

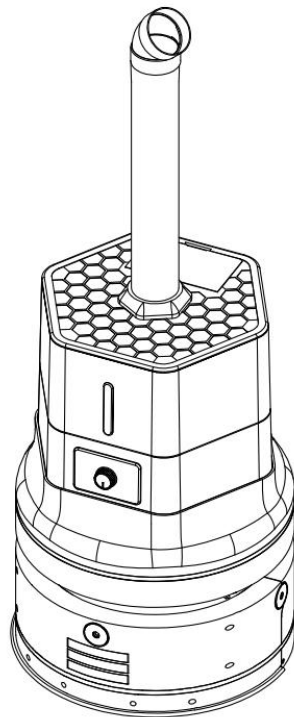


BooCar 布科思
Better Robot, Better Life

BKS-ST-220A

Product Manual

V 1.0.0



BOOCAX
0086 4001618661

Safety and Precautions

The use of spray robot shall follow the operation instructions. Use beyond the range is prohibited! BooCax Robotics will not assume any responsibilities for the losses caused by improper operation.

Symbols:

- ⊗ indicates prohibited acts.
- ⚠ indicates danger, warning and attention.

⊗ PROHIBITIONS

- Keep out DURING SPRAYING;
- Do not use in flammable gas environment or similar dangerous environment;
- Do not add any additive of unknown source into the water tank;
- Do not clean or add water when the robot is powered on;
- Do not disassemble the robot for repair or debugging;
- Do not touch the terminals when the robot is under charge to avoid short circuit or electric shock;
- Do not replace any parts. If necessary, please do so under the direction of BooCax Robotics.

⚠ PRECAUTIONS

FOR THE ROBOT

- The spray robot should be parked in a flat and solid place at normal temperature;
- When adding liquid, do not splash liquid into the robot;
- If there is odor or abnormal noise DURING SPRAYING, please immediately turn off the robot and report to the After Service;
- Before starting the robot, please check whether the safety components (sensor, emergency stop switch, etc.) are in normal conditions;
- If the floor is waterlogged and greasy, please clean the floor promptly;
- The robot body must be maintained by a trained professional;
- If the robot is not used for a long time, it needs to pour out the liquid in the water tank, and place it to a cool and dry place for preservation

FOR THE DISINFECTANT LIQUID

- The spray robot should be parked in a flat and solid place at normal temperature;
- Disinfectant belongs to external use and prohibited to be taken orally; keep it out of the reach of Children.
- People who are allergic to chlorine should use it with caution. If there is allergic phenomenon, stop using it immediately.
- When disinfectants are used for indoor-air disinfection, they should be carried out in the absence of anyone.
- In case of chemical reaction of disinfectants, it is recommended to clean the water tank with clean water when changing different kinds of disinfectants.
- Cannot be used for metal objects disinfection. There is a certain bleaching on fabric.
- Users should wear latex gloves and do eye protection. If any touch happens on skin or eye, clean it with clean water immediately. And if cause long-time discomfort, please seek for medical advice immediately.

ROUTINE MAINTENANCE

When performing routine maintenance, please make sure that the robot is turned off, unplugged or away from the charging pile! Otherwise, electric shock or serious failure may occur.

It is strictly prohibited to flush the robot and charging pile directly with tap water, which may lead to the accumulation of water vapor or water inside the equipment and cause serious irreparable failure.

CLEANING

- 1) Gently wipe the dirt inside the water tank and the ultrasonic sealing ring (the four black circles seen after removing the water tank) with a brush and a wet cloth every week;
- 2) Regularly brush the surface of the driving wheel and universal wheel;
- 3) Use detergent and dust-free cloth to gently wipe the outer surface of the robot regularly;
- 4) Regularly contact after-sales for maintenance services such as lubrication, dust-cleaning at the damping spring and universal wheel bearing;
- 5) Lidar sensor, as the expensive precision component in robot, should be wiped regularly with a non-dust cloth. Do not wipe with force or other detergent, which may be easy to cause functional damage
- 6) If the robot will not be used for a long time, store it in a dry and cool place.

CHECK THE SCREW IS LOOSE OR NOT

Shake the components gently on a regular basis to observe whether they are loose. If there is any abnormal sound, please check the screws at the installation position of relevant components. All the screws of the robot have undergone anti-loosening treatment. However, for the sake of safety, please contact "BooCax After-sales" if any screw is found loose

DISCLAIMER

BooCax Robotics possesses many patents related to this robot product. No organization or individual may use these patents without authorization. The robot has precise internal structure. For the sake of safety, no one is allowed to disassemble the robot without permission except the authorized personnel of BooCax, otherwise the warranty will be invalid. BooCax will not assume any responsibility for any damage, breakdown and property/personal injury caused by unauthorized disassembly. The identification of unauthorized disassembly will be subject to the anti-disassembly mark on the robot body

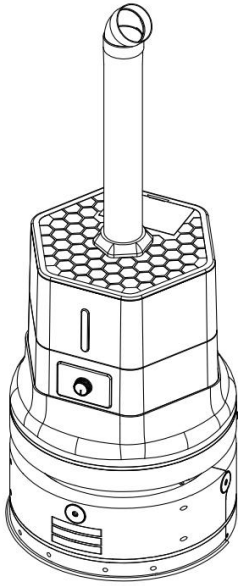
AFTER-SALES

If you have any questions about maintenance, safety and other issues during use of BooCax robot, please contact us by phone or email provided on the back of this manual. We are very willing to provide you with product-related services

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1. Introduction to Spray Robot



BooCax Robotics BKS-ST-220A atomizing spray robot is designed to purify the air by rapidly atomizing the liquid and automatically spraying the area.

