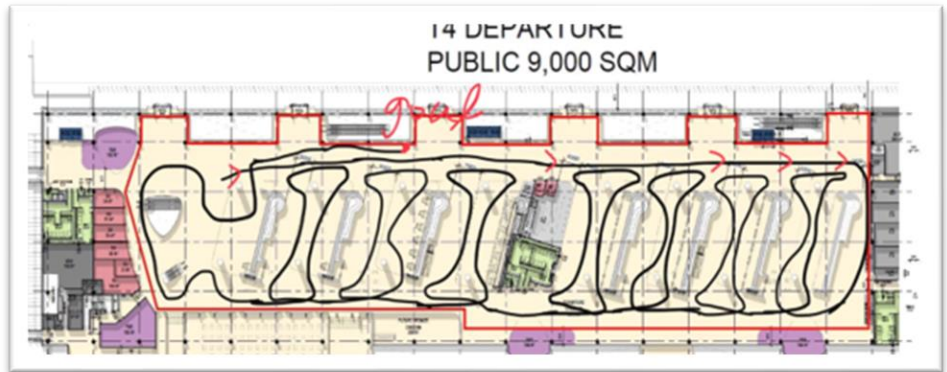
1. During the scanning, the status is visible on the LED screen. Push the robot forward steadily (smooth + straight line) and try to avoid a curved route.
2. When rotating or turning, it must be rotated slowly on the spot (less than 20°/sec at angular velocity), and then move straight forward again.
3. Forward velocity should be less than 1 m/s.



5.4.2.5 Create a new map - Scanning Tips

During the scanning process, loop closure is applied. Proceed as follows:

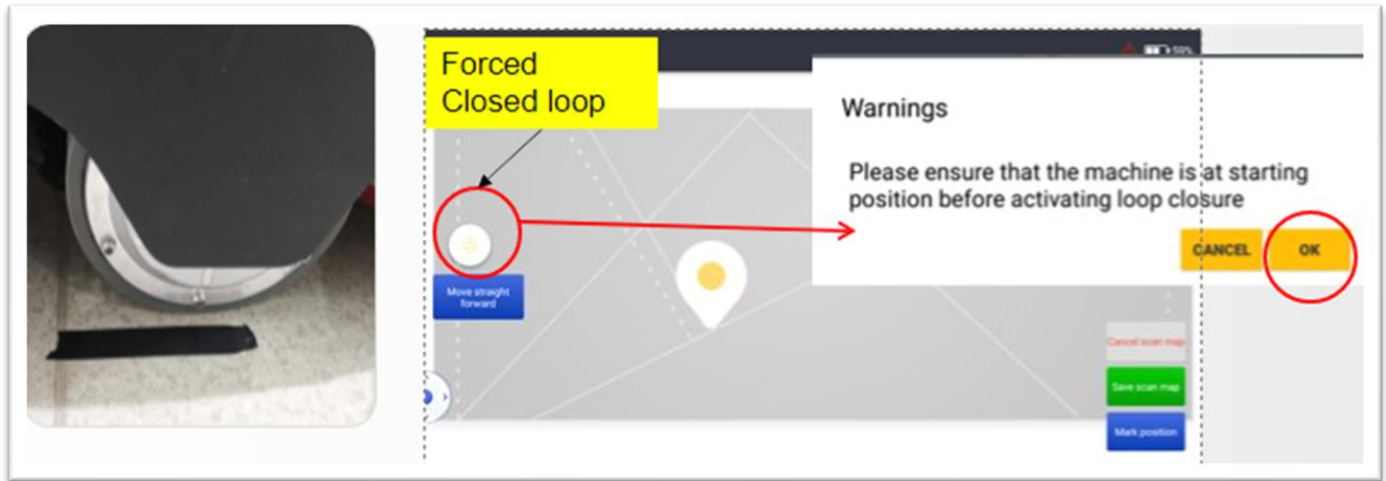
1. Select a reasonable route for the map scanning (1st - small closed-loop, 2nd- followed by large closed-loop).
2. All the cleaning areas must be scanned.
3. Avoid scanning the same area repeatedly.



5.4.2.6 Forced closed-loop

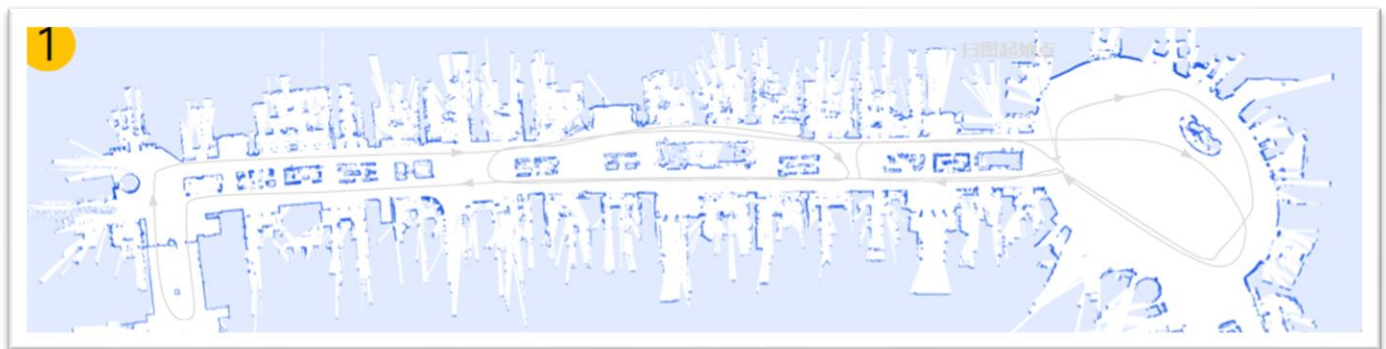
1. After scanning the map according to the closed-loop rules, move the robot to this position.
 - If the map status is normal, there is no need to use the forced closed-loop and go to the next page directly.
 - If there are still ghosting, distortion, etc. after waiting for 5 minutes, please perform the following operations:
2. Click the **"Forced Closed-loop"** button on the APP.
3. Steps to reproduce:
 - Click the **"Forced Closed-loop"** button → Click **"OK"** → Prompt that the closed-loop is successful.





5.4.2.7 Map confirmation/saving

After the map has been scanned (after the forced closed loop), you need to check the following points before clicking **"Save"**:



1. If there is an obvious distortion or ghosting in the start/end point, please try forced closed-loop.
2. If there are places that missed scanning, please do supplementary scanning.
3. If the scanned map has distortion and ghosting due to the wrong closed loop, which cannot be revised, please scan the map again.





NOTE:

- The final map you saved could be different from the preview during scanning. It is recommended to save the map and then check the quality.

5.4.2.8 Check map quality (important)

Carefully check the quality of maps

If there are issues in the locality, delete the locality with “map editing” and do a map extension. If the map frame was distorted, please scan the map again.



NOTE:

- The poor map quality would lead to random operation risks. There might be no issues in a test run, but there might be locating lost or jams in daily operation.

Key attention:

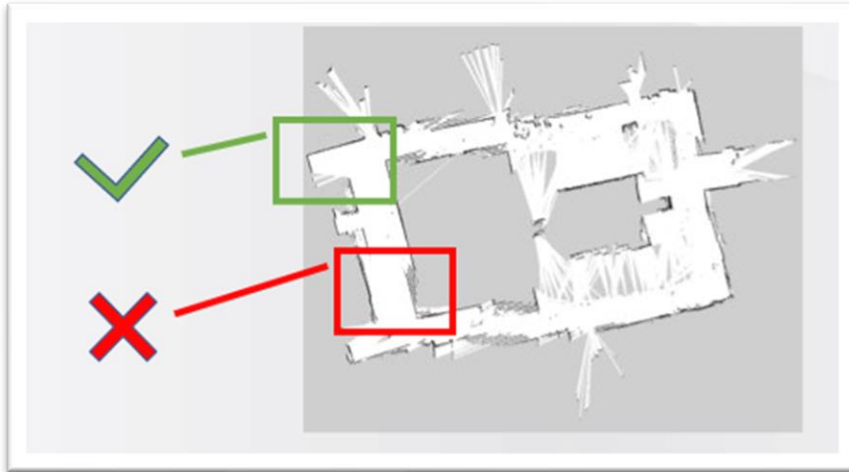
Closed-loop

The closed-loop means that the same area scanned by the machine at various times can be overlapped. False or missing closed-loop will lead to incorrect information on a map, which results in great locating offset or deviation, in the end, the robot loses locating or gets jammed.



Distortion

Distortion or ghosting is not acceptable. A common example is when one wall becomes 2 or more parallel walls. Distortion or ghosting will cause a great interference to navigation, such as locating jumping, lost, or jamming.



5.4.2.9 Map extension

Map extension is needed for one of the situations below:

1. There is a new area that needs to be cleaned that was not covered by the original map scanning. (Even if obstacles were scanned, the confirmation that obstacles are completed is necessary).
2. The environment has obvious changes, like decoration, displacement of furniture, etc. For this kind of situation, use "map editing" to delete these areas on the map and do map extension.)
3. The area is too big to scan only once. Use map extension to increase the success rate of map scanning.



NOTE:

- The map is to be less than 20,000 square meters, otherwise, robot operation would be not stable.
- If the area is over 20,000 square meters, separate it into several maps.
 - If all regions are connected, it is recommended to scan the major frame first, and then extend the map on the details in regions.
 - If all regions are connected only in one place, extend the map in turn.

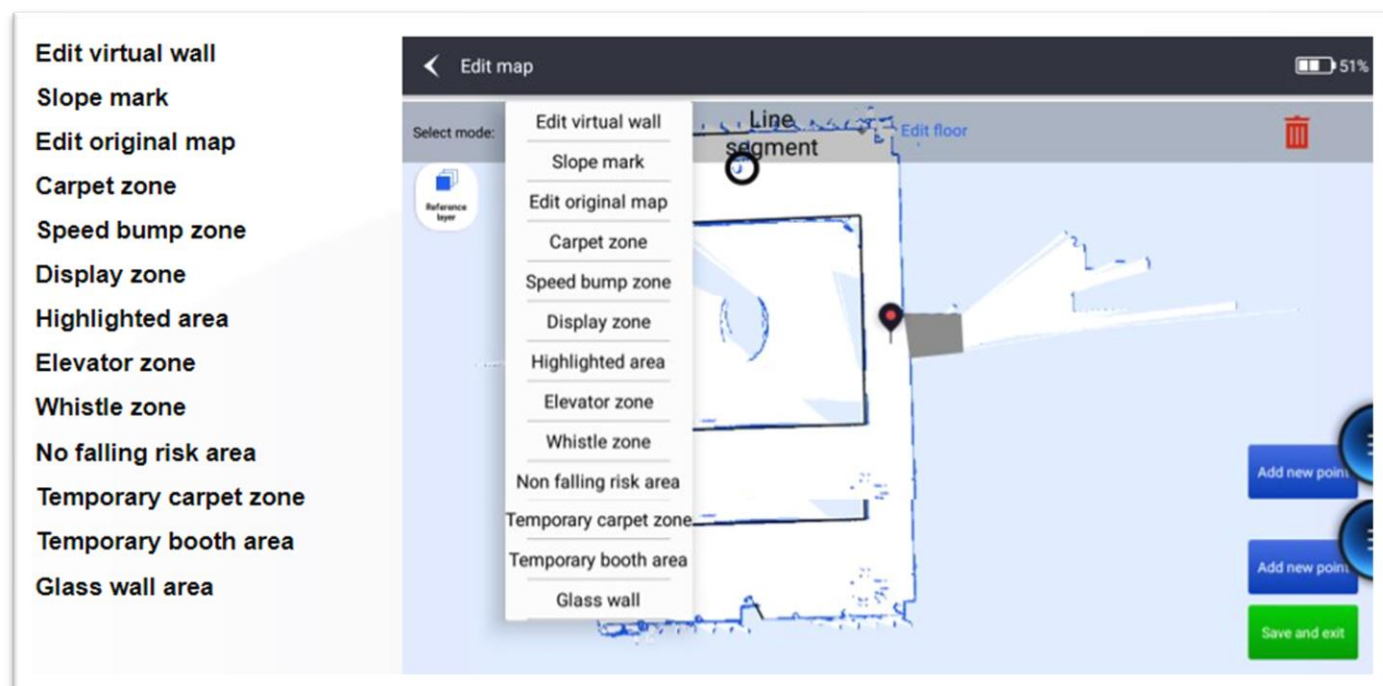


How to:

1. Select the map that needs to be extended in the map list, and click **"Map extension"**
2. Choose the appropriate start point for map extension, which is similar to map scanning .
3. Small closed-loop first, then big closed-loop. Confirm there are no ghosting and distortion before saving.
4. Locating the robot in the original map first, manually move a robot to the major route, then click map extension in APP.
5. Push the robot for more than 10 meters in the original map before entering the area to be extended. Map extension needs to follow the closed-loop rule as well.
 - a. Scan the major frame and the aisles for connections first, like in the figure above. Then do a map extension for the red highlighted areas.
 - b. Scan the areas from right to left and ensure their decent quality each time. If the quality of the map extension is not good, use "map store" to return to the previous status.

5.4.3. Map editing

The Map Editor has a total of 13 edit function buttons, as shown in the following figure:



Edit Mode	Description	Available shapes	Remarks
Original map editing	Clear area: modify the noise and obstacles on the original map and clear them by box selection (frame selection). Restore unknown areas: navigation and tasks are prohibited (in progress).	Polygon	The area surrounded by black lines
Virtual Wall Edit	It is used to mark the area that cannot be scanned by a laser, to prevent the robot from colliding in the above area and causing danger. For example, shops, fragile goods, etc.	Line/Polygon/Circle	black
Glass Wall	It is necessary to draw in the area with a glass wall. The sensor will filter the noise refracted by the glass to reduce the running jam of the robot caused by noise.	Polygon/Circle	Light blue
Highlighted area	The highlighted area is the key reference area for the robot to realize independent locating. It is necessary to select the fixed physical features in the map, such as walls, partitions, columns, pillars, etc. Try to make the highlight area range cover the fixed physical features, and do not exceed too much to prevent the introduction of non-fixed physical features. The robot will give more recognition weights to the physical features in the highlighted area. reduce the interference of the	Polygon/Circle	Cyan

	frequently moving non-fixed physical features to the machine's independent locating.		
Temporary booth area	When the robot moves to the temporary booth area, the robot will detect the interior of the area. If there is a temporary booth in the detection area, it will automatically avoid it; If there is no temporary booth in the detection area, the robot will perform the cleaning task normally.	Polygon/Circle	Grey
Carpet area	Give priority to avoiding this area. If there is no way to go, turn off / lift the cleaning equipment to pass through this area. After passing, the robot will turn on the cleaning equipment again.	Polygon/Circle	Green
Temporary carpet zone	In this area, only robots equipped with carpet ultrasonic detection sensors will work. When the robot moves to the temporary carpet area, it will detect the interior of the area, After the carpet ultrasonic detection sensor detects that there is carpet in this area, it will mark this area as a carpet area and trigger the idler running mechanism, that is, lift/off the cleaning equipment to cross the carpet area. If the carpet ultrasonic detection sensor does not detect a carpet in this area, it will normally perform tasks in this area.	Polygon/Circle	Green
Speed bump area	Turn lift/off the cleaning equipment to go through this area, and then turn on/put down the cleaning equipment again.		
Slope zone	Amplify/enlarge the recognition threshold of the sensor system for the height of obstacles and broaden the threshold triggered by anti-falling. When passing through this area, the machine will slow down for cleaning, that is, the cleaning equipment is still working.	Polygon	Dark blue
Whistle zone	Not supported now	Polygon	Light brown
Non-falling risk area	Estimate and define that there is no falling risk in this area and the anti-falling function is not triggered (common environment: Glass Kanban, glass floor, etc.)	Polygon	Grey Green
Elevator area	This functional area can only be used on the site where the elevator integration system is installed, which is the elevator car area.		
Recessed Floor lamp	Detour		

5.4.3.1 Edit virtual wall

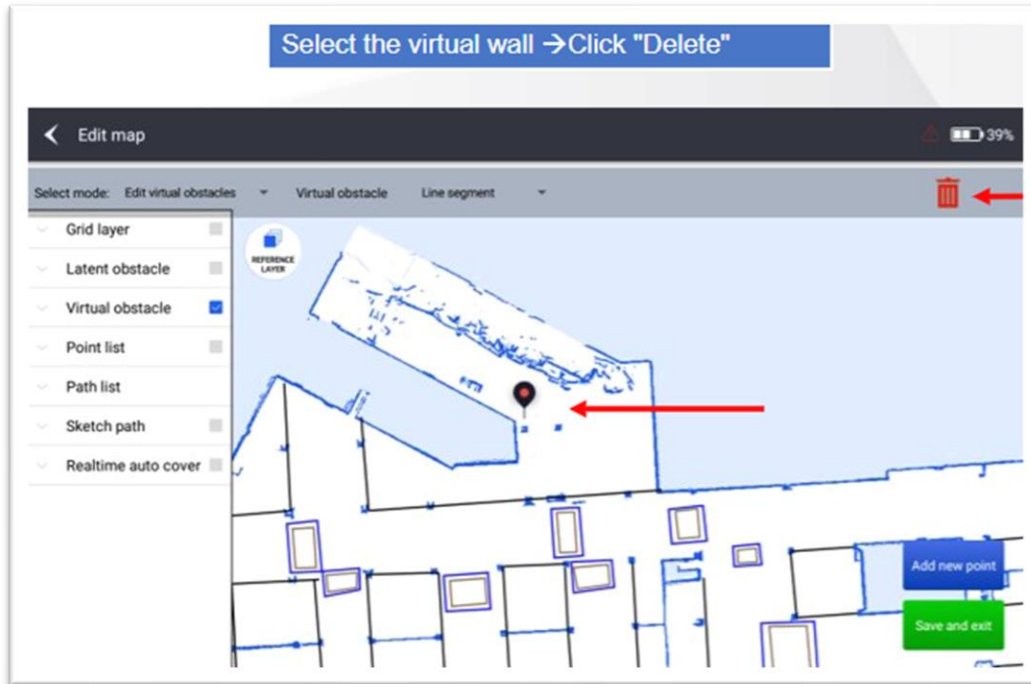
Add virtual walls for irregular/transparent/fragile items like glass walls, chairs, etc. to isolation, as well as stairs.

1. After entering "**Map Editing**," click "**Reference Layer**" in the upper right corner, tick all the paths, and draw a virtual wall according to the periphery of the path.
2. Drag the buoy to a suitable position on the touch screen, click "**Add New Point**" and then move the buoy to the next target position, and continue to click "**Connect to**." At this time, a line will be generated. This line is the virtual wall. It can be ended at any time and is not limited by quantity or length. You can stop drawing at any time, not limited by quantity or length.
3. Try to use polyline to draw it so that you can delete and redraw it at any time in case of the wrong drawing.
4. After creating the virtual wall, select "**Save All and Exit**" in the lower right corner → Click "**OK**".



Delete virtual wall

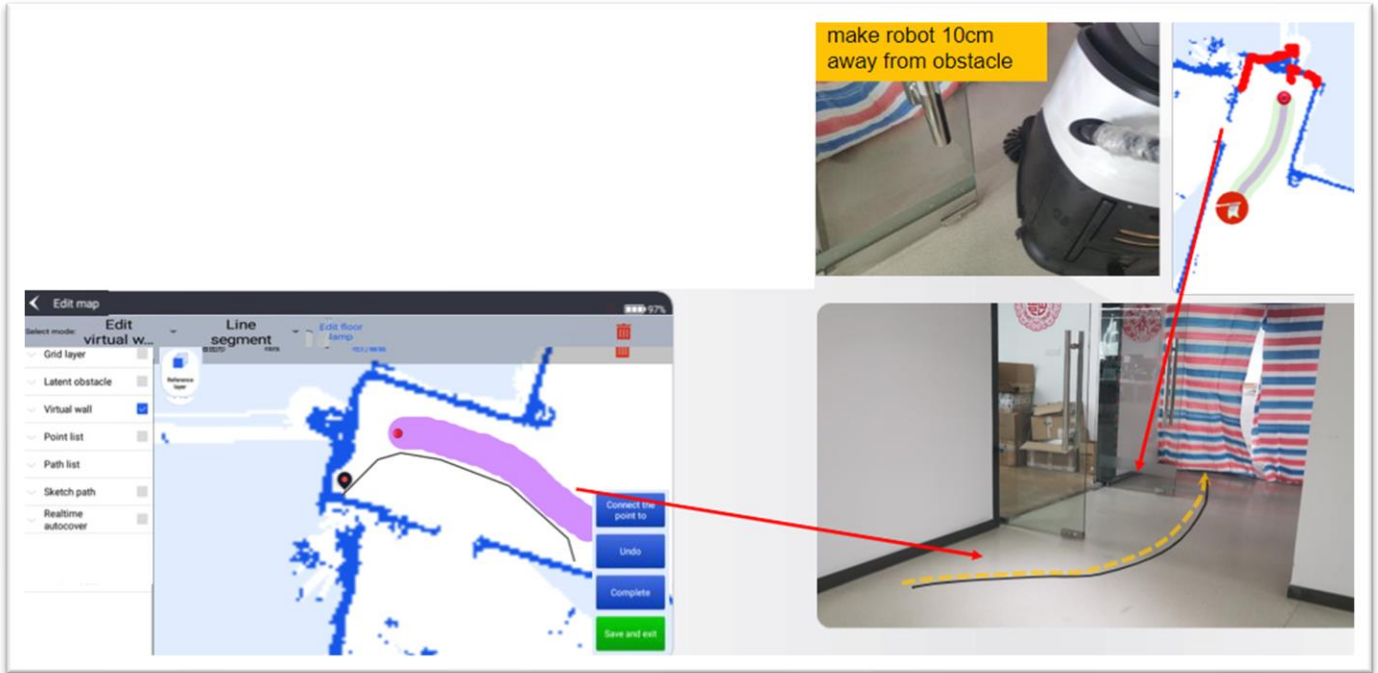
1. Click the virtual wall that needs to be deleted.
2. The virtual wall changes from **black** to **red**.
3. Click the red deletion symbol in the upper right corner to pop up the dialog box "**Confirm to Delete?**"
4. Click "**Save All and Exit**" in the lower right corner → Click "**OK**".



How to draw a virtual wall in specific areas:

When encountering scenes where the outline cannot be scanned normally, such as glass doors and we cannot draw the virtual wall accurately, we need to use other methods to achieve it.

1. After scanning the map, move the robot past the obstacle in the teaching mode and draw a path out.
2. Then return to the map editing interface, open the reference layer, and check the teaching path.
3. Draw a virtual wall according to the expansion area of the path, and then save.
4. Finally, delete this teaching path.



5.4.3.2 Mark slopes

The robot can intelligently identify slopes when going up or down. Users themselves design their robot response logic, such as deceleration, according to robot application requirements.

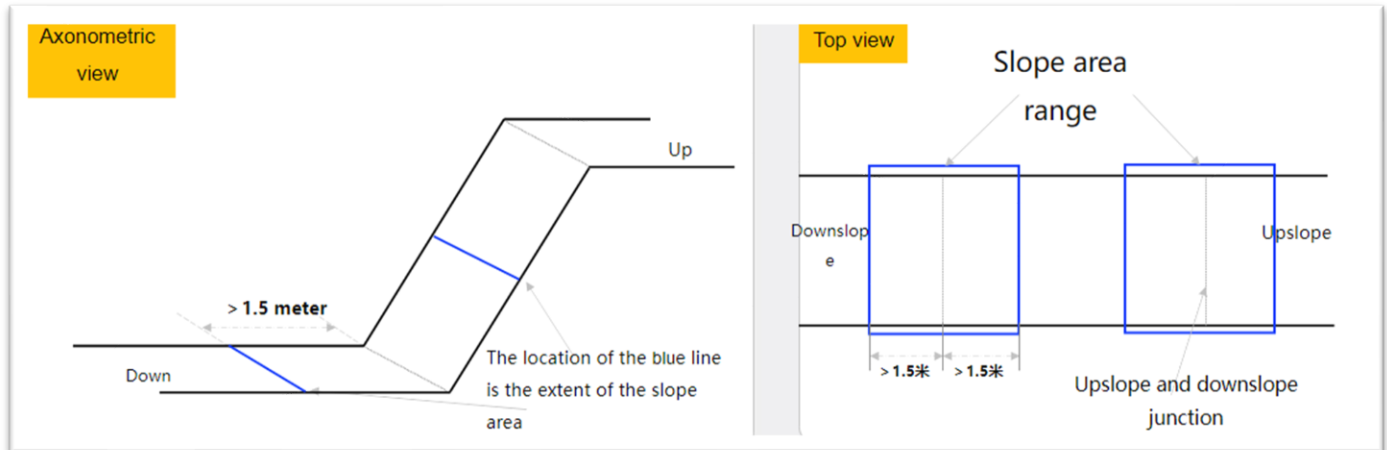
The area is only marked at the junction of uphill or downhill. Do not mark the entire slope.



NOTE:

- If the slope is less than 4 meters, it can be marked complete.

If the slope area is used to define the passable area, it is recommended to encircle the obstacles into the slope area, which does not need to activate obstacle avoidance.



5.4.3.3 Edit the original map

1. Modify the noise and obstacles on the original map and empty them as needed.
2. **Only the "Empty Area" function is currently recommended.**
3. The **"Fill Area"** feature is not recommended and can be replaced with a virtual wall.



NOTE:

- Do not remove the real wall, only the extraneous noise.

Drawing method:

Select mode → Edit original map → Find the noisy area → Choose a noisy area with the **"Connect to Point"** button → Click **"Complete"** → Select an Empty Area → Then **"Save and Exit."**



5.4.3.4 Highlighted area

Position:

Draw it on a fixed object, e.g., a pillar, wall, corner, etc.



NOTE:

- Do not introduce other movable obstacles when drawing the highlighted area.
- One highlighted area is drawn every 15~20 m.
- For commercial complexes and metro stations, all corners and pillars in the hall are required to be drawn as highlight areas. Refer to the link below:
<https://gaussian.yuque.com/docs/share/4cedb1db-e419-4373-ac22-8293b0500061?#>
- Do not draw symmetric highlighted areas on the map.



How to draw highlighted area:

“Add New Points” → “Connect Points to,” until the target is surrounded. The cyan box is generated at this time, i.e., the highlighted area. Finally, click “Save all and exit.”

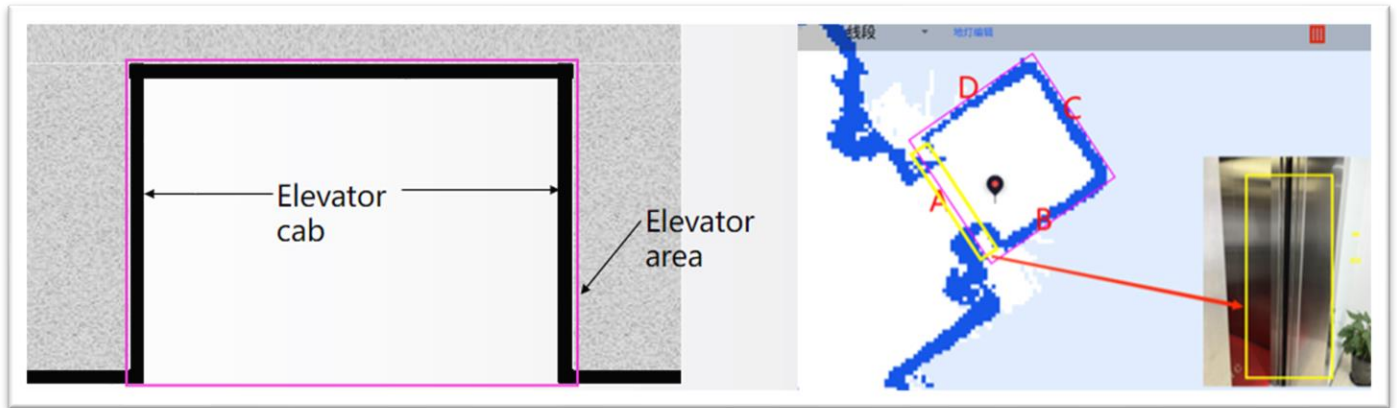


5.4.3.5 Elevator area

Use map editing to remove the noise inside the elevator or its door.

The elevator area should wrap the entire elevator, ABCD 4 sides. Draw the elevator area along the external outline of the elevator.

Side A is the door of the elevator, there must be no noise here, remove them after map scanning. Side A must be drawn in the middle of the elevator door (as follows) to facilitate the auto-generation of elevator points. Elevator points generated in the middle of the elevator door is also an important basis for the location generation of elevator point. There might be position deviation on the map, but the actual generation is based on the elevator door.



Position:

Scan the boundaries of the elevator according to the map to mark the elevator area, just to include the entire elevator in the elevator area.



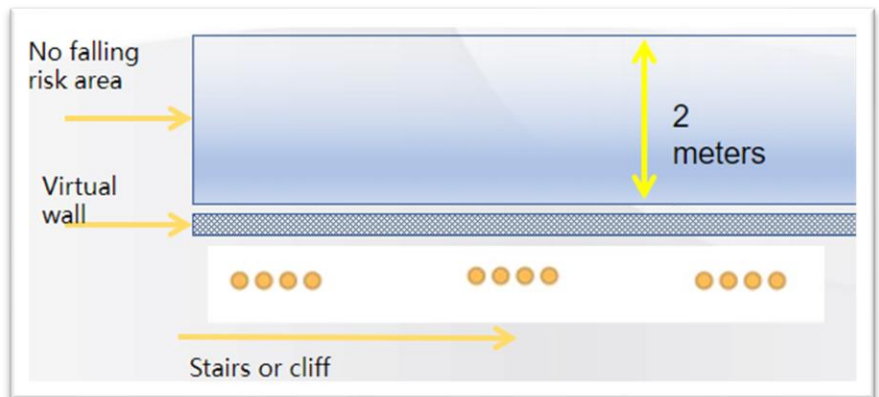
NOTE:

- The C side of the elevator area of each map should be consistent with the outline of the elevator. Do not draw lines near and far.

5.4.3.6 No-falling risk area

The rules for the area with falling risks are as follows:

1. The task area and area with falling risks should be isolated by virtual walls.
2. Virtual walls should be away from areas with falling risks as far as possible.
3. The distance is recommended to be more than 0.5 meters.



Purpose of no-falling risk area:

- The robot will neglect the falling risk recognized in this area. Avoid activating the anti-falling feature when passing through this area.

Applications:

- The inside of glass doors or fire doors, etc.



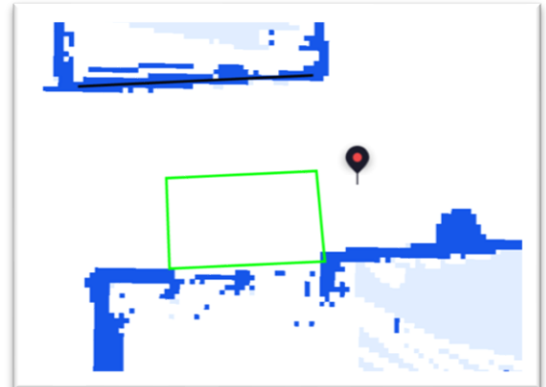
NOTE:

- Make sure the “no-falling risk area” has been separated from the areas with falling risks with virtual walls.
- Regard the area within 2m inside the glass wall as a no-falling risk area, like in the right figure.

5.4.3.7 Temporary carpet area

When the robot moves to the temporary carpet area, it will make judgments based on the inside area.

- If a carpet was detected in this area, the feature will be triggered to lift the corresponding equipment to go over the carpet.
- If no carpet was detected in this area, the robot will perform the cleaning task normally.



NOTE:

- Only the robot that equips carpet – ultrasonic has this feature. Use virtual walls to avoid this area.

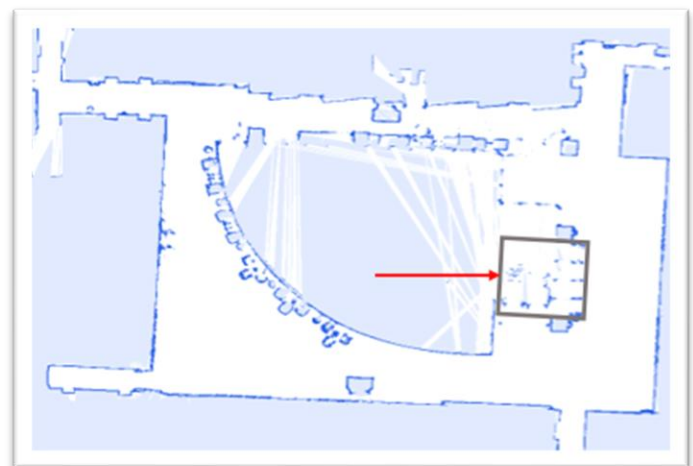
5.4.3.8 Temporary display area

Temporary display area:

Temporary placement of stands and activity areas need to draw temporary stand area.

Explanation:

The robot detects a large number of obstacles in this area, and this area will become a restricted area; if there are fewer obstacles, the robot can judge intelligently and continue the cleaning task.



Judgment criteria:

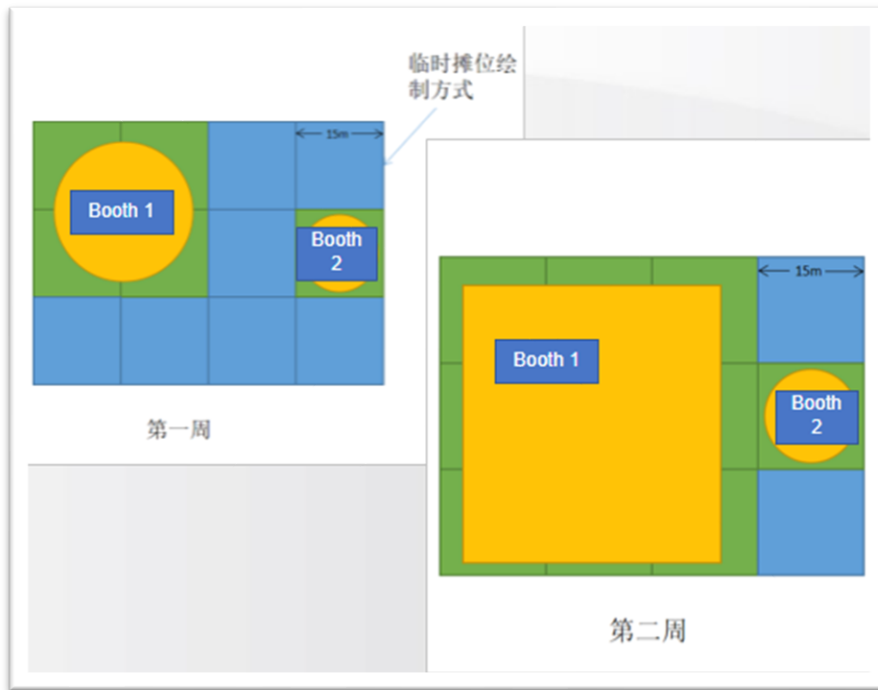
Less than 40% of the area is covered by obstacles.

Reference:

<https://gaussian.yuque.com/rh21ns/gxv6wx/behtye>

For large areas (event booths > 15m in length on equal sides), please follow the drawing method below.

Multiple temporary stand area splicing



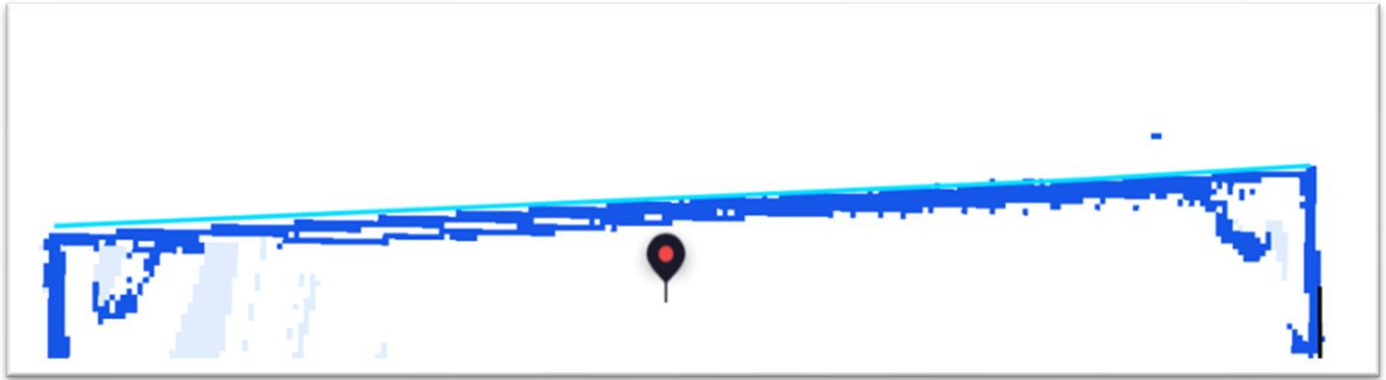
5.4.3.9 Glass wall

When the robot runs against the glass, it may generate noise and trigger obstacle avoidance. If a glass wall is painted, the robot can intelligently filter irrelevant noise.



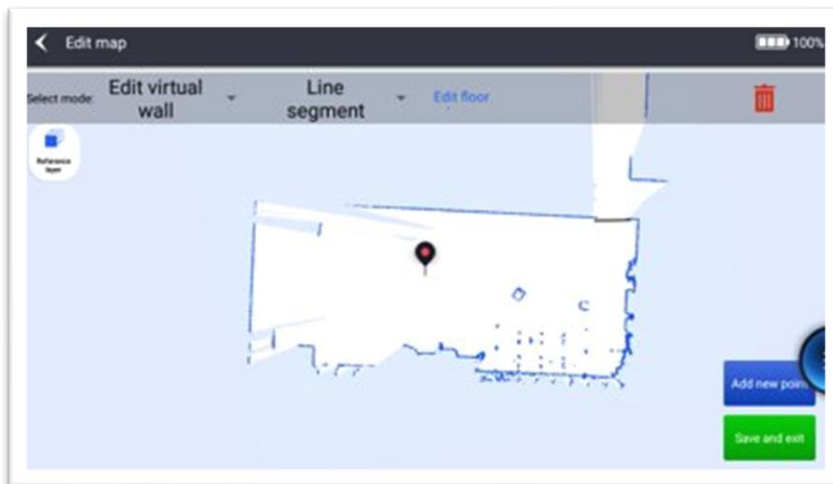
NOTE:

- Draw glass walls and virtual walls at the same time in the place where there are actual glass walls (within 10cm).



5.4.3.10 Recessed ground lamp area

The area with a recessed ground lamp or pop-up floor plug needs to be marked to avoid damage to these devices.



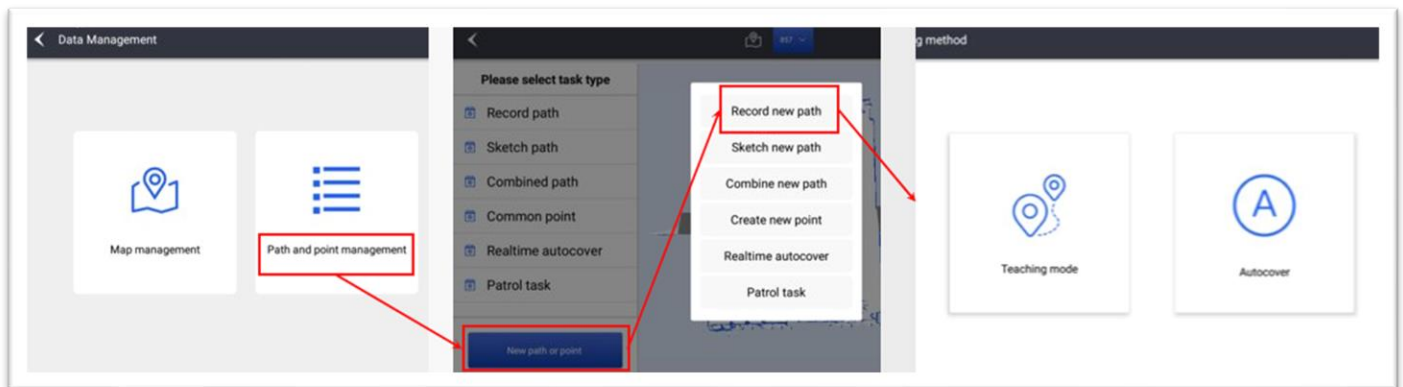
1. Select "**Edit floor**," then confirm locating status, if the locating is normal, select "match", and re-locating robot if it's abnormal.



2. Make the robot face the ground lamp for the bumper to touch the center of the ground lamp. Then, click **"Start to mark"** and save.

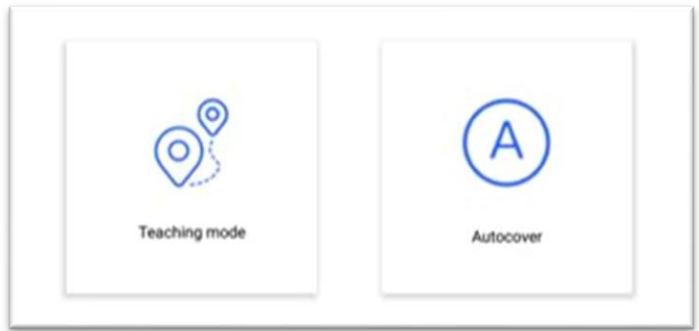
5.4.4. Create cleaning path

- After editing the map, you will see the following screen when you do the path planning: **"Path and Point Management."**
- Click the **"New Path or Point"** button at the bottom left.
- When the window pops up, please click **"Record New Path."**
- Then you will enter another selection screen: **"Teaching Mode"** & **"Autocover."**



5.4.4.1 Teaching mode

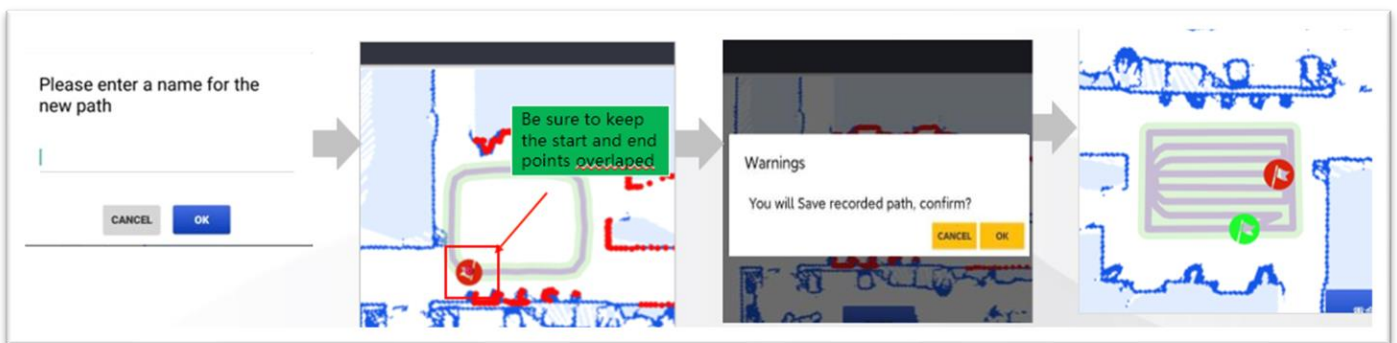
- Click "Record new path" to bring up the page on the right and select **"Teaching mode."**
- Push the robot through the area to be cleaned. The auto mode will only follow this route.
- The route must be straight + arc. Do not bend and do not leave white.



Teaching mode → Enter path name → Manually move the robot through the areas that need cleaning → Then save it.

5.4.4.2 Auto-cover

Autocover → Enter a path name → Drive the robot manually to record a closed-loop path → Then save it.

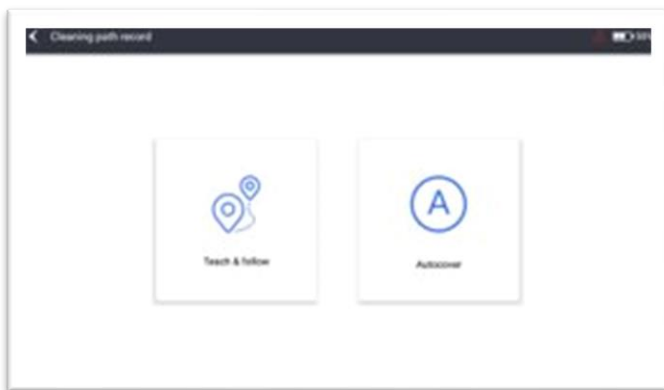


The following two examples are not feasible, so please avoid them:

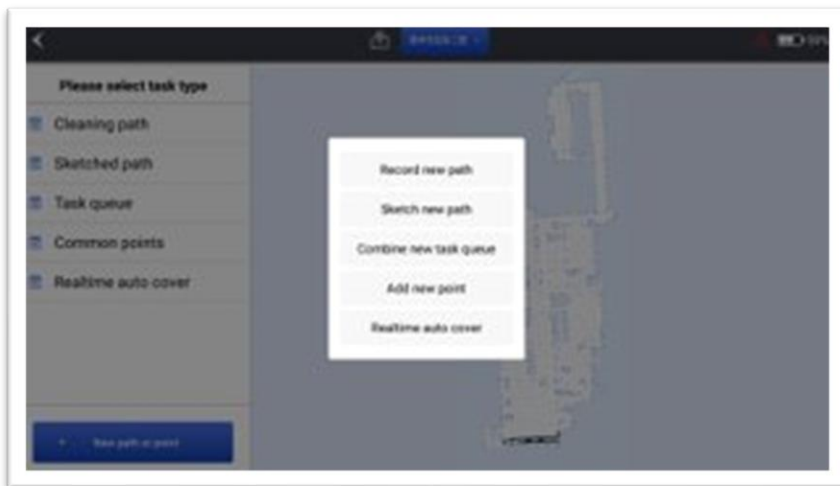


5.4.4.3 Real-time auto-cover

- Enter data management and click **"Path and Point Management."**



- Click **"Real-Time auto-cover."**



- Through pinch-to-zooming/rotating and dragging on each side, make the red square cover the area to be cleaned (allowing to exceed walls and obstacles, no effects on path generation).