This robot can automatically navigate to the area for full-coverage spraying, and supports mobile App control to achieve man-machine separation and minimize personnel exposure, so that the use safety is greatly improved. With simple structure, it is easy to maintain and manage.

The spray robot is widely applicable to hospitals, airports, office buildings, shopping malls, schools, factories and other public places.

Product Features

- ① The spray volume is up to 3200 ml/h, with the atomized particles less than 10 microns;
- ② The spray diameter is 6 m averagely (by maximum injection rate), leaving no dead corners in the spraying area;
- ③ 22L large-capacity tank to meet the disinfection need for super large-scale scene;
- ④ It is simple to use with mobile App control (with disinfection log), and supports two spraying modes: regular spraying, immediate spraying;
- ⑤ With high-precise autonomous navigation function, it can set the working area (room) and working time independently;
- ⑥ Support applications for multi-area(room), complex layout environment, ensure the uniformity and consistency of disinfection
- ⑦ It has functions of the automatic detection to obstacles, App and voice reminder.
- ⑧ Supports automatic charging, which can completely eliminate the trouble of cable charging;
- ⑨ When the liquid is below the alert level, it will turn off the spray device and automatically return to standby.

Suggestion for use

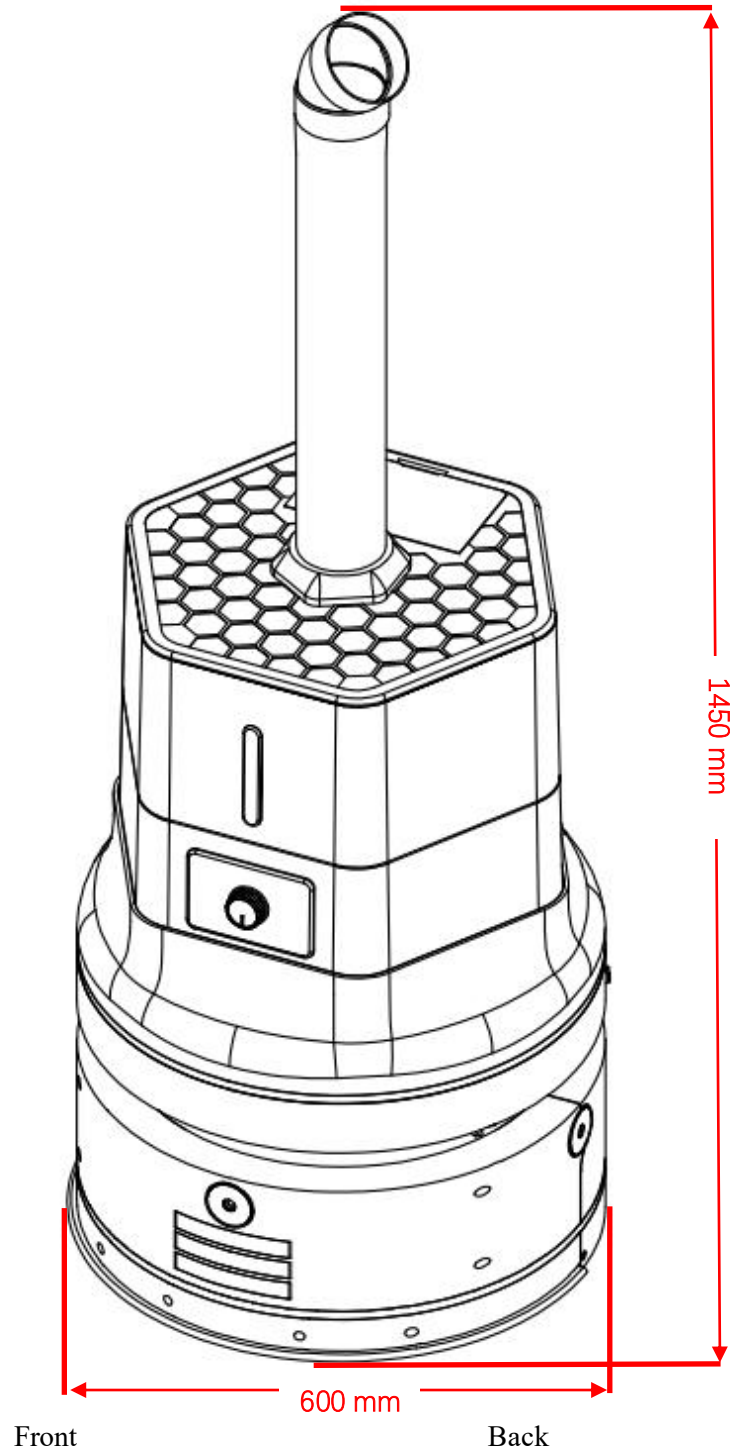
User type		Spraying scenarios	Suggestion for use
Medical institution	<ul style="list-style-type: none"> Hospital Clinic 	Registration hall, waiting hall, internal working area, canteen, fever clinics, warehouse, etc.	<ul style="list-style-type: none"> ✓ Medical institution level.
Station	<ul style="list-style-type: none"> Railway station Bus station Subway Airport 	Five accesses and one platform (station entrance, ticket gate, elevator entrance, station exit, platform), waiting room (airport lounge)	<ul style="list-style-type: none"> ✓ Real-time spraying at "five accesses and one platform": medical institution level; ✓ Regular spraying in waiting room: public health security level.
School	<ul style="list-style-type: none"> Kindergarten Primary and secondary school University 	Lecture hall, library, indoor sports hall, classroom, laboratory, toilet, cafeteria, office area, etc.	<ul style="list-style-type: none"> ✓ Daily scheduled spraying: public health security level.
Office area	<ul style="list-style-type: none"> Office building Office block Administration service hall Bank outlet 	Toilets, halls, corridors, elevator rooms, offices, etc.	<ul style="list-style-type: none"> ✓ Real-time spraying at entrance/exit: medical institution level; ✓ Daily scheduled spraying: public health security level.
Shopping mall	<ul style="list-style-type: none"> Shopping mall Supermarket 	Entrance/exit, counter, rest area, service desk, cashier desk, elevator, and other public areas	<ul style="list-style-type: none"> ✓ Real-time spraying at access and in other crowded areas: medical institution level; ✓ Scheduled spraying in other areas: public health security level.
Hotel	<ul style="list-style-type: none"> Guesthouse Hotel 	Hotel lobby, toilet, floor corridor, guest room, restaurant, etc.	<ul style="list-style-type: none"> ✓ Spraying in guest room and restaurant: medical institution level. ✓ Spraying in other areas: public health security level.