- You can click the **"Preview"** button in the lower right corner and click **"Cancel Preview"** after confirming that the path is correct.
- Go back and click **"Save All"** in the upper right corner, and finally, enter the new path name.



5.4.4.4 Real-time auto-cover | virtual wall tracking

Support version:

M line optimized version, the version later than 3-22-0.

- Draw virtual walls less than 10 centimeters away along obstacles, like green lines in the figure below:

Artificial wall:

A new language that makes a robot clean the area close to obstacles along the virtual wall.



How to activate:

- It is ON if the default scenario is a hotel.
- If it is not employed in a hotel, activate it via the APP Data Management → Setting → Advanced → robot config → check parameter → strategy → realtime_auto_cover, turn on **"use_virtual_wall_tracking"** and reboot the robot.



NOTE:

- Make the artificial wall line overlap the real wall as far as possible.
- A virtual wall should be placed outside the door at a safe distance to avoid scratch risk.
- The value of "safe_distance" in the advanced parameter setting should be higher than 0.04. Otherwise, the robot is too close to a wall, and crashing might happen.

Support version:

M line optimized version, the version later than 3-22-0.

Set the distance against the virtual wall:

APP Data Management → Setting → Advanced → robot config → check parameter → strategy → realtime_auto_cover → safe_distance (this value is the distance between the robot shell and obstacle, unit: meter. Revise this value to adjust the distance against the wall. Restart the robot after revising it.



NOTE:

- These 2 parameters will be saved in public/user_config.yaml after revision. The software upgrade will not restore them to default.
- The "safe distance" parameter works not only on the virtual wall but on the artificial wall as well.

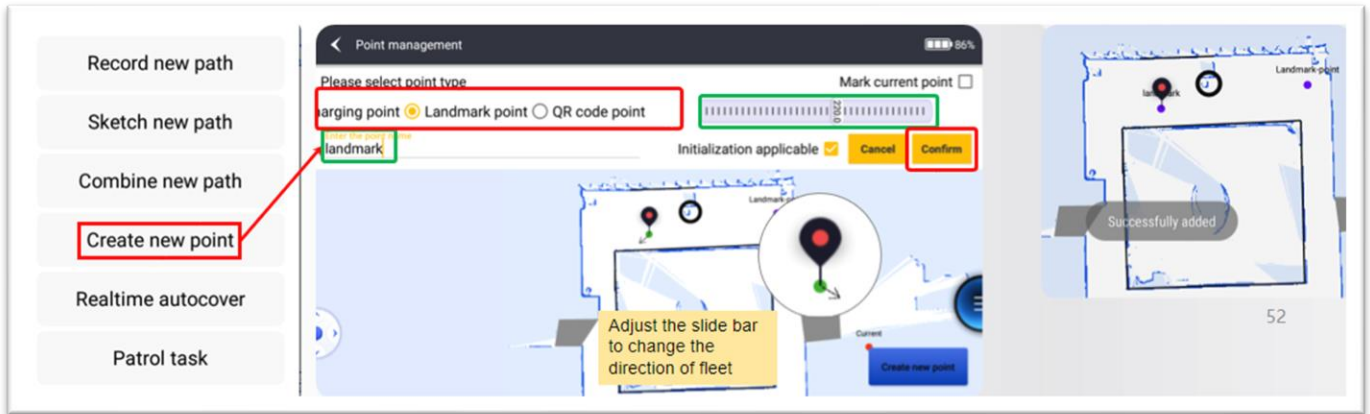
- Revising "safe distance" would lead to crashing or jam issues. Assess it several times if it needs to be revised. The value should not be less than 0.04.
- Turning "virtual wall tracking" on/off will not affect "wall tracking." These 2 features can be used simultaneously. Turn "wall tracking" on/off in APP as needed.
- To perform the first "wall tracking" task, confirm to select the right cleaning device. Refer to this file to choose the right cleaning device:
 - <https://gaussian.yuque.com/docs/share/6a06d2bf-9d9c-4760-9c1e-036f11d3afb6?#>
- Walls cannot be recognized in real-time auto-cover due to the gap in front of a door in a hotel. So, it is necessary to draw walls manually (artificial walls).
- In the corner of the actual wall, do not draw virtual walls to avoid activating the wall tracking feature, which would lead to a crash with actual walls.

5.4.4.5 Create new points

Point Name	Definition	Creation Method	Remarks
Landmark Point	Points for robot positioning.	Mark directly on the map, paying attention to the direction of the arrow, i.e., the front of the robot.	It must be created. Be sure to communicate with the client about the location to be created (Make sure the location is stable and reliable, will not change, and is easy to find).
Charging Point	Points are to be created for automatic charging.	Manually dock the robot and directly mark the current point as the charging point.	It must be created and equipped with a charging station. There should be only one charging point.
Workstation	Automatic charging, water filling, and draining point.	Manually dock the robot to the workstation and directly mark the current point as the workstation.	It must be created if you have a workstation.
Maintenance Point	Triggering back to this point when the low battery, the clear water tank is empty, sewage tank is full.	Mark directly on the map, paying attention to the direction of the arrow, i.e., the front of the robot. The robot goes to this point and waits for maintenance from an operator.	It's not a charging point, and no workstation must be created.

Navigation Point	The robot automatically navigates to the point of the target location.	Mark directly on the map, paying attention to the direction of the arrow, i.e., the front of the robot.	Not required to create.
QR Code Point	Scan the QR code to automatically locate and select tasks.	Need to print the completed QR code and fixed on the wall (and the front flat camera height), the front flat camera is facing the QR code according to the prompt to create the point.	Not required to create.
Entry Point	No need to establish manually at present, the elevator control area will be generated automatically after drawing; the waiting point for entering the elevator cabin.		Ladder control sites must be created.
Initial Point	Not currently in use.		Not required to create.

- Each point type has a different color.
- The workstation point and charging point cannot be used simultaneously.
- When "initialization applicable" is selected, this point should be set up in a place that has specific features.
- For the elevator feature, a landmark should be set up in front of the elevator for each floor.



- ① Click **"Create new point."**
- ② Click the type of point you need, then enter the point name at the bottom, pass the slider to adjust the angle, and click **OK**. The point is created.
- ③ It will prompt **"Added successfully."**

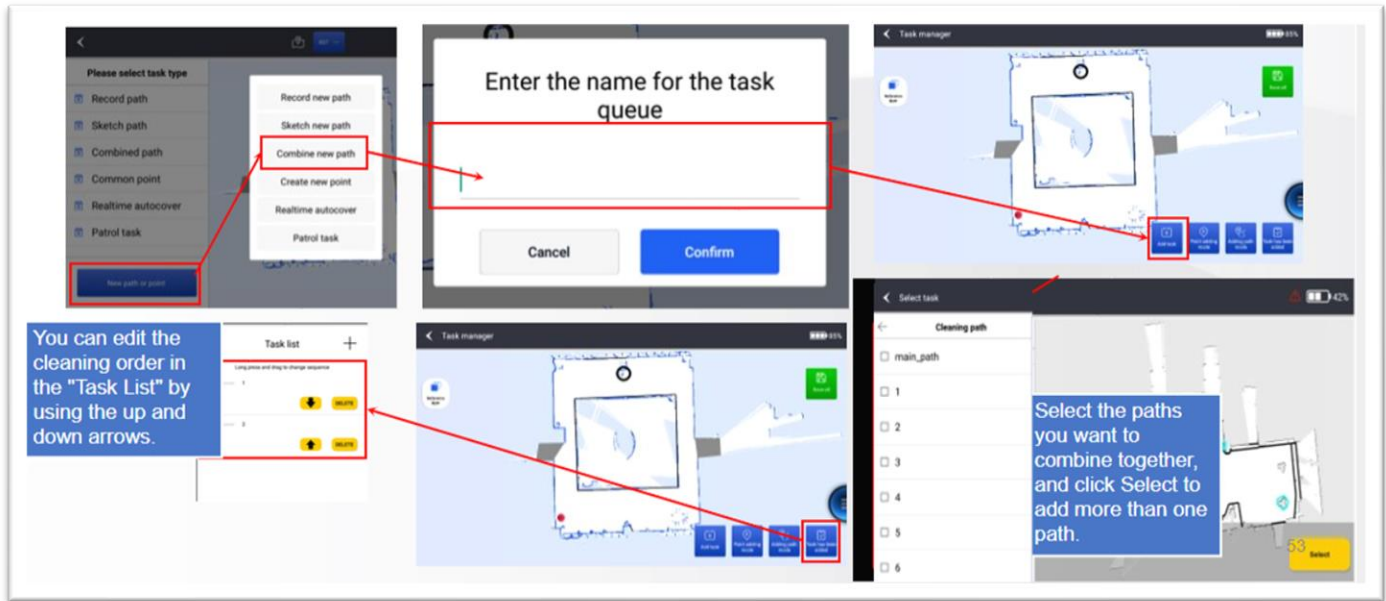
5.4.5. Create paths | Combine new path

- Click the **"Combine new path"** button → enter the name of the combined path → add the path to be cleaned → edit the order → save.



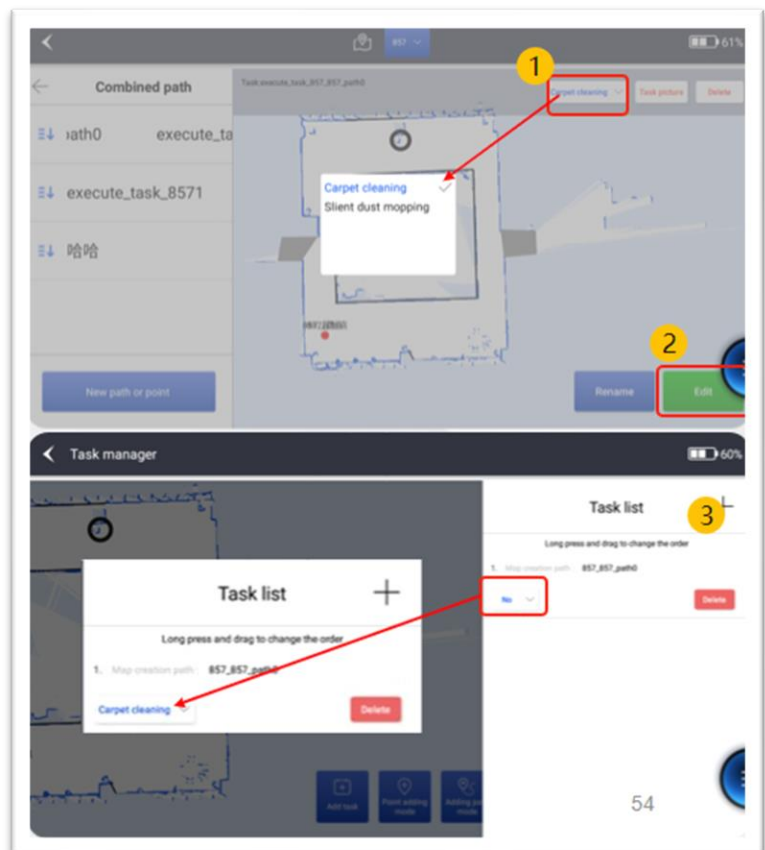
NOTE:

- There should be a "go home" task after each combined path. If "go home" is unavailable due to cross-floor, add "back to maintenance point" to combine the path.



5.4.6. Create paths | Combine new path – cleaning mode configuration

- First, in the “cleaning configuration,” complete 2 cleaning mode configurations under “cleaning mode”.
- Enter the combination path interface. First, select the combination path that needs to be adjusted, and select cleaning mode in the upper right corner.
- Then, click “Edit” in the bottom right corner to enter the task scheduling interface.
- If there are single or multiple sub-paths, the cleaning mode needs to be configured separately and can be adjusted manually.
- Save and Exit.



Logical explanation :

- If single or multiple sub-paths are configured with cleaning mode, these sub-paths will not be affected by the cleaning mode of "combined paths" and will take effect separately when performing automatic tasks.
- The cleaning mode of the sub-path has the highest priority, and the cleaning mode of the combined task has the second highest priority.

5.5. Precautions of deployment

Map scanning

- The turning speed of the scanning map should be slow (not higher than **20°/s**), to avoid ghosting/deformation.
- For map scanning, we must take a small closed-loop first and then a large closed-loop (simple scenes only need a large closed-loop); the extended map must also be a closed loop.
- If the quality of the map is poor, please re-scan it; because it will directly affect the robot's locating, please be careful.
- For the places with glass, tables, and chairs, it is recommended to put laser stickers first to improve the quality of scanning and stabilize the auto-locating of the robot.

Path

- For on-site path deployment, the "**Real Time auto-cover**" path is recommended; for narrow passages (≤ 1.5 m), the "**Teaching Mode**" is recommended.
- Avoid obvious grooves/bumps in the path, otherwise, the auto-generated path will be messy and there may be blank space.
- If it is a recorded cover path, the origin point and the endpoint should be as close as possible, and the two points should not be more than **2 m** apart.
- If the cleaning area is large ($> 1,000$ m²) or irregular, it is recommended to divide it into several regular auto-cover paths.

Map editing

- For any on-site deployment, please be sure to draw the virtual wall and highlighted area.
 - The virtual wall should completely encircle the cleanable area.
 - One highlighted area is drawn every about 15 to 20m, with no need to draw too many.
- When editing the original map, the real wall must not be deleted, but just the irrelevant image noise is deleted.
- In areas where there is a risk of falling, a virtual wall must be drawn slightly away from the risk area.

- It is recommended to draw the virtual wall after the path is deployed so that it is not easy for the path to interfere with the virtual wall.
- All functions are edited in the same way.
- All functional areas that have been edited are deleted in the same way.
- Each functional area is displayed in a distinct color.
- The highlighted area and the display zone have opposite literal meanings, but their purpose is the same, and they are both used for locating assistance.
- The display zone can be drawn at the temporary active area.

Deployment of charging pile

1. Issues about laser reflective stickers

Solution:

B5010142111 Deploy laser stickers for workstation & charging pile
<https://gaussian.yuque.com/rh21ns/cig8as/gg8aco>

2. Issues with the configuration

Solution:

SOP for issues relating to auto-docking
<https://gaussian.yuque.com/docs/share/904ba703-87ef-4215-901b-e4d95e9eff5e?#>

3. Issues with QR code

Solution:

Z5009262111 QR code replacement for charging pile & workstation
<https://gaussian.yuque.com/rh21ns/cig8as/tig3fs>

5.6. CHARGING PILE DEPLOYMENT

1. Auto-charging triggering.

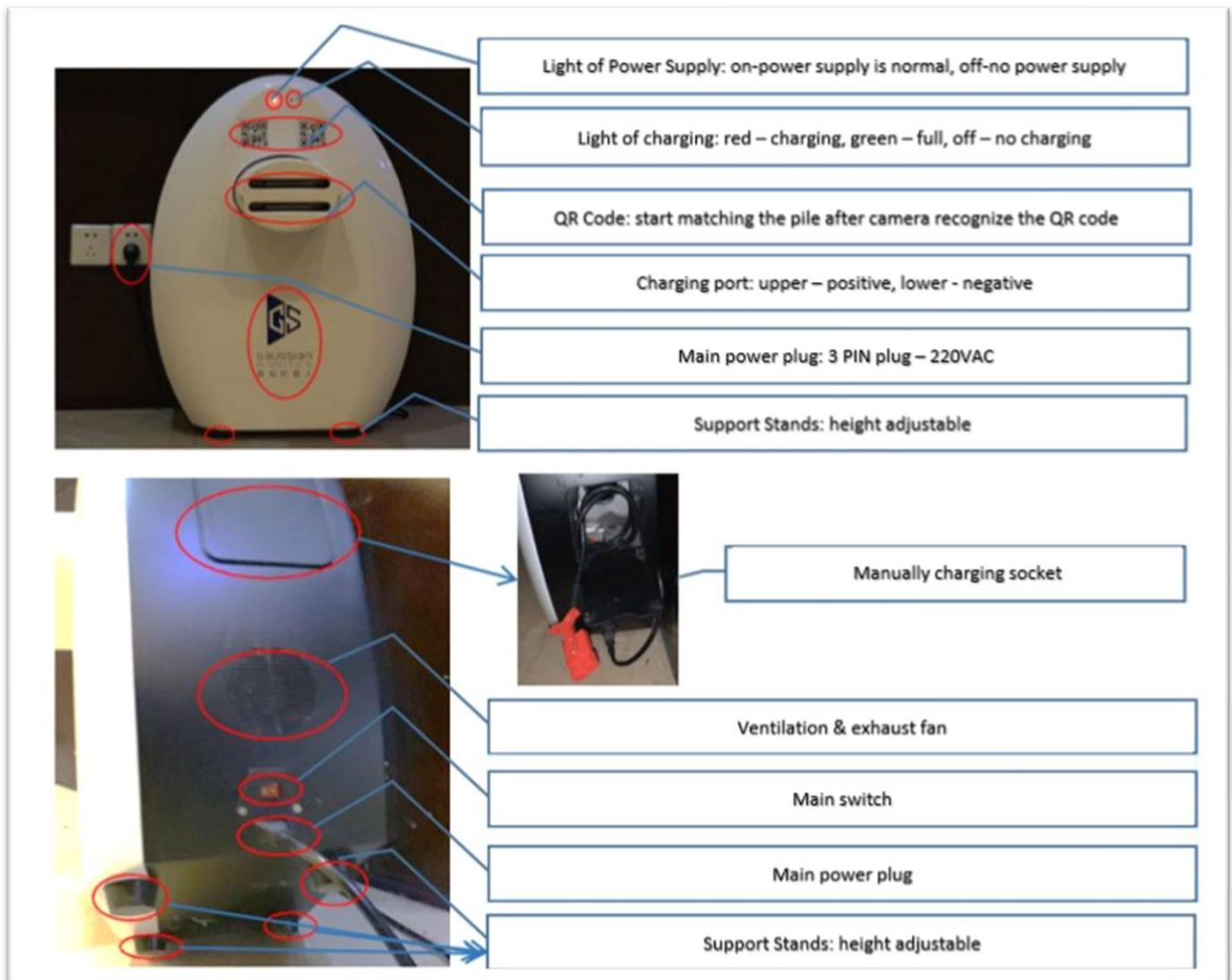
- a. When the power of the robot drops to 20%, the robot will go to the charging pile and do auto-docking for charging.
- b. A charging point is added to the combined task, and the robot will go to the pile and dock itself for charging.

2. The robot recognizes the charging pile.

- a. When the charging task is triggered, the robot autonomously navigates to the front of the charging pile and uses the laser to identify the shape (length and width) of the charging pile.
- b. If the charging pile position recognized by the robot deviates, the robot will adjust the position left and right.

3. The robot moves backward to identify the QR code for docking.

- a. After the robot recognizes the charging pile, it turns around 180 degrees, retreats about 40cm away from the charging pile, and will use the rear camera of the robot to identify the position of the QR code and prepare to locate the position of the charging pile. After the precise position of the QR code is accurately recognized, the robot adjusts the angle and continues to retreat to dock itself.



5.6.1. Deployment requirements

1. The charging pile must be placed against a wall and be perpendicular to the ground. If a laser sticker is deployed, there is no requirement on a wall.
2. There should be no obstacles within 0.7 m on the left and right of the charging pile.
3. There should be no reflective material object within 0.6m around the charging pile.
4. If it is necessary to be moved, the movement distance should be less than 10cm.
5. Start from the fusion of the M line: 1.6 meters from the walls is fine for the length of the reserved place.

6. Ensure there are no obstacles in the way of "go home" mode, and the task was combined with paths.
7. The appointment feature can be turned off for all charging piles. Docking does not need an appointment. Close the appointment feature following the path in the APP: **/strategy/gs_work_station/need_order**.



5.6.2. Set a charging point in-app

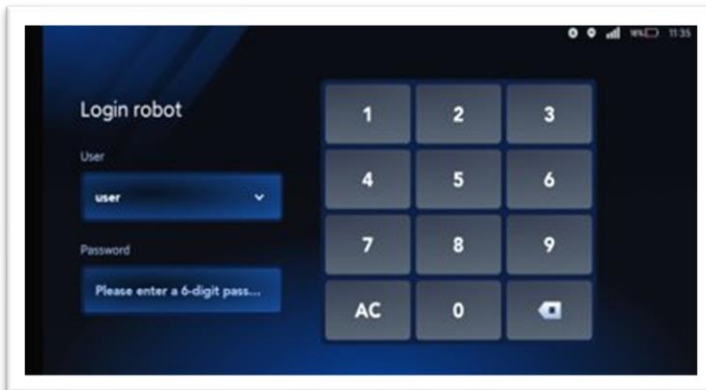
1. Manually dock the robot to the charging pile:

- a. Ensure that the robot is located precisely and make the back of the robot face the charging pile (as shown in the figure below).
- b. Make their charging ports fully contacted.
- c. Then create a charging point by marking the current point.



2. Set the charging point:

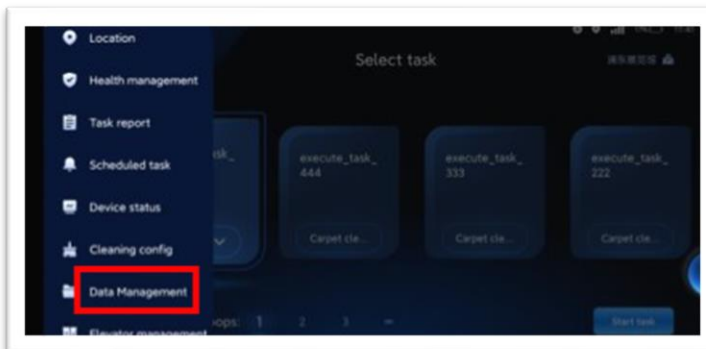
- a. Enter the following parameters:
 - i. User: admin
 - ii. Password: 314159.



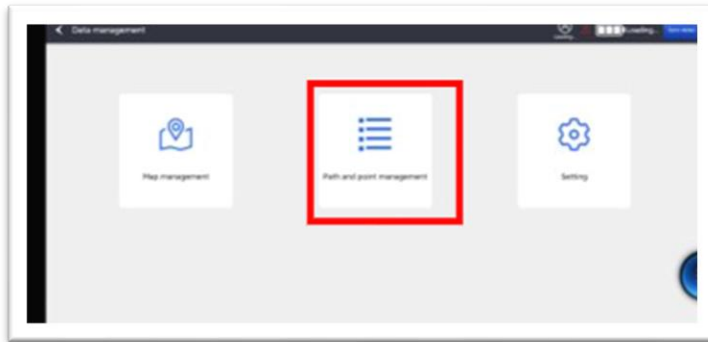
- b. Click the Menu on the left.



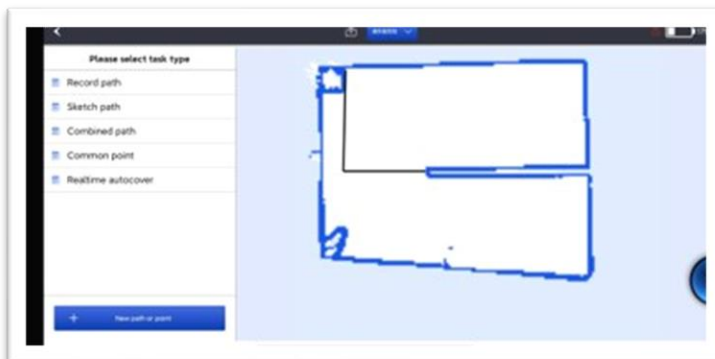
- c. Click "**Data Management.**"



- d. Click "**Path and Point Management.**"



e. Select **"New Path and Point."**



f. Complete the creation of the point according to the serial number above.



NOTE:

- After setting the charging point, when the power of the robot is down to **20%**, it will automatically go to the charging pile and dock itself for charging.

5.6.3. Deployment verification

1. Set up a combined task (only add the charging point to the combined task):

After completing the following operations, you will be able to execute the newly created charging task and test the function of auto-docking and charging.



- ① Select **"New Paths or Points"** → **"Combine New Task Queue."**
- ② Add tasks.
- ③ Select the charging point.

2. Make sure the charging is working:



- ① The charging indicator light of the charging pile turns **red**.
- ② The APP pop-up window shows "charging."
- ③ The lightning icon is displayed on the power screen.



NOTE:

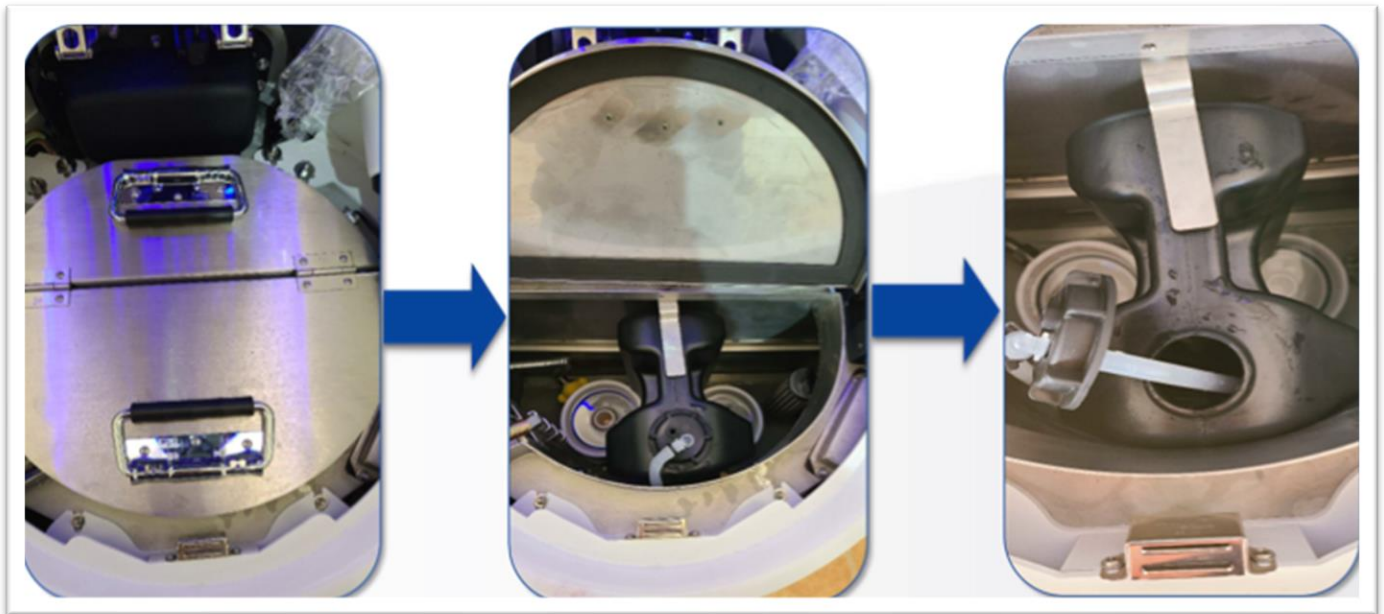
- Manual charging and auto charging cannot be used at the same time.
- Do not turn off the robot during charging.
- The QR code shall not be damaged or soiled.
- Do not put debris on both sides of the charging pile.
- Only one charging point can be set in the APP.
- The charging point can be added to the task queue and placed at the end of the task queue.
- The power supply of the robot cannot be switched off.

5.7. DISINFECTION PACKAGE DEPLOYMENT

5.7.1. Basic Introduction

Get access to the disinfectant box:

- ① Open the top lid.
- ② Open the cleaning water tank.
- ③ Open the disinfectant tank.



NOTE:

- Toggle the buckle left or right, then take the disinfectant tank out.



Disinfectant: hypochloric acid (recommended)

Liquide level display:

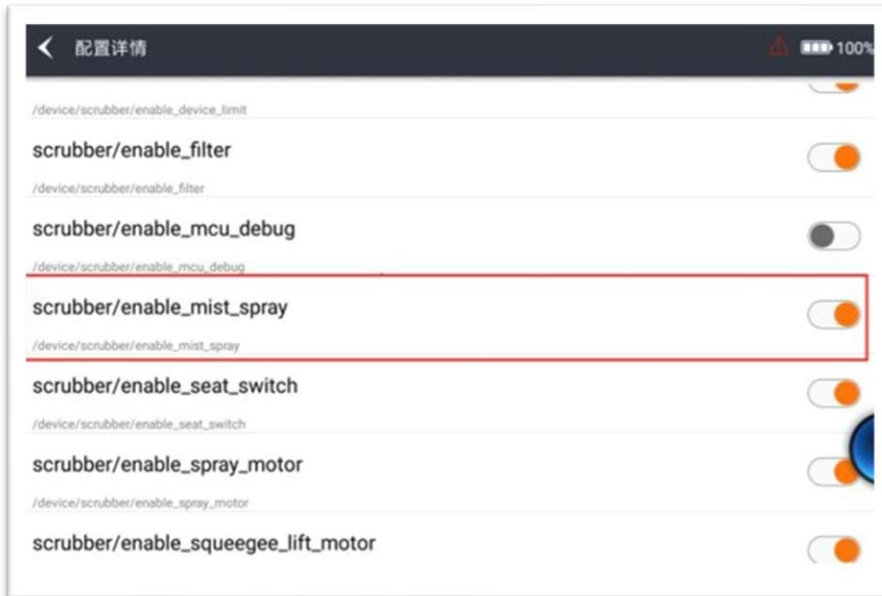
- Load in the disinfectant tank: maximum - 5 liters
 - Load in the water tank: maximum - 20 liters
1. Smoothly add disinfectant to avoid overflow.
 2. Observe the liquid level while filling the disinfectant. Pay attention to the liquid level when filling the disinfectant without a measuring cup.
 3. Stop filling when it is close to full.



5.7.2. Config settings

You need to complete the following steps during deployment:

1. In "Advance Settings," enable mist spray to turn on the feature.
2. Restart the robot to activate this feature after turning it on.



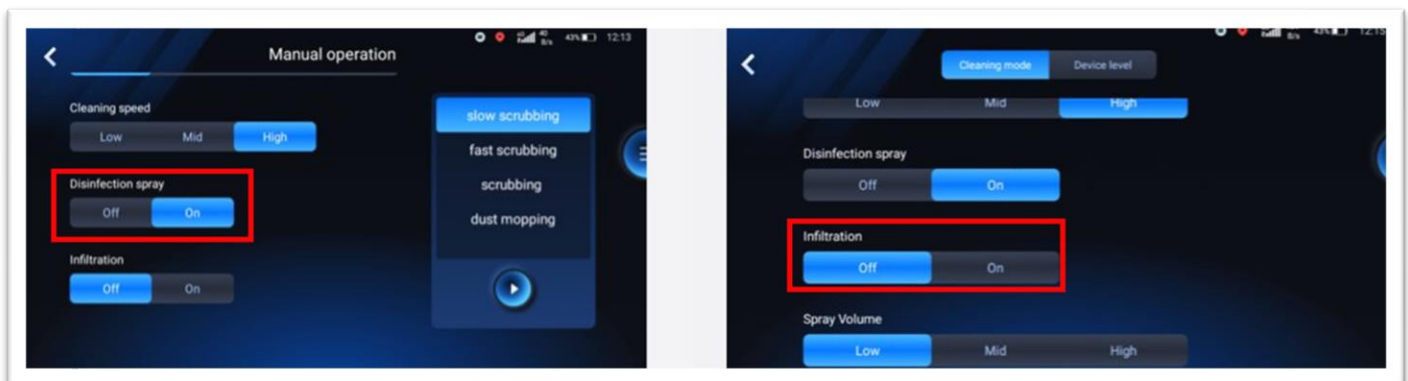
For operator:

3. After enabling the disinfection feature, turn "**Disinfection Spray**" **ON** in the cleaning mode interface. It is available in both auto and manual modes.
4. "Disinfection Spray" is set to open by default.



NOTE:

- If the "Disinfection Spray" option is not displayed, "scrubber/enable_mist_spray" may not be enabled.
- Enable it first.



- Set the "spray" feature enabled to have it work together with the cleaning task. If it is set to "disabled," it will not work together with the cleaning task.
- The spray will be paused when the robot moves backward. The spray is not restricted by turning and speed with a regular value of 0.8L/H.
- The "**Spray**" feature has two statuses: "**ON/OFF**." The speed and level are adjustable.

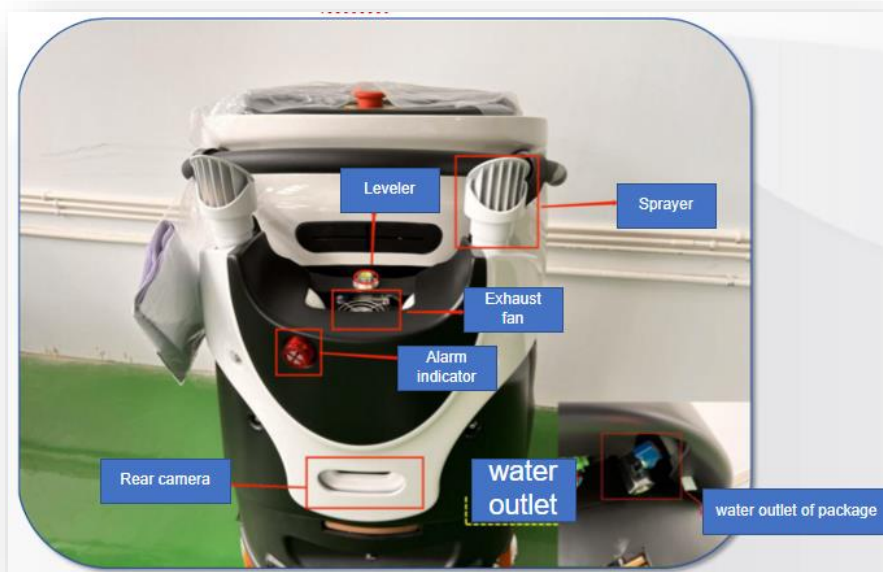


- When the spray feature is turned on, and if there is no disinfectant, there will be an alarm message pops up in UI.
- If a low liquid level of disinfectant was detected during operation with the spray ON, the spray will be stopped; and an alarm message will pop up – “20043 ran out of disinfection”. Pause the operation and add disinfection on time.
- If the spray was turned OFF, the liquid level will not be monitored, and the alarm will not pop up during cleaning tasks.
- The liquid level sensor will not be affected by water waves. It monitors consistent levels.



5.7.3. Cleaning procedure

1. Drain disinfectant from the outlet first.
2. Fill the tank with clean water.
3. Drain the clean water.
4. Keep the outlet open and fill the tank with clean water for about 1 minute.



5.8. WORKSTATION DEPLOYMENT

5.8.1. Basic structure and parameters

For the workstation, it is necessary to carry out a small-scale transformation in the field. Power supply, water supply, drainage, and other interfaces need to be provided in the field. The product information is as follows:

Item	Specification
Length	450mm
Width	480mm
Height	1400mm
Weight	30 kg
Drain Tank Capacity	18 L
Rated Voltage	24VDC
Rated Power of Water Pump	28.8W
Working Temperature Range	-10℃ - +45 ℃
Working Humidity Range	20% - 75% RH
Temperature for Storage	-40℃ - +45 ℃
Humidity for Storage	20% - 93% RG



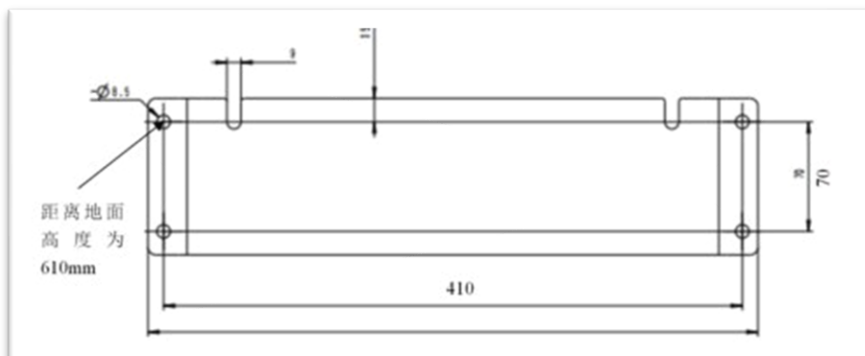
5.8.2. Installation requirements

Power supply:

- The voltage is 220VAC, 10A with a three-pin plug.

Pipe:

- The joint of the inlet pipe/drainpipe is the GB DN15 (1/2 inches), 1 for each. The height of the joint of the inlet pipe/drainpipe is 294mm from the ground.



Space:

- Ensure no obstacles are left in the area with 0.7m length left and right of the working to have the laser recognize the position of the workstation. Ensure the robot can rotate and adjust its posture with enough space where there are no other obstacles in 1.6 meters in front of the workstation.

Positioning:

- The workstation is fixed on the wall with a pylon (the pylon is on the back of the workstation, and screw holes for M8 expansion screws). Keep the wall strictly vertical to the ground. When the docking is in process, it may fail due to the forward or backward tilt of the workstation. The size of the pylon is shown in the right figure.

Warning tape:

- Post warning tape after workstation deployment, to remind pedestrians not to enter the warning tape area.



Reflective stickers

1. Stickers should be attached symmetrically and longitudinally along the central axis of the charging station.
2. The center spacing of the reflective stickers is 0.25m.
3. Length requirements:
 - the upper edge is aligned with the lower edge of the protruding part where the electrode is located.
 - the lower edge is aligned with the lower edge of the charging pile (close to it).
4. The direction is vertical, the paste is flat, and the phenomenon of folding and warping should be avoided.



Issues related to docking deployment SOP

<https://gaussian.yuque.com/docs/share/904ba703-87ef-4215-901b-e4d95e9eff5e?#>

5.8.3. Set a charging point in-app

1. Manually dock the robot to the charging pile:

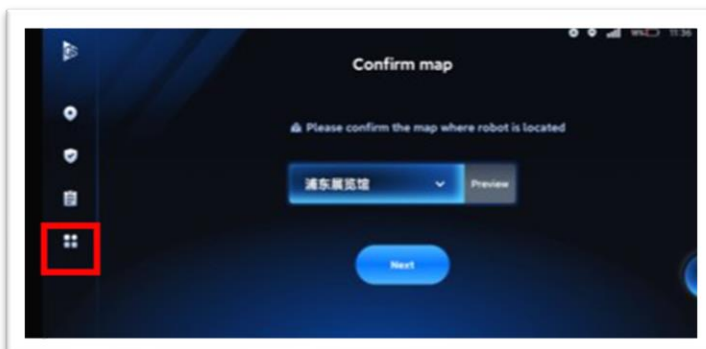
- a. Ensure that the robot is located precisely and make the back of the robot face the charging pile.
- b. Make their charging ports fully contacted.
- c. Then create a charging point by marking the current point.

2. Set the charging point:

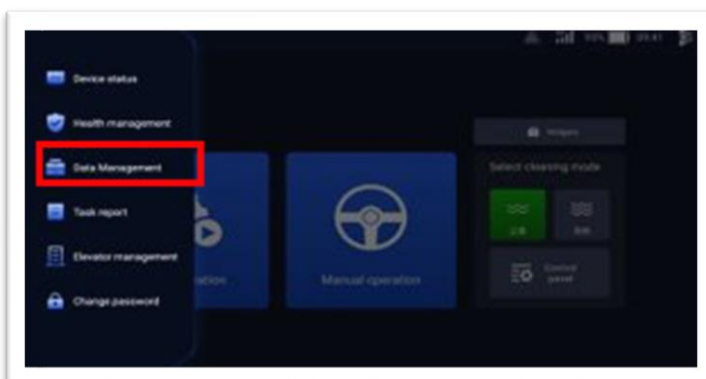
- a. Enter the following parameters:
 - i. User: admin
 - ii. Password: 314159.



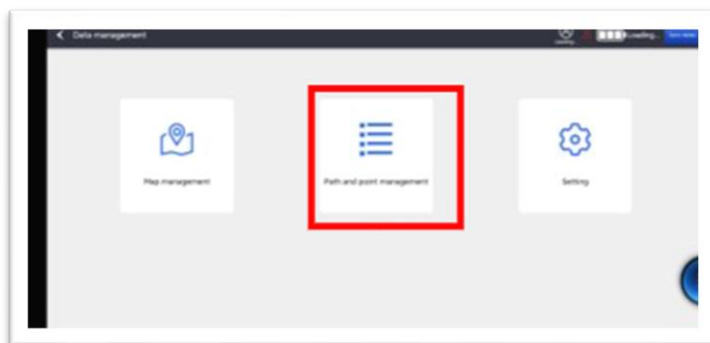
- b. Click the Menu on the left.



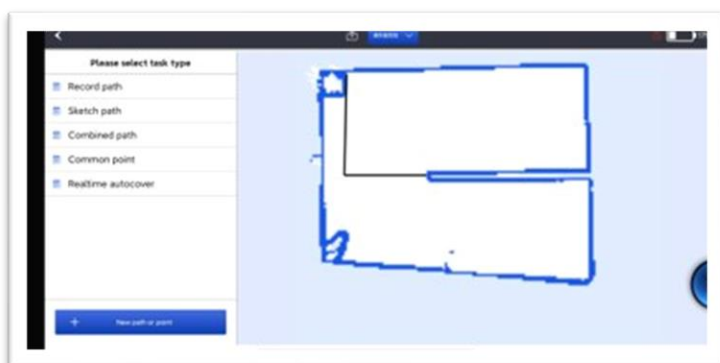
- c. Click "**Data Management.**"



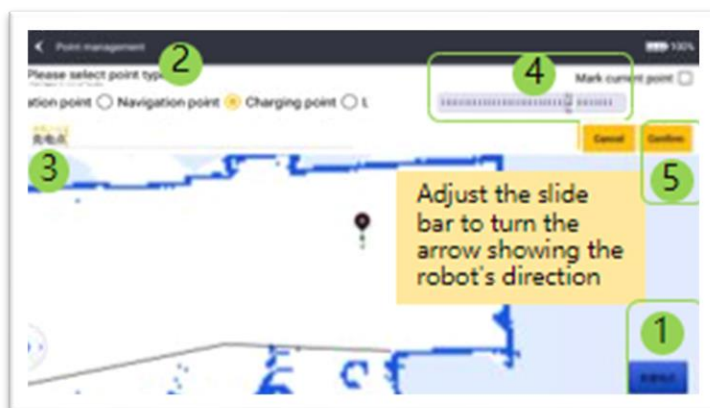
- d. Click "**Path and Point Management.**"



e. Select **"New Path and Point."**



f. Complete the creation of the point according to the serial number above.



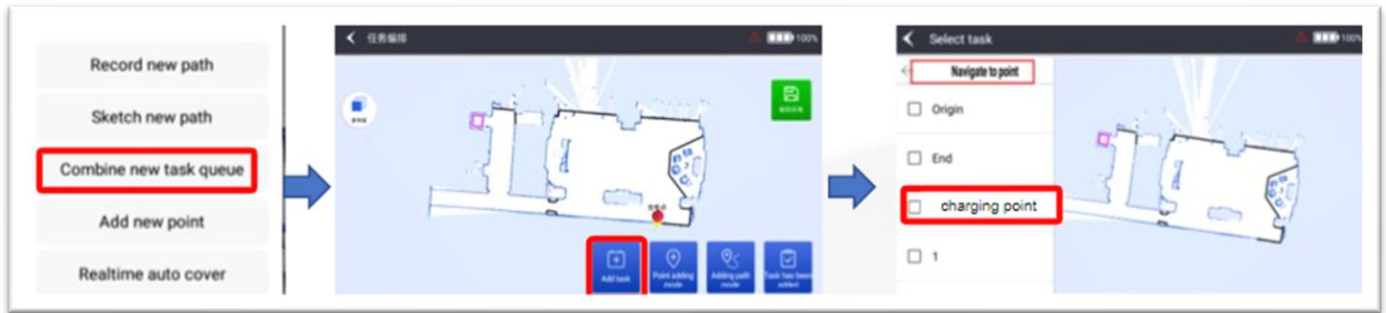
NOTE:

- After setting the charging point, when the power of the robot is down to **20%**, it will automatically go to the charging pile and dock itself for charging.

5.8.4. Deployment verification

1. Set up a combined task (only add the charging point to the combined task):

After completing the following operations, you will be able to execute the newly created charging task and test the function of auto-docking and charging.



- ① Select **"New Paths or Points"** → **"Combine New Task Queue."**
- ② Add tasks.
- ③ Select the workstation point created between the two

2. Make sure the charging is working:



- ① the charging indicator light of the charging pile turns **red**.
- ② the APP pop-up window shows "charging."
- ③ the lightning icon is displayed on the power screen.



NOTE:

- Manual charging and auto charging cannot be used at the same time.
- Do not turn off the robot during charging.
- The QR code shall not be damaged or soiled.
- Do not put debris on both sides of the charging pile.
- Only one charging point can be set in the APP.
- The charging point can be added to the task queue and placed at the end of the task queue.
- The power supply of the robot cannot be switched off.

5.9. DEBUGGING PREPARATION

5.9.1. Consumables

The consumables of GS-ECOBOT SCRUBBER 50 are listed below:

- rubber strip,
- filter cartridge,
- brush,
- floor pad,
- mop pad.

Before starting the test, ensure that the consumables are installed correctly.

The filter cartridge, plate brush, floor pad, and dust mop work well if they were installed correctly according to the specifications.



The rubber strip is special, pay more attention to it. Refer to the next page for the confirmation method.

Drop the squeegee down to the ground, manually push the GS50 robot forward, and check the contact between the rubber strip and the ground.

Best effect:

- ① Avoid the rubber strip being deformed, wavy, etc.
- ② Rubber strip evenly touches the ground with a best angle of 45°.