2. Product specification

Name	Spray Robot
Model	BKS-ST-220A
Application	Indoor automatic atomizing spray
Appearance size	Diameter 600 mm* Height 1,450 mm (with 500mm fog tube)
Body weight	50 kg (without liquid)
Spray rate	Maximum 3200 ml/h (adjustable)
Tank volume	22L
Spray diameter	5-6 m
Suitable disinfectants	Hypochlorous acid, hydrogen peroxide, peracetic acid, etc.
Spray mode	One-direction nozzle or Mushroom nozzle
Adding liquid way	Uncover the lid and pour the liquid into the tank gently
Movement mode	Autonomous path planning and auto-navigation
Moving speed	0.3 m/s
Obstacle surmounting	≤10 mm
Gradeability	≤8°
Travel lane width	≥750 mm
Noise	≤50dB
Continuous running hours	3.5hours
Charging mode	Auto-charge
Charging time	3 hours (0-80%)
Charging pile	INPUT:110V-220V AC OUTPUT: DC29.4V=8.0A
Safety protection	low water alarm
Working temperature	0°C-50°C

3. Appearance size

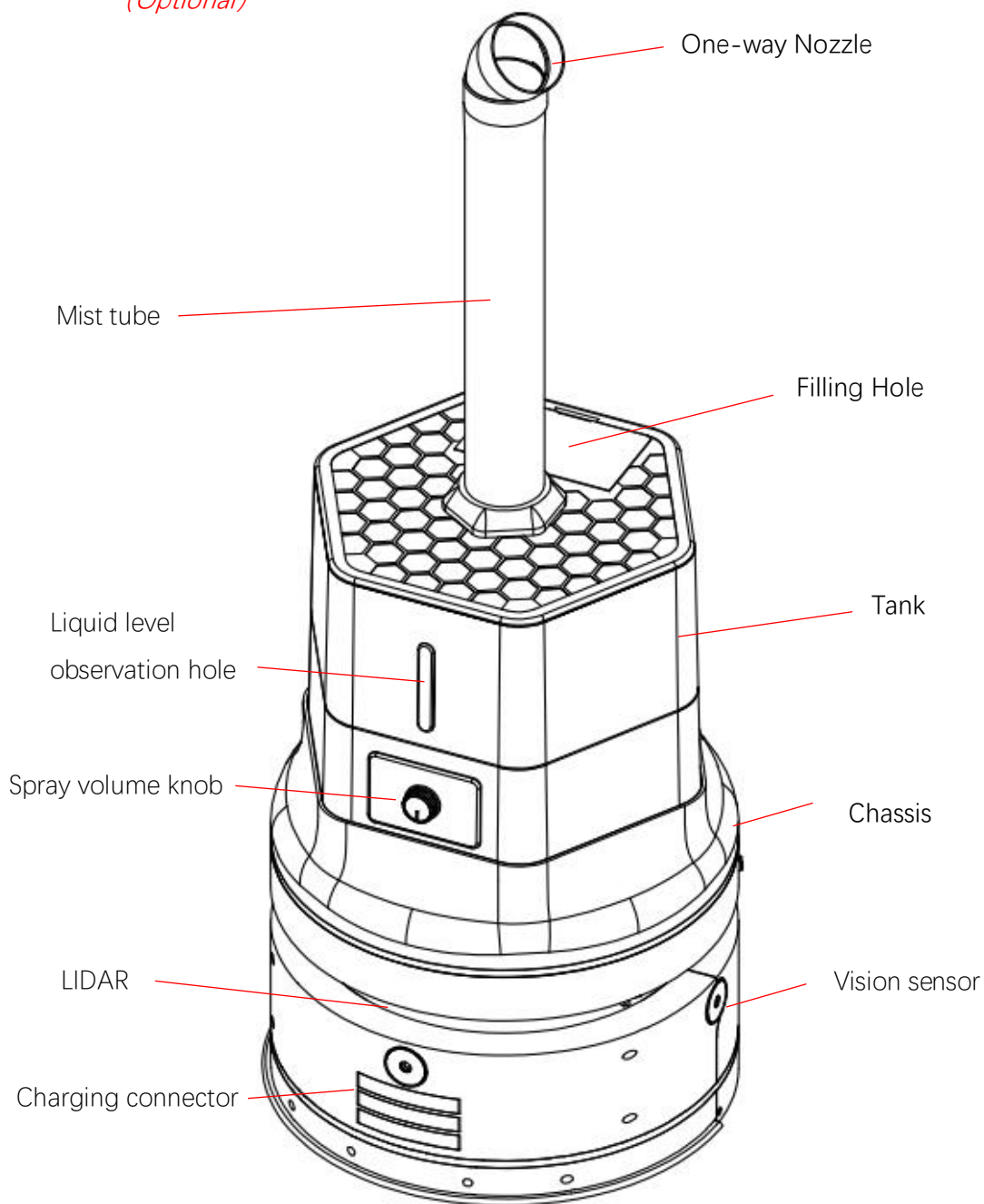
Overall size



4. Function module