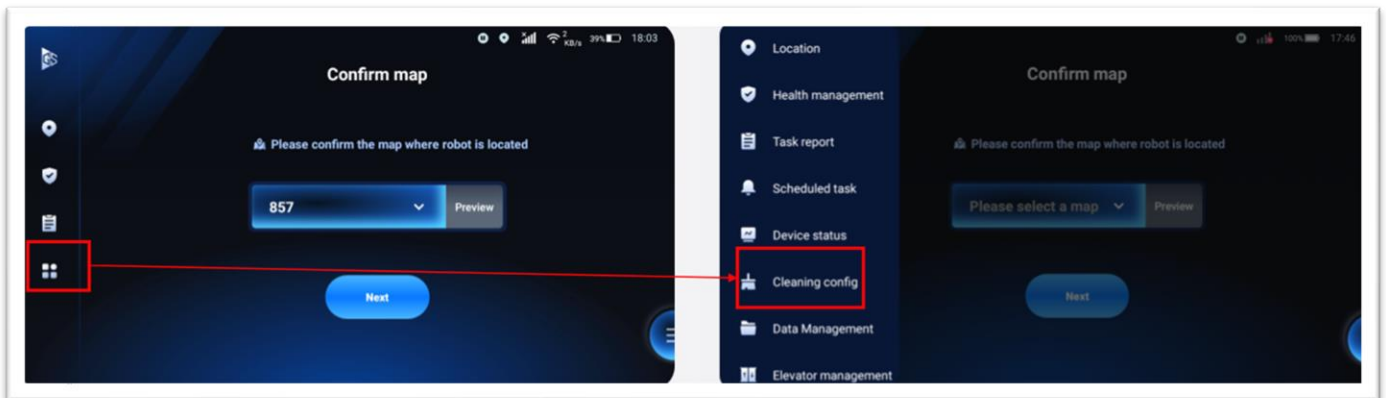
How to adjust the height of the squeegee:

- Use an open-end wrench to loosen the upper and lower nut, so that you can adjust the height of the casters.



5.9.2. Cleaning mode

1. Click the highlighted button on the left side of the main interface to open the navigation bar.
2. Click **"Cleaning Config."**



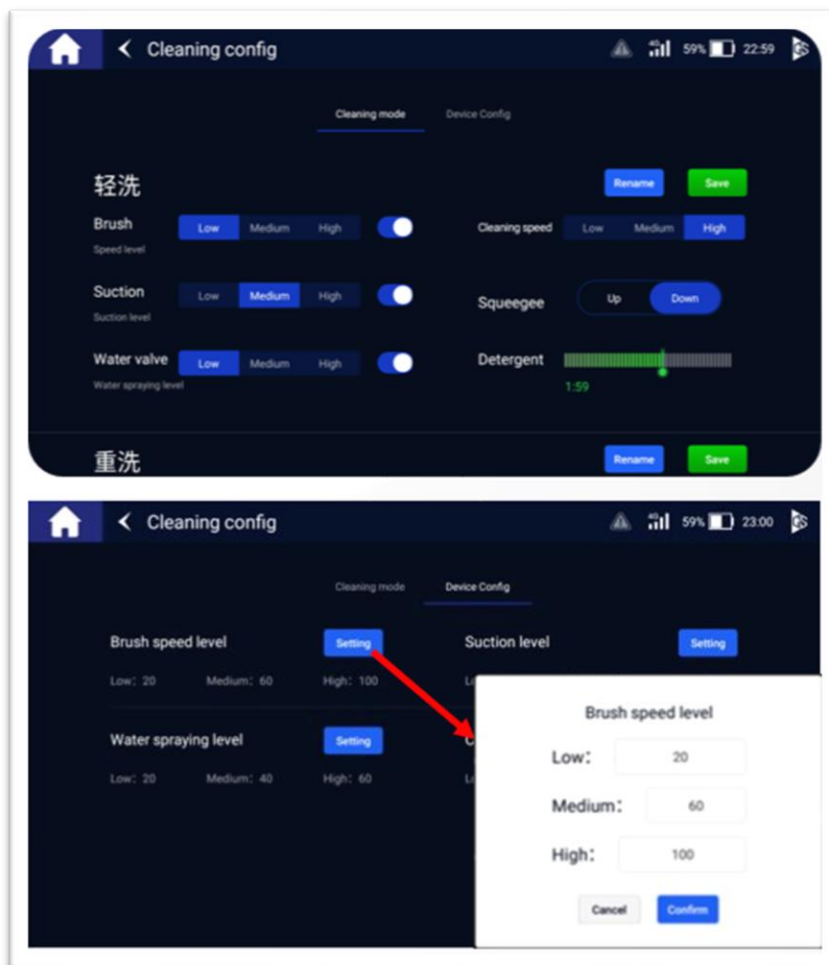
The following cleaning configuration can be applied to most ground surfaces.

Cleaning mode:

- **General cleaning**
 - Brush: medium
 - Cleaning speed: high
 - Suction: high
 - Squeegee: down
- **Deep cleaning**
 - Brush: high
 - Cleaning speed: medium
 - Suction: high
 - Squeegee: down
- **Dust mopping**
 - Brush: off
 - Cleaning speed: medium/high
 - Suction: off
 - Squeegee: down

Equipment level:

- **Rotating speed of brush:**
 - low: 40
 - medium: 60
 - high: 100
- **Level of suction:**
 - low: 40
 - medium: 60
 - high: 100
- **Level of spraying water:**
 - low: 20
 - medium: 30



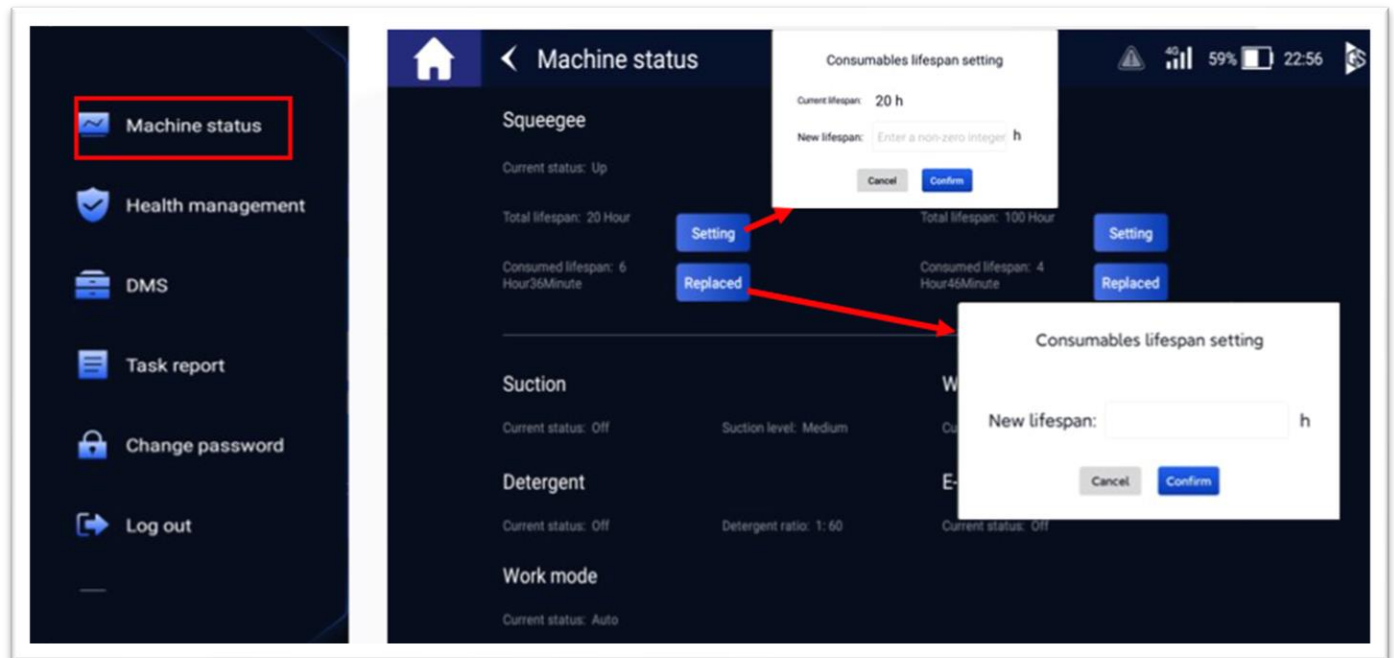
Ground Type	Cleaning Speed	Brush speed	Water Level	Suction level	Brushes	Mopping pad	Remarks
PVC ground	Medium or high	Medium	Low 15~25	80~95	White fur (0.25m m)	N/A	Recommended to only use a dust mop
Epoxy floor	Medium or high	Medium	Low 15~25	80~95	White fur (0.25m m)	N/A	Recommended to only use a dust mop
Marble floor	Medium or high	Medium or high	Low 15~25	80~95	White fur (0.35m m)	Red	N/A
Terrazzo floor	Medium or high	Medium or high	Low 15~25	80~95	White fur (0.35m m)	Red	N/A
Floor with small square bricks	Medium or high	Medium or high	Low 15~25	90~100	White fur (0.35m m)	Red	N/A
Cement floor	Medium or high	Medium or high	Low 25~35	90~100	White fur (0.35m m)	N/A	N/A
Wooden floor	Medium or high	Medium or high	Low 15~20	80~100	White fur (0.25m m)	N/A	Recommended to only use a dust mop
Rubble ground	N/A	N/A	N/A	N/A	N/A	N/A	Not recommended

5.9.3. Consumables lifespan

1. Click the ">" button on the left side of the main interface and get into the first option **"Machine Status"**.
2. If the ground is marble, PVC, epoxy floor, and other smooth ground, set the lifetime of the brush to 800 and the water-sucking strip to 500.
3. If the ground is rough, set the life value of the brush to 600 and the water-sucking strip to 400.
4. Use the default value for the filter, no need to change it.

Parameter Definition & Meaning:

When the usage time of consumables reaches the lifetime, the APP pop-up window appears to remind a customer to check the status of consumables and clean or replace them.

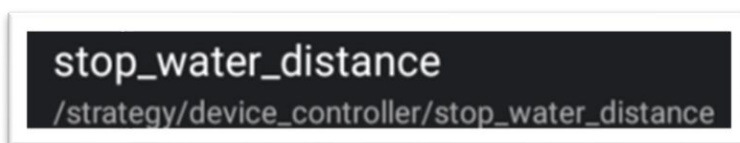


This parameter is for reference only and mainly serves as a reminder.

If the consumables were replaced, please click the "**Replaced**" button.

5.9.4. Stop water distance

Location:



Data Management/Settings/Advanced Settings/ecobot settings/View Parameters/strategy/device_controller/stop_water_distance (meter)

Logic:

- Stop spraying water at a certain distance from the endpoint (functional areas such as speed bump/carpet area).
 - If the ground is marble, PVC, epoxy floor, and other relatively smooth ground, it is recommended to set the stop water distance as **25~30** m.

- If the ground is rough, it is recommended to set the stop water distance as **10~15** m.
- In addition, the “stop water distance” affects the speed bump area and carpet area.

5.9.5. Keep suction on

After the robot reaches the endpoint, it keeps suction on and keeps the squeegee touching the ground to avoid the backflow of wastewater left on the ground.

How to adjust:

- Lift the squeegee after T1 s lapse and stop the suction after T2 s lapse once the squeegee is lifted.

Configuration parameters:

Location:

Data Management/Settings/Advanced Settings/ecobot Settings/
ViewParameters/device/scrubber/

- T1: keep_squeegee_suction (T1 default value: **60s**)
- T2: keep_suction (T2 default value: **30s**)

Scrubbing mode:

- If you think it is too much, you can manually modify it. It is recommended that both items should not be less than **10s**.

Dust-pushing mode:

- ① In dust-pushing mode, both of the 2 parameters shall be set to 0 (software version < commercial complex MVP.)
- ② The default value is 0 as long as the water spray button is turned off in the cleaning configuration (software version ≥ commercial complex MVP.)

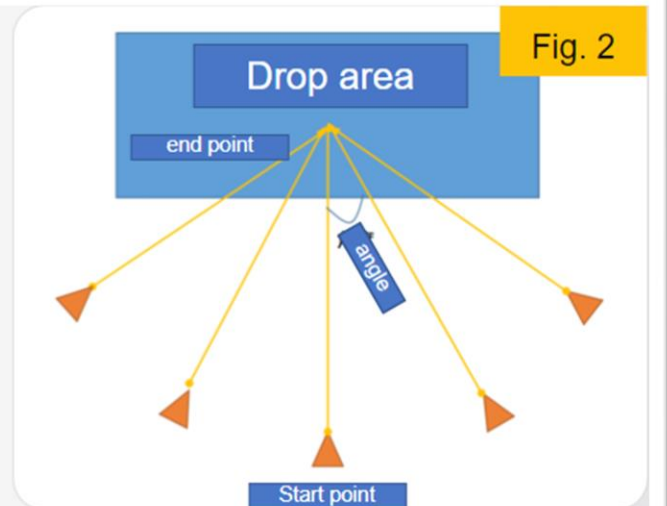
keep_flush_water	300
/device/scrubber/keep_flush_water	
keep_squeegee_suction	60
/device/scrubber/keep_squeegee_suction	
keep_suction	30
/device/scrubber/keep_suction	

Relationship between water stopping distance and keeping suction ON:

- In the normal automatic task, the water stop is triggered before reaching the endpoint, and the robot stops at the same place when reaching the endpoint triggering the delay – **“turning off suction and lift squeegee up”**.
- If an emergency stop was pressed in the task, it will directly trigger the delay.

5.9.6. Anti-falling function verification

Manually push the robot slowly to the area where there is a risk of falling after the infrared sticker was placed and robot positioning was done. Then open the config of infrared stickers in APP: **/strategy/ir_sticker_enable** and check whether anti-falling can be triggered.



1. As shown in Figure 1 on the left, slowly push the robot near the escalator or steep stairs to check whether the APP pop-up displays an alarm of falling risk.

2. You need to move the robot to the risk area from different directions according to the method shown in Figure 2 to check whether the anti-falling can be triggered normally.
3. If it was not triggered at some certain angle, please contact an AROS service engineer for more information.

5.9.7. Cleaning effectiveness

To confirm the Scrubber 50 robot's cleaning effectiveness:

1. Perform cleaning tasks manually, and remove artificially created dirt (wastewater/cola, etc.) on the path routes.
2. Push the robot forward and observe the cleaning effectiveness.
3. Or perform auto-tasks, record a teaching mode (with turning routes), or draw a path manually.

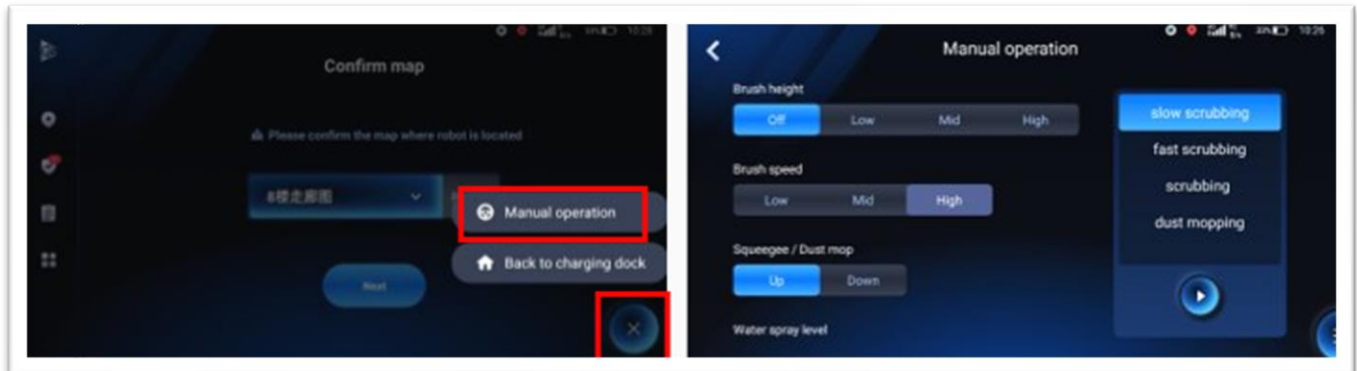
After cleaning, the ground is clean without water stains, and the dirt can be cleaned off normally.



If there are stains left after cleaning, the robot needs to be readjusted and checked.

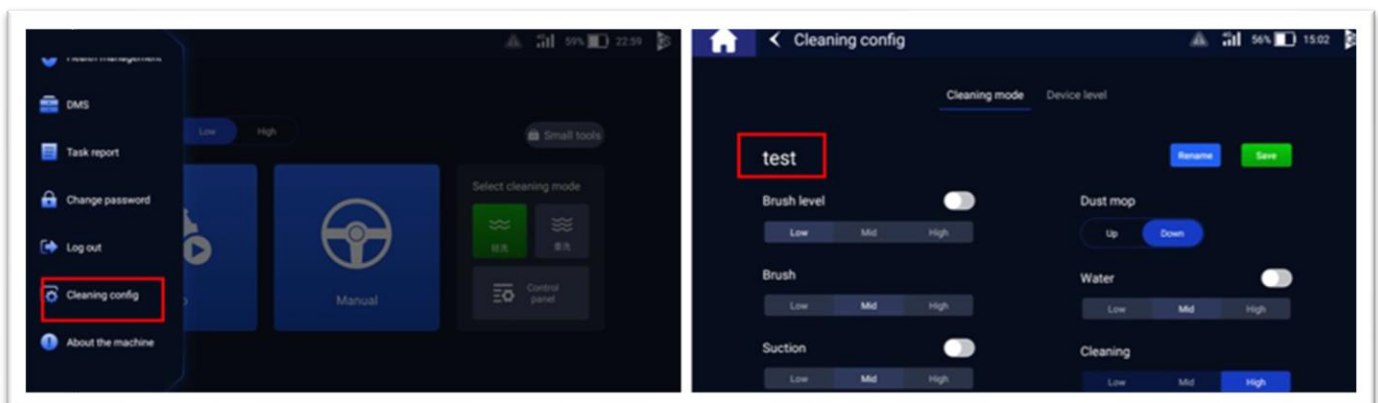


If the cleaning effectiveness is not acceptable, adjust the squeegee, check the suction settings, etc., accordingly.

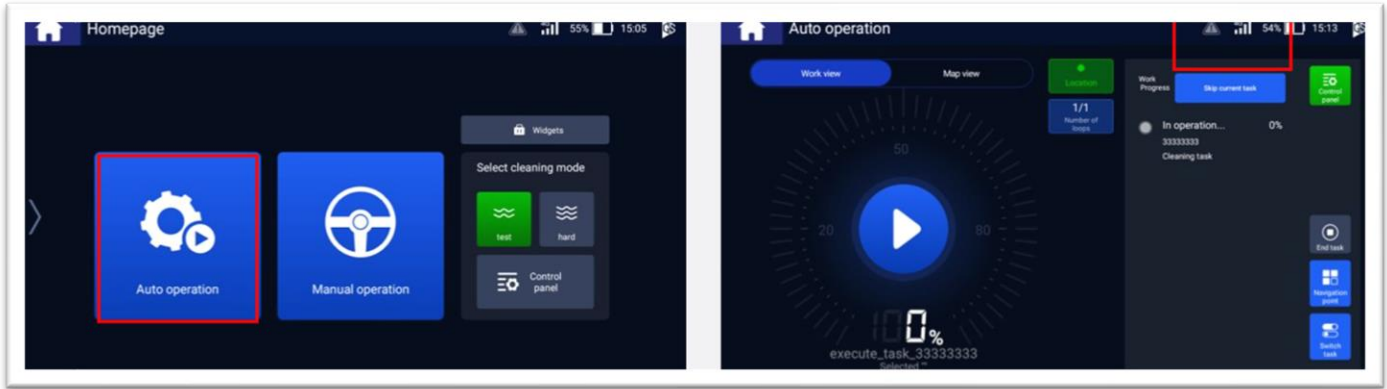


5.9.8. Test run

1. Access "**Cleaning Configuration**" and name it a Test Run.
2. Turn off the Brush, Suction, and water valve, lift the Dust Mop, and set the appropriate Cleaning Speed.
3. Click "**Save**" to exit.



4. Select "**Test Run**" in "**Cleaning Mode**", and then click "**Auto Operation**" to start the task (all effective paths for deployment).
5. You only need to run the outer ring in Coverage Path. If there is no problem, directly click "**Skip**" to skip the current task.
6. If you encounter problems, take photos, or record issues with your mobile phone, and resolve them later (solutions: modify the virtual wall, redraw the path, reset the points, etc.).



5.9.9. Scheduled task

Communicate with customers whether scheduled tasks are required before the robot handover and help them to complete the setting.

Scheduled task-setting steps:

1. Select "**Scheduled Task**" on the left menu → select "**New**" → enter the "**New Task**" interface.



Time:

- Select the time when the scheduled task is triggered.

Maps:

- Select the map on which to perform cleaning tasks.

Task:

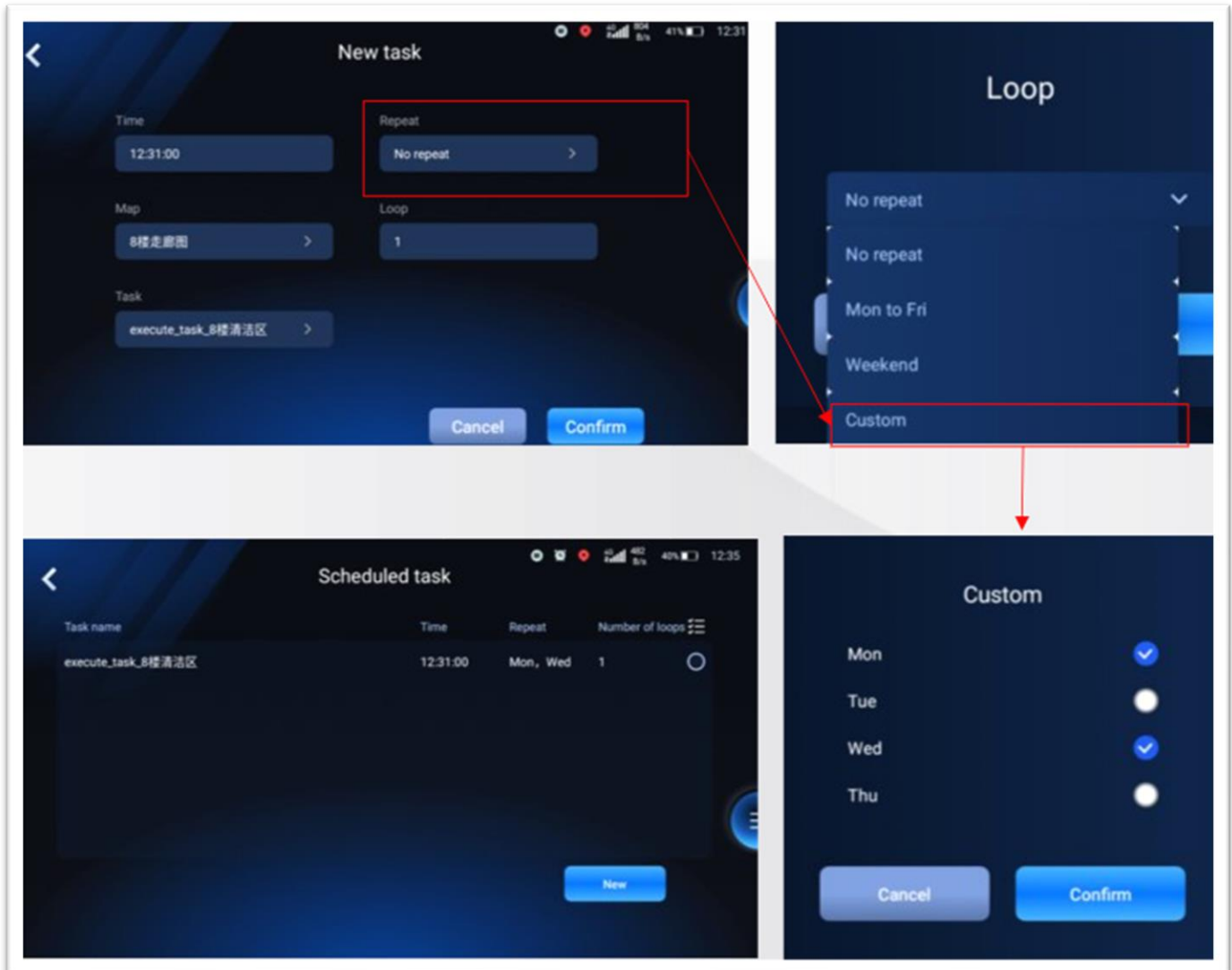
- Select the task to perform.

Repeat:

- There are multiple modes to choose from (non-repeat, Monday to Friday, weekends, custom).

Customization:

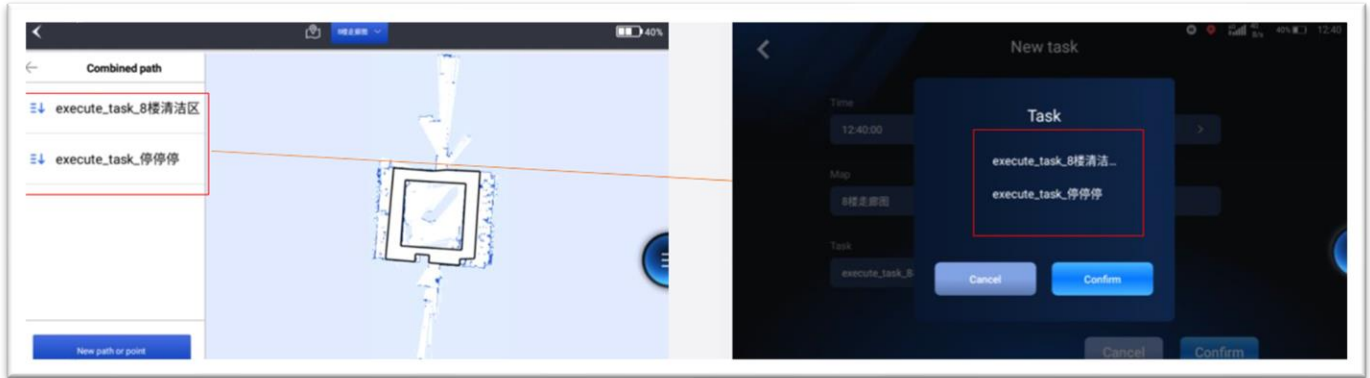
- Freely choose the date when the scheduled task needs to be executed.



After creation, you can delete and edit operations.

Cleaning Mode:

- You cannot change the cleaning mode operations in the scheduled task.
- You can only add combined tasks and select the appropriate cleaning mode in task combination.



5.10. APPLICATION DEPLOYMENT SCENARIOS

5.10.1. Office buildings | Rules on path

Generally, only the "Real Time Auto Cover" path + "Teaching Mode" is deployed in office building scenarios (If the width of the passage is less than 1.3m, please use the path in "Teaching Mode".)

As the figure below shows, for the Wangjing SOHO complex of three curvilinear asymmetric skyscrapers, three paths in "Real Time Auto Cover" (**green area**) need to be created for A/B/C [They are divided into several regular paths, which improves the cleaning efficiency and meet the logic of cleaning business needs.]

"Teaching Mode" was used in **yellow** areas.

- For ① and ②, the "Teaching Mode" is used because the width of the passage is only 1.5m.
- For ③ and ④, to make area A more regular, the "Teaching Mode" was decided to be used for the remaining two small areas.



NOTE:

- It is not recommended to deploy the path for a passage less than 95cm, and the "Teaching Mode" is used for a passage less than 1.3m.
- The "Real Time Auto Cover" shall be used for other places.

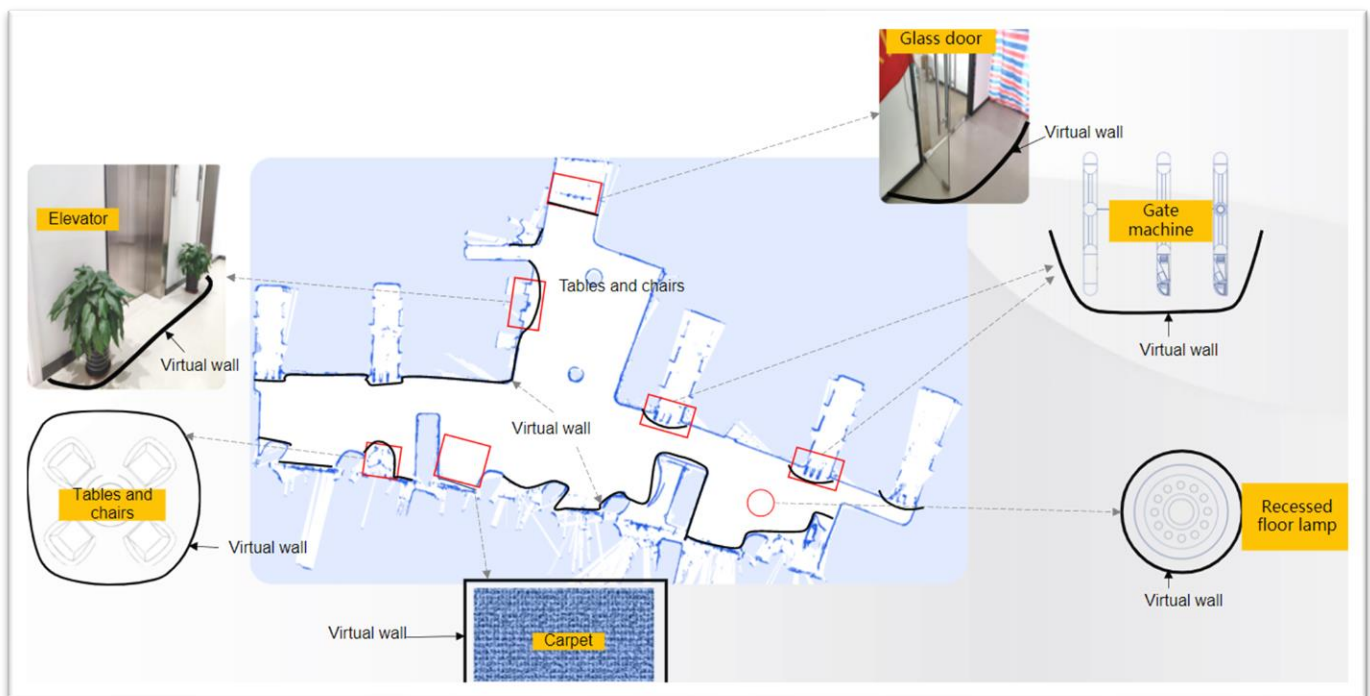
- Recommended number of paths deployed with "Real Time Auto Cover": one path every 50 meters.
- In the "Teaching Mode", the obstacles should be bypassed. If the obstacles were scanned in the map, the "Real Time Auto Cover" will automatically bypass them

5.10.2. Office buildings | Solutions & precautions

After the path deployment, virtual walls need to be drawn, and the following obstacles need to be treated with virtual wall drawing:

- Flowerpots,
- glass doors,
- turnstile,
- Recessed Ground Lights,
- carpets (most on rainy days),
- tables and chairs,
- elevator entrances,
- stairs, etc.

Virtual walls/stickers are required in these locations to avoid danger.



1. The irregularly shaped guide platform of the floor - a virtual wall needs to be drawn to bypass it.



2. Thin and frequently-moved exhibition stand - a virtual wall needs to be drawn around it.



3. Garbage cans or billboards in staircases - virtual walls needed to bypass them.



4. Virtual walls and infrared stickers are required in the location of escalators. Virtual walls should be **1-1.5m** away from the escalator.



5. Virtual walls are required to bypass some glass POP stands with irregular shapes. Notice the position of the virtual wall and if they were temporarily positioned.



6. The revolving glass door, where a virtual wall shall be drawn at an interval of 30cm to not affect people walking.



7. Some office buildings have pop-up ground sockets, which must be bypassed by virtual walls.



5.10.3. Hotels | Rules on path

The environment of the hotel is similar to an office building with a special point: a lot of tables and chairs.

Use real-time auto-cover + teaching mode to deploy the path.

Use teaching mode for the passage where the width is lower than **1.3** meters.

As shown in the figure - a hotel lobby: teaching mode is only used in **yellow** areas.

Use real-time auto-cover in other areas. Separate the whole area into several regular small areas. Area separation improves cleaning efficiency.



NOTE:

- It is not recommended to deploy a path for passages **<95cm**.
 - Use teaching mode for passage **≤1.3**.
 - Use real-time auto-cover for other areas.

5.10.4. Hotels | Solutions & precautions

1. There are large flowerpots, exhibition stands, billboards, etc., in the lobby. Confirm their position with customers in advance and use virtual walls to isolate them.



2. Some hotels have revolving glass doors or curved doors. They need to be isolated by virtual walls.



3. There are meetings, dining areas, etc., in the hall. Draw proper virtual walls for the chairs inside these areas.



4. People crowd around the reception. Talk to the customer in advance, a space of 40-50cm should be reversed.



5. There are special-shaped artworks in some lobbies, safety distance should be reversed, and draw virtual walls for them.



6. There might be stairs or escalators on the first and second floors, draw virtual walls for them.



7. There are trash cans or other obstacles In the elevator hall. Confirm with customers in advance and draw virtual walls for them.



8. Confirm with customers in advance for the dining timeline in the dining area. Set up “do not disturb” mode to avoid the peak busy hour.



9. Draw virtual walls for low obstacles as well.



10. There must be carpet in the hotel. Talk to customers and set the different cleaning modes on the other map for the carpet area, especially on a rainy day.



11. There might be some fire hydrants that are kept open. Draw virtual walls for them to avoid the robot getting into an unknown area.

Draw highlighted areas for permanently fixed obstacles, like pillars or walls.

- ① Do not introduce other movable obstacles into the area when drawing the highlighted area.
- ② For the lobby, just draw highlighted areas for corners and pillars. **Do not draw highlighted areas for an aisle.**



NOTE:

- Two maps (name them a "rainy day" and a "fine day") are needed for rainy and non-rainy days. Set different cleaning modes for carpet areas on a rainy day.
- For the area with chairs, reverse space for chairs movement to avoid scratching with feet of chairs.
- For multi-floor deployment, the landmarks on the different floors should be set in a place 2 meters away from elevators.
- If the pedestal of the stands is big, it is better to reserve enough space for the stands to avoid scratches.
- Reserve enough space for busy reception.
- Use teaching mode for the aisle of guest rooms. Reserve enough space for U-turns at the end of the aisle.
- Draw virtual walls for flowerpots, exhibition stands, and billboards.
- The customer needs to return the chairs in the meeting room before the robot starts the cleaning task.

- During map scanning, gently turn the robot for 270° to have a laser scan of all the features of the doors of guest rooms. Then turn it back and move forward. Reason: laser can just scan objects at a range of 180°.
- For a long aisle, it is recommended to scan a section of the aisle and save the map in place with obvious features. Then, use the map extension to continue scanning the map.



NOTE:

- Scan the long aisle only **once**, do not scan it back and forth.

- When there is ghosting or deviation, check whether the laser is installed horizontally. Level the laser via its leveler and scan the map again. If it still does not work, calibrate the laser, and try again. If fail again, submit it in JIRA.
- Draw virtual walls for the doors that could be opened in aisles. The virtual wall expands, so draw them a little inside the actual walls. Check and adjust virtual walls in the test run.
- Draw virtual walls for glass walls around the cleaning area to avoid lost locating or robots getting into other areas. Do not place the virtual wall too close to a glass wall.
- Draw virtual walls for objects with black pedestals. Sensors (laser) cannot detect them.
- Do not combine the transition area with the ceramic tile area or carpet area into one task. Set cleaning tasks for them separately.
- The height of the roller brush :
 - wool carpet: make a roller brush just touch the wool carpet. Improper height might damage the wool carpet.
 - other carpets: adjust the height based on real situations to ensure cleaning effectiveness. Just touch is recommended.
- **Suction level:** Run the robot for 20 minutes and check how much debris was collected in the trash box and adjust the level gradually. The less power consumption, the less noise there is. But ensure hair and debris can be sucked into the trash box.

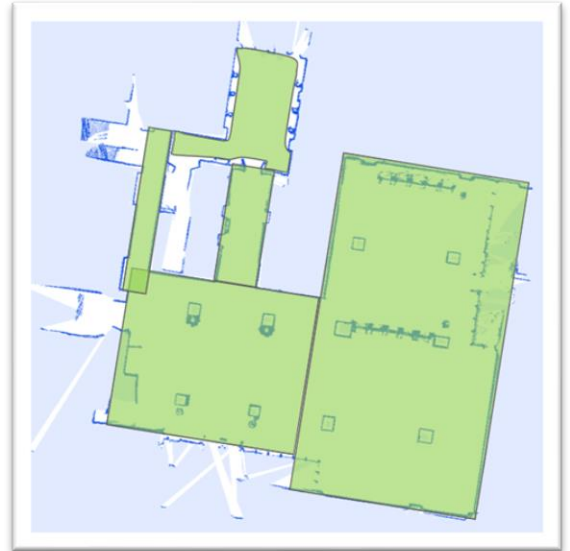
5.10.5. Schools | Rules on path

A robot is used to clean the halls in teaching buildings. They are similar to office buildings.

Use real-time auto-cover + teaching mode to deploy the path.

Use teaching mode for the passage that width is lower than **1.3** meters.

As shown in the right figure, there is no passage narrower than 1.5 meters in the teaching building. Use real-time auto-cover for all areas (area separation improves cleaning efficiency).



NOTE:

- It is not recommended to deploy a path for passages <95cm. Use teaching mode for passages ≤ 1.3 .
- The halls of the teaching building are not large, we just need to separate the hall into several regular areas and deploy paths for them.

5.10.6. Schools | Solutions & precautions

School environment:

1. There might be carpet in the halls, or carpet will be placed on rainy days. Draw virtual walls for these carpets in advance.



2. Draw virtual walls for upward stairs. For downstairs, both virtual walls and infrared stickers are needed.



3. There are art booths in some halls, please draw virtual walls for them (keep a 30cm distance).



4. There might be flowers, please draw virtual walls and display zones for them.



5. Some carpets are placed diagonally. Confirm with the customer if it is placed in the long or short term.
- Short-term: use "record path - virtual wall" as a solution as well as set up the second map while explaining to the customer when to use the 2nd map.
 - Long-term: draw virtual walls and ask the customer not to move them.



6. Talk to the customer and fix the position of the one-meter fence, then draw virtual walls for them. If there is any movement, contact the AROS support team in advance.



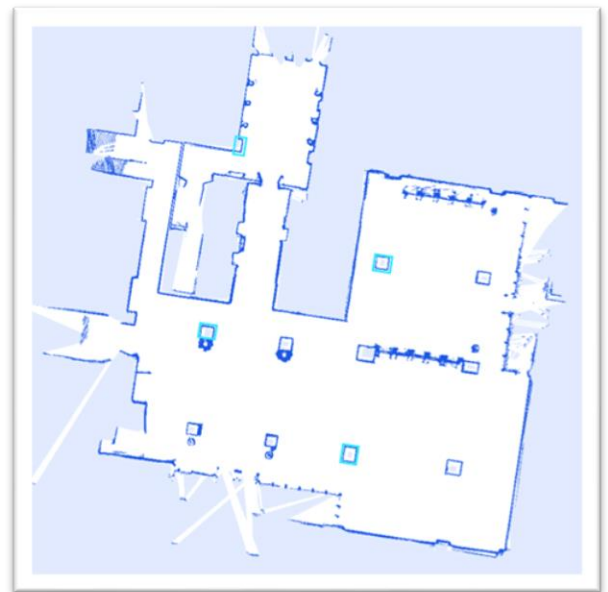
Draw highlighted areas for permanently fixed obstacles, like pillars or walls



NOTE:

- Do not introduce other movable obstacles into the area when drawing highlighted areas.
- Interval: 15-20 meters for each.
- The school environment is stable. Drawing several highlighted areas is enough.

1. Set the "do not disturb" warning for a busy time slot.
2. Draw temporary display areas as needed.
3. Draw virtual walls for flowerpot and one-meter-fence
4. Two maps (name them a "rainy day" and a "fine day") are needed for rainy and non-rainy days.
5. Set different cleaning modes for carpet areas on a rainy day.
6. Set "rainy day" and "fine day" tasks.
7. Draw virtual walls for elevators.
8. Draw virtual walls for any risks.
9. Draw virtual walls for all cleaning areas.



5.10.7. Hospitals | Rules on path

The most obvious feature of hotels is people are crowded. The environment is similar to an office building.

Use real-time auto-cover to deploy the path.

Use teaching mode for the passage that width is lower than 1.3 meters.

As the right figure shows, use teaching mode only in the **yellow** area (seating area).

Use real-time auto-cover for other areas. Separate the whole area into several regular small areas (area separation improves cleaning efficiency).

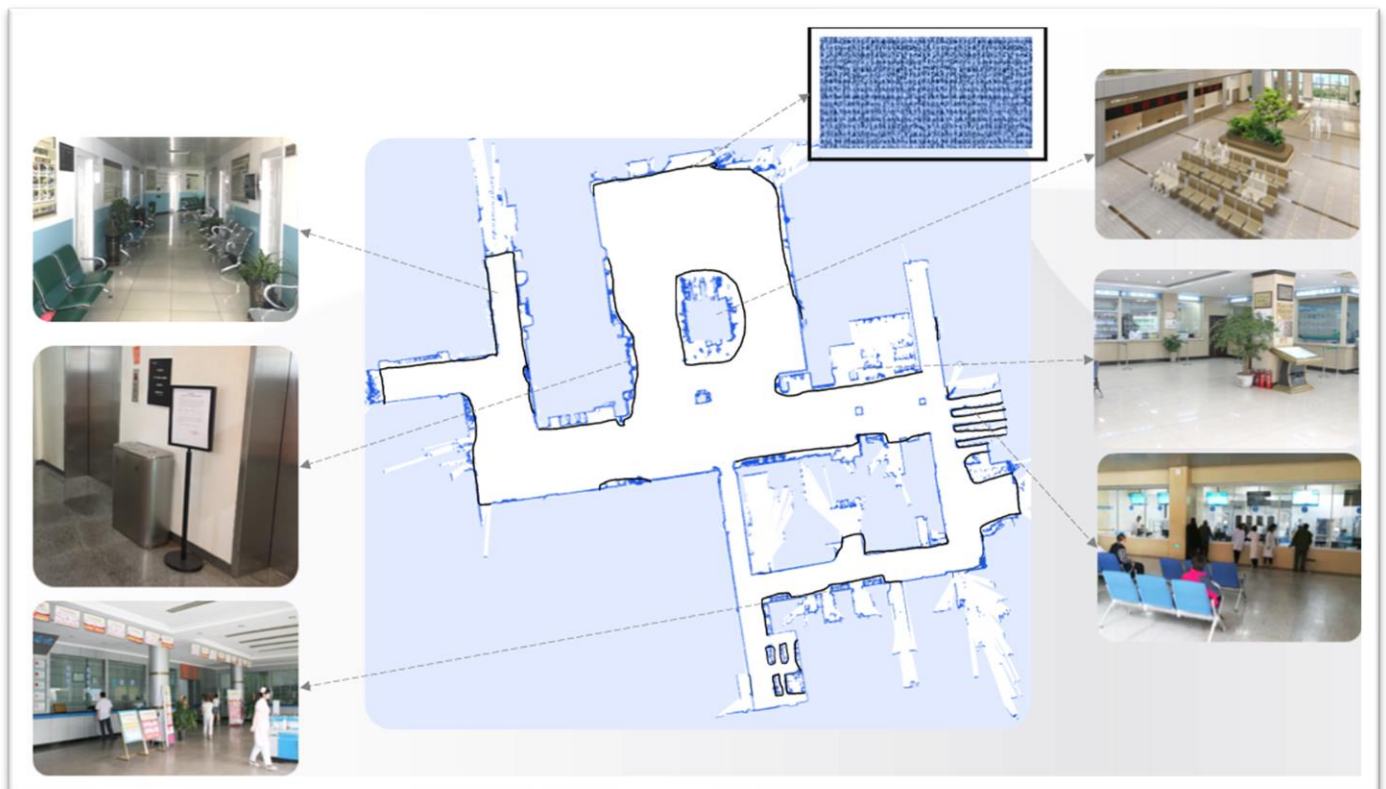
**NOTE:**

- It is not recommended to deploy a path for passages **<95cm**.
 - Use teaching mode for passage **≤1.3**.
 - Use real-time auto-cover for other areas.

5.10.8. Hospitals | Solutions & precautions

Draw virtual walls for the following obstacles after path deployment:

- flowerpots
- carpets
- long seats
- elevators
- billboards
- stairs.



1. Draw virtual walls in front of the gate machine to avoid crashes with people.



2. Draw virtual walls and deploy infrared stickers 1.3 meters in front of the escalator.



3. For the temporary area placing tables and chairs, draw a temporary displacement zone for them.



4. There might be a bed in the aisle, create 2 sets of maps for customers, and have the operator select the proper task based on a real situation.



5. Channels for staff and emergencies should be avoided.



6. Suggest customers fix the position of billboards or other big obstacles in the halls. And draw virtual walls for them.



7. Draw virtual walls for the trash bin, flowerpot, or other obstacles as well.



Draw highlighted areas for permanently fixed obstacles, like pillars or walls



NOTE:

- Do not introduce other movable obstacles into the area when drawing highlighted areas.
- The hospital environment is stable. Draw several highlighted areas for corners or pillars.

1. Two maps (name them a "rainy day" and a "fine day") are needed for rainy and non-rainy days.
2. Set different cleaning modes for carpet areas on a rainy day.
3. Draw virtual walls for the carpet area.
4. When deploying the path in a public seating area, reserve enough space for seat movement to avoid scratching with the squeegee.
5. For multi-floor deployment, the landmarks on the different floors should be set in a place 2 meters away from elevators.
6. If the pedestal of the stands is big, it is better to reserve enough space for them to avoid scratching.
7. Avoid busy elevators, emergency channels, etc.
8. Virtual walls and infrared stickers are needed nearby stairs or escalators.
9. Draw a temporary display zone or display zone for any temporary areas.



5.10.9. Commercial complexes | Rules on path

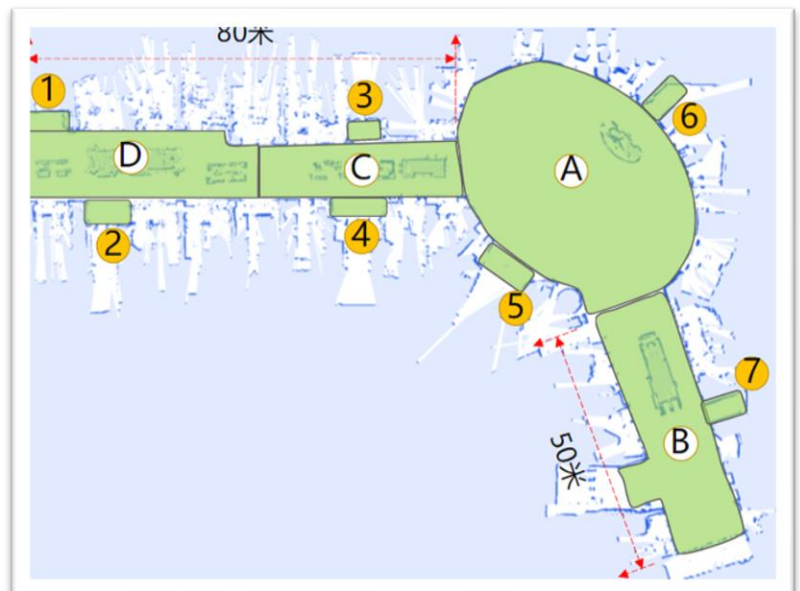
A commercial complex is larger than an office building. But it is the same for deploying the path. Only use real-time auto-cover + teaching mode.

Use teaching mode for the passage that width is lower than 1.3 meters.

The right figure is a commercial complex: it is recommended to separate it into A/B/C/D 4 big regions, and 7 small areas.

Use real-time auto-cover for all **green** areas (area separation improves cleaning efficiency).

There are fewer passages narrow than 1.5 meters in the commercial complex. If there are some, use the teaching mode.





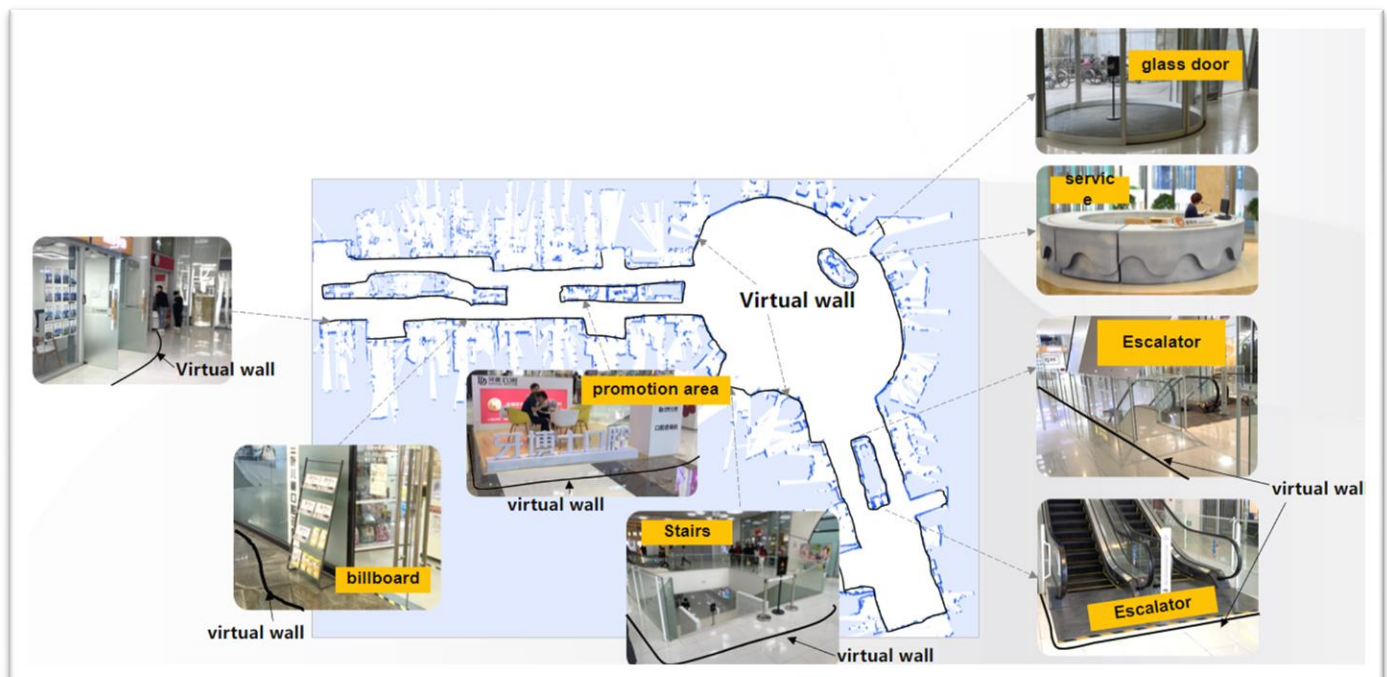
NOTE:

- It is not recommended to deploy a path for passages $< 95\text{cm}$.
 - Use teaching mode for passage ≤ 1.3 .
 - Use real-time auto-cover for other areas.
 - The dimensions for the real-time auto-cover area are 50 square meters each.

Draw virtual walls for the following obstacles after path deployment:

- glass doors
- escalators
- stairs
- billboards
- seats
- recessed ground lamps
- carpets
- revolving doors
- display booths, etc.

Deploy infrared stickers in any area with a falling risk (like escalators).



5.10.10. Commercial complex | Solutions & precautions

1. Virtual walls from glass rail. Infrared stickers for risk areas.



2. Glassdoor + carpet, reserve enough space and draw a virtual wall along the outer line.



3. Some billboards are specially shaped with glass. Reserve enough space to draw a virtual wall. Confirm if it is placed temporarily as well.



4. Virtual walls for floor guides.



5. Fix the position of the trash bin in the elevator hall. draw virtual walls 20-30cm in front of the elevator door.



6. Some receptions are specially shaped. Draw virtual walls along the outer line.



7. For the elevator hall with the glass door, talk to the customer in advance and set up the cleaning time. The glass door needs to be opened during the cleaning task.



8. Draw virtual walls for a one-meter fence. It is better to have customers fix their position



9. Draw a temporary display zone for the promotion area.



10. For the space under the elevator, we need to draw virtual walls based on the height of the robot.



11.Seat: deploy a virtual wall.



12.Blind track: deploy a virtual wall.

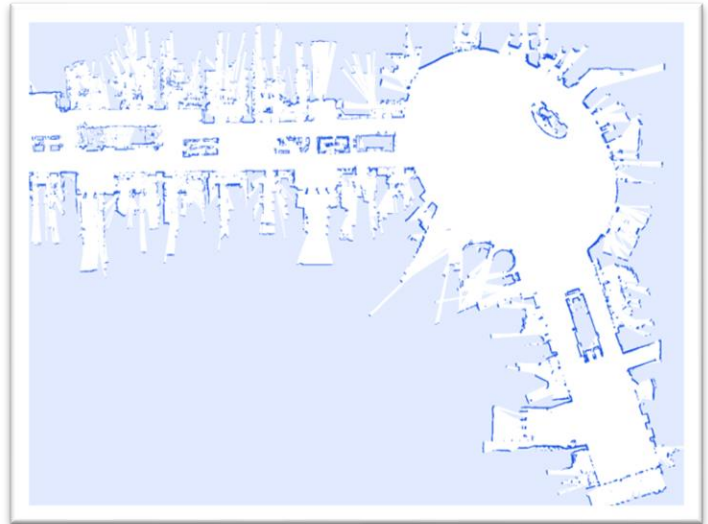


13.For this kind of scenario, it is necessary to draw a virtual wall and deploy laser and infrared stickers as well as highlighted areas.



Highlighted area

1. It is recommended to draw more highlighted areas in the commercial area because of its large environment.
2. Please refer to the right figure on how to draw highlighted areas.
3. Draw highlighted areas for unmovable objects, do not introduce other obstacles into these areas.
4. Do not draw several highlighted areas in one path.



NOTE:

- Reserve 1.5-2 meters for elevators to deploy virtual walls and infrared stickers.
- Reserve 0.5 meters for the escalator to draw virtual walls.
- Check the doors of each shop, reserve enough space for door opening, and redeploy laser stickers.
- Draw virtual walls for carpet area (+glass door especially).
- Draw virtual walls for all obstacles except real walls.
- Reserve a safety area for the robot under the escalator.
- Draw a temporary display area for any temporary areas.

6. OPERATION INSTRUCTIONS

The content of this chapter is for the person who directly operates the Scrubber 50 (Sprayer) cleaning robot or manages the Scrubber. People who directly operate the Scrubber 50 (Sprayer) need to know how to control the scrubber movement, perform cleaning tasks, add water to the clean water tank, drain the sewage tank, and charge. The management staff of Scrubber 50 (Sprayer) needs to understand the above information. Furthermore, you also need to understand how to create a map, create a cleaning path, deploy cleaning tasks, view the task report of the scrubber cleaning task, and view a series of advanced operations such as the health status of the scrubber. The above operations will be introduced in the sequence below.

6.1. Starting and Moving the Scrubber

1. Scrubber 50 (Sprayer) cleaning robot is small in size and can be moved by hand when it is shut down.
2. The auto mode of Scrubber 50 (Sprayer) is enabled by default after the scrubber is started. In auto mode, the scrubber cannot be moved manually or pushed forcefully to avoid damage to the motor.
3. Press and hold the manual/automatic button for 3 seconds, then the scrubber is switched to manual mode.

6.2. Adding Water

When the empty-tank indicator of the freshwater tank turns red, it means that the water in the freshwater tank has not been added or has been used up. If the ground cleaning work needs to be continued, please add fresh water.

**NOTE:**

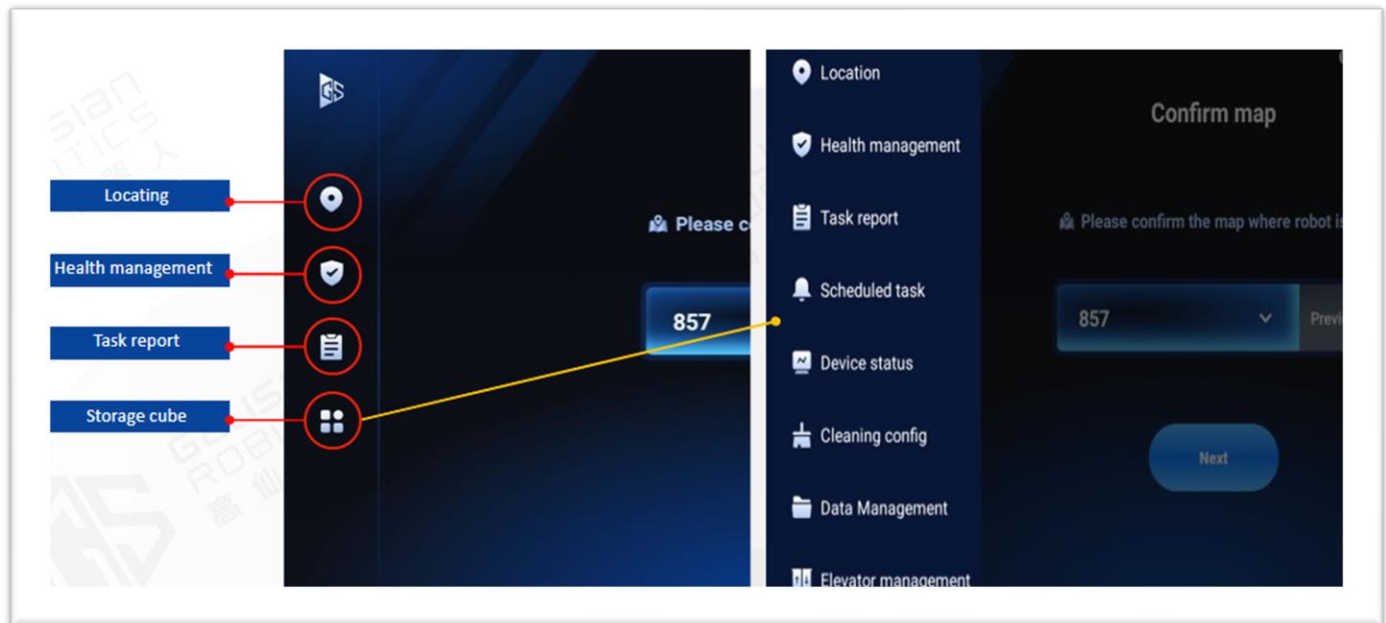
- Before adding water, please control and move the scrubber to the designated location. Ensure that the scrubber is parked on the flat ground and the start-up key is inserted into the start-up keyhole on the control panel and turned from On to Off to turn off the power.

1. Please open the upper cover of the scrubber, and then open the tank cover of the freshwater tank.
2. Put the water hose into the freshwater tank, turn on the switch or tap to start adding clean water into the freshwater tank, and stop adding water when the water reaches 90% or the float above the clean water tank floats.
3. After filling, remove the water hose, cover the water tank cover and the upper cover plate, and ensure that the water tank cover is pressed tightly, then move the scrubber to the area to be cleaned and start the operation.

6.3. Function Bar

There are 4 buttons on the left column:

- [Locating](#),
- [Health management](#),
- [Task report](#), and
- [Storage cube](#) (clicking the “cube” will pop up other function buttons).

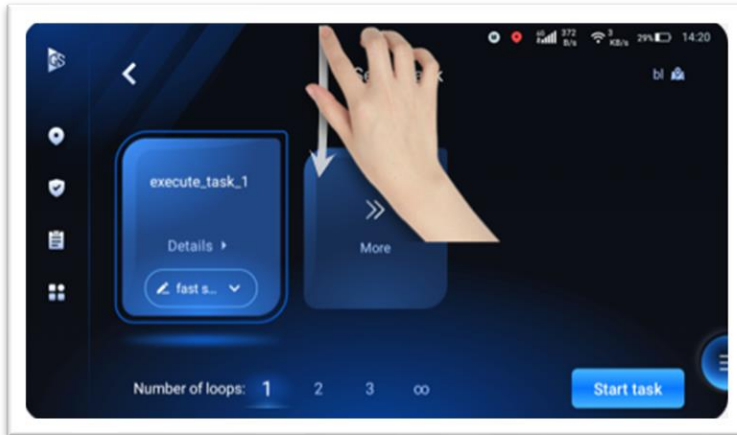


There are 11 options in the Storage cube:

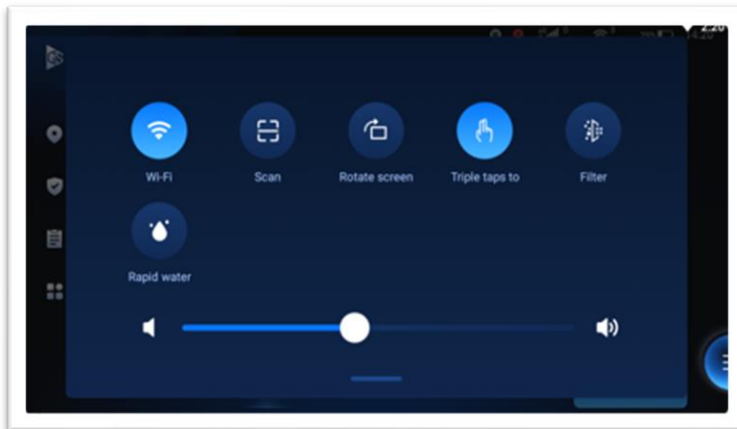
- [Location](#)
- [Health management](#)
- [Task report](#)
- [Scheduled task](#)
- [Device status](#)
- [Cleaning configuration](#)
- [Data management](#)
- [Elevator control management](#)
- [System setting](#)
- [Network management](#)
- [Logout](#)
- [Login](#).

6.4. Pull-Down Menu

1. In the interface, slide your finger from top to bottom to display the “**pull-down menu bar**”.



2. There are 7 functions available:



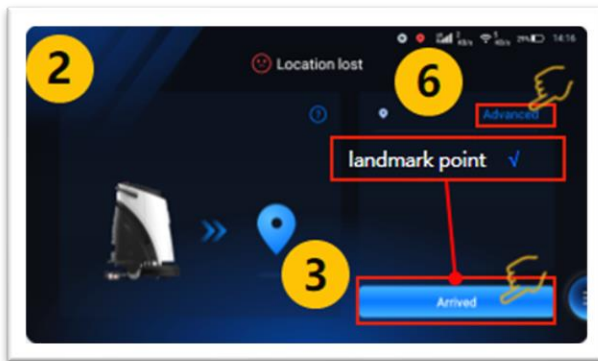
1. **Wi-Fi**: Button to connect to Wi-Fi.
2. **Scan**: Open by default, scan the QR code to locate and trigger tasks.
3. **Rotate screen**: Flip the APP display orientation (180°).
4. **Triple taps to**: On by default, 3 consecutive taps on the screen during a task can pause the task.
5. **Filter**: On by default, whether to enable the filtering function.
6. **Rapid water**: Off by default; after opening, the water spray function can be activated independently.
7. **Speaker**: speaker volume.

6.5. Robot Locating

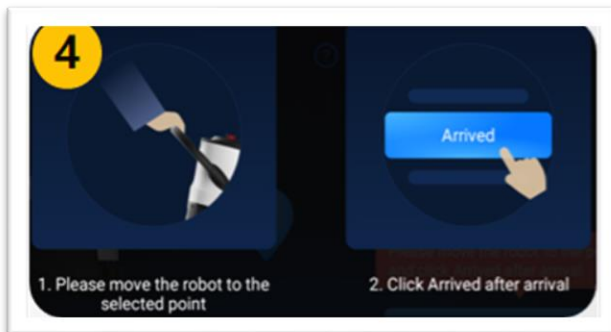
1. Click the “**Locating**” button.



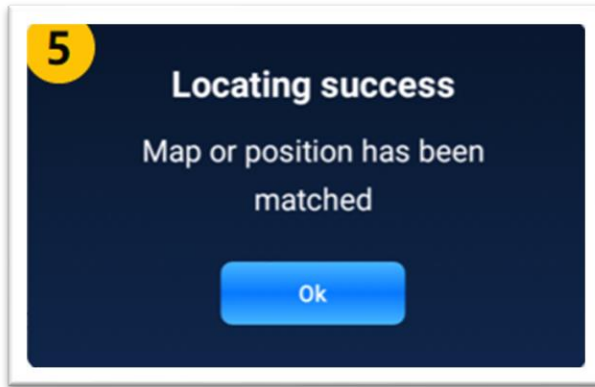
2. Move the machine within 2 meters of the locating point.



3. Select the locating point and click “**Arrived.**”



4. The robot will turn 360 degrees in place or stay still.



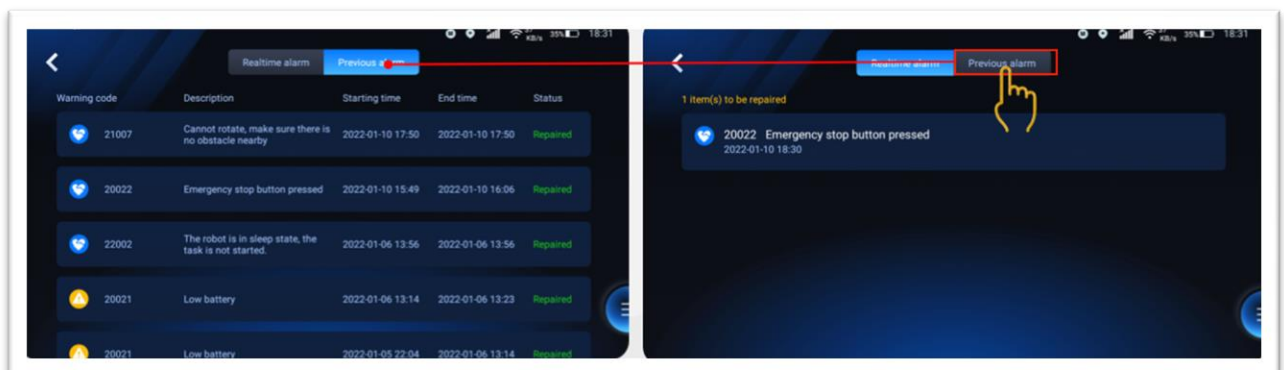
5. After the locating succeeded, a window pops up with a voice message. The sequence is 12345.
6. You can also click "**Advanced**," move the cursor to the current position of the machine and click "**OK**".
7. The robot will turn 360 degrees or stand still, and a window will pop up with a voice message when positioning succeeds. The sequence is 12678.

6.6. Health Management

1. Click the "**Health Management**" button.



2. Switch the screen to the Health Management interface. Alarms are displayed here.



3. You can see the error code, descriptions, reporting time, and status.

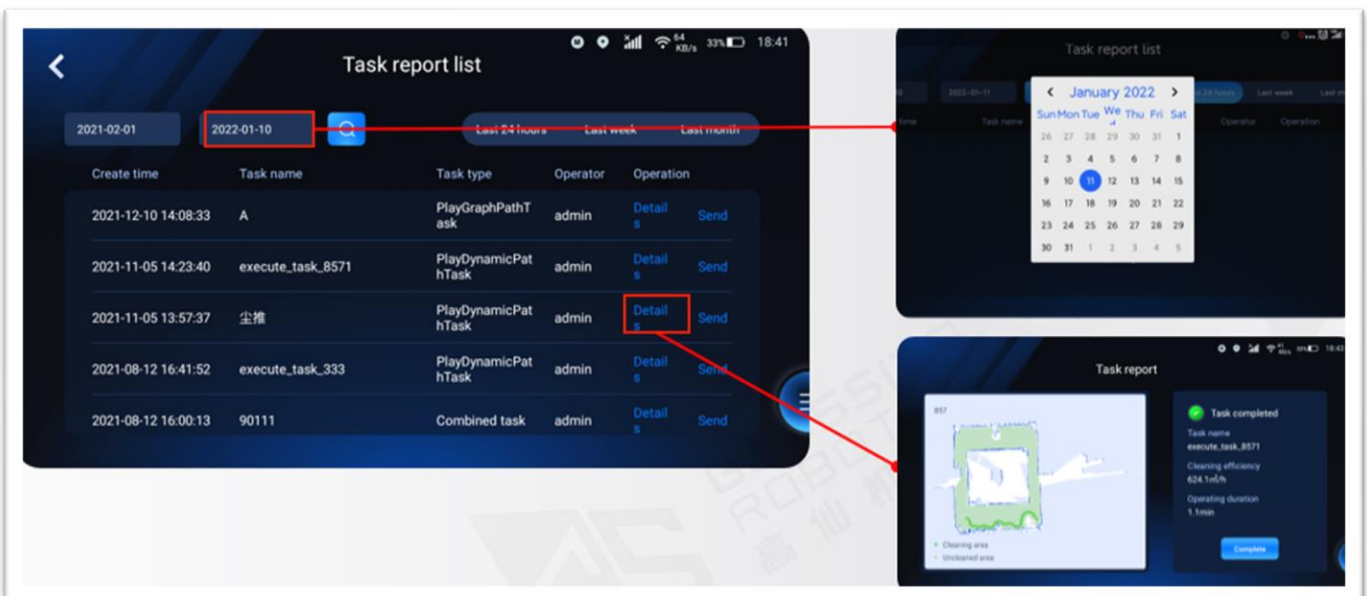
- The error that has been fixed will be recorded as well.

6.7. Task Report

- Click the “**Task Report**” button.



- You can instantly view the task report executed in the “last 24 hours”, “last week”, and “last month” through 3 buttons.
- You can also manually filter the period to view the task report.
- View task report details via the “**Details**” button.



6.8. Storage Cube

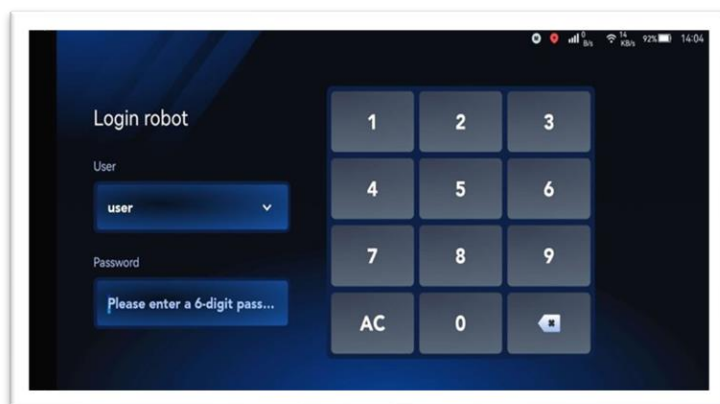
There are 11 options in the Storage cube:

- Location,
- Health management,
- Task report,
- Scheduled task,
- Device status,
- Cleaning configuration,
- Data management,
- Elevator control management,
- System setting,
- Network management,
- Logout, and
- Login.

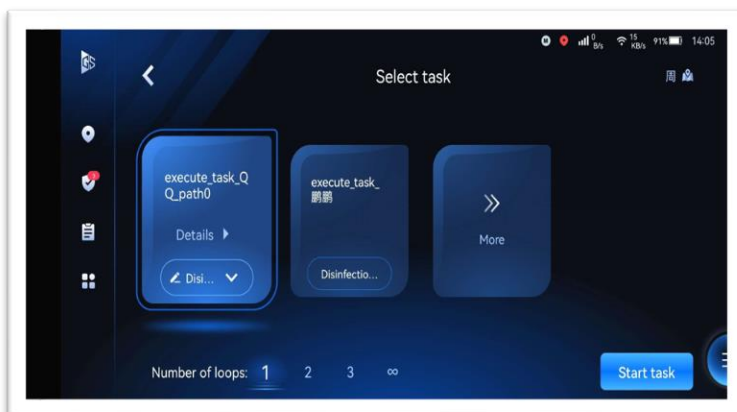
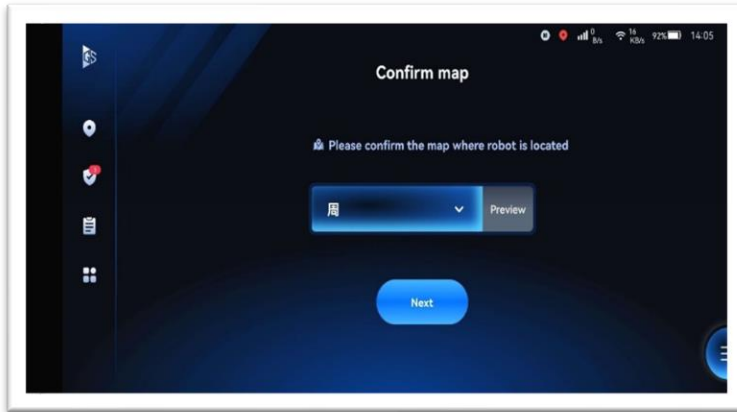
6.9. Manual Driving Operation

The scrubber retains the manual operation function that traditional scrubber has and supports the manual execution of cleaning tasks. To manually operate the scrubber, cleaners can control the movement and steering of the intelligent scrubber by the pedal and steering wheel. The operation steps are as follows:

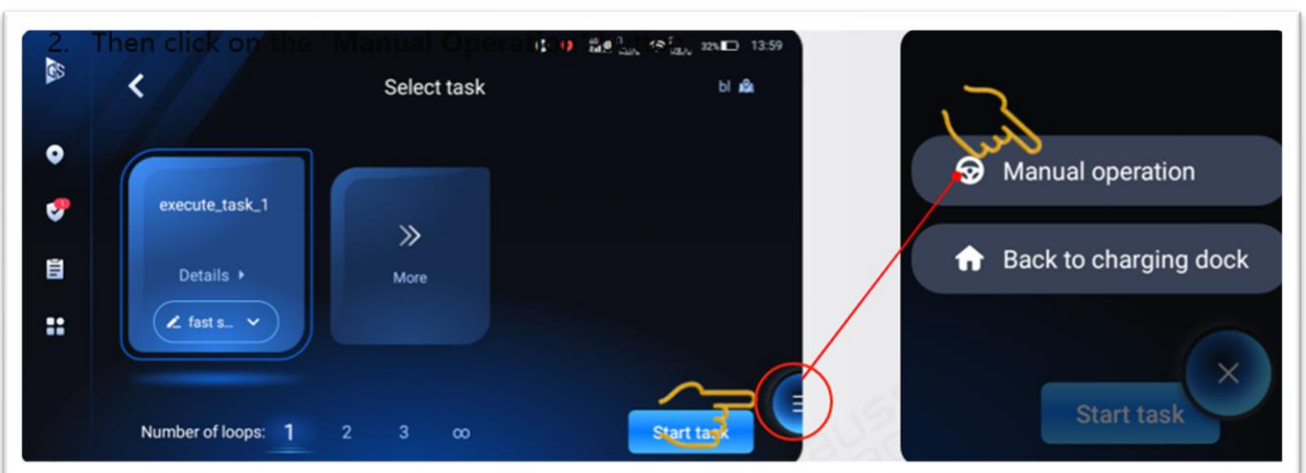
1. Switch the robot to manual mode.
2. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.
3. Wait for about 30 seconds after the scrubber is started with a key, then enter the GS User App.
4. As shown in the figure below, the login interface will appear on the screen. Select the corresponding username in the login option and enter the password to enter the GS User App.



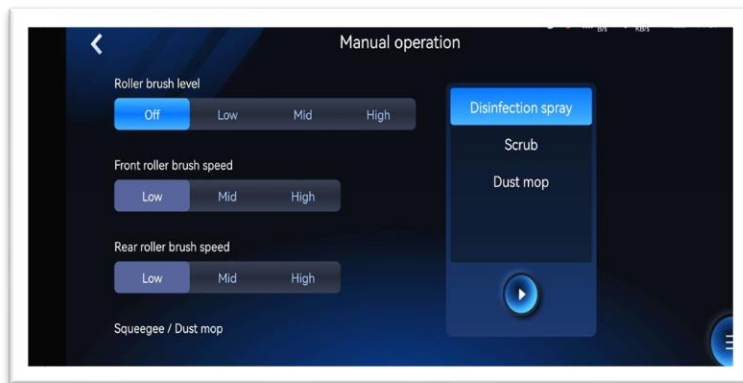
5. After a successful login, the device status screen will pop up like the following figure shows displaying the current water level of tanks, residual life of consumables, and other information. Click **"OK"** in the lower right corner.
6. First, you need to confirm the current map of the machine. Click the content of the input box, drop-down to select the corresponding map, and click **"Preview"** to enter the map page for viewing.



7. Click the floating ball in the lower right corner, and then click **once** after the floating ball pops up. It will show the **"Manual operation"** and **"Back to charging dock"** buttons.



8. Enter the manual operation interface, as shown below:



9. During manual operation, you can select or switch the cleaning mode, and adjust the water spray level, suction level, cleaning speed, etc. as required.

10. Click the **Start** button and push the robot to do the cleaning task manually.

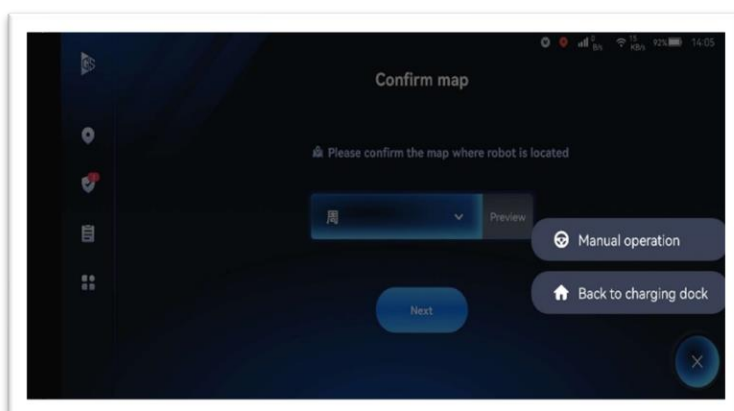
11. When the cleaning task is completed, click the **End** icon.



12. After the end of the manual task, push the robot forward for one meter to clean the residual water on the ground.

13. After residual water is cleaned, the squeegee is lifted.

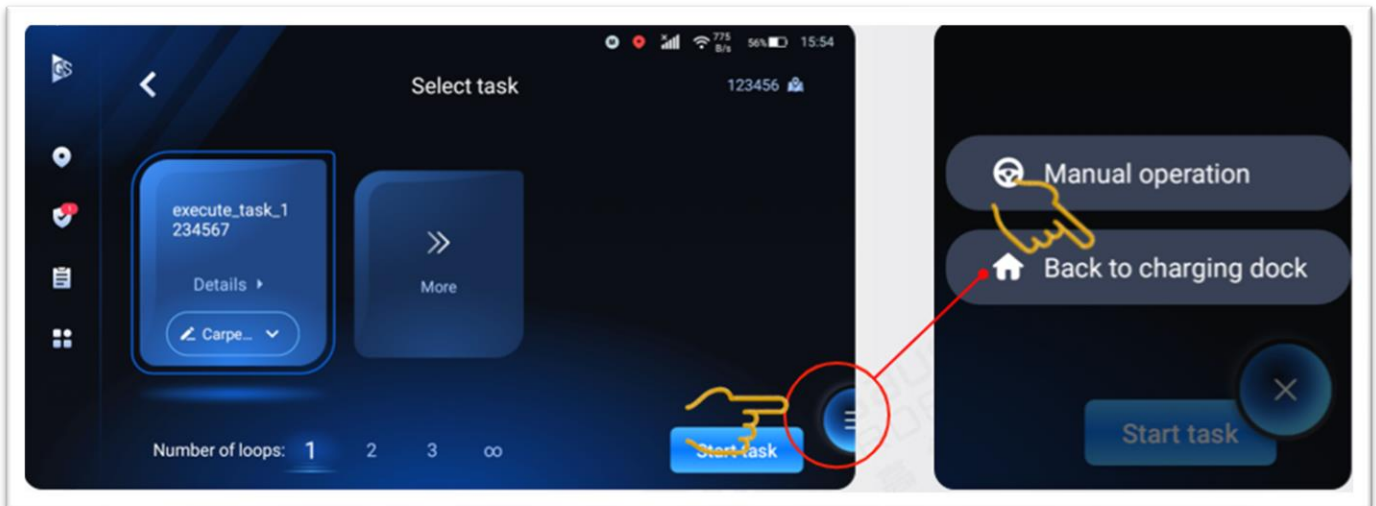
14. Click the screen to go back to the main UI.



- 15.If the charging pile/workstation is configured, click home and recharge with one button.
If the charging point/workstation is not configured, you can select a target location, and the machine can go to it automatically.

6.9.1. Moving Back to Charging Dock

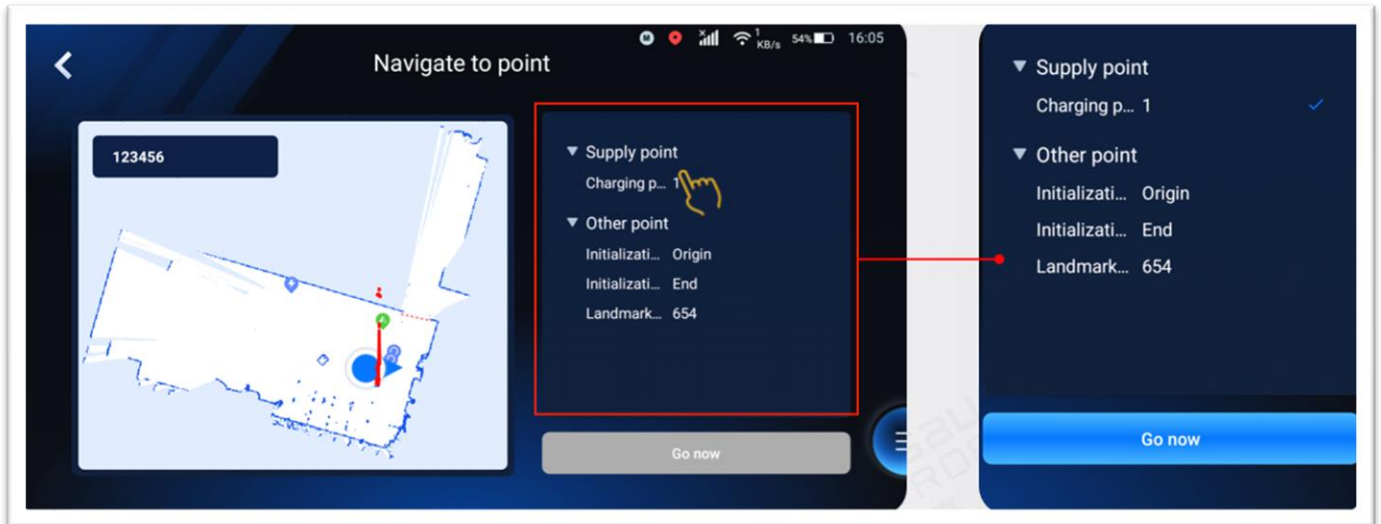
1. Click the floating window in the lower right corner, when the floating window pops up and then click once, and the **"Manual Operation"** and **"Back to charging dock"** buttons will be displayed.



2. Then click the **"Go Now"** button.

The premise of "back to charging dock"

- There is a scanned map, and the positioning is normal.
- There are manually created points: charging points, workstations, navigation points, landmark points, maintenance points, etc.
- In most cases, using a charging point or workstation.



3. After clicking the "**Back to charging dock**" button, it will switch to the interface shown on the right.
4. Then click the point you want to go back to, at this time, "✓" will be displayed behind the name of the point, and the "**Go Now**" button will change from **gray** to **blue**.
5. Then click the "**Go Now**" button, and the robot will automatically navigate to the target location.

6.9.2. Power OFF & Storage

1. Switch the robot to manual mode. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



2. Push the robot to the maintenance point and conduct [daily maintenance](#).



3. Push the robot to the storage place.



4. Turn the key to power the robot off and wait for the screen to turn off.

6.10. Auto Driving Operation

First, we need to move the scrubber to the "**Mark**" position, click the "**Automatic Operation**" icon on the main interface of the APP, and then enter the automatic operation interface shown in the following figure. In the interface, you can select specific tasks, set task areas and the number of execution times, and start to execute tasks.

After the setup is completed, the robot will complete the task autonomously according to the selected task and the set circulation time.

The operation steps are as follows:

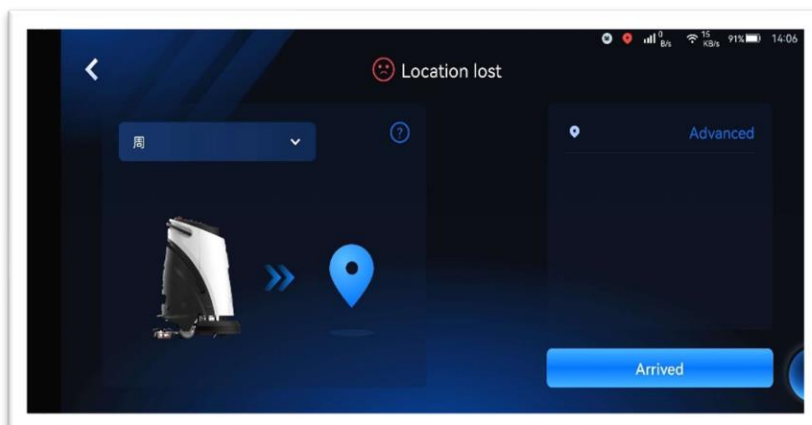
1. Select the Task

In the Select Task interface, slide left and right to select a task. It supports modifying the cleaning mode of the task, setting the number of cycles, and viewing the task details. Click "**More**" to jump to the page.



2. Initialize Location

Then click **"Mark"** on the screen, and the robot will automatically initialize its location. When the **"Positioning State"** in the upper right corner turns **green** and the **red** laser line coincides with the edge of the obstacle, it indicates successful positioning. If not, manual initialization is required.



3. Set the Number of Circulation Times

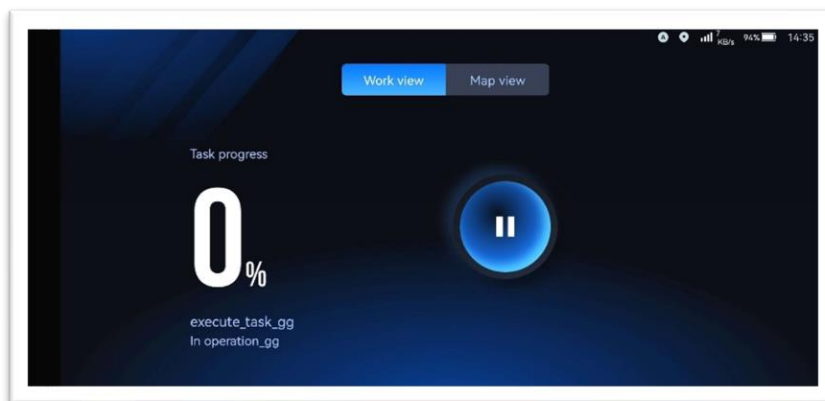
Click the **"Cycle Times"** button on the right to select the number of task cycles. Enter the number of times you want the robot to repeat the selected task. Click the **OK** button to save, and the robot will repeat the task you have selected until the number of times reaches the required value.

- If you only need to perform a task once, just click **"Start Task"** in the lower right corner.



4. Start the Task

Click the "**Start Task**" button in the lower right corner to enter the Automatic Operation interface. After clicking the "**Start Task**" button, it counts down 5 seconds and starts automatic operation after the countdown.



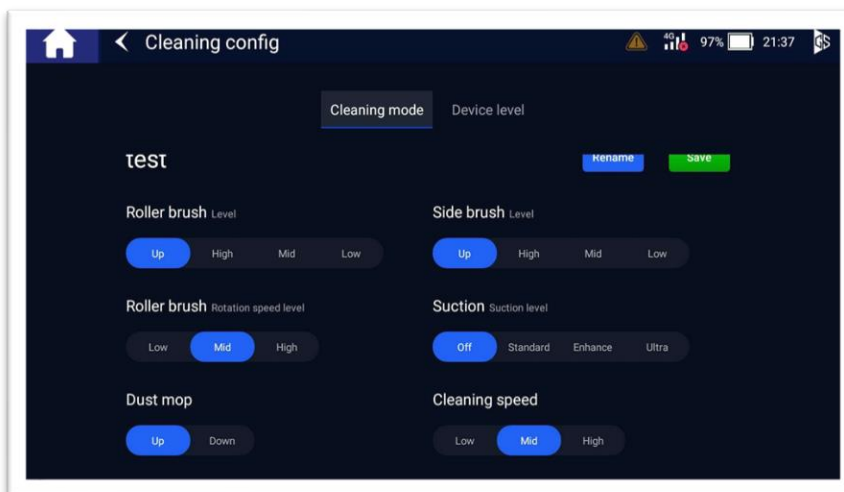
5. Pause the Task

- The task can be paused at any time during the working process by pressing the **Pause** button, and the task will continue by clicking the **Start** button again. The current cleaning task will be terminated by clicking the **End the Task** button in the lower right corner.
- Click the **Skip Current Task** button to skip the current task and perform the next task.
- Click the **Control Panel** button in the upper right corner to enter the same page as the home page control panel to control the brush, water spraying grade, etc.
- The current cleaning task will be terminated by clicking the **End the Task** button in the lower right corner.



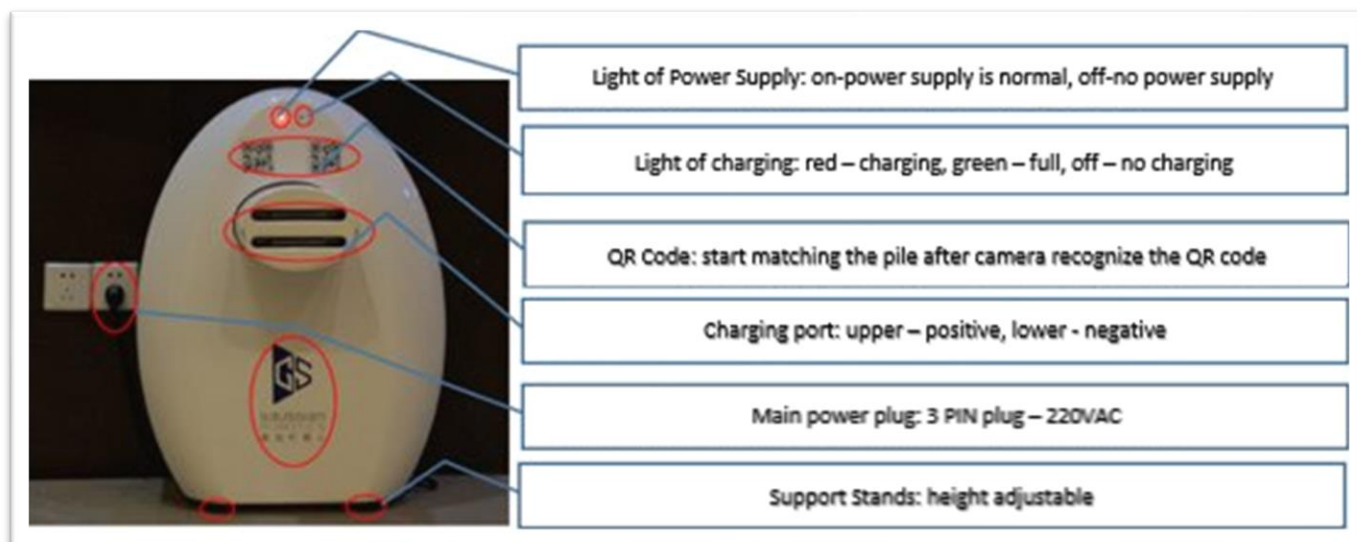
6. Disinfection Start/Stop And Adjustment

- The task can be paused at any time during the working process by pressing the **Pause** button and entering the cleaning allocation task interface. The current disinfection task will be terminated by clicking the **Atomization** button in the lower right corner.
- After selecting the Atomization task, **Atomization Rate** and **Atomization Distance** could be set following the task requirements.