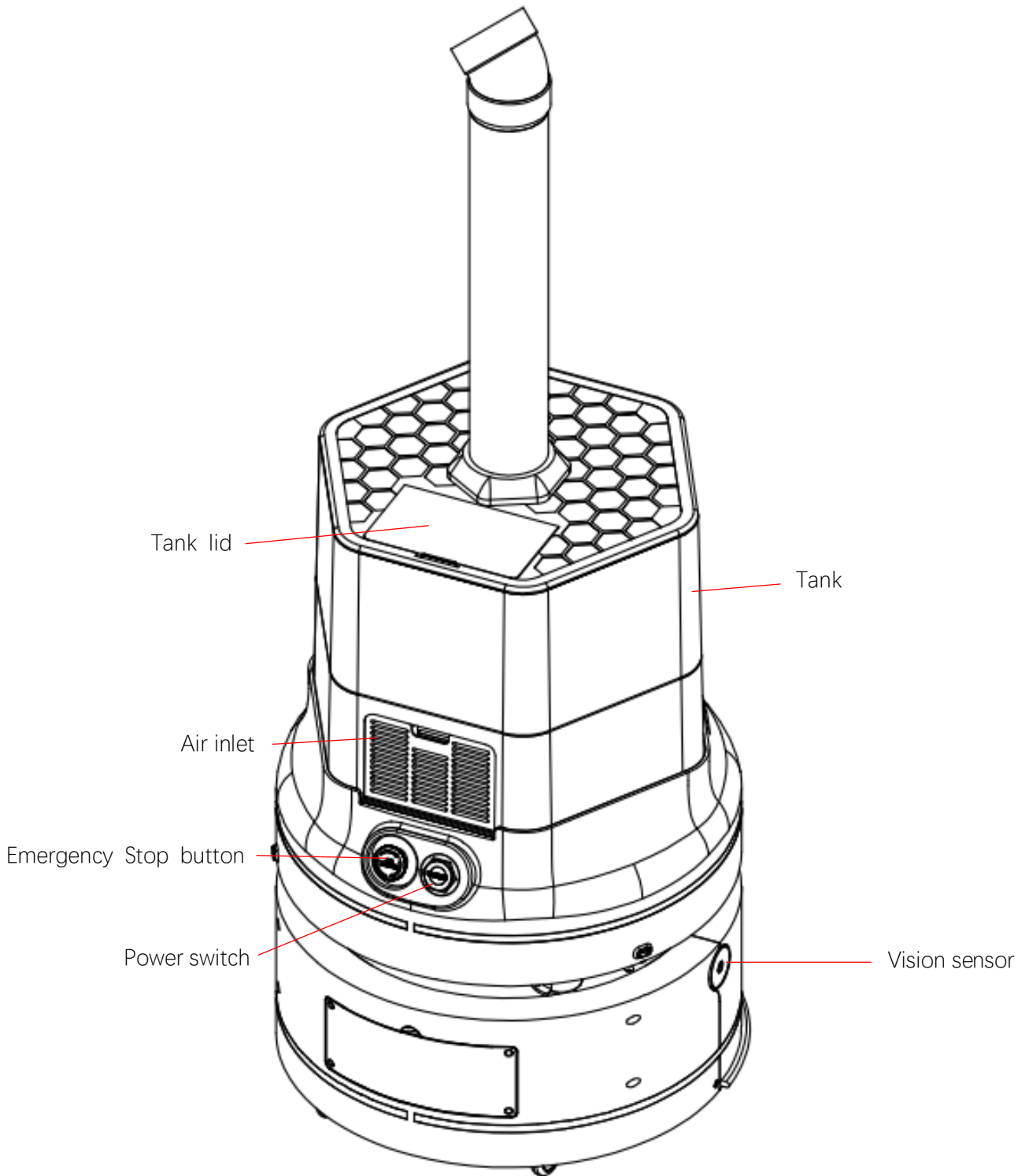


Mushroom Nozzle
(Optional)



Front

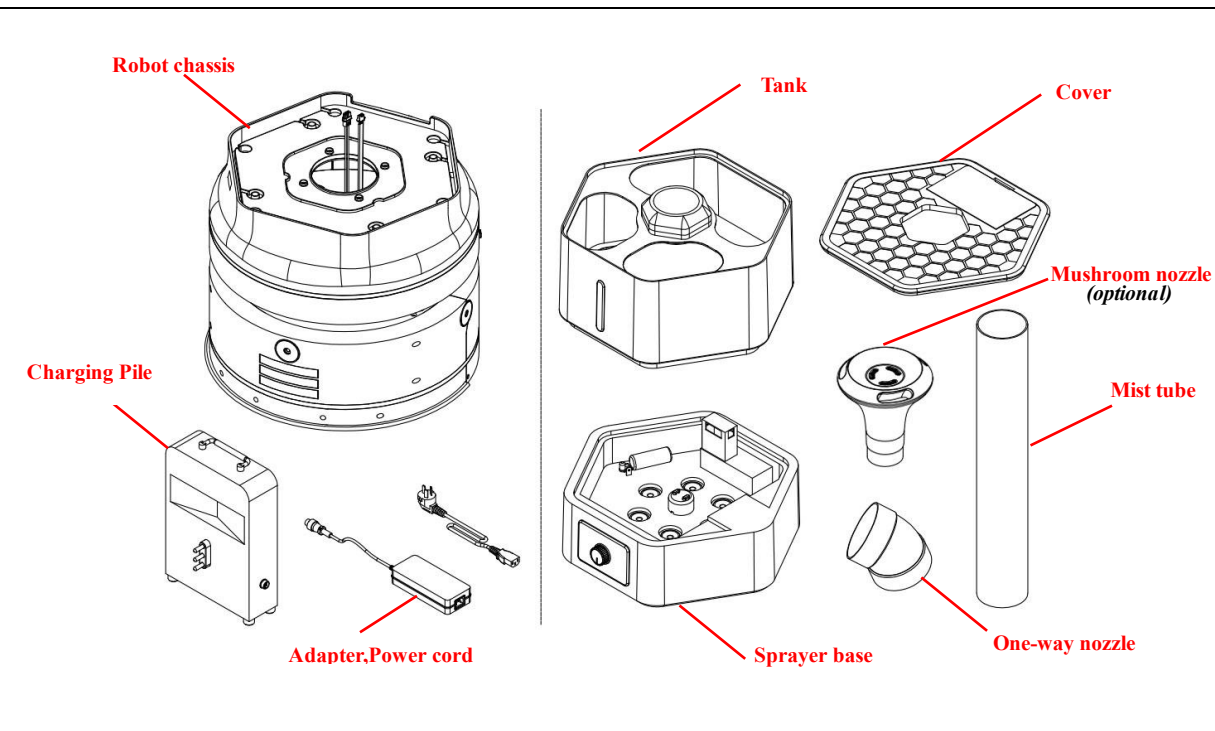
Back



2.Assembly

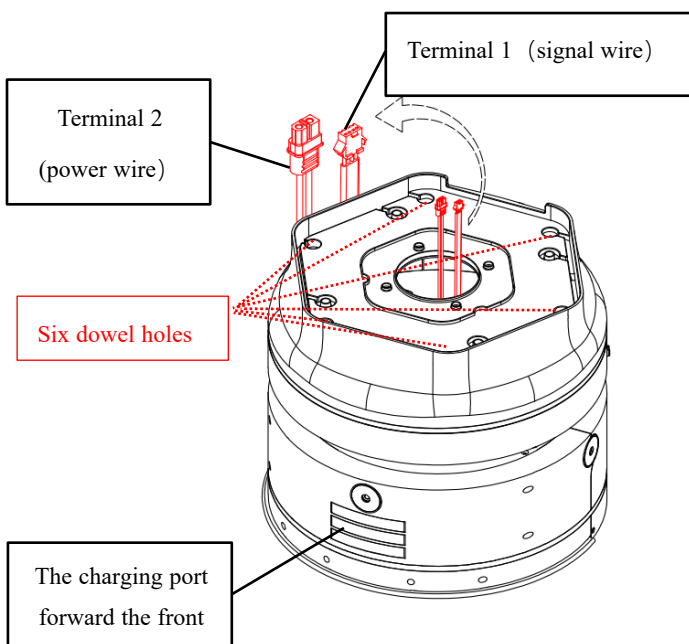
Step 1: Unpack and check materials

The packaging of this product consists of two boxes, with the larger box for the chassis and charging pile, and the smaller box for the robot body. After unpacking, check the materials and accessories against the Nos.1-8 in the figure below for any missing or damage.

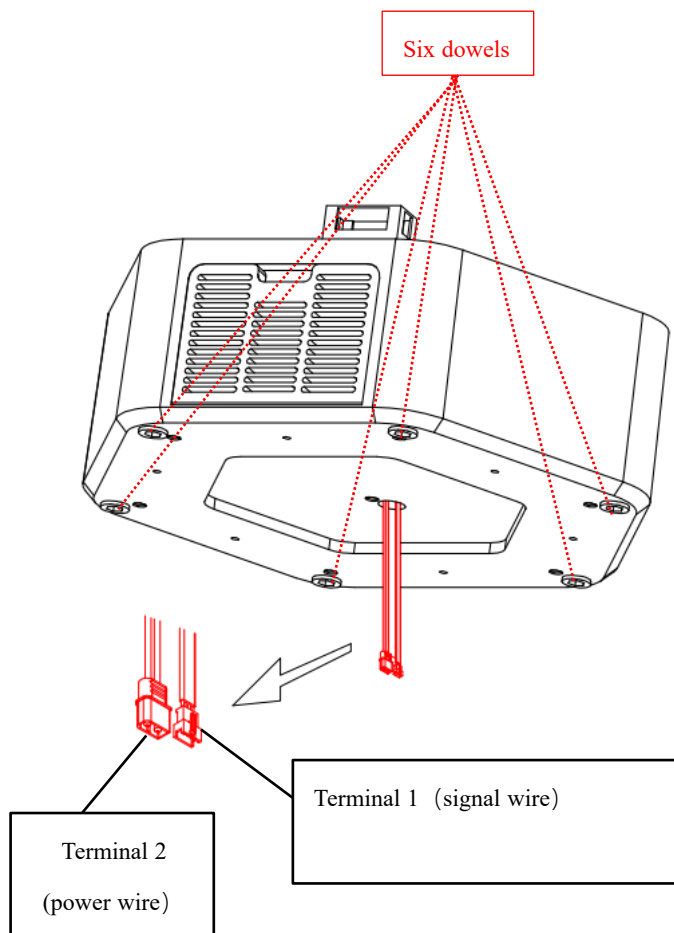


Step 2: Install the sprayer

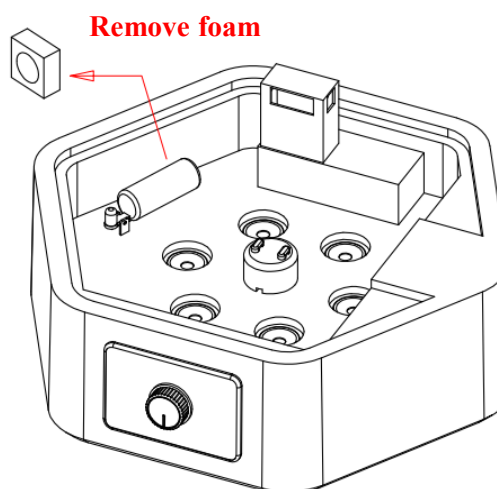
① Take out the chassis and place it on the floor stably, make sure that the lower charging mouth is facing forward, pull out the two connectors (Terminal 1: signal wire, Terminal 2: power wire), and visually find the six positioning holes on the iron plate →



- ② Turn the direction of knob on the sprayer base forward, and then pull out the two connectors (Terminal 1, Terminal 2 as shown) at the bottom to match the male and female connectors on the chassis. Six dowels are aligned with the Six positioning holes on the chassis (note that the lower charging mouth of the chassis is also facing forward) so that it falls smoothly and snaps into place →

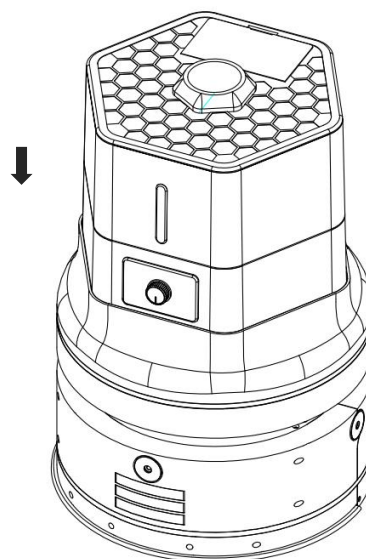


- ③ Remove the protective foam from the water control valve on the sprayer base to ensure that the next stack of water tank is not hindered →