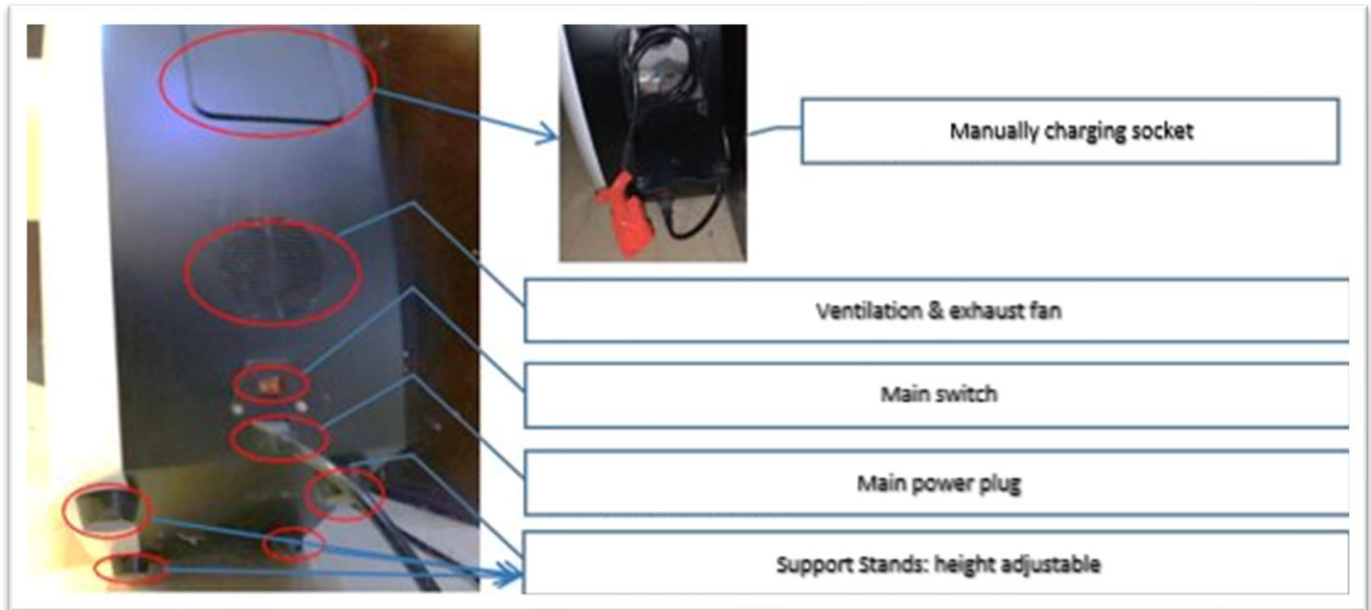
6.11. Auto-Docking

Auto-Charging Triggering



Scenario A

1. When the power of the robot drops to **20%**, the robot will go to the charging pile and do auto-docking for charging.
2. The robot recognizes the charging pile. When the charging task is triggered, the robot autonomously navigates to the front of the charging pile and uses the laser to identify the shape (length and width) of the charging pile.
3. The robot moves backward to identify the QR code for docking.
4. After the robot recognizes the charging pile, it turns around 180 degrees, retreats about 40cm away from the charging pile, and will use the rear camera of the robot to identify the position of the QR code and prepare to locate the position of the charging pile. After the precise position of the QR code is accurately recognized, the robot adjusts the angle and continues to retreat to dock itself.



Scenario B

1. A charging point is added to the combined task, and the robot will go to the pile and dock itself for charging.
2. If the charging pile position recognized by the robot deviates, the robot will adjust the position left and right.

6.12. Stopping the Scrubber

There are several ways to stop the scrubber from moving.

1. To stop the robot from moving in an emergency, you can press the **red** emergency stop button on the control panel. The scrubber will keep the power on but will stop moving and operating at this time (**note**: the vacuum motor will not stop working).
2. When you stand on the scrubber and control the scrubber, you can move the joystick to the middle to stop the scrubber from moving. At this point, the front wheel brake will be automatically put down.
3. Turn the power-on key inserted in the power-on keyhole under the head cover from On to Off to turn off the power of the cleaning robot.

6.13. Draining Water

In the process of cleaning the ground, if the full-tank indicator of the recovery tank turns **red**, it means the sewage in the recovery tank of the scrubber has reached the limit capacity. At this time, the scrubber cannot continue cleaning, and the operator should manually control the scrubber to drain sewage at the designated drainage place before continuing the operation.

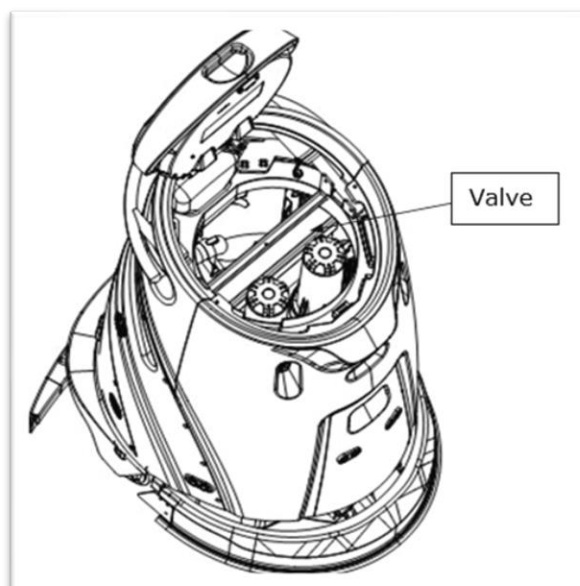
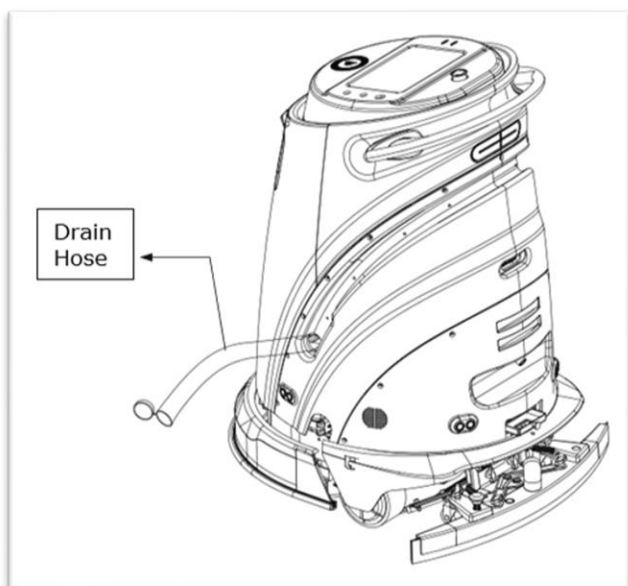
The operation steps are as follows:

1. Control the movement of the scrubber to the designated sewage discharge point (it is recommended to be consistent with the water addition point to facilitate the cleaning and maintenance of the sewage tank).
2. Take out the drain hose, remove the plug, and start draining sewage into the sewer.
3. After the sewage is drained, plug in the plug tightly (please make sure the plug is plugged tightly, otherwise, it may affect the scrubbing effect). The scrubber returns to normal. Meantime, put the drain hose away, and then move the scrubber to the area to be cleaned to start working.
4. Also, if you want to drain the water from the clean water tank, you can turn the valve 90 degrees anticlockwise to form a horizontal state. The water from the clean water tank will automatically flow into the sewage tank and then be discharged through the sewage pipe.



NOTE:

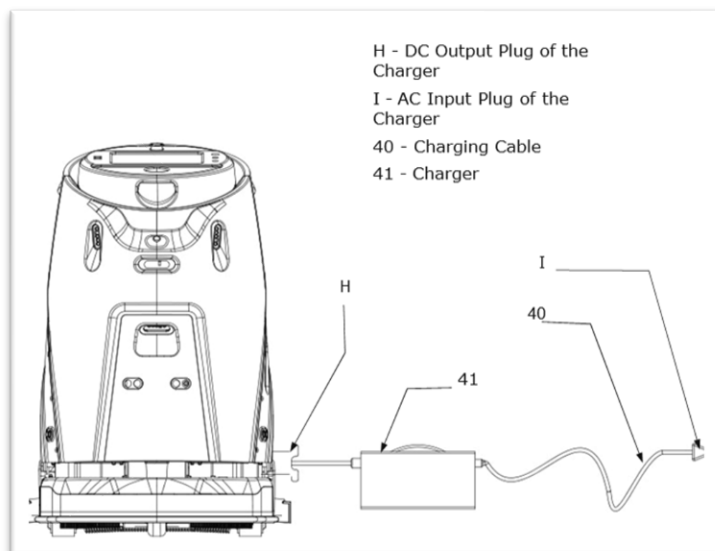
- After the use of the scrubber, all the water in the freshwater tank and recovery tank shall be drained off before the scrubber is stored in the storeroom.



6.14. Charging the Scrubber

In the upper right corner of the GS App application interface on the control panel display, you can view the current remaining battery of the scrubber. When the battery level is lower than 20%, the scrubber will prompt that the battery level is low. At this time, the scrubber shall be returned to the charging place to be fully charged before proceeding to the next step.

1. You can manually drive the scrubber to the known charging place or select a certain charging place in **Execute Task** of the GS User App to let the scrubber automatically go there. The charging point is recommended to be in a flat and dry place, and the area must be protected to prevent dangerous accidents from being touched by children.
2. After the scrubber moves to the designated charging place, please park the robot on flat ground, insert the power-on key into the keyhole and turn the key from On to Off to turn off the power, and then perform the charging operation.
3. Please use the charger dedicated to the Scrubber 50 (Sprayer) and charge it in strict accordance with the following order:



Charging: plug in the DC output plug of the charger → plug in the AC input plug of the charger.

4. The screen of the charger will show the corresponding current and voltage values and there is a charging indicator that will show the charging status. A steady **red** light indicates that the scrubber is charging. And the red light turns to **green** to indicate a full charge.
5. After the scrubber is fully charged, carry out operations in strict accordance with the following order:

Fully-charged: Unplug the AC input plug of the charger → unplug the DC output plug of the charger → plug in the power plug.

Then start the scrubber and manually drive it to return to the designated place to continue cleaning or store the scrubber in the storeroom for use next time.

6.15. Physical Fence Function

There are often temporary construction areas at the robot working site, and if the robot incidentally enters such construction area, it may lead to perilous consequences.

If the customized physical fences are placed around the restricted area (the distance between two physical fences should not exceed 4m), once the robot manages to recognize physical fences, a virtual wall between the fences will be generated automatically and the robot will continue to carry out the task by avoiding such restricted area(s). Such a virtual wall will be erased automatically after the robot is powered off.



Figure: Illustration of a physical fence

6.16. Anti-Falling Function

Cleaning robots at the working site often encounter areas such as escalators, stairs, platforms, and other areas, where there exists a risk of falling, which may cause it to fall. When the robot is performing a task, after detecting an area with a risk of falling, it will initiatively avoid the risk area to perform the task to evade the falling situation.

At present, the robot is mainly furnished with the following anti-falling solutions, including front-slant camera detection, virtual wall drawing, RFID sensor recognition, infrared sticker solutions, etc. The specific anti-falling deployment plan requires AROS professional service engineer's on-site deployment.

6.17. Device Status | Adjusting the Lifespan of Consumables

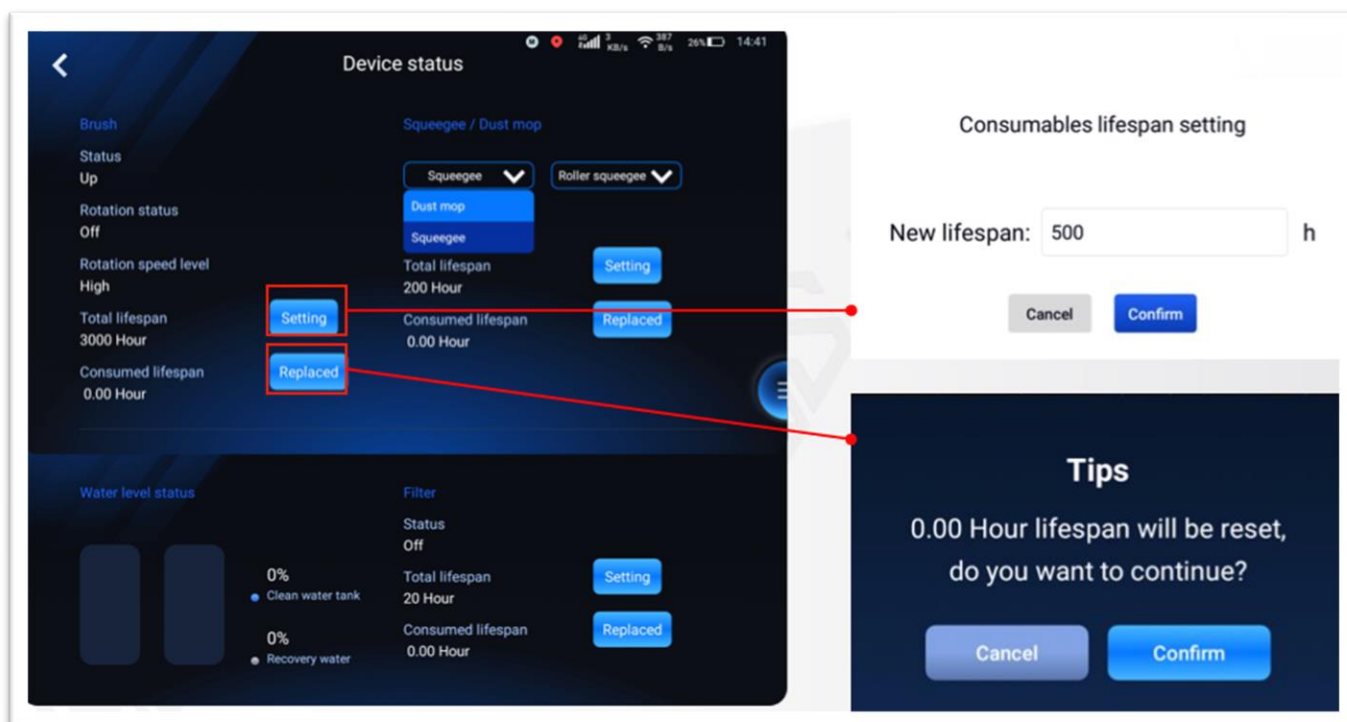
Set up the upper limit of the lifespan of the roller brush, squeegee/dust mopper, and filter.



NOTE:

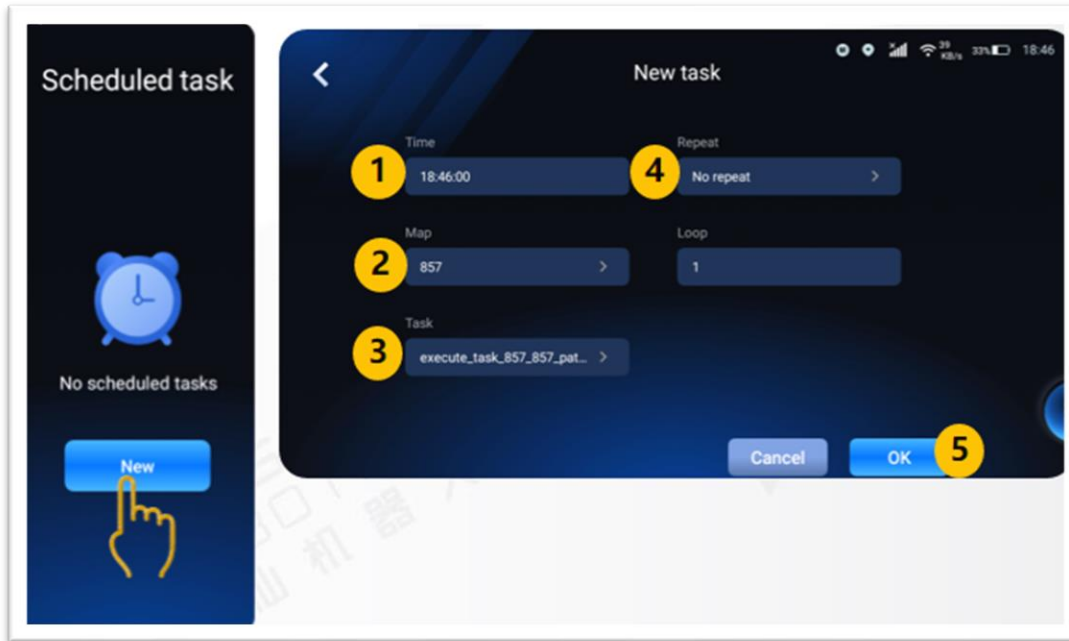
- The data here is for reference only and is the default value for:
 - Disc brush/roller brush/roller cloth: 500h is recommended.
 - Dust mop/squeegee: 300h
 - Filter: 20h

1. If there is a large deviation between the data and the actual situation, set it up accordingly.
2. If the related consumables are replaced, you need to click the "**Replaced**" button, the data will be cleared and reset.

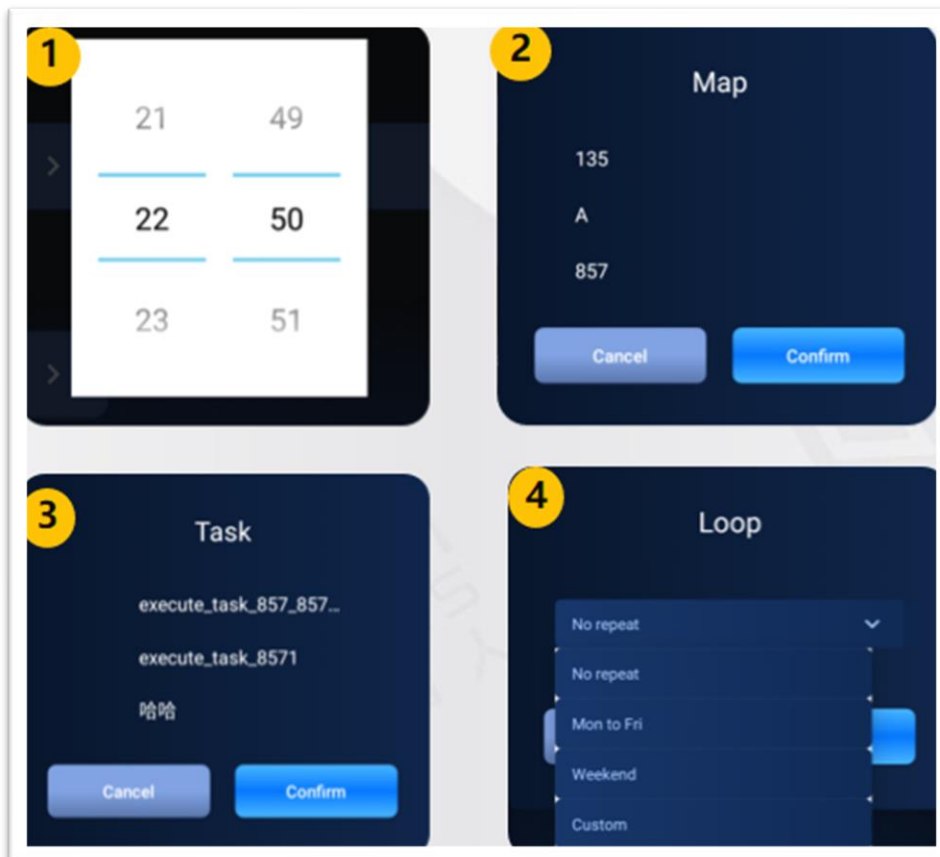


6.18. Scheduling Tasks

1. Click "**Scheduled Task**" to enter the interface of the scheduled task setting as shown in the figure:



2. Click the **"New"** button to switch to the **"New Task"** interface.
3. You can now set the start time, select the map, execute a task, repeat, and determine cycle times (up to 99).



6.19. Switching Map and Operation

1. Push the robot to the landmark point.
2. Click the "**Locating**" icon in the sidebar, select the landmark point, and click "**Arrived.**"
3. Then the robot will be initialized.
4. A message will pop up if locating is successful.
5. Click "**Start**" on the screen to start the operation.

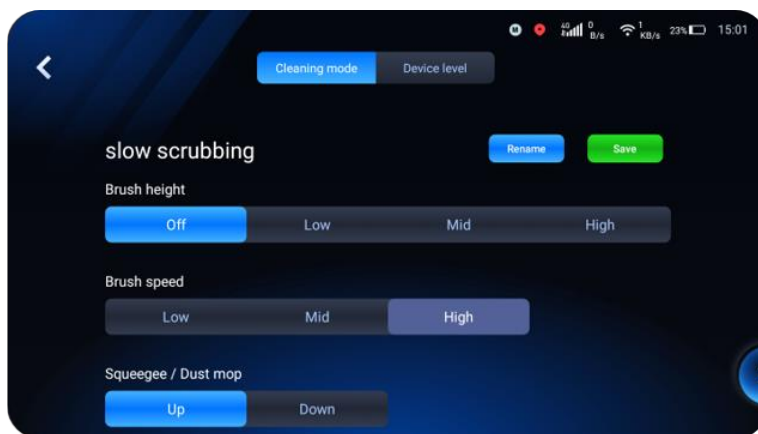
6.20. Clean configuration

6.20.1. Clean Mode

A total of 4 cleaning modes can be configured, such as:

1. dust cleaning,
2. run only,
3. land cleaning, and
4. heavy cleaning.

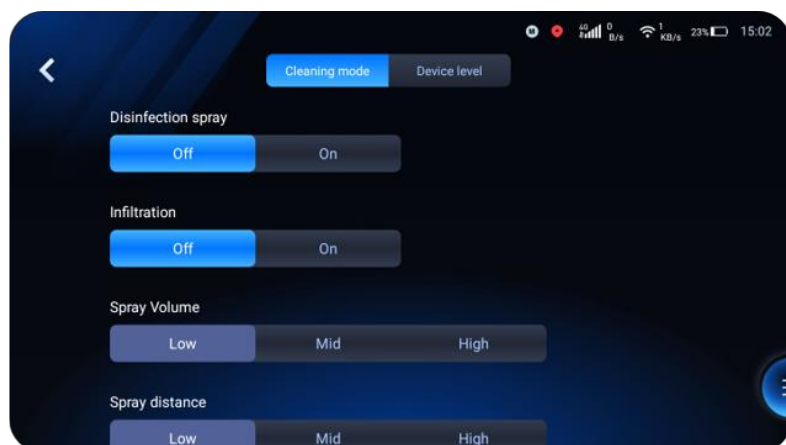
Select the mode accordingly to meet an actual situation.



- **Brush height:** the height from the ground
- **Speed of front roller brush speed:** grade selection
- **Rear brush speed:** grade selection



- **Squeegee/dust mop:** state selection
- **Water spray level:** level selection
- **Suction level:** level selection
- **Cleaning speed:** level selection



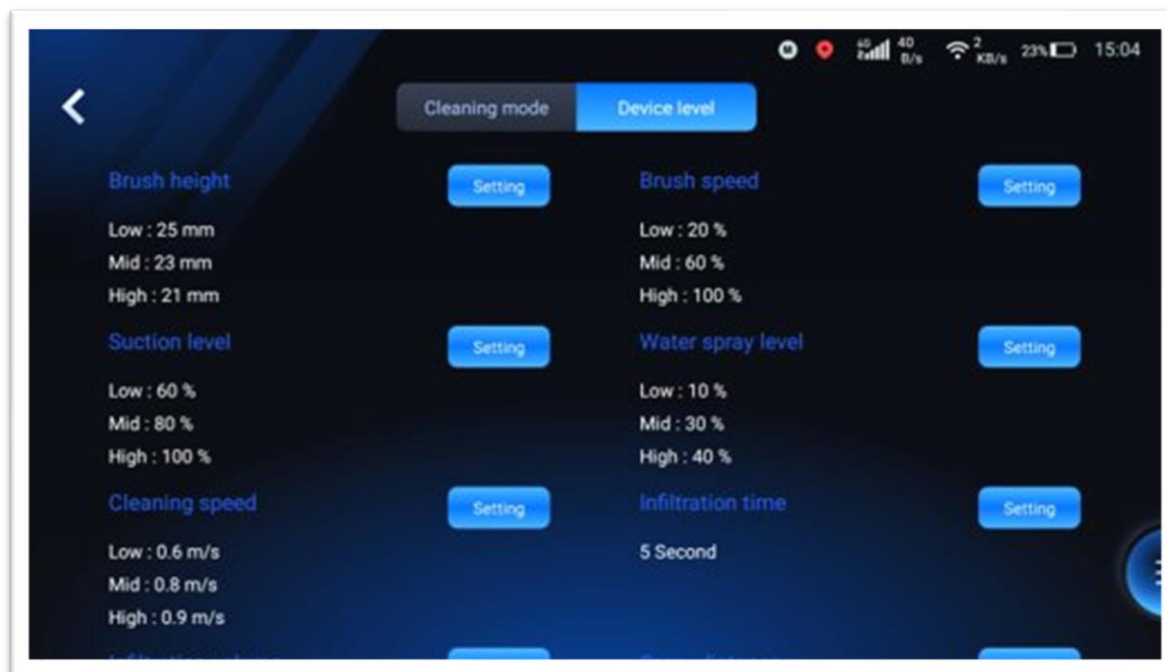
- **Disinfection Spray:** state selection
- **Infiltration:** state selection
- **Spray volume:** can be set only when the spray button is turned on.
- **Spray distance:** can only be set when the spray button is turned on.

6.20.2. Device Level

The speed range of each device is as follows. For the recommended values in different scenarios, please refer to the data on the next page.

- Roller brush height: 10~40
- Front roller brush speed: 0~100%
- Rear brush speed: 0~100%
- Suction level: 0~100%
- Water spray level: 0~100%

- Cleaning speed: 0~1.0
- Infiltration time: N seconds
- Infiltration water volume: 0~100%
- Spray distance: 0~100%



Recommendations for different grounds

Floor Type	Speed	Brush Rotate Speed	Water Level	Suction	Brush	Cleaning Pad
PVC	Medium/High	Middle	Low 15~25	80~95	white fur (0.25mm)	x
Epoxy floor	Medium/High	Middle	Low 15~25	80~95	white fur (0.25mm)	x
Marble	Medium/High	Middle/High	Low 15~25	80~95	white (0.35mm)	
Terrazzo	Medium/High	Middle/High	Low 15~25	80~95	white (0.35mm)	
Small square brick	Medium/High	Middle/High	Low 15~25	90~100	white (0.35mm)	
Concrete floor	Medium/High	Middle/High	Low 25~35	90~100	white (0.35mm)	x
Wooden floor	Medium/High	Middle/High	Low 15~20	80~100	white fur (0.25mm)	x

7. MAINTENANCE INSTRUCTIONS

In the operating process of the Vacuum 50 cleaning robot, operators need to perform maintenance to the robot before and after each operation, periodically inspect and maintain the equipment, and periodically replace consumables, to ensure the best performance of the robot and maximize its service life.

7.1. Daily Maintenance Process

During daily use, you should maintain the automatic scrubber to minimize the consumption of parts, give full play to the advantages of the scrubber, and prolong its life.

- ❖ Before maintenance, be sure to turn off the key switch and unplug the power plug, to prevent accidental electric shock or parts damage.
- ❖ The machine should be placed in a dry and ventilated place to prevent the humid environment from affecting electronic and electrical components and shortening its service life.
- ❖ If the storage environment temperature is lower than 5°C, please ensure that there is no water in the entire waterway.
- ❖ If detergent is added to the clean water tank to prevent the accumulation of foam inside the water tank, be sure to add a defoamer to the recovery tank (the amount of defoamer should be matched according to the proportion of detergent used).

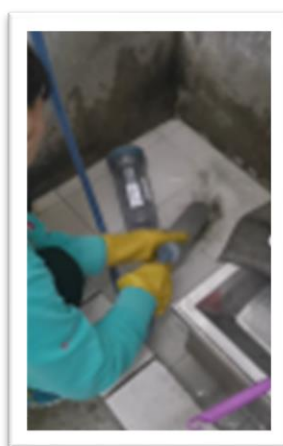
1. Push the machine to the maintenance point for daily maintenance operations.



2. Open the drain cover and take out the drain/wastewater tank pipe for drainage.



3. Remove the filter bag, remove the filter bottle with the tool, remove the filter element, and rinse. Filter element specifications are different, do not install reverse.



4. Use clean water for internal cleaning, repeat several times to make sure the inside of the tank is clean.



5. Open the soft rubber plug of the charging port and plug in the charger to charge. When charging, make sure the plug is properly connected.



6. Open the anti-collision front cover.



7. Remove dust boxes on both sides and clean them.



8. Open both end-covers of the roller brush.



9. Remove the roller brush and clean.



10. Install the parts back after cleaning.



7.1.1. Everyday Maintenance

1. Drain the water from the recovery tank and clean the tank with a water hose or a spray gun. Ensure that the inner surface of the recovery tank is clean, prevent the accumulated dirt from blocking the recovery tank, and avoid water spilling to other places in the process. Please off the recovery tank valve in time after draining the sewage.
2. **Filter element cleaning:** tiny solid particles will adhere to the filter element. Please use flowing water to rinse the filter element.

3. **Filter bag cleaning:** Because some sediment will sometimes weaken the filtering effect, please use a brush, running water, or pressurized water gun to clean the filter bag, and need a periodic inspection.
4. Check whether there is any silt/debris in the recovery tank, if any, remove it immediately.
5. Clean the inside of the squeegee mount to prevent the accumulation of hair and other dirt, which will affect the wiping effect. And keep the surface clean, to reduce wear and tear, and prolong its service life. At the same time, the whole squeegee mount stand needs to be cleaned.
6. After the scrubber has completed the task, please check the power supply and charge it in time if necessary.
7. The water tank of the disinfection atomizer needs to be maintained and cleaned regularly and the recommended cleaning frequency is one (1) time per month.

7.1.2. Weekly Maintenance

1. Check whether there is dirt on the sensor. Please use a soft cloth or paper to wipe it gently to avoid scratches and other damage.
2. Check if the squeegee blade is worn out and replace it in time if necessary.
3. Check the steel filter of the recovery tank and freshwater tank, and clean or replace it in time if necessary.
4. Check whether the spring, screw, and sheet metal assembly are loose, deformed, and rusted everywhere.
5. Clean the skirt to avoid more dirt.
6. Remove the brush plate every week and clean the brush plate. There will be hair or other dirt entangled on the brush plate.
7. Check whether the suction pipe is damaged and remove the inner surface of the flushing pipe to prevent the accumulation of lint and debris and affect the water absorption effect.
8. Check the wear of the cleaning pad. If it is damaged or seriously worn, please replace it.
9. If the water tank has a peculiar smell, you can use self-purchased deodorant to deodorize the water tank according to the product instructions.
10. It is recommended that the water tank be treated with disinfectant twice a week, and the proportion of disinfectant should be used according to the product instructions.
11. **Flushing pipeline:** after cleaning the water tank, add clean water, and clean the ground with a large amount of water for 3-5 minutes, so that the large flow of clean water can fully flow through the pipeline, to clean the pipeline.

7.1.3. Long-term maintenance

1. Check whether the spring, screw, and sheet metal parts of the water suction structure are loose, deformed, or damaged.

2. Check whether the sealing ring of the water tank cover is damaged and whether there is leakage in the drainpipe.
3. Check whether there is abnormal noise in the structure of the whole machine, which affects normal use.
4. Apply grease on the water suction pulley and other frequently rotating or rubbing parts.
5. If the brush disc is worn to the Yellow bristles, please replace it.
6. The filter on the water intake shall be replaced regularly.

7.2. Description of Consumables

The main consumables of Scrubber 50 (Sprayer) include a squeegee blade, brush, cleaning pad, filter cartridge, filter, filter bag, etc. Replacement cycles of these consumables depend on floor materials in usage scenarios. For details, [see the table below](#).

If the operating frequency of the scrubber is too high or too low in the actual application scenarios, the user can appropriately shorten or extend the replacement cycle of the Scrubber 50 (Sprayer) consumables. Timely adjustments shall be made according to the observed cleaning effect of the scrubber.

7.3. Battery Maintenance

Batteries are not allowed to be disassembled and replaced privately to avoid unnecessary losses.

1. Batteries should be kept away from heat sources and high-pressure places and avoid long-time exposure to sunlight.
2. Batteries should not be put into water or fire.
3. Do not conduct short circuits of the positive and negative terminals of the battery with metal.
4. Avoid excessive physical shock and impact on the battery. Do not hit, drop, or step on the battery.
5. It is prohibited to disassemble or assemble the battery without the permission and guidance of the manufacturer. This appliance contains batteries that are only replaceable by skilled people.
6. Do not mix batteries of different manufacturers, types, and models for use.
7. It is prohibited to use or store the battery in a high-temperature environment (>45 degrees), to avoid battery heating, fire, or reduction of service life.
8. If the battery has run out, please charge it in time (within 2 hours).
9. In case of long-term storage (more than one week), be sure to turn off the circuit breaker switch after full charge, otherwise, the battery may be damaged, and the battery should be flushed once a month.
10. **WARNING:** To recharge the battery, only use the **CD-01** or **IC0650-024** provided with this appliance.

- 11.If the battery has a peculiar smell, discoloration, noise, leakage, serious deformation, and other abnormal conditions, please stop using it. The battery must be removed from the appliance before it is scrapped.
- 12.The appliance must be disconnected from the supply mains when removing the battery.
- 13.The battery is to be disposed of safely.
- 14.Battery safety treatment process: recovery and follow-up treatment by AROS or the third-party recycling organization established by AROS.
- 15.When electrolyte leakage splashes into the skin and eyes, please rinse with water and see a doctor immediately.
- 16.Please keep the battery out of the reach of pets and children. Children are not allowed to touch the battery.
- 17.When loading and unloading the battery during transportation, please pay attention not to fall, do not stack and turn over more than 3 layers, and ensure that the front is facing up.

7.4. Procedure for Manual Charging

7.4.1. Battery

The Battery (24VDC) is the main power supply for the machine. It is placed in the battery cabinet at the lower part of the robot's body.

7.4.2. Charging Socket

The socket can be used for manual charging. The charging plug is located on the left of the battery cabinet.

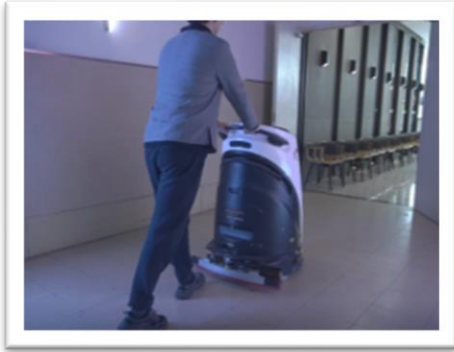
1. Remove the dust cover of the charging port and charge the robot.



2. When the plug is inserted into the socket, the machine gets a power supply.

7.4.3. Charging the Battery

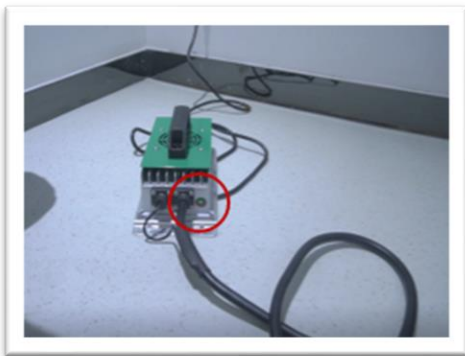
1. Long press the auto/manual switch for 3 seconds, and ensure the light indicator is OFF.



2. Then push the robot to the maintenance point.
3. Start charging.



4. Insert the red plug of the power adapter into the red charging port of the robot, then connect the power adapter to the 220V power socket.
5. The **flashing red** indicator light means charging is ongoing.
6. When the battery is full, the indicator turns **green**.



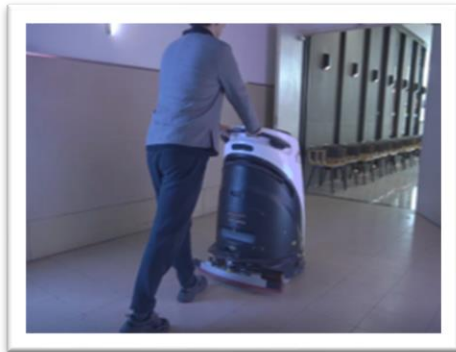
7. Disconnect the power adapter with the 220V power socket first, then disconnect the plug of the power adapter with the robot. Manual charging is completed.

7.5. Procedure for Manual Water-Fill & Drain

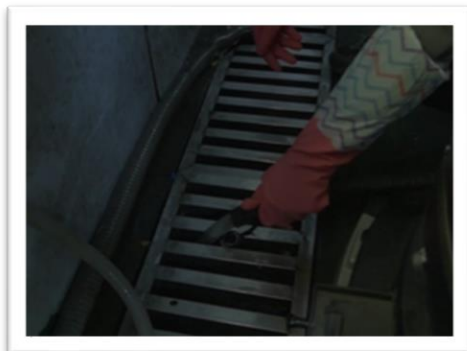
1. Switch the robot to manual mode.



2. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.
3. Push the robot to the maintenance point.



4. Take the wastewater pipe out and drain.



5. Open the cap of the wastewater pipe and quickly put it down to the drain.
6. **Kind reminder:** hold the pipe upward when opening the cap.
7. Close the cap tightly after the drain is completed.



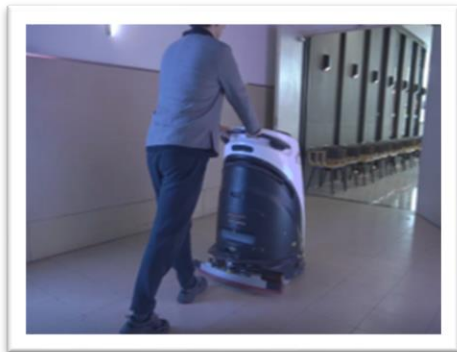
8. Withdraw the wastewater pipe.

7.6. Facade Cleaning

1. Switch the machine to manual mode. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



2. Push the robot to the maintenance point.



3. Using a damp, lint-free cloth, wipe the facade of the machine (be careful not to rub the camera and sensor).



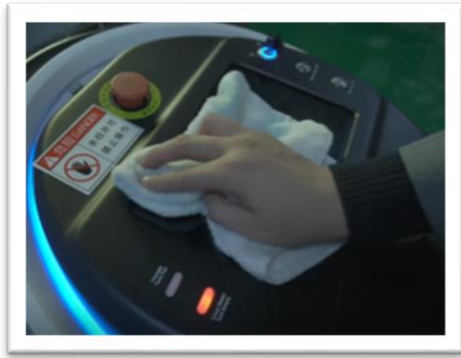
4. Using a clean, soft, lint-free cloth, gently wipe the laser, camera, and sensor.



5. Pull up the front bumper shell buckle, open the front bumper shell, and wipe the front horizontal laser inside.



6. Using a clean, soft, lint-free cloth, gently wipe the top-view camera. Finally, press the screen-off button and wipe the touch screen.



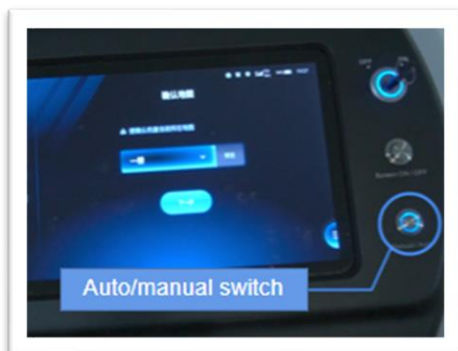
7.7. Water Tank Maintenance

After a cleaning task is completed, necessary maintenance is required for the water tank. Empty the freshwater tank and recovery tank and clean the tanks with clean water. Take down the filter of the recovery tank and the 2-stage filter of the freshwater tank and clean them with clean water. Note that the 2-stage filters cannot be mixed. Make sure the black seal ring of the filter is correctly installed back. Take down the dirt sieve of the recovery tank and clean it.

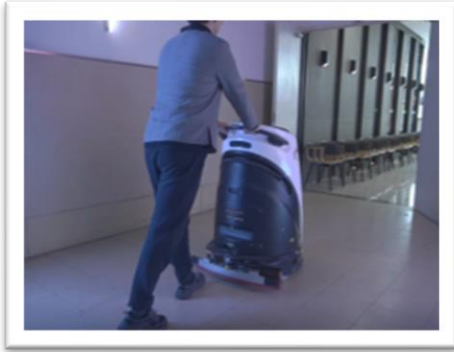
7.8. Water Tank Cleaning

Switch the machine to manual mode.

1. Press the auto/manual switch button for 3 seconds and confirm that the button indicator light is turned off.



2. Push the robot to the maintenance point.

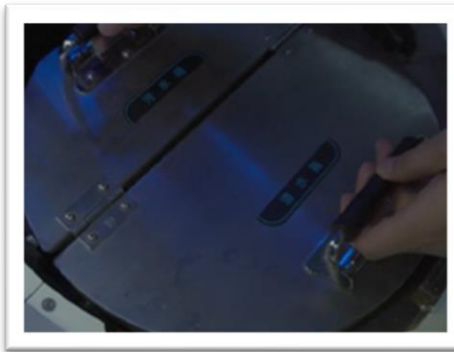


3. Open the top lid.



Open the tank cover.

1. Remove the entire tank cover.



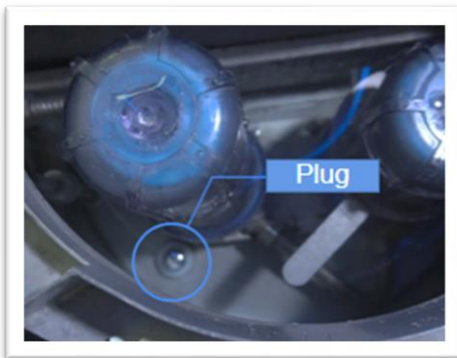
Take the wastewater pipe out and drain.

1. Open the cap of the wastewater pipe and quickly put it down to the drainage (*Kind reminder: hold the pipe upward when opening the cap*).



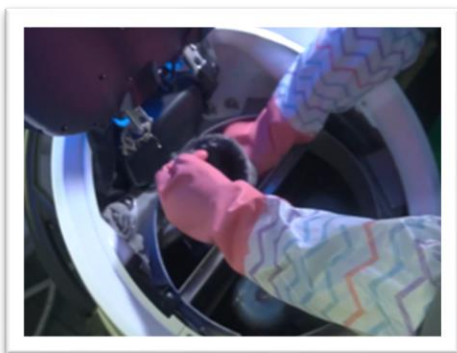
Empty the clean water tank.

1. Unplug the plug in the clean water tank after the wastewater tank has been emptied.
2. The water in the clean water tank will flow into the wastewater tank.
3. Then, continue to empty the wastewater tank using a wastewater pipe.



Remove and clean the filter bag.

1. Remove the rope from the hook and lift the filter bag.
2. Squeeze water out from the filter bag.
3. Hold the filter bag in one hand and take it out with the other hand.
4. Then, put it on the ground and clean it.



Remove and clean the steel wire filter in the wastewater tank.

1. Rotate and lose the steel wire filter anti-clockwise.
2. Take it out with two hands and put it on the ground.
3. Clean it with clean water.



Remove and clean the filter bottle and cartridge.

1. Use the wrench to loosen the filter bottle anti-clockwise.
2. Take the filter bottle and cartridge out, put them on the ground, and clean them with clean water.
3. Remove and clean the other filter bottle and cartridge in the same way.



Flush the inner wall of the clean water tank.

1. Place the water pipe into a clean water tank before flushing.
2. Then open the water valve to flush it. This helps to avoid water splashing to damage other components.



Clean the float switch sensor in the clean water tank.

1. Move the float sensor up and down when flushing it.



Flush the inner wall of the wastewater tank.

1. Place the water pipe into the wastewater tank before flushing.
2. Then open the water valve to flush it. This helps to avoid water splashing to damage other components.



Flush the float switch sensor in the wastewater tank.

1. Move the float sensor up and down when flushing it.



Take the pipe out.

1. Close the water valve, drain water from the pipe, and take the pipe out.



Plug in the plug to the clean water tank.



Clean the filter bag.

1. Trash the garbage in the filter bag and flush the inside and outside of it.



Clean steel wire filter.

1. Flush the two steel wire filters. The two steel wire filters are the same, no worry about mixing them up.



Flush filter bottle and cartridge.



Install the steel wire filter.

1. Align it to the hole and tighten it clockwise. One for the clean water tank, and one for the wastewater tank.



Install the filter bottle and cartridge.

1. Place the cartridge first, then install the filter bottle, and tighten it clockwise.
2. Install the other set of filter bottle and cartridge in the same way.



NOTE:

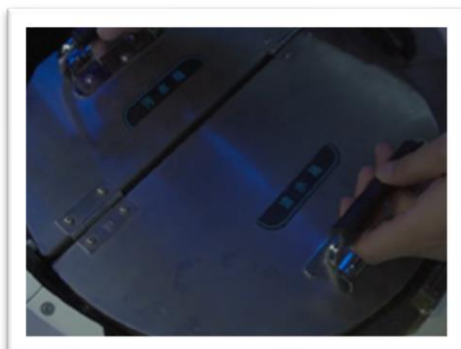
- The 50-micron filter should be installed on the left side of the machine and the 30-micron filter should be installed on the right side. Tighten the bottles with a wrench.

Install the filter bag

1. Hook the rope on the filter bag hook. The filter bag rope can be rotated and knotted and fixed on the filter bag hook.



Put the water tank cover back.



Close the top lid.



Withdraw drainpipe.

1. Ensure the cap of the pipe is tightly closed and withdrew the pipe.



7.9. Rolling Dust Push Maintenance Operation Process

1. Loosen the knob and remove the rolling dust push.



2. Remove the rolling dust cloth and clean or replace it.



3. Loosen the knob, remove, and clean the dust box.



4. Remove the cleaning roller and clean the roller with a sharp tool.



5. After cleaning, install it in reverse order.



7.10. Rolling Cloth Dust Pushing Maintenance Operation Process

1. Open the anti-collision front cover.
2. Remove the front bumper shell.



3. Pull up the buckle to remove the front bumper shell.
4. Remove dust boxes on both sides and clean them.



5. Open both end-covers of the roller brush.



6. Take the front roller brush out from the left side of the robot.
7. Long press the button on the latch and take the latch out.
8. Then remove the metal cover and take the roller brush out.
9. Take the rear roller brush out from the right side of the robot in the same way as the front roller brush.



10. Remove the roller brushes and clean them.



11. Take the front and rear roller brushes out, place and clean them on the ground.
12. Use a steel bristle brush shipped with the robot to clean roller brushes.
13. Clean cloth wiper with detergent.

14. Install after cleaning.



7.11. Squeegee Blade Maintenance

Material:

Natural rubber

Service life:

It depends on the actual service condition. Please check whether the squeegee blade is worn out and if the water absorption effect is affected thereby. If so, replace it.

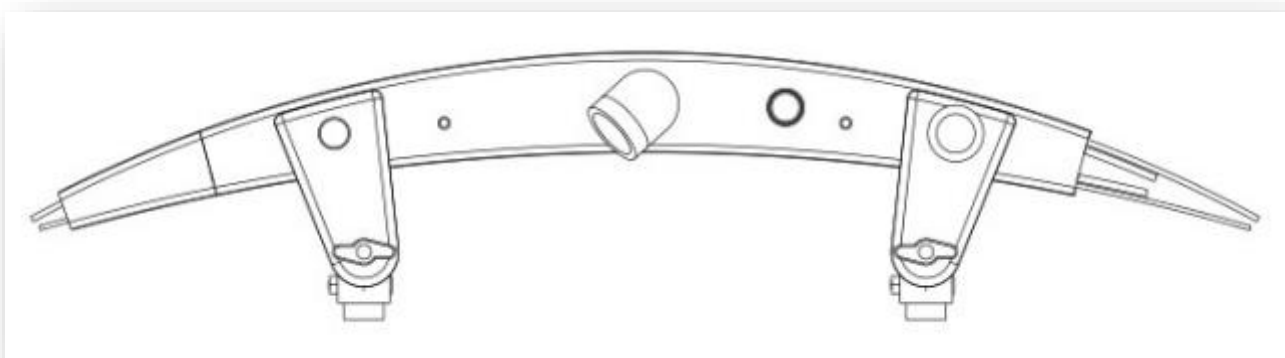


NOTE:

- If the water absorption effect gets worse, but the squeegee blade is not worn out, please check whether the tank cover is placed properly first. You can start the air suction function first separately, and then pull the pull ring on the water tank. If the tank cover is not opened by pulling, it means that the tank cover has been placed properly.

Replacement method:

The squeegee blade is fixed by latches shown in the following figure.



Gently release the latch to remove and replace the blade. If the squeegee mount has to be removed, use the lever to remove the screws on the platen, and then remove the squeegee blade.

7.12. Squeegee Cleaning

Wipe the surface of the inner and outer rubber strips.

1. Use a wet wipe to clean the surface of the inner and outer rubber strips.



Wipe the gap between the inner and outer strips.

1. Use a wet wipe to clean the gap between the inner and outer strips.



Clean the appearance of the squeegee.



7.13. Workstation Cleaning

1. Unplug the power cable.



2. Use a wet wipe to clean the facade of the workstation. Do not touch the charging port.



3. Take the sink and filter foam off.



4. Flush the filter foam.



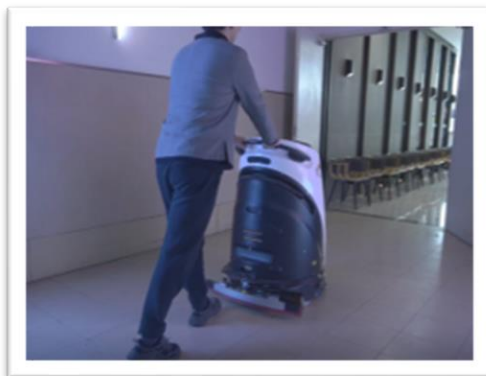
5. Install the sink and filter foam.



7.14. Filter Bag Replacement

Push the robot to the maintenance point in manual mode.

1. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



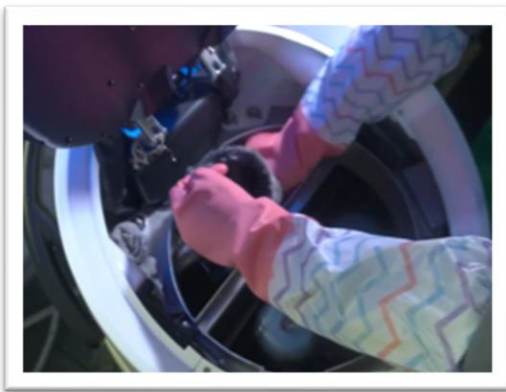
Take out the pipe and drain.

1. Open the cap of the wastewater pipe and quickly put it down to the drainage (***Kind reminder: hold the pipe upward when opening the cap.***)
2. Close the cap tightly after the drain is completed.



Remove the filter bag.

1. Open the top lid and remove the water tank cover.
2. Remove the rope from the hook and lift the filter bag.
3. Squeeze water out from the filter bag.
4. Hold the filter bag in one hand and take it out with the other hand.
5. Then, put it on the ground and clean it.



Replace the filter bag.

1. Prepare a new filter bag and wrap the rope around the hook.
2. The filter bag rope can be rotated and knotted to fix it on the filter bag hook).
3. Then close the water tank cover.



Close the top lid.



Withdraw drainpipe.

1. Withdraw the drainpipe after ensuring the cap is tightly closed.



7.15. Filter Maintenance

Material:

Polypropylene pleated filter

Replacement criterion:

When the service time reaches the specified consumable replacement time or the effect of the cleaned floor is still not ideal, it can be considered that the filters need to be replaced or cleaned.

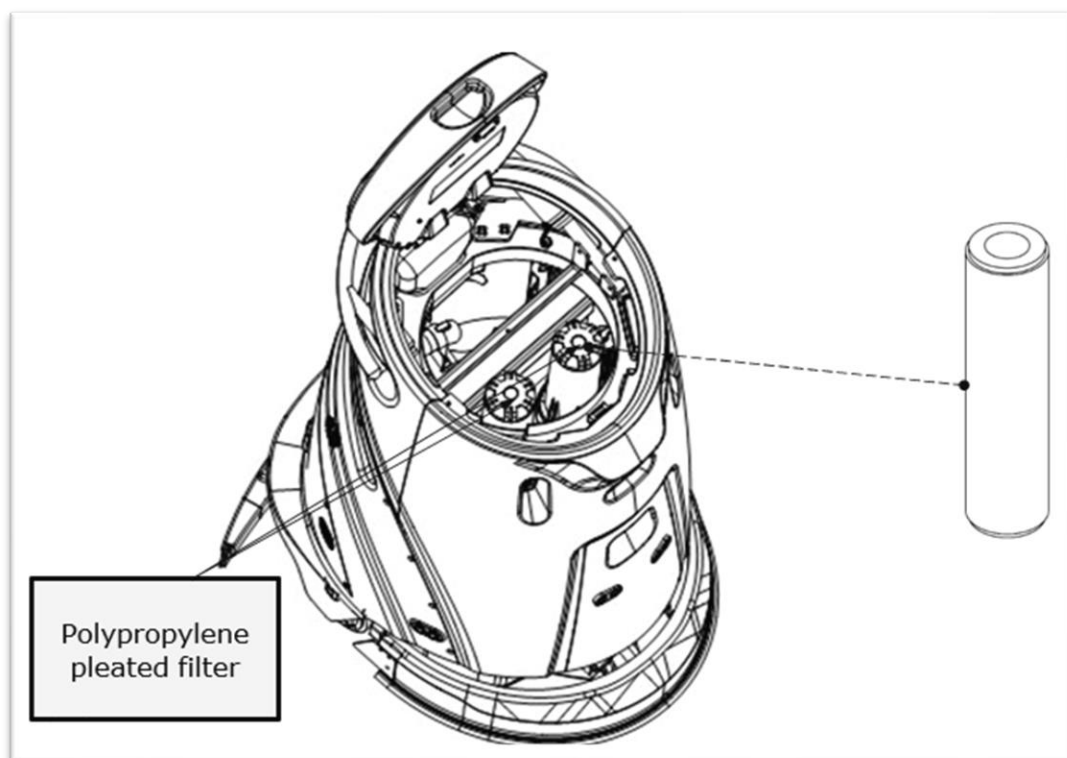
Replacement/cleaning method:

As shown in the figure below, open the tank cover. You shall see that there are two filters in the freshwater tank. To facilitate the removal and replacement of the filters, corresponding auxiliary tools have been designed. The operator only needs to turn the filters anticlockwise to remove them, and then replace or clean the filters.



NOTE:

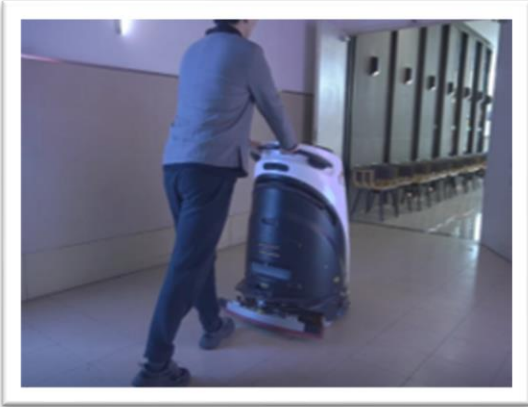
- Be careful when dismantling the filter, to prevent your hand, arm, or head from hitting the edge of the water tank or the tank cover due to excessive force.



7.16. Steel Wire Filter Replacement

Push the robot to the maintenance point in manual mode.

1. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



Take out the pipe and drain.

1. Open the cap of the wastewater pipe and quickly put it down to the drainage (**Kind reminder:** hold the pipe upward when opening the cap).
2. Close the cap tightly after the drain is completed.



Empty the clean water tank.

1. Unplug the plug in the clean water tank after the wastewater tank has been emptied.
2. The water in the clean water tank will flow into the wastewater tank.
3. Then, continue to empty the wastewater tank using a wastewater pipe.



Remove the right filter bottle and cartridge.

1. Use a wrench to loosen the filter bottle, remove the bottle and cartridge and place them on the ground. (**Prompt:** no need to remove the left filter bottle and cartridge).



Remove the steel wire filter in the clean water tank.

1. Rotate the steel wire filter in the clean water tank anti-clockwise.
2. Hold and drain it with 2 hands and put it aside.



Install a new steel wire filter.

1. Prepare a new steel wire filter, align it to the hole, and tighten it clockwise.



Install the filter bottle and cartridge.

1. Place the cartridge first, then install the bottle and rotate it clockwise. Use the wrench to tighten it at last.
2. Put the wrench on the bottle and close the water tank cover.



Close the top lid.



Withdraw the drainpipe.

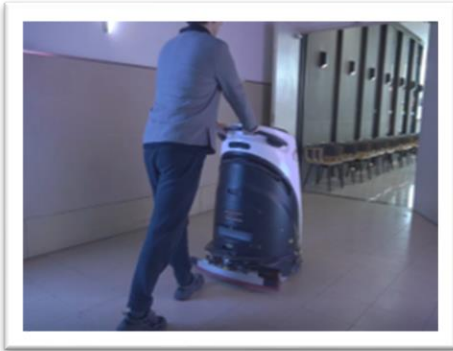
1. Withdraw the drainpipe after ensuring the cap is tightly closed.



7.17. Filter Cartridge Replacement

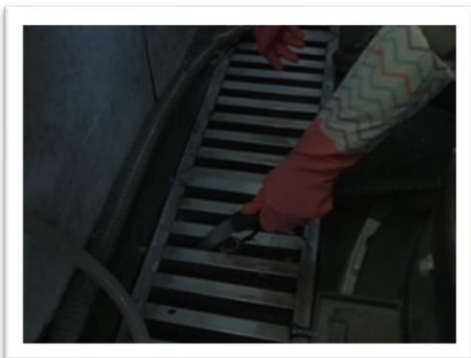
Push the robot to the maintenance point in manual mode.

1. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



Take out the pipe and drain.

1. Open the cap of the wastewater pipe and quickly put it down to the drainage (**Kind reminder:** hold the pipe upward when opening the cap).
2. Close the cap tightly after the drain is completed.



Empty the clean water tank.

1. Unplug the plug in the clean water tank after the wastewater tank has been emptied.
2. The water in the clean water tank will flow into the wastewater tank.
3. Then, continue to empty the wastewater tank using a wastewater pipe.



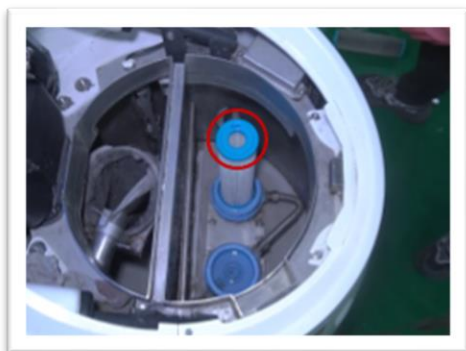
Remove the right filter bottle and cartridge.

1. Use a wrench to loosen the filter bottle anti-clockwise and take the bottle and cartridge out.
2. Put the cartridge in the bottle and place them aside.
3. Take the other set of bottle and cartridge in the same way.



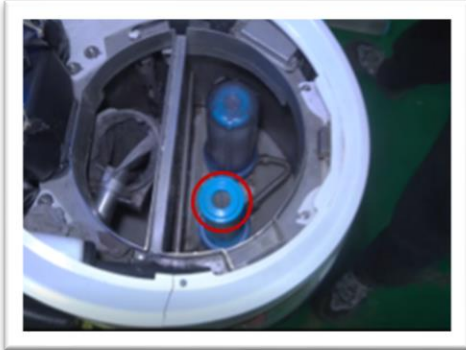
Replace and install a 30-micron filter.

1. Prepare a new cartridge. Ensure one end of the filter is marked 30 microns.
2. Place it on the filter near the side of the water tank wire strainer.
3. Then, put on the filter bottle and use the filter bottle wrench to tighten the filter bottle.



Replace and install a 50-micron filter.

1. Prepare a new cartridge. Ensure one end of the filter is marked with 50 microns.
2. Place it on the filter on the side away from the water tank wire strainer.
3. Then, put on the filter bottle and use the filter bottle wrench to tighten the filter bottle.



Close the water tank cover.



Close the top lid.



Withdraw the drainpipe.

1. Withdraw the drainpipe after ensuring the cap is tightly closed.



7.18. Roller Brush Maintenance

Material:

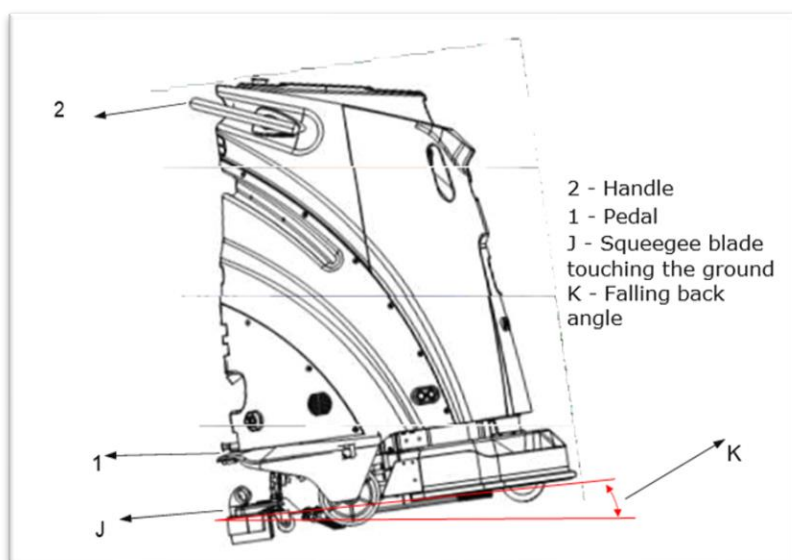
Nylon brush

Replacement criterion:

The service time reaches the specified consumable replacement time, or the brush is severely worn out.

Brush replacement method:

One person needs to hold the handle tightly with both hands and step on the pedal with one foot, which slowly causes the scrubber to fall back. When the squeegee blade touches the ground, it stops reclining. Another person should stretch his hand under the brush tray, touch the edge of the brush tray, press down slightly with his hands, and then take the opportunity to remove the brush tray.



7.19. Roller Brush Replacement

Remove the front bumper shell.

1. Pull up the buckle to remove the front bumper shell.



Remove the roller brush.

1. Take the front roller brush out from the left side of the robot.
2. Long press the button on the latch and take the latch out.
3. Then, remove the metal cover and take the roller brush out.
4. Take the rear roller brush out from the right side of the robot in the same way as the front roller brush.



Install a new roller brush.

1. Prepare a new roller brush, insert its front left side, and reach for the gear, while holding it with one hand.
2. When the gear is joined, install the metal cover.
3. Push it from the bottom up to the two locking screws.
4. Then, align the hole of the latch, and insert the latch.
5. Make sure the latch was locked tightly.



Close the front shell.



NOTE: Replacement for different brush

- The replacement steps for front&rear roller brush, bristle brush, and cloth brush are the same.

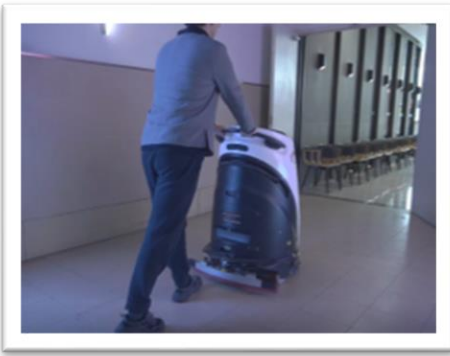
7.20. Rubber Strip Replacement

Switch the robot to manual mode.

1. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



2. Push the robot to the maintenance point.



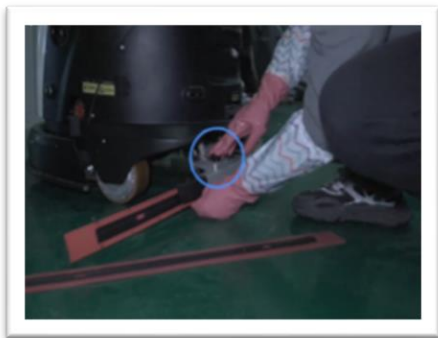
Remove the rubber strips

1. Press the **black** button on the squeegee and remove the inner and outer rubber strips.



Install new rubber strips.

1. Prepare a new set of rubber strips.
2. Install the inner strip first which has gaps in it.
3. Press the button on the squeegee and install the strip.



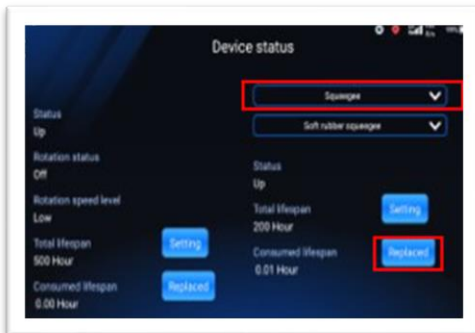
Check the stability of the rubber strip.

1. Shake the strip after installation to ensure it is installed correctly. Use the same way to install the outer strip.



Reset the lifespan.

1. After the replacement, click the left navigation bar and select "**Device status.**"
2. Go to "**Squeegee/dust mop.**"
3. Click "**Replaced.**"
4. Click "**Confirm.**"



7.21. Procedure for Disinfection Package Deployment

Get access to a disinfectant box:



1. Open the top lid.
2. Open the cleaning water tank.
3. Open the disinfectant tank.



NOTE:

- Toggle the buckle left or right, then take the disinfectant tank out.

4. Add the disinfectant to the tank carefully.



IMPORTANT:

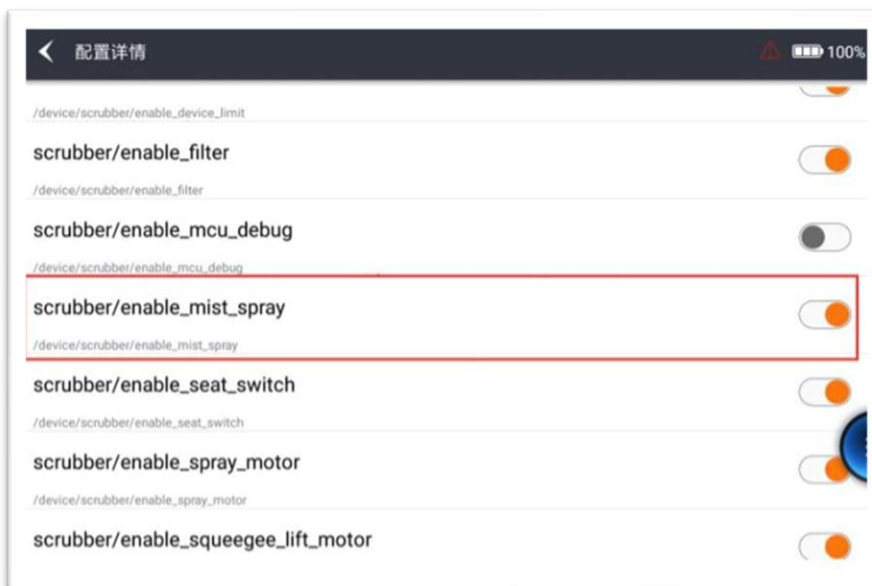
- Smoothly add disinfectant to avoid overflow.
- Disinfectant: hypochlorous acid (recommended).
- Observe the liquid level while filling the disinfectant.
- Stop filling when it is close to full.
- Load in the disinfectant tank: maximum - 5 liters.
- Load in the water tank: maximum - 20 liters.

Pay attention to the liquid level when filling the disinfectant without a measuring cup.

Config settings

Complete the following steps during deployment:

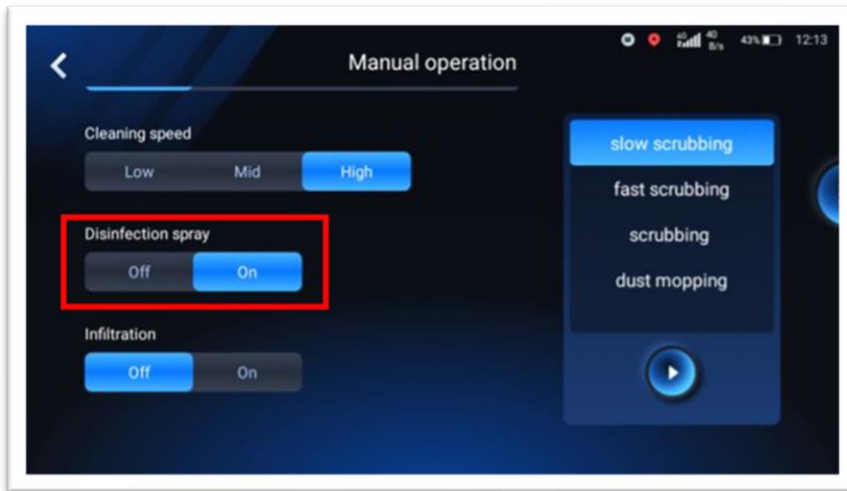
1. In "advanced," please enable mist spray to turn on the feature.



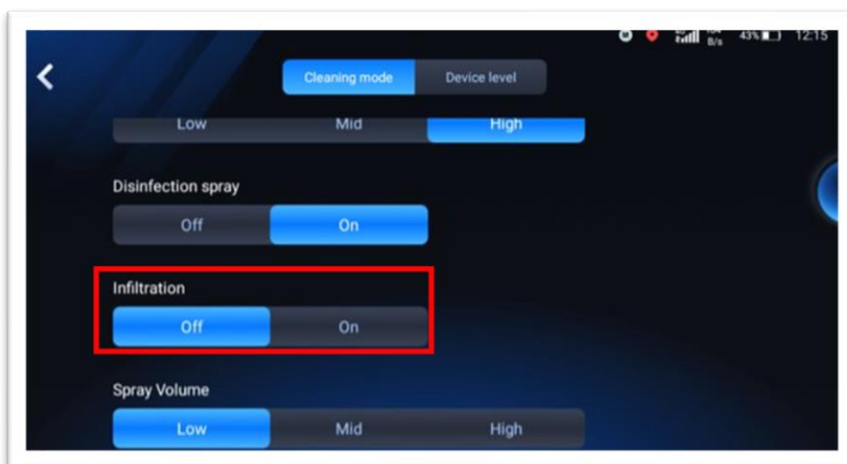
2. Restart the robot to activate this feature after turning it on.

For operator:

1. After enabling the disinfection feature, turn "**Disinfection spray**" on in the cleaning mode interface. It is available in both auto and manual modes.



2. The "**Disinfection Spray**" option is set to open by default.
3. If the "Disinfection Spray" option is not displayed, "scrubber/enable_mist_spray" may not be enabled. Enable it first.



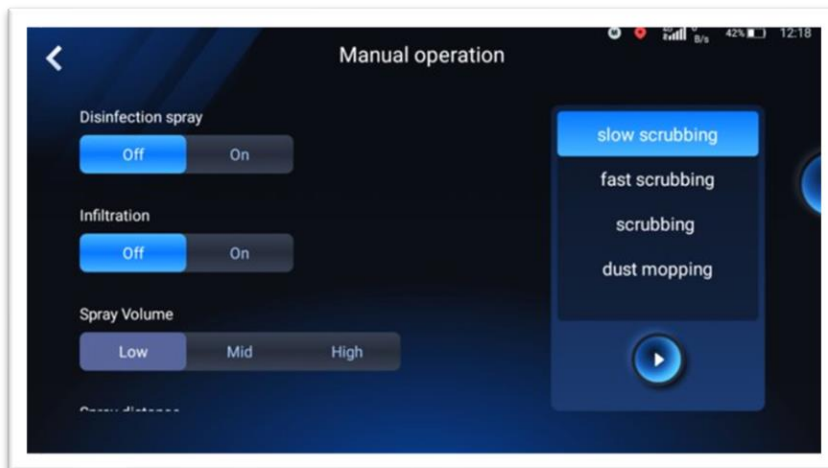
NOTE:

- Set the "Spray" feature enabled to have it work together with the cleaning task. If it is set to "disabled," it will not work together with the cleaning task.
- The spray will be paused when the robot moves backward.
- The spray is not restricted by turning and speed with a regular value of 0.8L/H
- The "Spray" feature has two statuses: "on/off." The speed and level are adjustable.



When the spray feature was turned on, and if there is no disinfectant, there will be an alarm message pop-up in UI.

If the low liquid level of disinfectant was detected during operation with the spray on, the spray will be stopped, and an alarm message will pop up - *"20043 ran out of disinfection"*. Pause the operation and add disinfection in time.

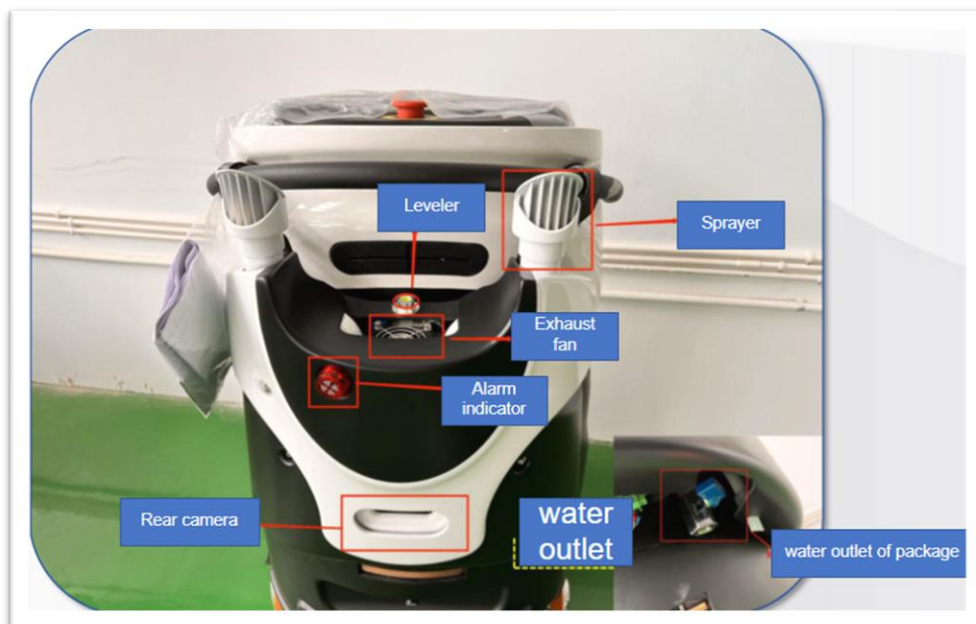


If the spray was turned off, the liquid level will not be monitored, the alarm will not pop up during cleaning tasks.

The liquid level sensor will not be affected by water waves. It monitors the consistent level.

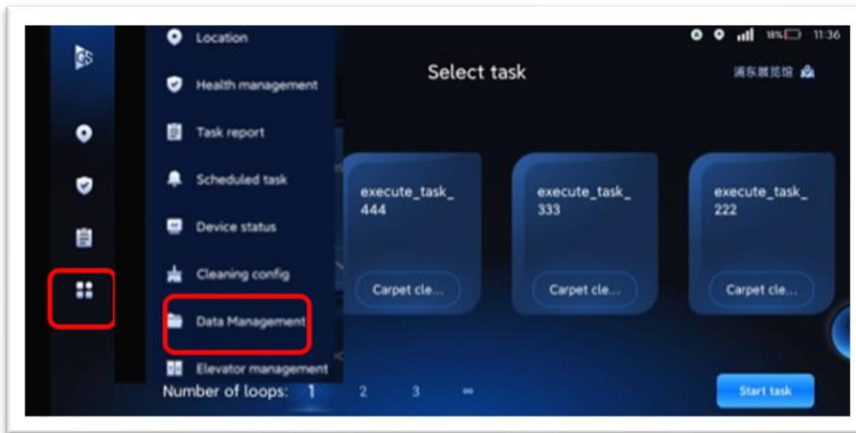
Cleaning procedure

1. Drain disinfectant from the outlet first.
2. Fill the tank with clean water.
3. Drain the clean water.
4. Keep the outlet open and fill the tank with clean water for 1 minute.

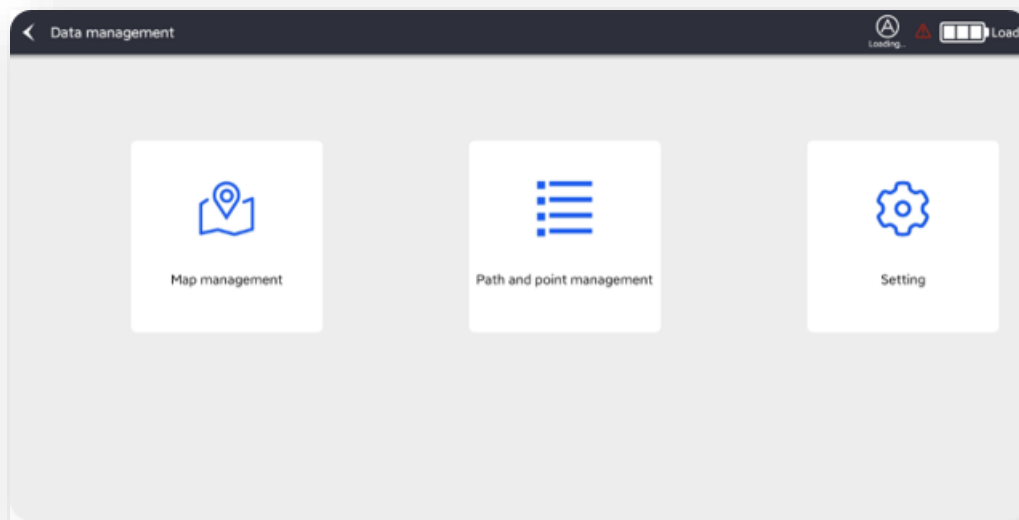


8. DATA MANAGEMENT

1. Click the button on the left and select "**Data Management.**"



2. After clicking "**Data Management,**" you will see three blocks: "**Map management,**" "**Path and point management,**" and "**Settings.**"
3. Click "**Map Management**" to enter the scanning interface:

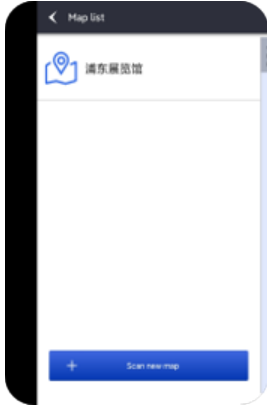


- **Map Management**: scan new maps, edit maps ...
- **Path and Point Management**: create paths, add points, combine paths ...
- **Settings**: customized parameters, manually update the APP, create new accounts, and other functions ...

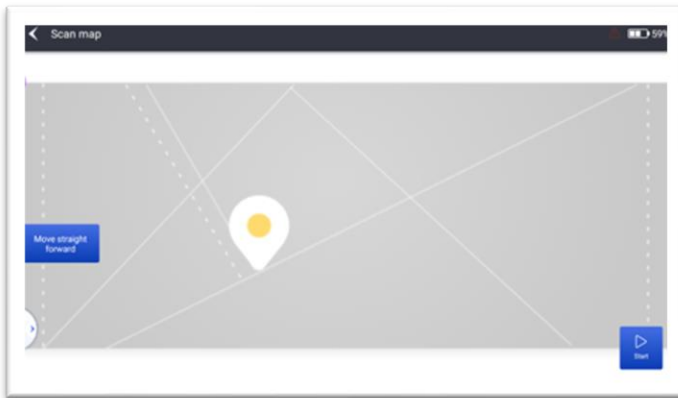
8.1. Map Management

8.1.1. Map Scanning

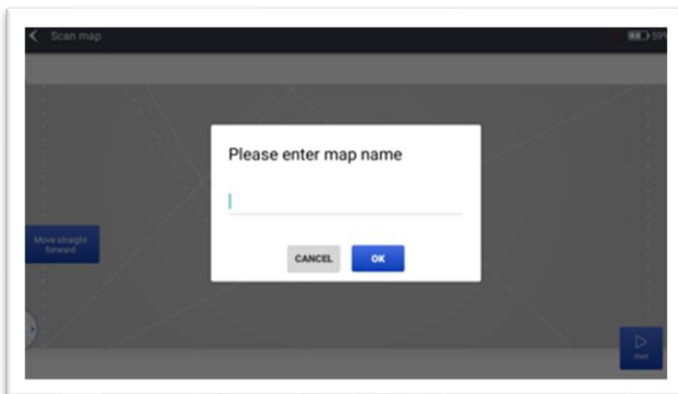
1. Click "**Scan New Map.**"



2. Then click the "**Start**" button.



3. Input the map name.

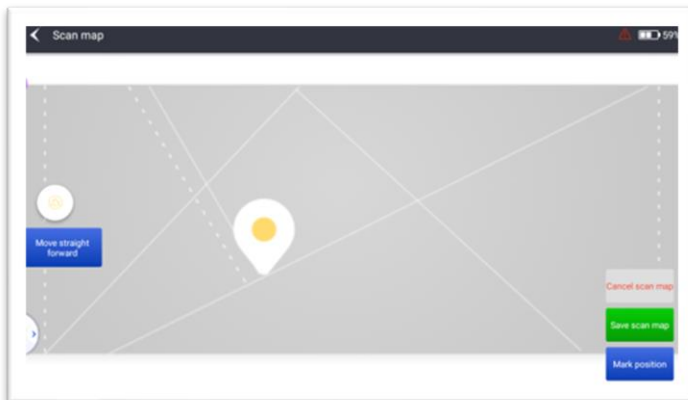




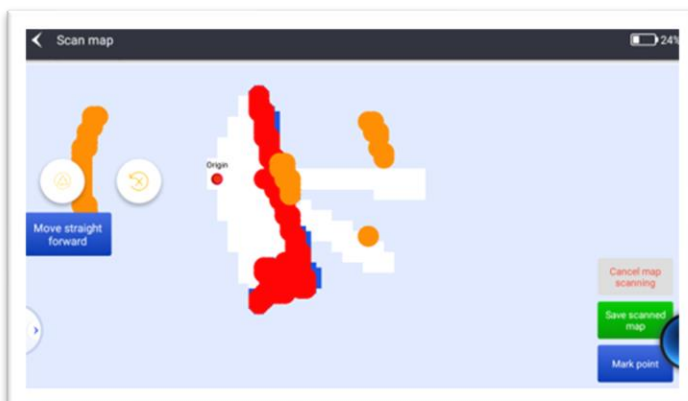
NOTE:

- If there are multiple floors, the floor information needs to be reflected to facilitate customers to find it.
- If it is a single floor, the cleaning area information is needed.
- The map name requires communication with customers and approvals from them are needed.

4. Start moving the robot to scan the map and observe the map status via the screen.



5. Walk around the area to be cleaned and click "**Save Scanned Map.**"

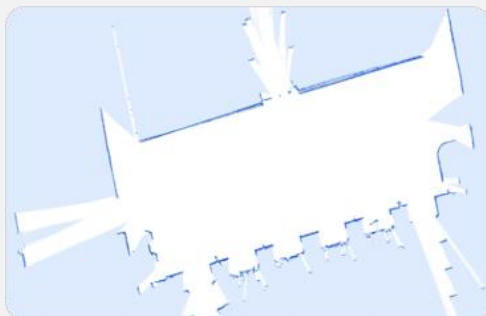


NOTE:

- During the scanning, the status is visible on the LED screen.



- During the scanning, push the robot forward steadily (smooth + straight line), and try to avoid a curved route.



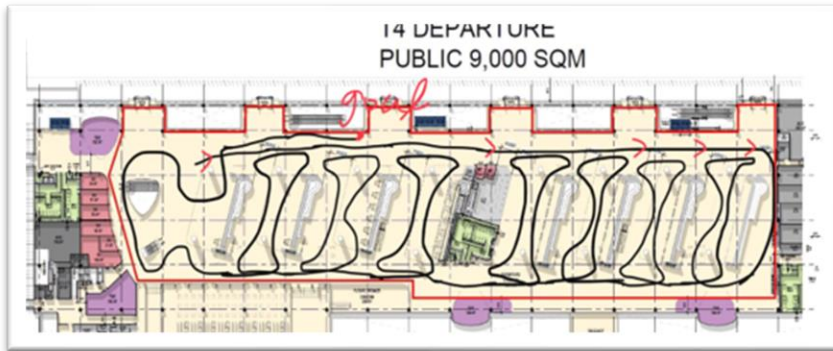
- When rotating or turning, it must be rotated slowly on the spot (less than 20°/sec at angular velocity), and then move straight forward again.



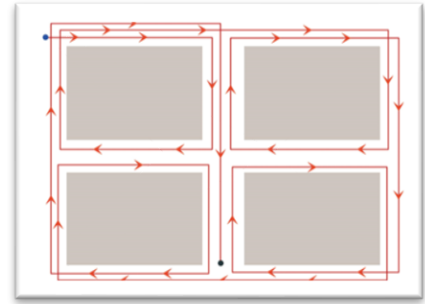
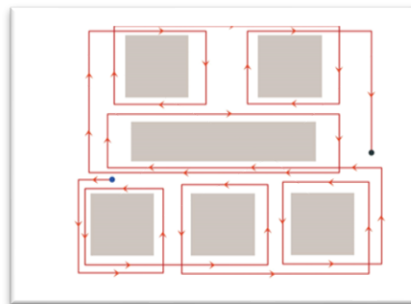
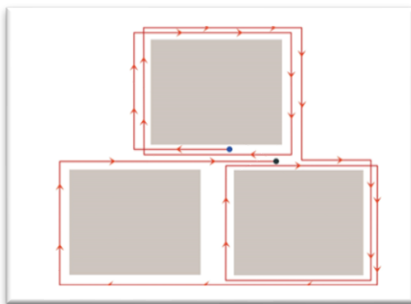
- Forward velocity should be less than 1 m/s.

8.1.2. Scanning Tips

During the scanning process, loop closure is applied. Please proceed as follows:



1. Select a reasonable route for the map scanning (1st - small closed-loop, 2nd - followed by a large closed-loop).
2. All the cleaning areas must be scanned.
3. Avoid repeatedly scanning the same area.

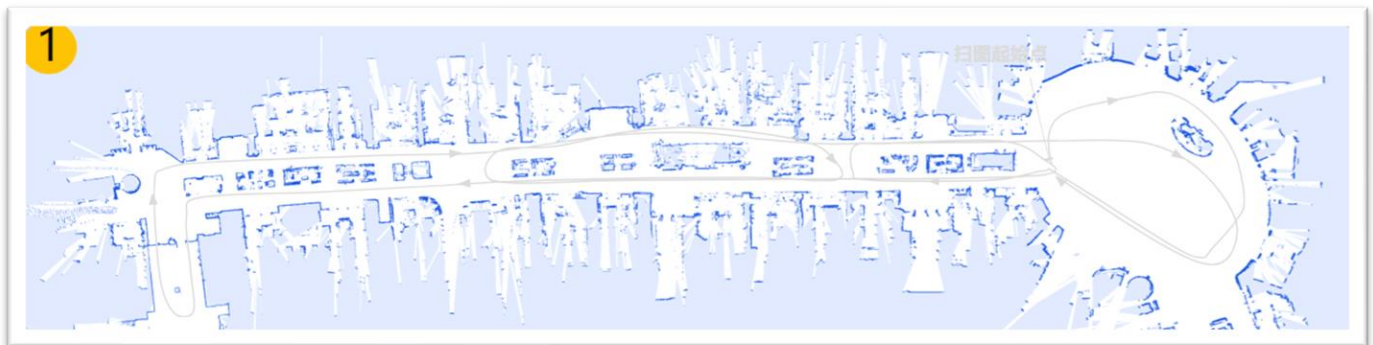


8.1.3. Forced Closed Loop

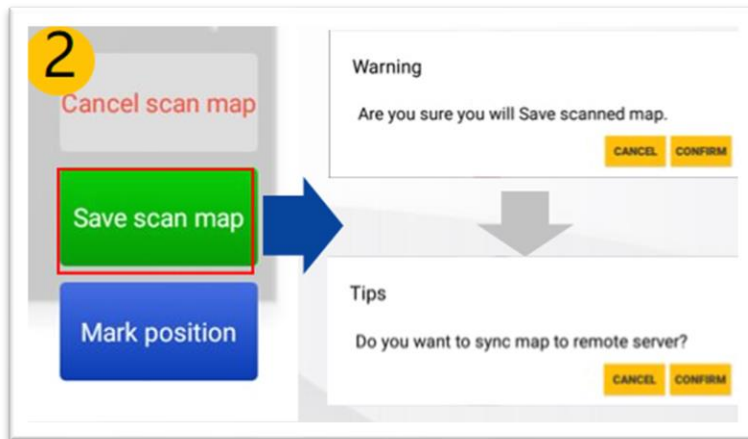
1. After scanning the map according to the closed-loop rules, move the robot to this position.
 - a. If the map status is normal, there is no need to use the forced closed-loop and go to the next page directly.
 - b. If there are still ghosting, distortion, etc., after waiting for 5 minutes, please perform the following operations.
2. Click the **"Forced Closed-loop"** button on the APP.
3. Steps to reproduce:
 - a. Click the **"Forced Closed-loop"** button.
 - b. Click **"OK."**
 - c. Prompt that the closed-loop is successful.



After the map has been scanned (after the forced closed loop), you need to check the following points before clicking "**Save**":



- If there is an obvious distortion or ghosting in the start/end point, try a forced closed loop.
- If there are places that missed scanning, do supplementary scanning.
- If the scanned map has distortion and ghosting due to the wrong closed loop, which cannot be revised, scan the map again.



NOTE:

- The final map you saved could be different from the preview during scanning. It is recommended to save the map and then check the quality.

Please master the scanning skills, understand the precautions, and be able to detect the quality of the map to scan a high-quality map.

8.1.4. Check Map Quality

Carefully check the quality of maps.

If there are issues in the locality, delete the locality with "[map editing](#)" and do a [map extension](#). If the map frame was distorted, please scan the map again.



NOTE:

- The poor map quality would lead to random operation risks. There might be no issues in the test run, but there might be locating lost or jams in daily operation.

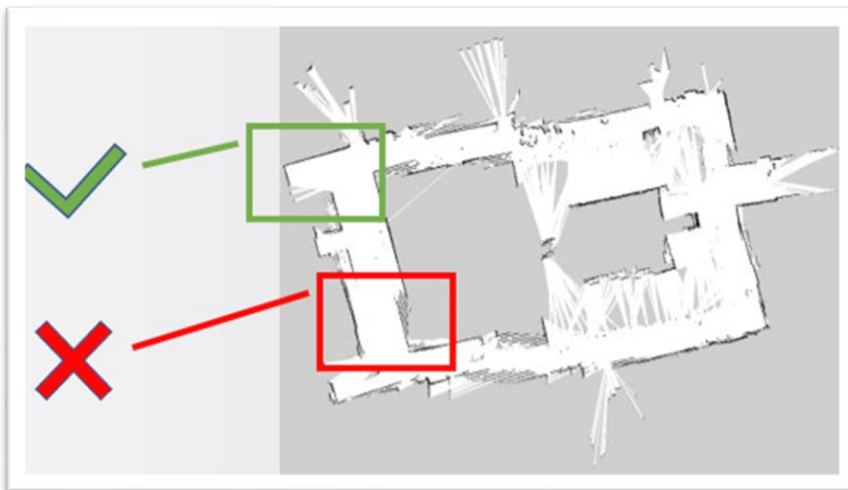
Closed-loop

The closed loop means that the same area scanned by the machine at various times can be overlapped. A false or missing closed loop will lead to inaccurate information on the map, which results in great locating offset or deviation, and finally, the robot loses locating or gets jammed.



Distortion

Distortion or ghosting is not acceptable. A common example is when one wall duplicates and becomes 2 or more parallel walls. Distortion or ghosting will cause a great interference to navigation, such as locating jumping, lost, or jamming.



8.1.5. Map Extension

A map extension is required in one of the following situations:

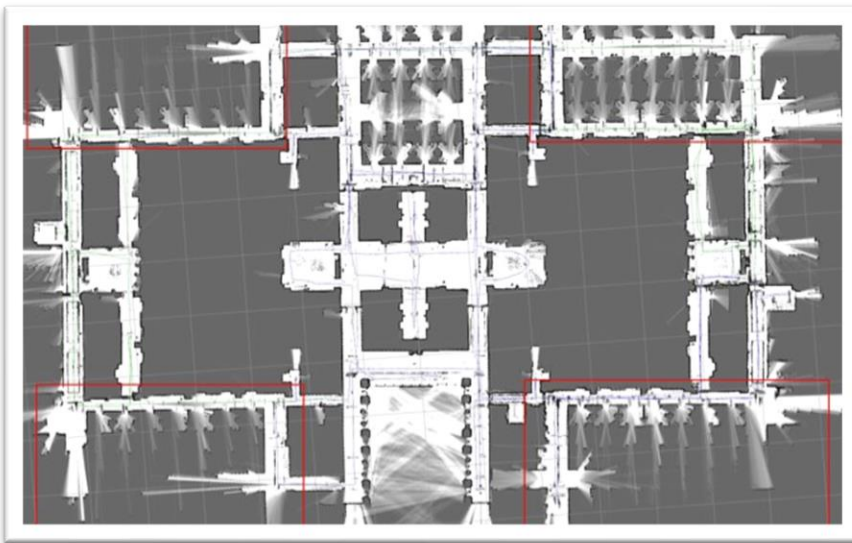
1. The areas need to be extended for new cleaning tasks, and the original scanned map does not cover the new areas to be cleaned. Even if obstacles were scanned, the confirmation that obstacles are completed is necessary.
2. The on-site environment has obvious changes, like decoration, displacement of furniture, etc. For this kind of situation, use "map editing" to delete this area on the map and do a map extension.

3. The area is noticeably big, it is hard to scan it perfectly just one time. It is better to use map extension to increase the success rate of map scanning.



NOTE:

- the map should be less than 20,000 square meters, otherwise, robot operation would be unstable.
 - If the area is over 20,000 square meters, separate it into several maps.
 - If all regions are connected, it is recommended to scan the major frame first, and then extend the map on the details in regions.
- If all regions are connected only in one place, extend the map in turn.



Steps to reproduce:

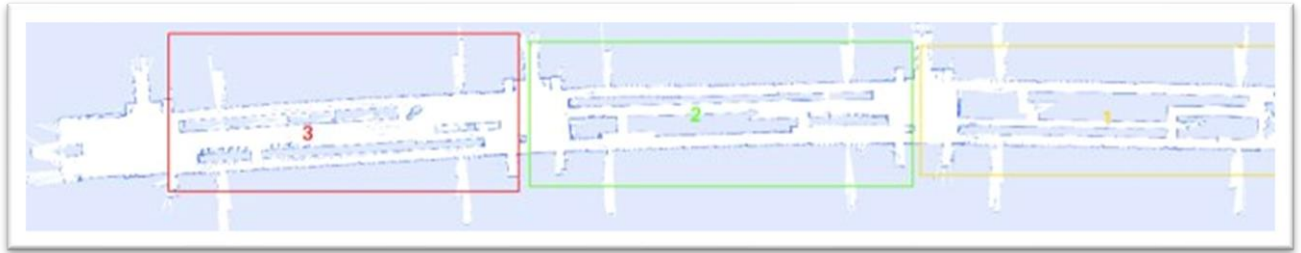
1. Select the map to be extended in the map list and click "**Map extension.**"



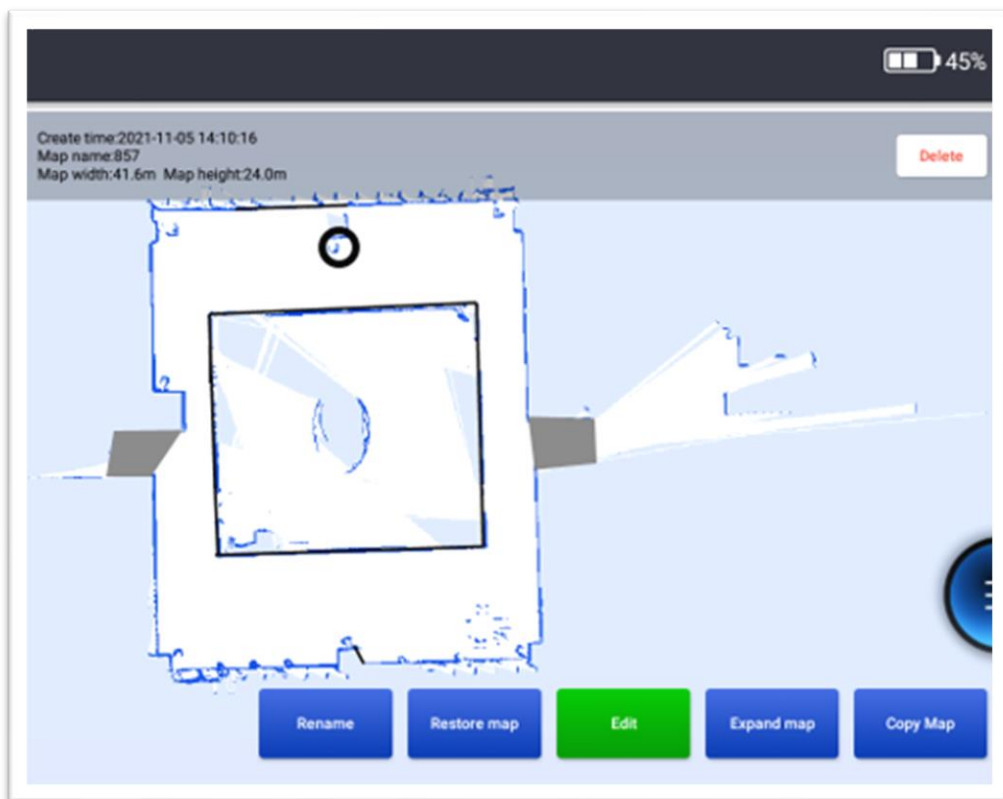
Precautions:

- Expanding a map is the same as scanning a map, and it is necessary to choose a suitable starting point.
- First, extend a small closed-loop and then a large closed-loop, confirm that the map has no ghosting/distortion, and then save the map.
- Locate the robot on the original scanned map, then manually move the robot to the main path, click the APP to start map expansion, drive on the original map for more than 10 meters, and then enter the area that needs to be expanded to expand the map. Map extension also requires following the closed-loop rule.

2. Scan the major frame and the aisles for connections first. Then do a map extension for the red highlighted areas.

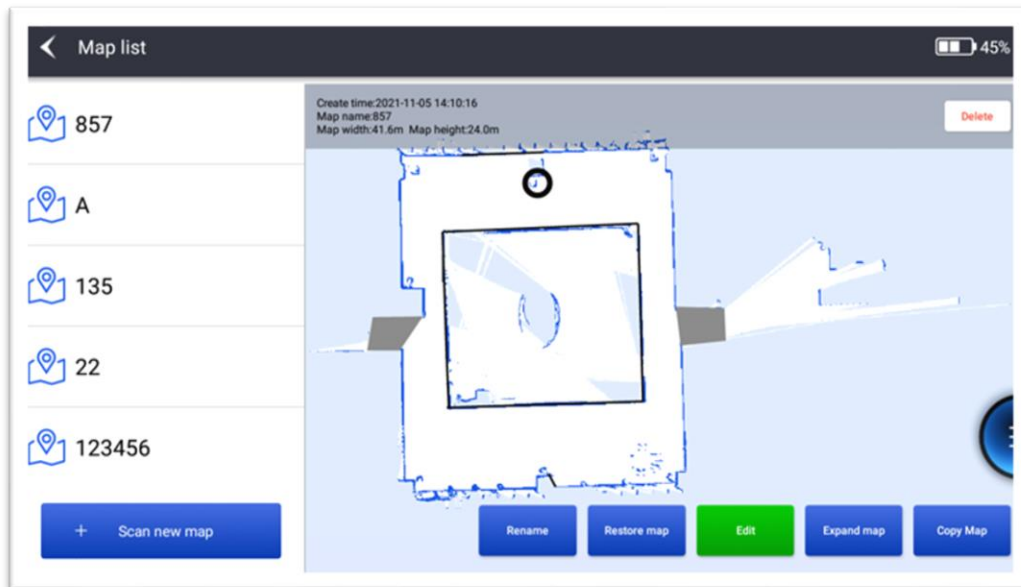


3. Scan the areas from right to left and ensure their decent quality each time. If the quality of the map extension is not good, use "map store" to return to the previous status.



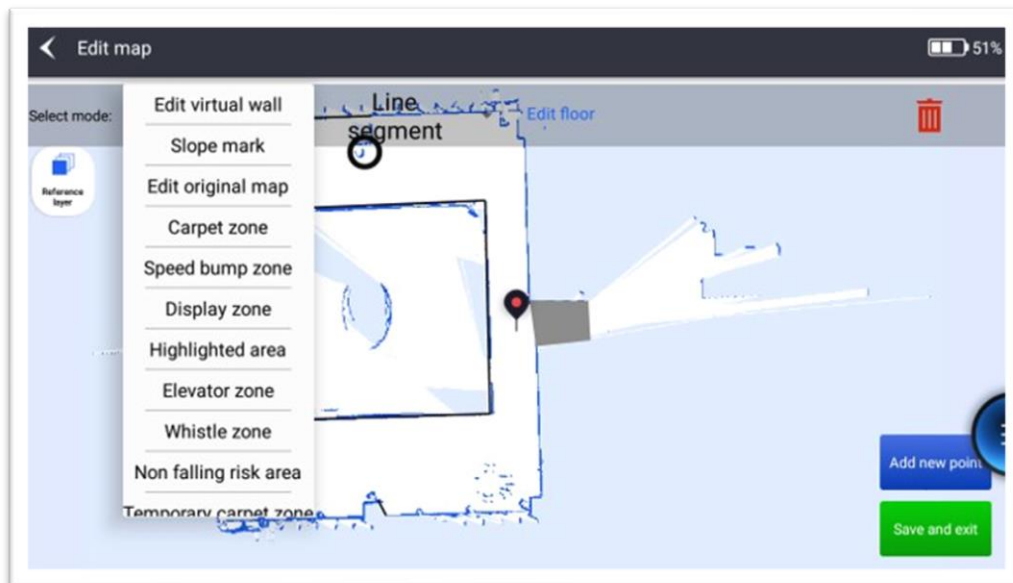
8.1.6. Map Management Editing

After the map is scanned, you can see the preview map on the right.



- Click the “**Edit**” button.

There are 14 editing function buttons in map editing, as shown below:



1. Edit virtual wall
2. Slope mark
3. Edit original map

4. Carpet zone
5. Highlighted area
6. Elevator zone
7. Whistle zone
8. Speed bump zone
9. Non-falling risk area
10. Temporary carpet zone
11. Temporary booth area
12. Glass wall
13. Edit floor
14. Display area

For an explanation of each function, please see the table below:

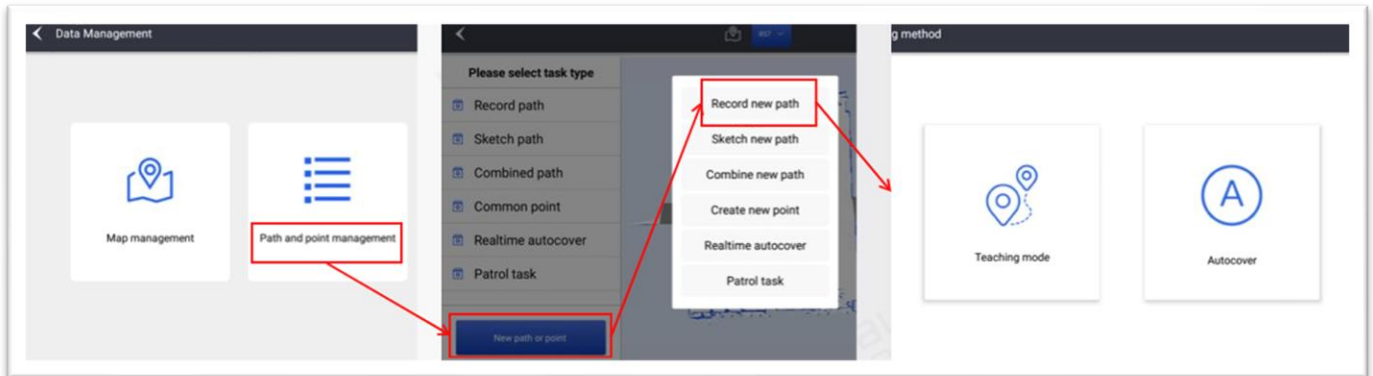
Edit mode	Description	Available shapes	Remarks
Virtual wall editing	It is used to mark the area that cannot be scanned by a laser, to prevent the robot from colliding in the above area and causing danger. For example, shops, fragile goods, etc.	Line/Polygon/Circle	black
Slope mark	Amplify/enlarge the recognition threshold of the sensor system for the height of obstacles and broaden the threshold triggered by anti-falling. When passing through this area, the machine will slow down for cleaning, that is, the cleaning equipment is still working.	Polygon	Dark Blue
Original map editing	1. Clear area: modify the noise and obstacles on the original map and clear them by box selection (frame selection). 2. Restore unknown areas: navigation and tasks are prohibited (in progress).	Polygon	An area surrounded by black lines
Carpet zone	Give priority to avoiding this area. If there is no way to go, turn off / lift the cleaning equipment to pass through this area. After passing, the robot will turn on the cleaning equipment again.	Polygon/Circle	Green
Highlighted area	The highlighted area is the key reference area for the robot to realize independent locating. It is necessary to select the fixed physical features in the map, such as walls, partitions, columns, pillars, etc. Try to make the highlighted area range cover the fixed physical features, and do not exceed too much to prevent the introduction of non-fixed physical features. The robot will give more recognition	Polygon/Circle	Cyan

	weights to the physical features in the highlighted area. reduce the interference of the frequently moving non-fixed physical features to the machine-independent locating.		
Elevator zone	This functional area can only be used on the site where the elevator integration system is installed, which is the elevator car area.	Line/Polygon/Circle	Purple
Whistle zone	Not supported now.	Polygon	Light brown
Speed bump zone	Turn lift/off the cleaning equipment to go through this area, and then turn on/put down the cleaning equipment again.	Polygon	Black
Non-falling risk area	Estimate and define that there is no falling risk in this area and the anti-falling function is not triggered (common environment: Glass Kanban, glass floor, etc.)	Polygon	Grey green
Temporary carpet zone	In this area, only robots equipped with carpet ultrasonic detection sensors will work. When the robot moves to the temporary carpet area, it will detect the interior of the area. 1. After the carpet ultrasonic detection sensor detects that there is carpet in this area, it will mark this area as a carpet area and trigger the idler running mechanism, that is, lift/off the cleaning equipment to cross the carpet area. 2. If the carpet ultrasonic detection sensor does not detect a carpet in this area, it will normally perform tasks in this area.	Polygon/Circle	Green
Temporary booth zone	When the robot moves to the temporary booth area, the robot will detect the interior of the area. If there is a temporary booth in the detection area, it will automatically avoid it; If there is no temporary booth in the detection area, the robot will perform the cleaning task normally.	Polygon/Circle	Grey
Glass wall	It is necessary to draw in the area with a glass wall. The sensor will filter the noise refracted by the glass to reduce the running jam of the robot caused by noise.	Polygon/Circle	Light blue

8.2. Path and Point Management

After the map is edited, proceed to path planning: "**Path and point management.**"

You will see the interface as shown below:

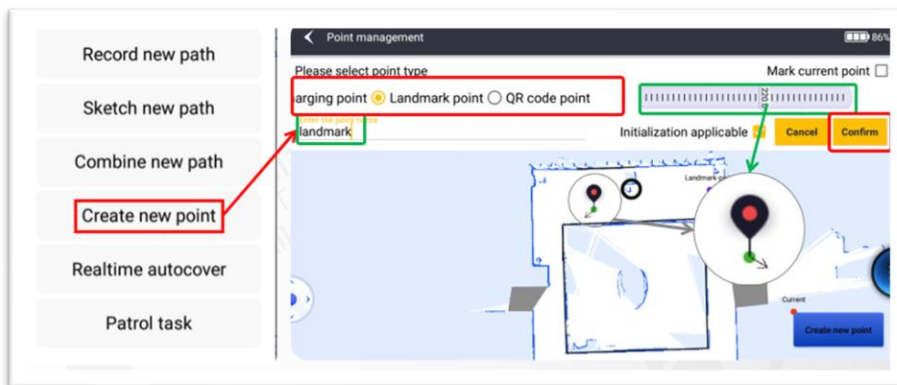


8.2.1. Adding a New Path

1. Click the "**New Path or Point**" button at the bottom left.
2. A window will pop up on the right.
3. Please click "**Record New Path**" to enter another interface – "**Teaching Mode**" & "**Autocover.**"

8.2.2. Adding a New Point

1. Click "**Create New Point.**"



2. Click the point type you want, then enter the point name below.
3. After adjusting the direction with the slide bar, click **OK**, and "**Confirm**".



4. The **"Successfully added"** prompt will display.



NOTE:

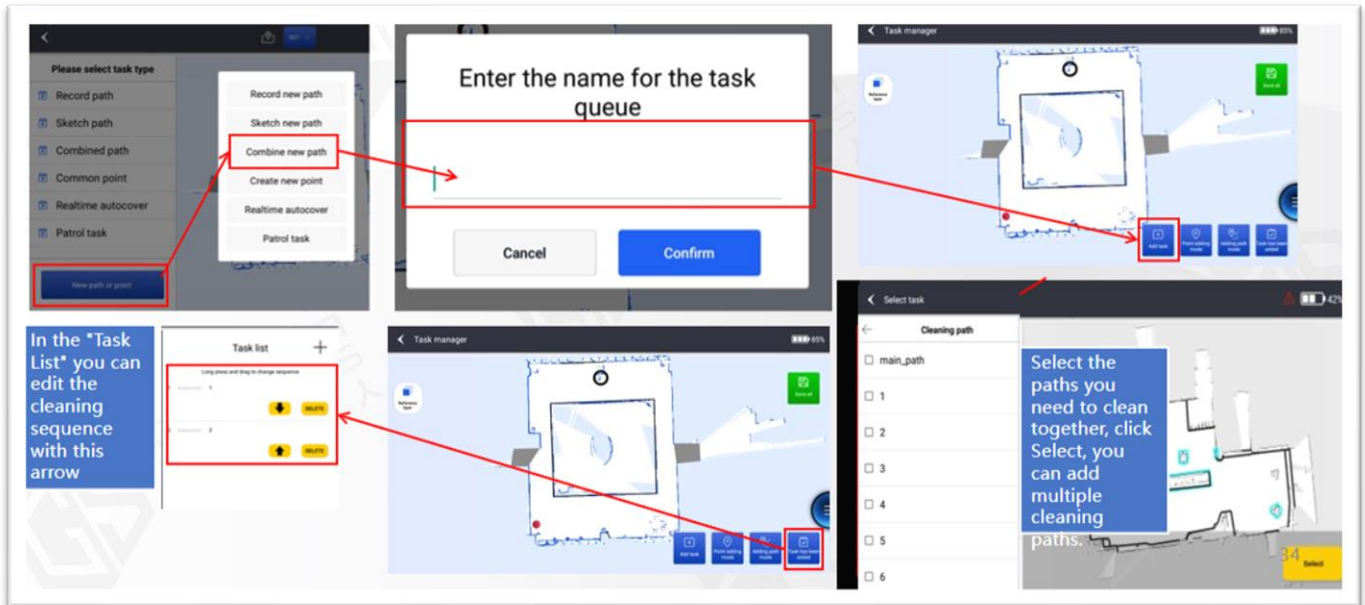
- Each point type has a different color.
- The workstation and charging point cannot be used simultaneously.
- When the support initialization point is checked, the similarity point detection will be conducted (the places where the environment is similar will be detected to avoid mispositioning). The support initialization point needs to be built where the environment has eigenvalues.

Name of the points	Description	Create method	Remarks
Landmark point	Point for robot positioning	Mark directly on the map, and pay attention to the direction of the arrow, that is, the front of the robot	*Must create Be sure to communicate with the client the location created (guarantee that the location is stable and reliable, will not change, and is easy to find).
Charging point	Points to be created for automatic charging	Put the robot on the charging dock manually, and directly mark the current point as the charging point.	Must be created and equipped with a charging dock. There should be only one charging point
Workstation point	Automatic charging, watering, and draining points	Put the robot on the workstation manually, and directly mark the current point as the workstation	Those with workstations must be created.
Maintenance point	Triggered back to this point when the battery is low, the clean water tank is	Mark directly on the map, and pay attention to the direction of the arrow, that is, the front	No charging dock and no workstation must be created

	empty, and the recovery tank is full	of the robot. The robot goes to this point and waits for maintenance from an operator.	
Navigation point	The point where the robot automatically navigates to the target location.	Mark directly on the map, and pay attention to the direction of the arrow, that is, the front of the robot.	Optional
QR code point	Scan the QR code to automatically locate and automatically select tasks	The QR code needs to be printed and fixed on the wall (the same height as the front-facing camera), and the front-facing camera is facing the QR code to create points according to the prompts.	Optional
An entry point for the elevator	There is no need to manually create at present, the ladder control area will be automatically generated after drawing		Sites that require elevator control must be created; no manual creation is required.
Initialization point	Not currently in use		Optional

8.2.3. Combining New Paths

1. Click the **"Combine new path"** button.
2. Enter the name of the combined path.
3. Add the path to be cleaned.
4. Edit the sequence.
5. Save.



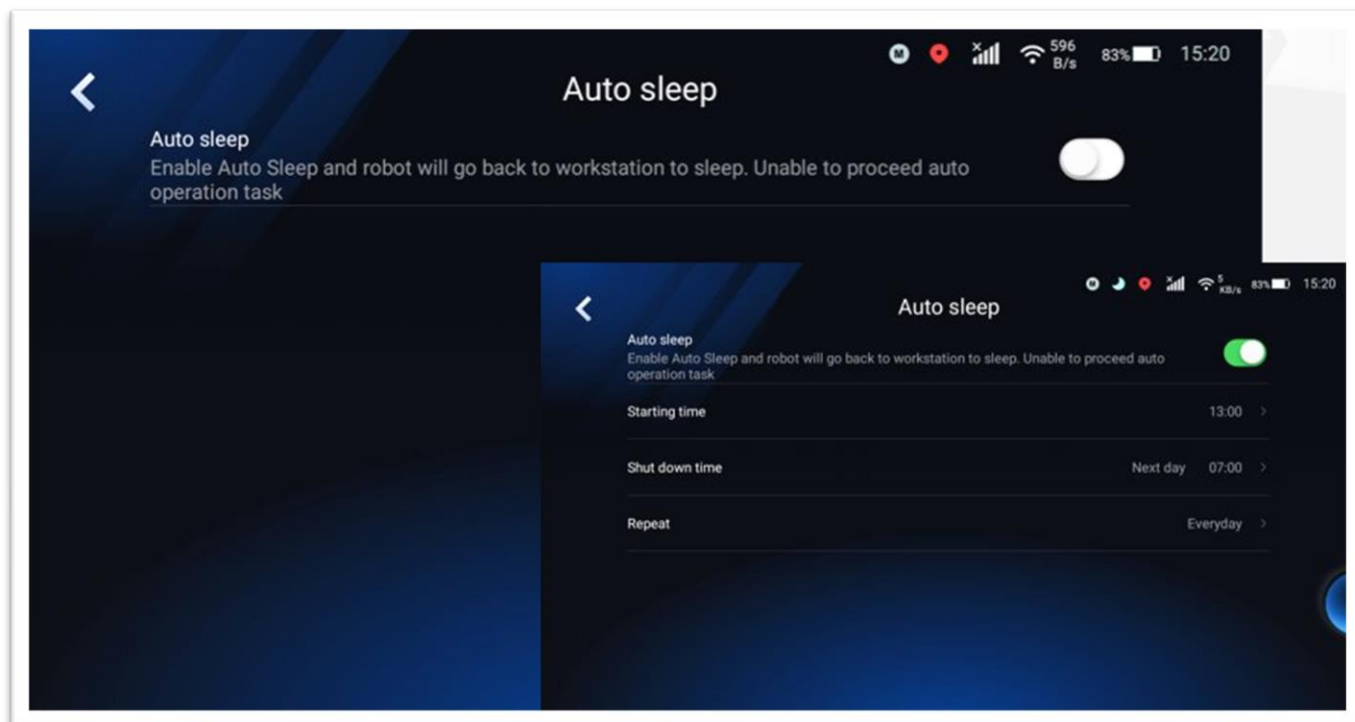
8.3. Settings

The following features are included:

- **Basic settings:** not functional currently
- **Auto Sleep:** Set the sleep time of the robot
- **Robot data operation:** for map backup
- **Advanced setting:** parameter settings, account creation
- **Update:** Manually update the APP version

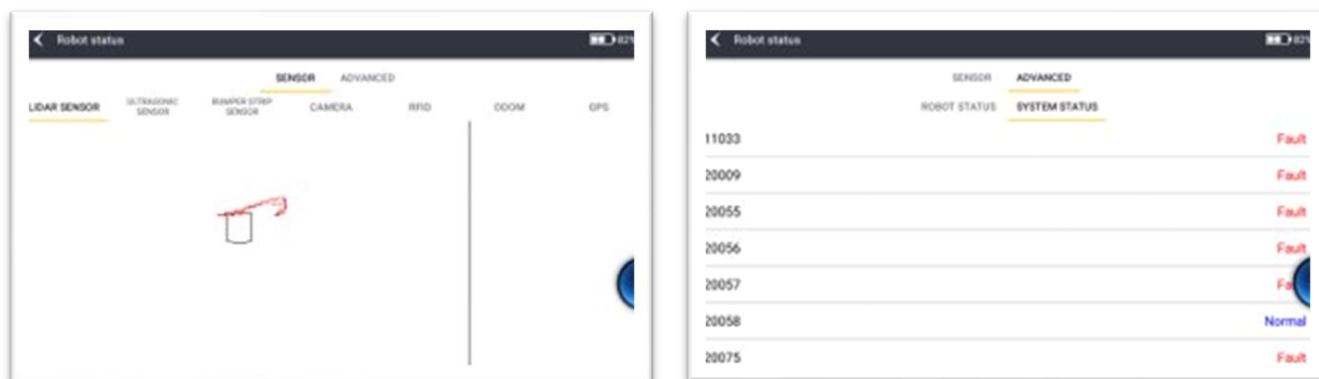
8.3.1. Auto Sleep

If “**Auto Sleep**” is enabled, when the scheduled time arrives, the robot will automatically return to the charging pile/workstation. When the sleep time is over and the robot has unfinished tasks, it will leave the pile to complete the cleaning task.



8.3.2. Robot Status

There are two items in the robot status: SENSOR and ADVANCED.



SENSOR

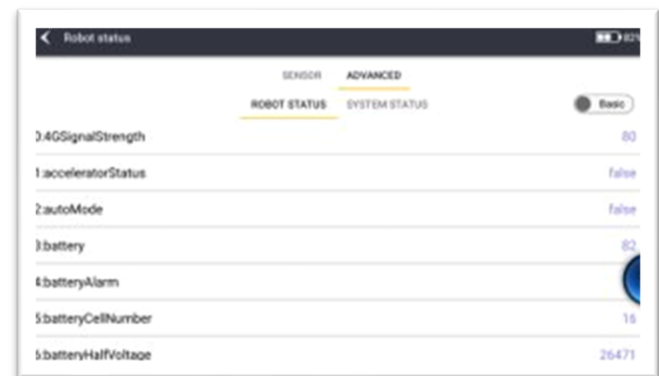
You can see whether each sensor is working normally through the sensor interface:



The laser point needs to be outside the robot. You can see that the green line retracts when the ultrasonic sensor is covered by hand.

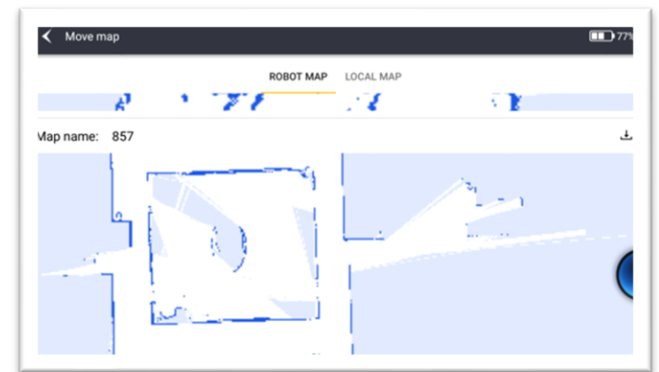
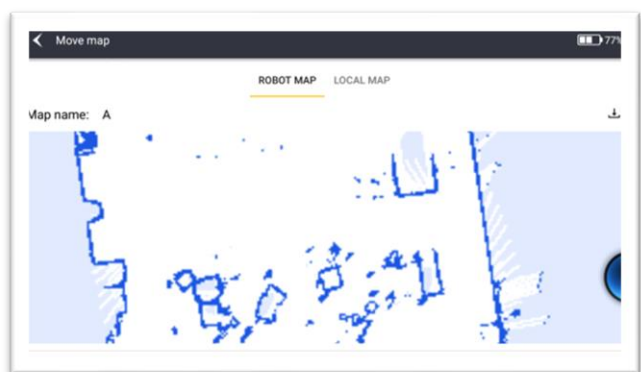
The color of the lights will vary from **green** to **red** when the anti-collision switch is activated.

Orange-yellow clouds are captured by the front and rear cameras.



8.3.3. Moving a Map

The "**ROBOT MAP**" is stored in the hard disk of the upper computer, and the "**LOCAL MAP**" is stored in the tablet.



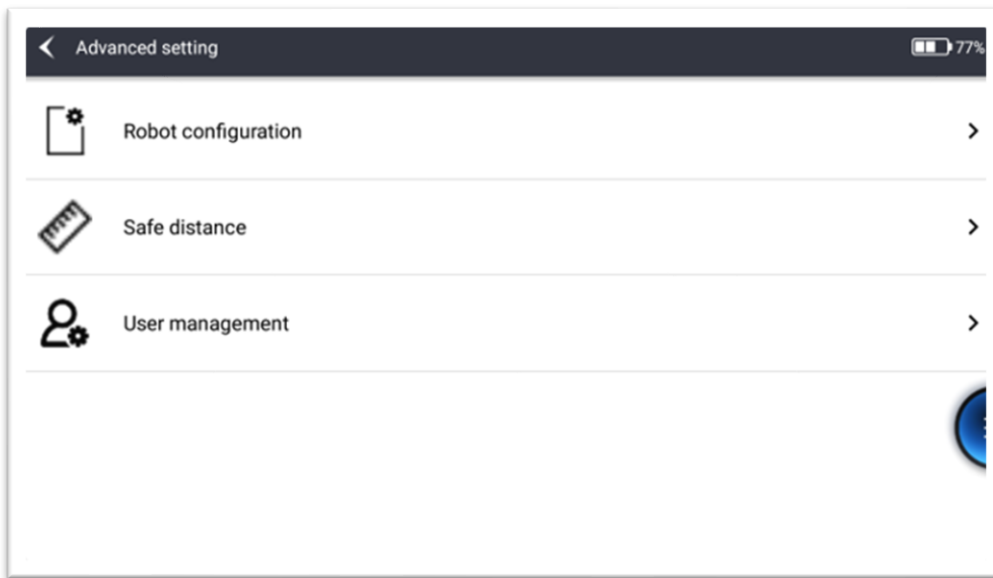


NOTE:

- It is recommended to back up the "ROBOT MAP" to the "LOCAL MAP" after the deployment is completed, to prevent the operator from deleting it by mistake. If the control box is suddenly damaged and the robot cannot be started, this backup can avoid the loss of the map.

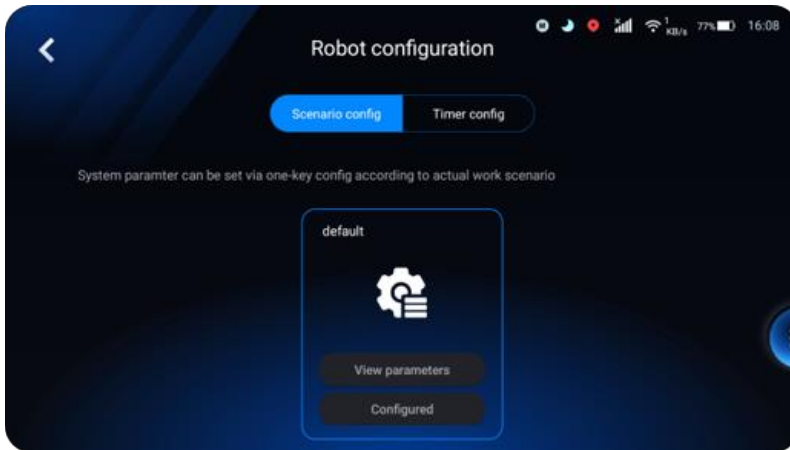
8.3.4. Advanced Settings

Advanced settings include the following features:

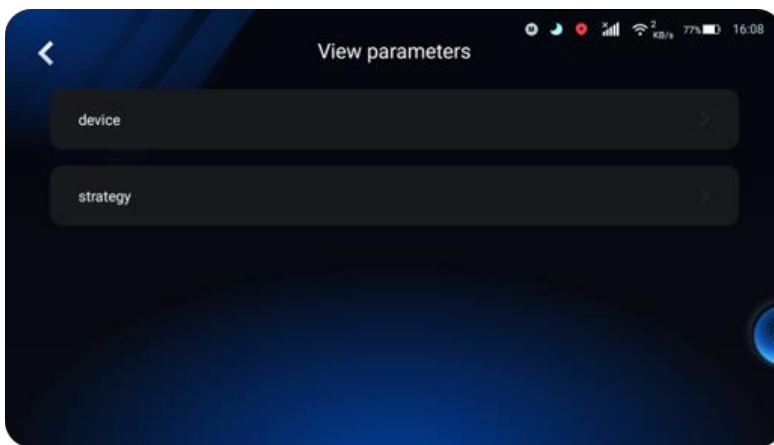


1. **Robot configuration:** various parameters.
2. **Safe distance:** do not need to use temporarily, do not modify.
3. **User management:** create new accounts, delete accounts, view passwords.

Robot configuration: scene configuration, timer config.

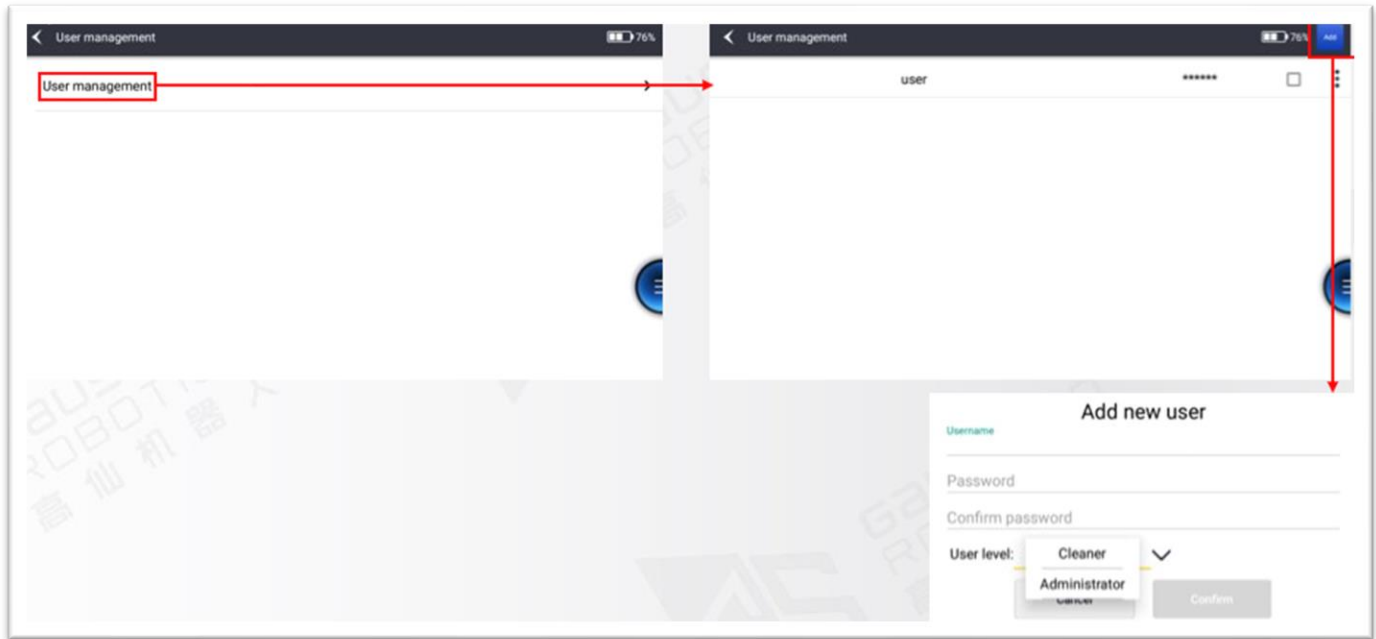


The scene configuration is mainly “**View parameters.**”



Deleting and creating accounts in “User Management”

1. Click the “**Add**” button.
2. Enter “**Username**” and “**Password.**”
3. Select “**User level.**”
4. Click **OK** to create a new account.

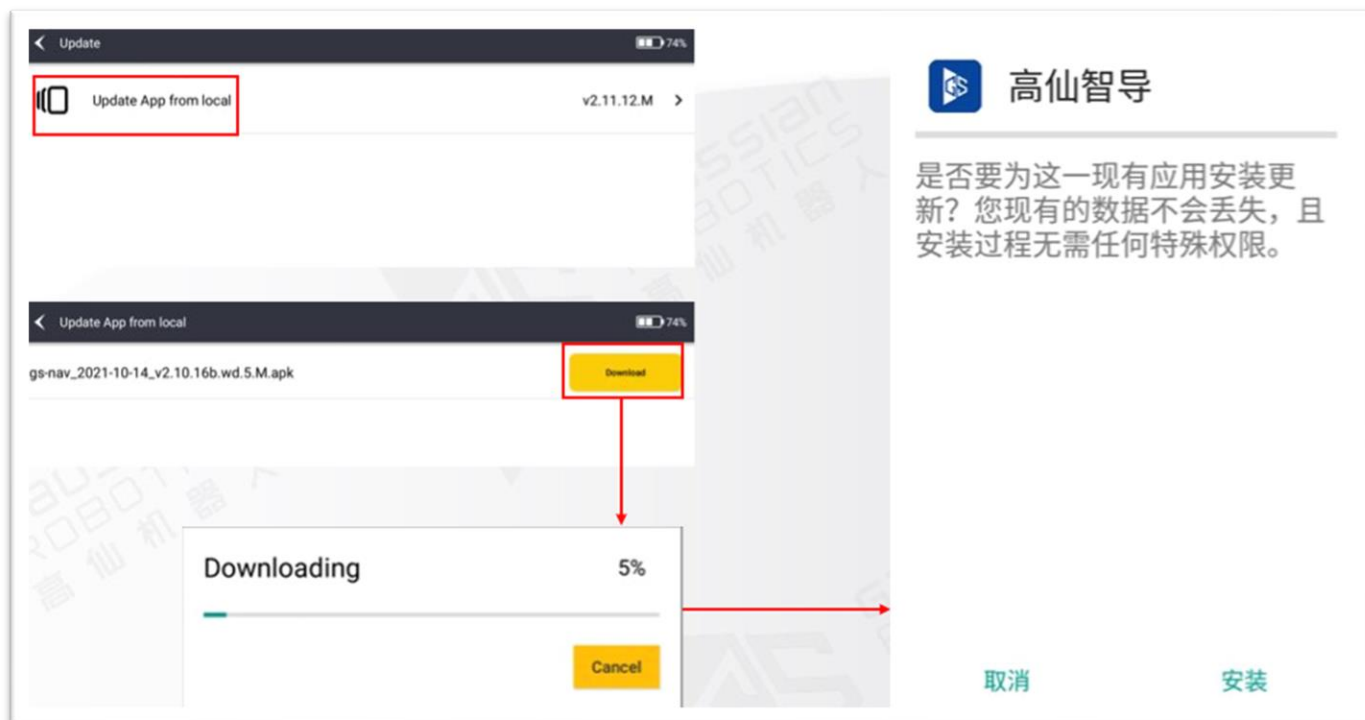


NOTE:

- Permission for a specific account can be customized as per a given situation.

8.3.5. System Updates

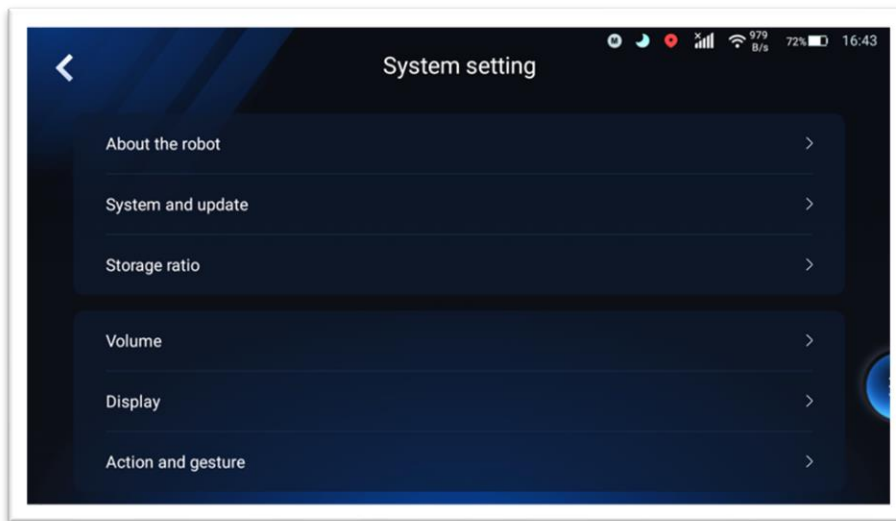
1. Click "**Update APP from local.**"
2. You will see the list of available APP versions.
3. Click the download button on the right and follow the prompts to complete the update.



9. SYSTEM SETTINGS

There are 6 modules in the "**System Settings**":

- [About the robot](#),
- [System and update](#),
- [Storage ratio](#),
- [Volume](#),
- [Display](#),
- [Action and gesture](#).



9.1. About the Robot

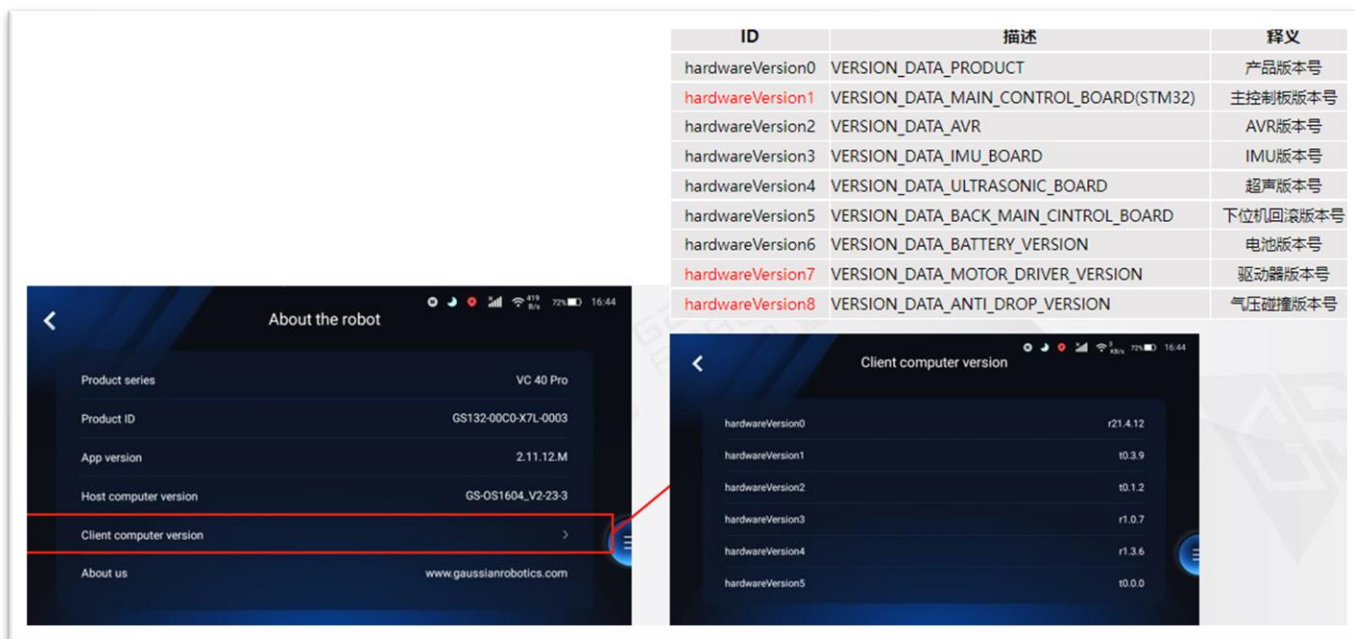
Product model: Scrubber 50, or else Product

Product ID: robot SN

APP version: G-mind version number

Host computer version: software version number

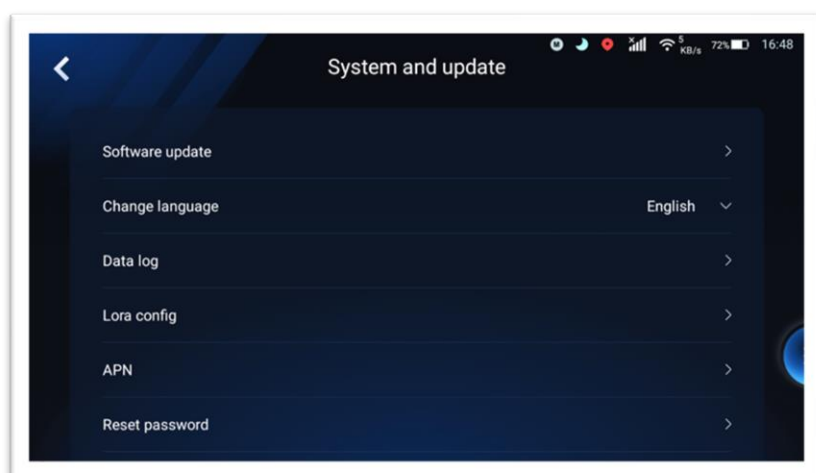
Client computer version: focus on 1, 7, 8



9.2. System and Update

There are 7 modules in the “**System and Update**” section:

1. [Software update](#)
2. [Change language](#)
3. [Data log](#)
4. Lora config*
5. [APN](#)
6. [Reset password](#)
7. [Change time zone.](#)





NOTE:

- The “**Lora config**” module is currently unavailable, waiting for the latest version to access it.

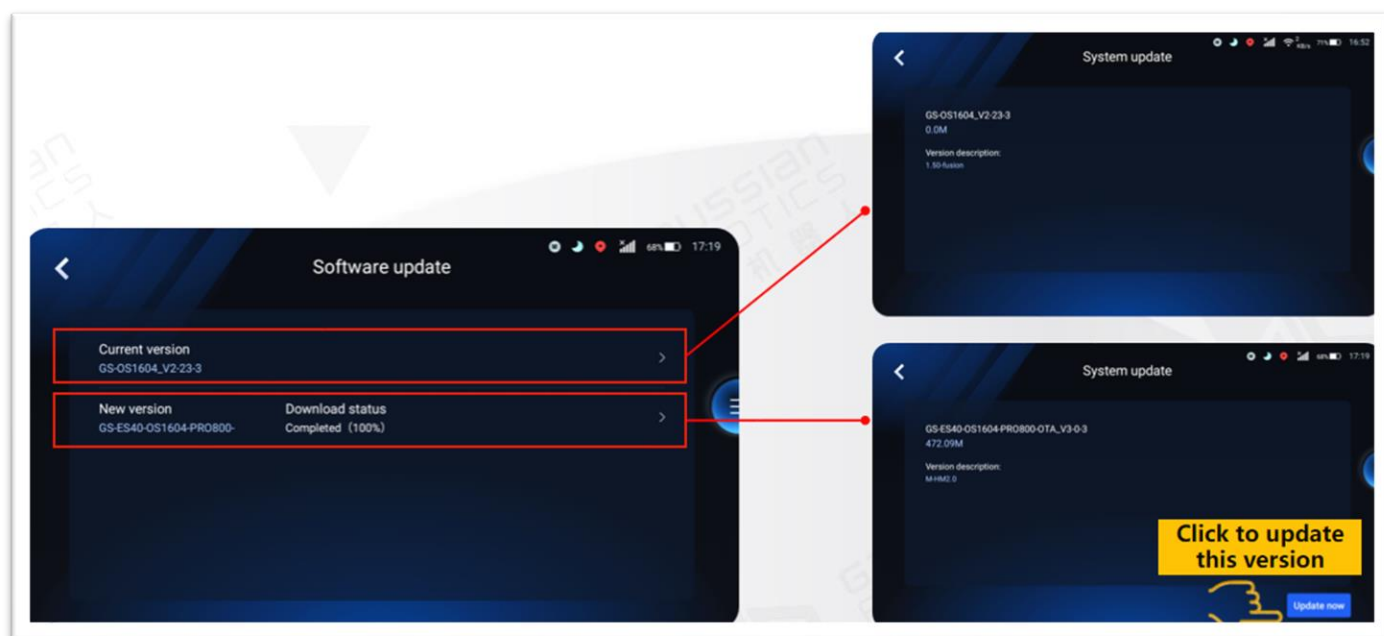
9.2.1. Software Update

Current version:

Description of the G-mind version used by the current robot.

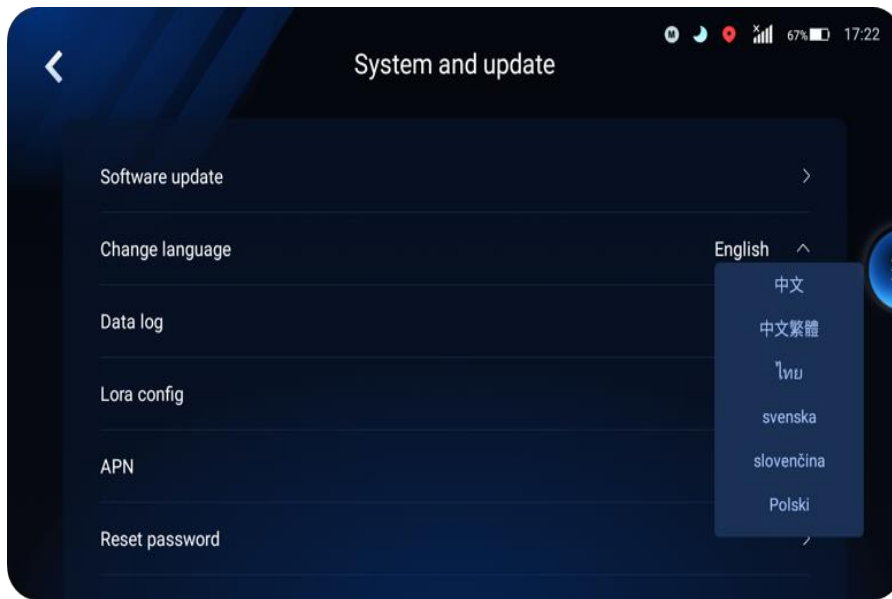
New Version:

The version is currently available for updates, and release notes.



9.2.2. Language Switch

Currently, the APP supports 15 languages:

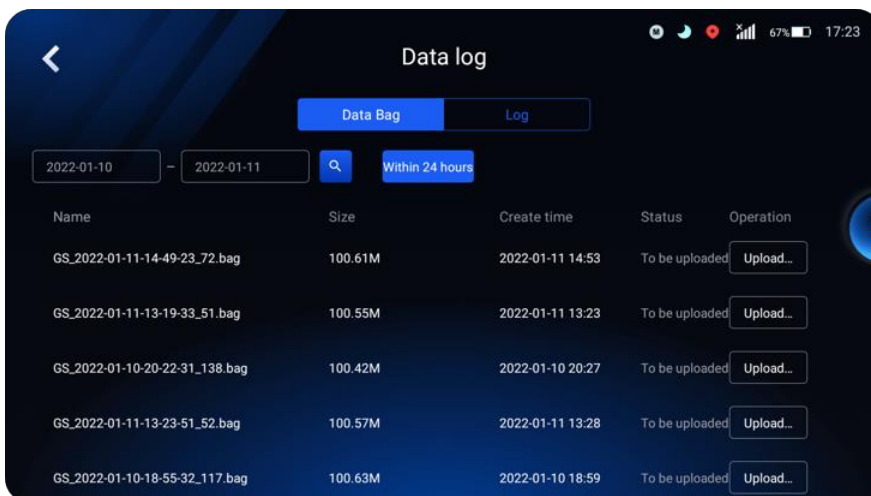


- Simplified Chinese
- Traditional Chinese
- Thai
- English
- Swedish
- Slovenian
- Korean
- Japanese
- German
- French
- Polish
- Dutch
- Norwegian
- Czech

After switching the language, the APP will automatically log you out, and you will need to log in again.

9.2.3. Data Log

You can filter data bags and logs by date, and by module:



*** The "Tempo Studio" tool is used to back up the current data bag/log copy.

9.2.4. APN

APN is used for overseas markets:

Enter the address in the **APN** field and click **Confirm**.

For the settings in specific overseas regions, please contact the local technical support engineer.

9.2.5. Reset Password

First, enter the original password (current password), then enter the new password and confirm, and click "**OK**" to complete.



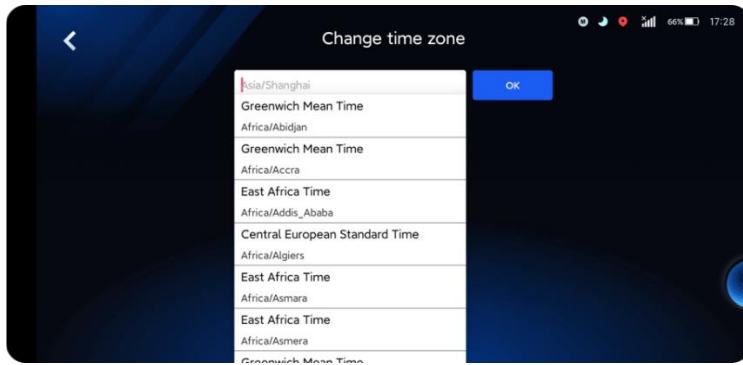
NOTE:

- You can only modify the password of the current account here; if it is an admin account, you cannot modify the user account password.

9.2.6. Change Time Zone

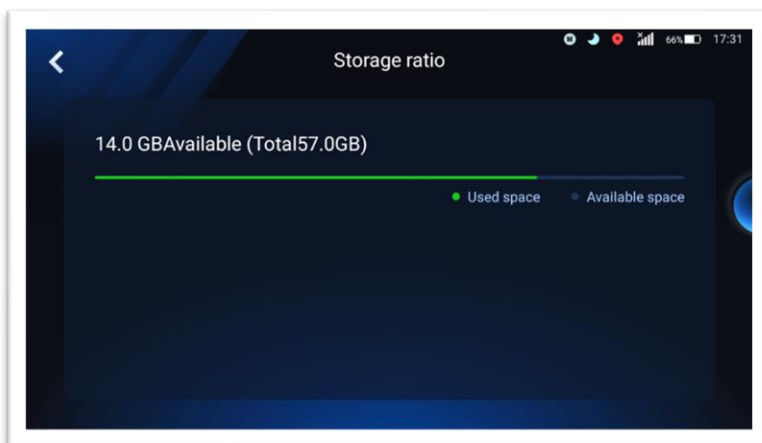
1. Enter the "**Change time zone**" interface and enter text to filter.

2. Select the needed time zone.



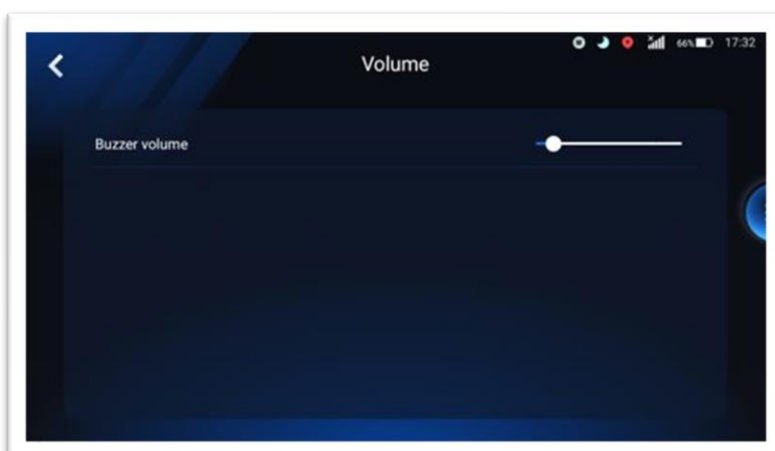
9.3. Storage Ratio

After entering this interface, you can view the total amount of disk, and the current remaining free space:

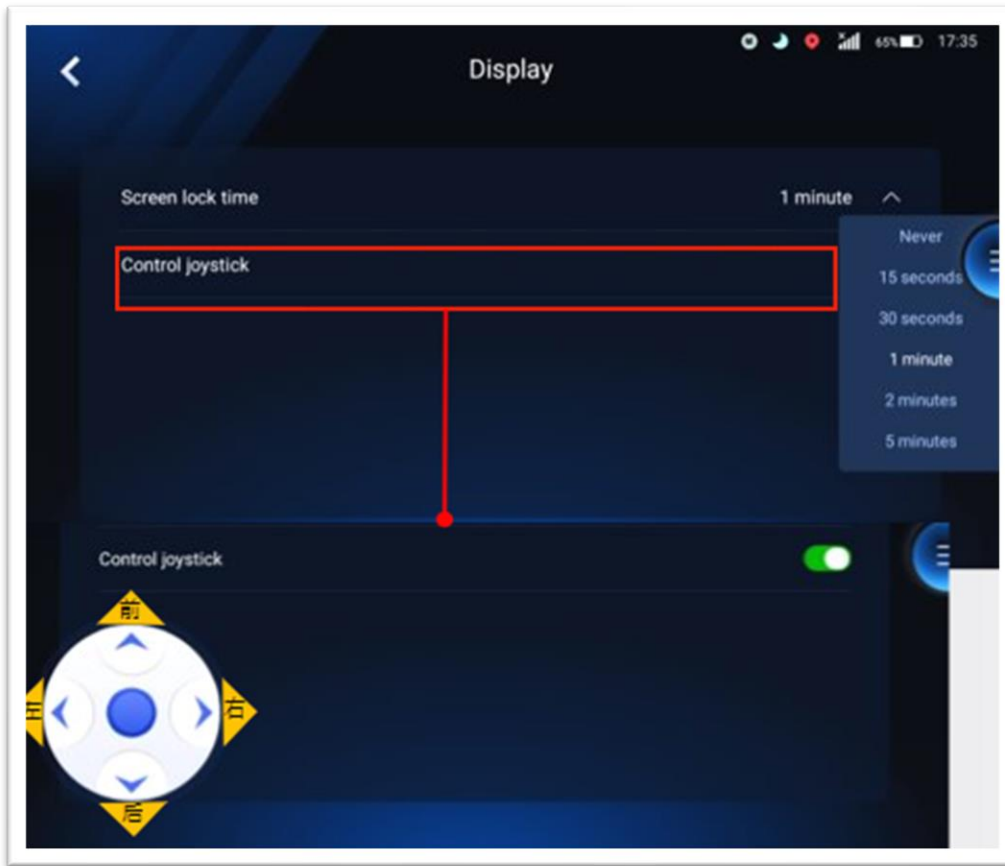


9.4. Buzzer Volume/Display

Enter this interface to adjust the buzzer volume:



Adjust the volume here and synchronize the volume in the drop-down menu.



After entering this interface, you can adjust the **Screen lock time**, and open the **Control joystick** to control the robot to walk through the front, back, left, right, and azimuth keys.

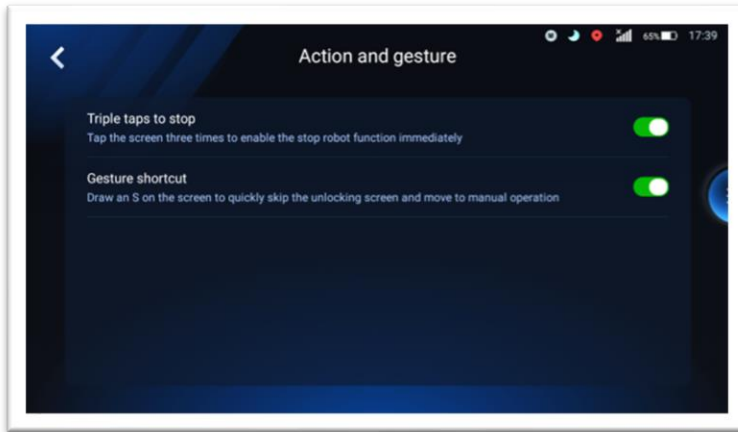


NOTE:

- The Control joystick works in automatic mode only.

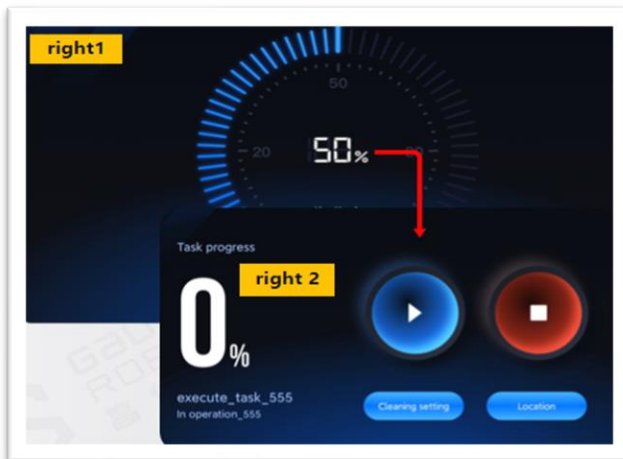
9.5. Action and Gesture

Enter this interface for opening/closing the “**Triple taps to stop**” and “**Gesture shortcut**” switchers/sliders.



9.5.1. Triple Taps to Stop

1. Lock the screen during automatic tasks.
2. Tap the screen **3 times in a row**, to enter the "**Task progress**" interface.



9.5.2. Gesture Shortcut

1. Lock screen during automatic tasks.
2. Draw "S" to enter the "**Task progress**" interface.

10. NETWORK MANAGEMENT

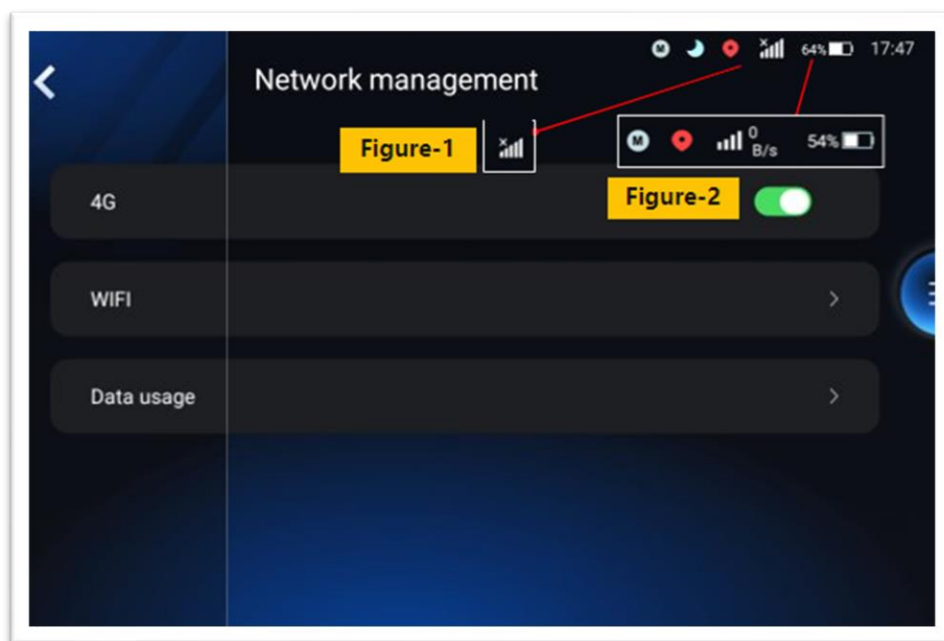
There are 3 modules for network management:

- [4G](#)
- [Wi-Fi](#), and
- [Data usage](#)

10.1. 4G

4G network open and close buttons.

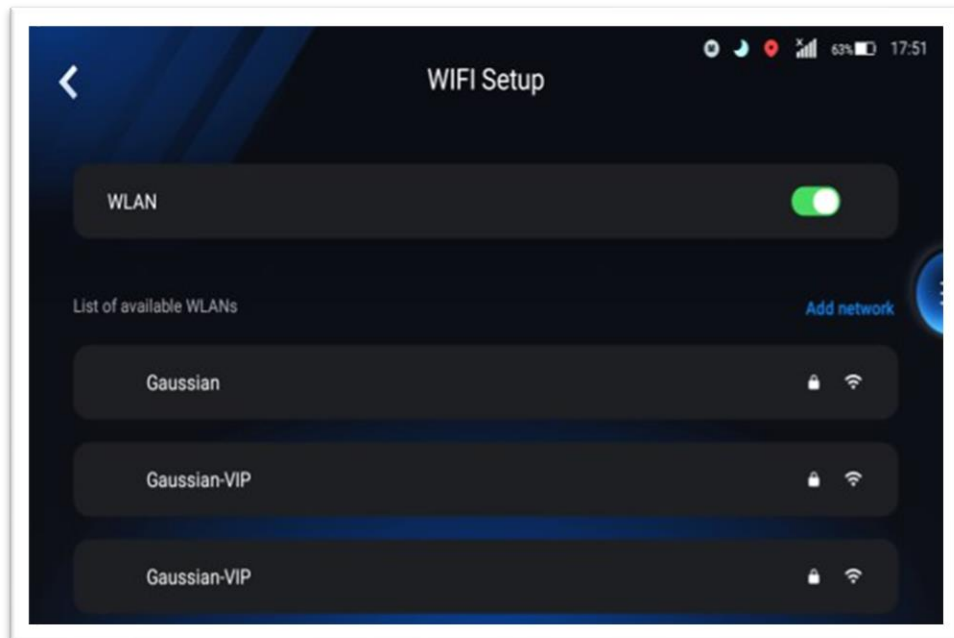
- the network status is white,
- the non-network status will be displayed in the lower right corner of the 4G icon.



10.2. Wi-Fi

Select the Wi-Fi that can be connected in **"Wi-Fi management."**

If the Wi-Fi is turned off, the Wi-Fi icon will be hidden in the status bar.

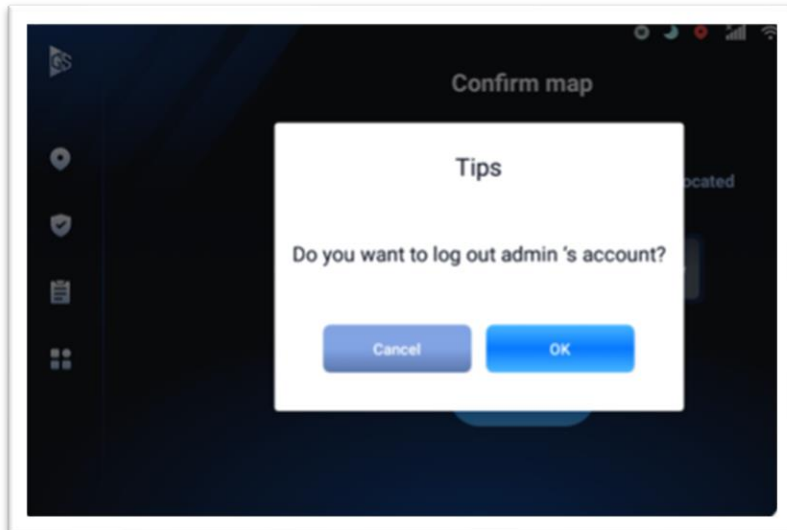


10.3. Dataflow statistics

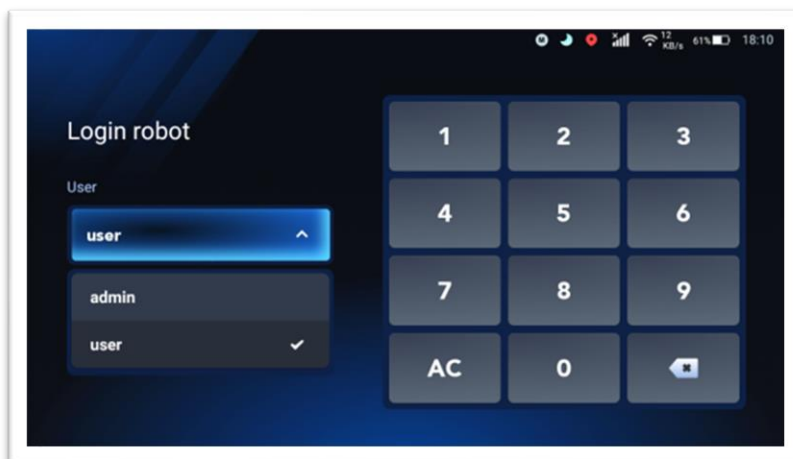
Data usage statistics under Wi-Fi or 4G network.

11. LOGOUT

After clicking logout, a pop-up warning appears asking you to either confirm or cancel your log out of the APP.



1. Click the **"OK"** button to confirm logging out of your account.
2. Otherwise, you may click **"Cancel"** to abort the procedure.
3. Then, you can switch to another account and log in again.



12. TROUBLESHOOTING

The scrubber may not work as you expected. Based on the data fed back by the technical support personnel, we have measured the most common failure situations, and given effective troubleshooting methods and solutions for the above failure situations. In the event of a failure, you can refer to the following table for first-time troubleshooting.

Fault Phenomenon	Probable Causes of Fault	Solution
Unclear or double-created map	The scrubber moves at a high speed, resulting in an inadequate quality of the created map.	Please control the scrubber to move at a slow speed during mapping.
	The sensor is contaminated with dust or blocked by obstacles.	Clean the outside of the laser sensor with a dust-free cloth. Check whether there is any foreign object near the sensor. If so, please remove it in time.
	The environment where the scrubber is located is complicated, and there are high-transparency materials such as glass walls.	During mapping, if it is found that there are high-transparency materials in the surrounding environment, please draw a visual wall in time to control the map boundary.
Indistinct or ghosting drawing	The traveling speed of the robot is too fast, resulting in poor-quality mapping.	Please control the robot to run at a slower speed to scan the map.
	The sensor is dusty or obscured by obstacles.	Clean the outside of the laser sensor with a dust-free cloth, check if there are foreign objects near the sensor, and remove them if any.
	The environment is more complex, and there are glass walls and other high-permeability materials.	When mapping, if high-permeability materials are found in the surrounding environment, please draw a virtual wall to control the map boundary.
Initialization failed	<ol style="list-style-type: none"> 1. The wrong map has been chosen 2. Not located at the marked point 3. Surrounded by the crowd at a short distance 	<ol style="list-style-type: none"> 1. Choose the correct map 2. Push to the marked point 3. It is prohibited to be surrounded by the crowd
Robot does not move	The robot has no power, cannot turn on, and cannot move.	Please connect the charger to the charging port of the robot to charge, and then control the movement of the robot after the battery is fully charged.



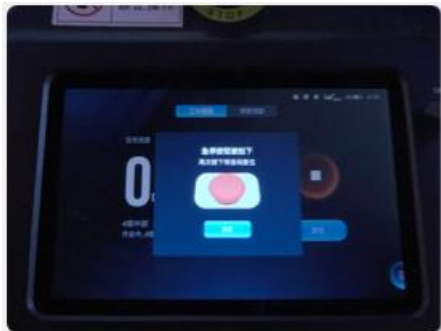

	The scrubber is powered off, and it cannot be started and moved.	Please insert the key into the start-up keyhole on the control panel and rotate the key to start the scrubber. Then, try to control the scrubber to move.
	The implemented mode is the automatic mode	It is necessary to switch to manual mode by hand.
	The red emergency stop button on the control panel is pressed, which results in emergency braking of the scrubber and prevents it from moving.	Please turn the red emergency stop button clockwise and release it to restore the movement function of the scrubber.
The robot roller brush fails to rotate	The roller brush button on the control panel is closed and cannot start cleaning.	Open the roller brush button on the control panel and turn it on to see if the roller brush is put down close to the ground.
	The brush is wound around the wire garbage, and it is stuck and thus fails to rotate.	Please remove the roller brush for cleaning. After cleaning, install it back into the scrubber.
	The full-tank indicator of the recovery tank or the empty-tank indicator of the freshwater tank on the control panel is steady red, indicating that the recovery tank is full or no clean water is in the freshwater tank, and the scrubber cannot continue cleaning.	Drive the scrubber to the maintenance zone to drain sewage, add clean water, and then continue cleaning.
The scrubber fails to absorb water	The squeegee mount is not set down.	Press the button of the squeegee blade on the control panel to open it and observe whether the squeegee blade is put down.
	The suction button on the control panel is closed so water cannot be absorbed.	Press the suction button on the control panel to open it and check whether the suction function works.
	The full-tank indicator of the recovery tank or the empty-tank indicator of the freshwater tank on the control panel is steady red, indicating that the recovery tank is full or no clean water is in the freshwater tank and the scrubber cannot continue cleaning.	Drive the scrubber to the water room to drain sewage or add clean water, and then continue cleaning.

	The connection of the water suction hose is improper, or the water suction hose inhales unidentified objects, causing a blockage.	Check whether the water suction hose is properly connected to the front of the squeegee blade and the recovery tank and whether there is any blockage. If there are any, please adjust or remove them in time.
	There is solid residue adhered to the squeegee blade, or the squeegee blade deforms or is severely damaged and worn, affecting the water-gathering effect.	Clean the squeegee blade, adjust the structural shape, or directly use a new squeegee blade.
The cleaning effect of the scrubber is poor	The brush has not been cleaned for a long time and is contaminated with a lot of dust and dirt, which affects the cleaning effect.	Remove the roller brush for cleaning and install it back into the scrubber after cleaning.
	The brush is severely worn, and the cleaning performance is poor.	Replace with a new roller brush of the same specification.
	The type of brush does not apply to the floor type. For example, a brush is used to clean an epoxy floor.	Please refer to the instructions for consumables, and select a brush or cleaning pad suitable for the floor material for cleaning.
	The floor to be cleaned is quite dirty or there is a large solid waste on it, so the scrubber cannot clean it all at a time.	Pick up the solid waste on the floor before cleaning, and then repeat the cleaning several times to ensure the best cleaning effect.
The scrubber cannot be charged	The power outlet is powered off and does not supply power.	Please make sure that the power outlet is powered. It is recommended that the charger be connected to another outlet for verification.
	The charger is damaged and cannot be charged.	Please check whether the indicator of the charger is steady red. If it is, charging is normal. If it is off or blinking, the charger is working abnormally. In this case, please contact AROS Technical Support personnel to apply for repair.
	The battery is damaged and cannot be charged normally.	If the charger functions normally, but the percentage of battery level does not increase with the extension of the charging time, it means that the battery is damaged or abnormal. In this case, please contact AROS Technical Support personnel to apply





		for battery replacement.
The scrubber cannot be started	<ol style="list-style-type: none"> 1. The air switch is off. 2. The battery runs out. 3. The key switch is not turned on. 	<ol style="list-style-type: none"> 1. Turn on the air switch. 2. Charge the battery. 3. Turn on the key switch.





If you have tried all the solutions to the above problems still exist, or if the problems you have met are not listed above, please contact AROS Technical Support for further assistance. Thank you for your co-operation.




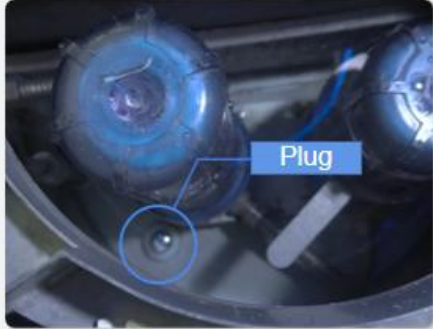

13. APPENDIX A. SOLUTIONS FOR COMMON PROBLEMS

Problems	Possible Reasons	Solutions
Power-on failure	Air Switch 	Check if the air switch has been turned on.
	Battery Activation 	Remove the dust cover of the charging port in the robot and charge the robot for a while, then try to power it on again.
	Emergency STOP button engaged 	The robot will pause the current cleaning task when the emergency STOP button is pressed. Press the button again to continue the current cleaning task.
Intermittent lag		Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point in manual mode.
	Wipe external sensors	Check if there is contamination on the surface of the camera or laser, or if they are blocked by something

No actions after starting auto-operation		else. Use a soft, clean, and lint-free wipe to clean the surface of the sensors.
	Clean front horizontal laser 	Lift the latch of the front bumper and open the shell and clean the front horizontal laser. Close the shell after cleaning.
	Emergency STOP button engaged 	Check if the emergency STOP button was pressed. (Red liner light indicator means it was pressed, blue light means it has been released). If it was pressed, click "confirm" on the screen, and press the button again to continue the cleaning task.
	Robot lost locating 	Check if the robot lost locating. (White icon means locating is normal, red means lost). If the robot lost locating, push the robot to the landmark point for re-locating.
	Alarm message	Open "Health management" and check if there are alarm messages. If they cannot be resolved, please take photos, and contact us for support.

		
An abnormal noise from rubber strips	<p>Something adhered to strips</p> 	<p>Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point.</p> <p>Lift the squeegee and clean the strips with a clean wet wipe.</p>
	<p>Strips damaged or worn</p> 	<p>If the strip is damaged or worn, please do the replacement.</p>
Water stains left on the ground	<p>Something adhered to a strip</p> 	<p>Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point.</p> <p>Put on gloves and lift the squeegee to check if something is adhering to the strip. Clean strips with a clean wet wipe.</p>
	<p>Air leakage into the water tank</p>	<p>Remove the water tank cover and check if the sealing strip on it is good.</p>



		
	<p>The cap of the drainage pipe</p> 	<p>Check if the cap of the drainage pipe was closed tightly.</p>
	<p>The suction pipe is blocked</p> 	<p>Check if the suction pipe was inserted well or blocked. Loosen the locking screw and remove it and check for any blockage inside it.</p>
	<p>Improper height of squeegee</p> 	<p>Engage the squeegee to touch the ground. Check the height of casters and adjust it to achieve a 30-45° between the strip and the ground.</p>
	<p>The rubber strip is damaged or worn</p>	<p>If the strip is damaged or worn, please refer to the maintenance guide - rubber strip replacement to do the replacement.</p>

		
No or low water spray	<p>Filter timeout or overload</p>    	<ul style="list-style-type: none"> ➤ Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point. ➤ Open the cap of the wastewater pipe and quickly put it down to drainage (<i>Kind reminder: hold the pipe upward when opening the cap</i>). ➤ Unplug the plug in the clean water tank after the wastewater tank has been emptied. The water in the clean water tank will flow into the wastewater tank. Then, continue to empty the wastewater tank using a wastewater pipe. ➤ Remove the filter bag, filter bottle & cartridge, and steel wire filter. ➤ Flush and clean the filter bag, filter bottle & cartridge, and steel wire filter. ➤ Put the water tank cover back. ➤ Close the top lid. ➤ Ensure the cap is closed tightly, then withdraw the drainage pipe.



Auto-charging failure	Power supply failure	Check the power supply to the workstation.
	Rear camera contaminations	Check if there is contamination on the surface of the rear camera, or if it is blocked by something. Clean it with a soft, clean lint-free wipe.
	Obstacles around	Remove all obstacles around the workstation and charging pile.
	QR code for docking dirty or damaged	Check if the QR code is dirty or damaged. Clean it with a clean wet pipe.
	Improper air switch position	Check and turn the air switch of the robot on.



		
		
Poor water absorption	The power adapter is damaged	Connect the power adapter with the robot first. Then connect the adapter to the 220VAC power supply. The flashing red indicator means charging is ongoing. If the indicator is off, it means the power adapter could be damaged. Please contact AROS Technical Support for assistance.
	The rubber is worn and damaged	Change rubber.
	The suction outlet of the water-sucking scratcher is blocked	Remove dirt.
	The water tank cover is not well covered	Readjust the water tank cover.
	The suction volume of the cleaning configuration is too small	At least, ensure that the suction volume is greater than 70%.
	The caster wheel is loose	Readjust the height of the caster wheel to make the rubber contact the ground best.
	Excessive water, over 30%	The amount of water sprayed on the marble floor should be kept at 20% ~ 25%.
Filtration overload	The steel mesh of the sewage tank is damaged or dirty	If damaged, it should be replaced; if it is too dirty, it should be cleaned.
	The filter element of the clean water tank is too dirty	Clean or replace the filter element.
	Problems with the filter pump body	Replace the pump.
	The water pipe is bent or blocked	Straighten the water pipe and replace it if it cannot be restored. If the blockage is serious, replace it.
Water-spraying overload	The steel filtering screen of the clean water tank is too dirty	Clean or replace the steel filtering screen.

	The solenoid valve is damaged	Replace the solenoid valve.
No spraying	The amount of clean water in the clean water tank is too small	Add clean water.
	The steel filtering screen of the clean water tank is too dirty	Clean or replace the steel filtering screen.
	The solenoid valve is damaged	Replace the solenoid valve.
	The electric ball valve is damaged	Replace the electric ball valve.
	The water pipe is broken or leaked	Replace the water pipe.
No filtering	The filtering function is turned off by the tool on the APP main interface	Turn it on manually.
	The water level of the sewage tank did not make the third floating ball float	Without treatment, the sewage will be automatically filtered when it reaches a certain water level.
	The steel mesh of the sewage tank is too dirty	Clean or replace the steel mesh.
	The filter element of the clean water tank is too dirty	Clean or replace the filter element.
	The filter pump body is damaged	Replace the filter pump.
There are wheel marks on the ground	Check the wheels for dirt	Clean the rubber coating of the rear wheel with a brush.
	There is a stained layer on the surface of the ground	Clean it with Gaussian special detergent.
	The wheel encapsulation is hard	Replace it with the wheel with softer encapsulation.
Locating failed	The robot is not within 2 m of the landmark point	Push it within 2 m of the landmark point.
	The wrong floor is selected	Move it to the right floor.
	The location and environment of landmark points change too much	Delete old landmark points and create new landmark points.
Running is stuck or the head swings	Dirty sensor	Please wipe it gently.
	Scratched sensor	Replace parts.
	Impacted by strong and direct light	Contact the after-sales personnel for handling.
	Inaccurate TF	Calibrate TF.
No voice for obstacle avoidance	The power amplifier is turned off	Turn on the power amplifier.
	No voice files	Contact the after-sales personnel for assistance. In the future, customized voice content will be supported.
	System problems	Contact the after-sales personnel for assistance.

Robot cannot be charged	Speaker failure	Replace the speaker.
	The air switch is disconnected	Close the air switch manually.
	Damaged charger	Contact the after-sales personnel to replace parts.
	The plug-in row is not powered	Replace the plug row or change the charging position.
Stop in automatic task	Full sewage tank	Discharge sewage.
	Empty clean tank	Add clean water.
	The wheel is stuck	Move the robot manually and solve environmental problems.
	Other faults	Check the APP alarm and contact after-sales personnel for handling.
Unable to enter APP	Loose network cable leads to disconnection of host and slave computers	Re-insert the network cable and tighten it.
	Loose network cable of the all-in-one robot	Re-insert the network cable and tighten it.
	All-in-one robot failure	Replace the all-in-one robot.
	Control box failure	Replace the control box.
	System failure	Update the system version.
The brush/water-sucking scraper cannot be lowered	No lowering is set under cleaning mode	Reset the cleaning mode.
	Structural interference results in the inability to lower	Confirm the interference position for structural adjustment or replacement of components.
	Push-rod motor failure	Replace the pushrod motor.
	Drive failure	Update parameters and replace the drive.

14. APPENDIX B: CONSUMABLE REPLACEMENT SUGGESTION

Power consumption level		High consumption	Medium consumption	Low consumption
Consumables	Remarks	Supermarket, planning scene – 4-6 working hours per day. Rough ground like Cement floor – 3-4 working hours per day. The ground with heavy sewage.	Wear-resistant floor, terrazzo, and other slightly rough ground – 3-4 working hours per day. Rough ground – 1-2 working hours per day. Smooth ground – 3-5 working hours per day. The ground with some sewage.	Epoxy floor, plastic floor (PVC or else floor that can be cleaned via dust-mop or bristle brush). Marble, artificial tile, and other smooth surfaces. Relatively clean floor.
Filter Cartridge	30µm - cartridge	2 times/month	1-time/month	1-time/month
	40µm - cartridge	2 times/month	1-time/month	1-time/month
	50µm - cartridge	2 times/month	1-time/month	1-time/month
Rubber strips of the squeegee	Front strip	2 times/month	2 times/month	1-time/month
	Rear strip	2 times/month	2 times/month	1-time/month
Steel wire filter	Steel wire filter in the clean water tank	1-time/quarter	1-time/quarter	1-time/semi-annual
	Steel wire filter in the wastewater tank	2 times/quarter	2 times/quarter	1 time/quarter
Disk brush	10 inch - bristle disk brush	2 times/quarter	1-time/2 months	1-time/quarter
	10 inch - disk brush	2 times/quarter	1-time/2 months	1-time/quarter
	10 inch - disk brush assembly (magnet) (needle plate together with cleaning pad)	2 times/quarter	1-time/2 months	1-time/quarter
Cleaning pad	Cleaning pad-GS75.1.1.1.1.3	4 times/month	2 times/month	2 times/month

Needle plate	FB0679245mmGX - compound needle brush	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
Castles	1.6-inch castle (M8-L40)	1-time/month	1-time/2 months	1-time/quarter
Roller brush	V-type roller brush - left side	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
	V-type roller brush - right side	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
	Double row roller brush - L	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
	Double row roller brush - R	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
Upper suction pipe	Upper suction pipe	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
	Sewage suction pipe -50	1-time/semi- annual	1-time/semi- annual	1-time/semi-annual
Filter bag	Non-woven filter bag 150 mesh 5L	2 times/month	2 times/month	1-time/month
	Nylon filter bag 200 mesh, 5L	2 times/month	1-time/month	1-time/month

15. APPENDIX C: TECHNICAL SPECIFICATION

Parameter Type	Parameter	Value
ROBOTICS	Navigation Technology	Integrated Lidar-Visual SLAM
	3D LIDAR	No
	Primary Laser detection distance	25 m
	Laser scanning angle	270°
	Secondary Laser detection distance (level)	No
	Secondary Laser detection distance (inclined)	No
	Depth Cameras	3* Real sense camera
	Ultrasonic Sensors	Yes
	Anti-drop Sensor	by using an inclined laser
	Collision sensor	Yes
	Mapping Process	Easy onsite mapping (off-line, on-screen)
	Mapping Efficiency (e.g., 3,000 sqm)	1 hour
	Map Editing	On-site, Off-line, On-Screen
	Single map coverage	Max. 30,000 m ²
	Dynamic Map updating	Yes, a maximum of 30%
	Minimum distance close to the wall	7-10 cm
	Ability to detect thin poles and hanging obstacles	Able
	Dynamic path planning	Yes
	Obstacle avoidance strategy	slow down-stop-wait-bypass-replan path
	Start the task anywhere on the map	Yes
	Continue the previous task after interrupting/switching to manual mode	Continue from where it stopped
	Ability to work in complicated and dynamic scenes	Able
	Can detect obstacles higher than N cm	10 cm
SOFTWARE & DIGITAL	Cloud Platform to check the statistics and monitor	Yes
	Task Reports and Alerts	Auto-generated and comprehensive email
	Mobile App	Yes
	Account with different access levels	Yes
	Scheduling function	Yes
	OTA	Yes

	Ability to work offline	Yes
	Manual mode	Yes, Push behind
	Adjustable cleaning mode	Yes
CLEANING PERFORMANCE	Working width	50 cm
	Water absorption width	72 cm
	Disc Brush RPM	270
	Cleaning down-pressure	12,5/15 kg
	Number of main brushes	2 pcs
	Optional Rolling brush	Yes
	Clean Water Tank Capacity	24 l
	Recovery Tank Capacity	18 l
	Filtration function	4-stage filtration system
	Cleaning speed	1.1 m/s
	Charging time	1-2 hours
	Operation time	2.5 hours
	Cleaning efficiency	800-1200m ² /h
	Max. cleaning area/Charge	2,000 m ²
KEY COMPONENTS AND OTHERS	Battery capacity	24V / 40Ah Li-ion
	The weight of the body (including the battery)	150 kg
	Warning lights	Yes
	Dimensions (mm)	860 (L) X 700 (W) X 1030 (H)

16. APPENDIX D: SCRUBBER 50 Consumables

Nº	CODE	PART NAME	DESCRIPTION	PRICE (€)	1 SET/ 6 months	SET PRICE (€)
1	A0304020327	Hem Strips - Magnetic Suction	5037180009 S00 Natural Rubber	8.00	1	8.00
2	A0304020328	Brush Plate Front Strip - Magnetic Suction	5037180014 S00 Natural Rubber	6.88	1	6.88
3	A0304020332	Suction Stripping Front Rubber	5037080003 S00 NR	14.80	2	29.60
4	A0304020333	Absorb Water and Scrape Back Rubber	5037080004 S00 NR	15.68	2	31.36
5	A0304000463A	Brush Skirt	7504180004 Brush hem front A00 rubber +PA	27.28	1	27.28
6	S0100000176	Hexagonal Magnetic Brush Tray Set - Red	5037180027 A00 9 Inch Magnetic Brush Disc (Medium), Wiring Diameter 0.35mm, Red, Life Span 500h	42.64	2	85.28
7	S0100000101	Needle Hook Tray	5037180020 S00 9 inches, gray	43.12	1	43.12
8	A0312010340	Wool Mat	Customized Part, 9 Inch, Red, T 25mm. Used to remove slight scratches and dirt to form a smooth and shiny bright surface. It is an ideal product for daily cleaning and polishing.	5.20	3	15.60
9	A0303010653	Dust Cloth Gray (Good Water Absorption)	T501003, 3.3.1, GS 50, 170*720, 1PCS, with good vacuum effect.	4.72	3	14.16
10	A0306010312	Manyfold Filter	Filtering Accuracy 50 µ, Dims: Inner Diameter 28mm, Outer Diameter 69mm, Total Length 250mm, Washable.	4.32	3	12.96

11	A0306010313	Manyfold Filter	Filtering Accuracy 100 μ , Dims: Inner Diameter 28mm, Outer Diameter 69mm, Total Length 250mm, Washable.	4.32	3	12.96
12	A0306010004	Clean Water/Sewage Filter	1/2 Inch Outer Thread L 30, Filter Cartridge L ϕ 45*180	38.88	2	77.76
13	A0312012138	Nylon Mesh Bag	Material: Nylon, Mesh: 100 Mesh, Specification: 300*450mm, Opening Width: 300mm (With Drawstring).	1.92	4	7.68
14	S0100000102	Filter B Component	Extended Filter Wool, Applicable to V3.5.2 Squeegee.	62.96	1	62.96
15	A0305040312	Suction Tuyere Honeycomb Filter Cotton Mesh	T50330040, V3.3	2.56	1	2.56
16	A0308010302	1.6 Inch Wheels	Standard Part; 1.6 Inch Caster Wheel; M8-L40	1.84	2	3.68
TOTAL:						338.72