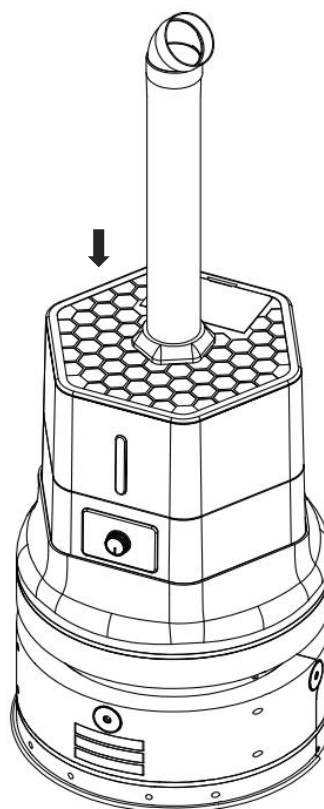


Step 3: Dock the water tank and robot base cable

Lift the water tank stably, stack it on top of the sprayer base. Relying on the positioning steps that sink around, it can be freely in place from top to bottom under the action of gravity →

**Step 4:** Install mist tube and one-way nozzle

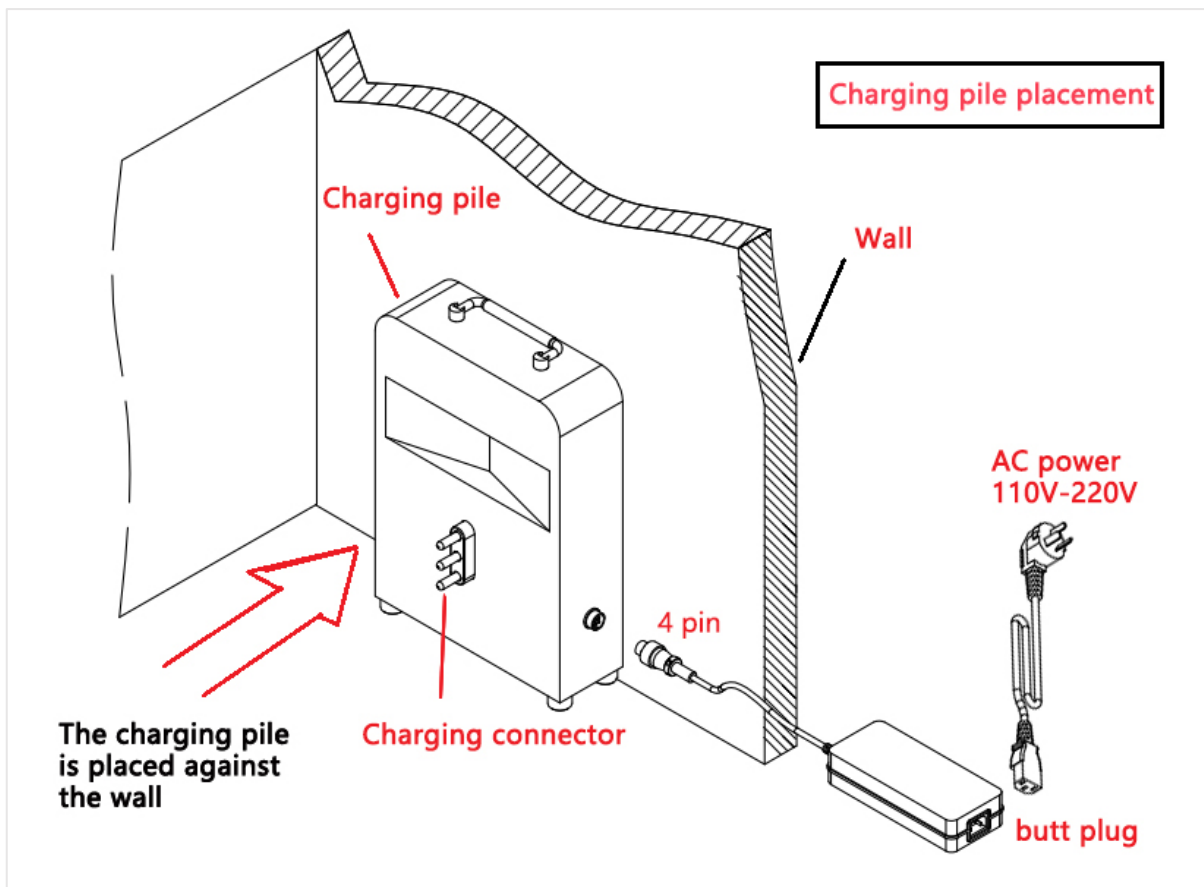
Finally, remove the mist tube, insert one end into the circular outlet at the center of the water tank, and then put the other end on the top into a one-way nozzle for connection (for tight connection, it is recommended to wrap it with waterproof tape before putting it in) →



5. Preparation before use

5.1. Install the charging pile

The charging pile of the spray robot should be placed in a safe and tidy place. It should be on the horizontal ground with its back against the flat wall (it is better to fix the charging pile to the ground or wall). As shown in the following figure:

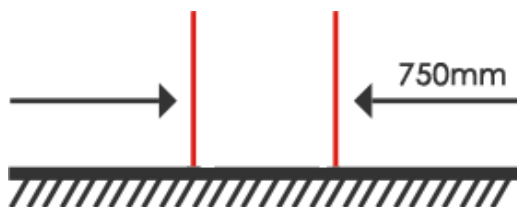


Schematic Diagram of Installation and Use of Charging Pile

- ① Place the back of the charging pile against the wall, and then turn the foot pads at the bottom to adjust the charging pile.
- ② Connect the power cord, adapter, and charging pile as shown above, and finally connect the end of the power cord to the 110V / 220V AC socket to formally complete the boot preparation.

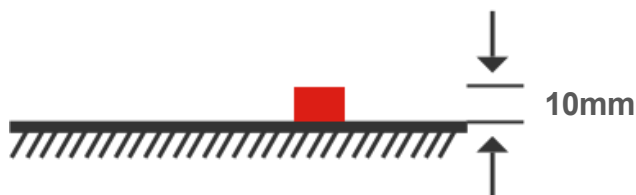
5.2. Clean up barriers

- 1) Before using the spray robot, remove the barriers in the aisle to avoid affecting the working and charging of the robot;



The minimum walking width of the robot is 750mm

- 2) Make sure that there is no vertical step over 15mm in the spraying area, and no objects (books, boards, stones, etc.) over 15m in height on the working path;



The surmounting height of the robot is 15mm

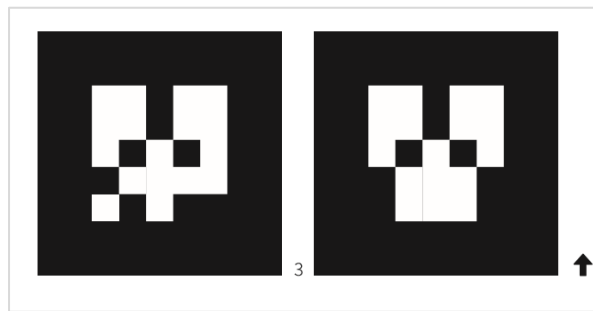
- 3) Make sure that there is no large slope on site:



The maximum gradeability of the robot is 8°.

5.3. QR code deployment

In order to enhance the positioning accuracy of the robot, we designed a QR code scheme to ensure that the robot's long-term running position is not lost. The QR code is generally used where the robot positioning is prone to deviation, for example, the two ends of a long corridor, in which case, a QR code can be pasted at a distance of 10m from the two ends to assist positioning.



1) Precautions for QR code pasting

- Avoid deploying at a place with strong light, so as not to affect the camera to capture the QR code image;
- The QR code should be pasted at the same level as the camera;
- Paste the QR code in the direction as the arrow;
- If the QR code is damaged, replace it in time.

2) The example is shown below



3) Precautions for saving QR code

- No duplicate QR code boards can appear in the same environment;
- When mapping, the robot stops at the QR code board for 1-2 seconds to ensure that the QR code is saved (Voice prompt will be given for successful identification) ;
- The QR code of the charging pile should be identified by the camera in front of the robot, and the QR code of a corridor can be identified by the cameras on the left and right;
- When incrementally mapping, it is necessary to ensure that the robot's positioning is accurate before identifying and saving the QR code.

5.4. Download mobile App

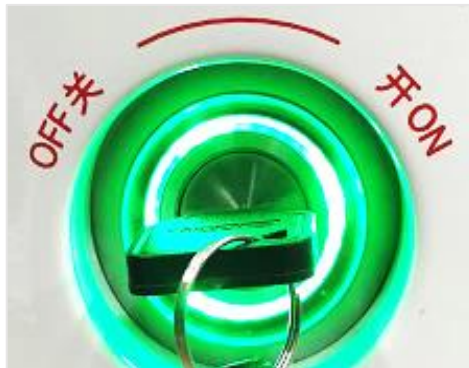
Android 8.0 and above mobile phone Scan the QR code below download the corresponding App and install it.



Android mobile browser scan to download the App

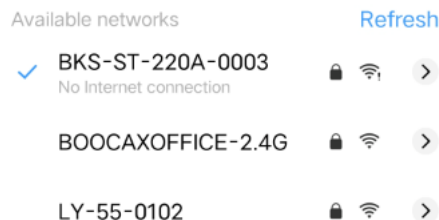
5.5. Turn on, connect the robot

- 1) Turn on the switch to initiate the working mode of the robot

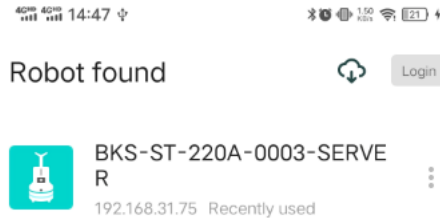


Power switch

- 2) Turn on the phone wifi, search the wifi network beginning with "BKS-ST-220A", and enter the assigned password "robot123" to connect the robot

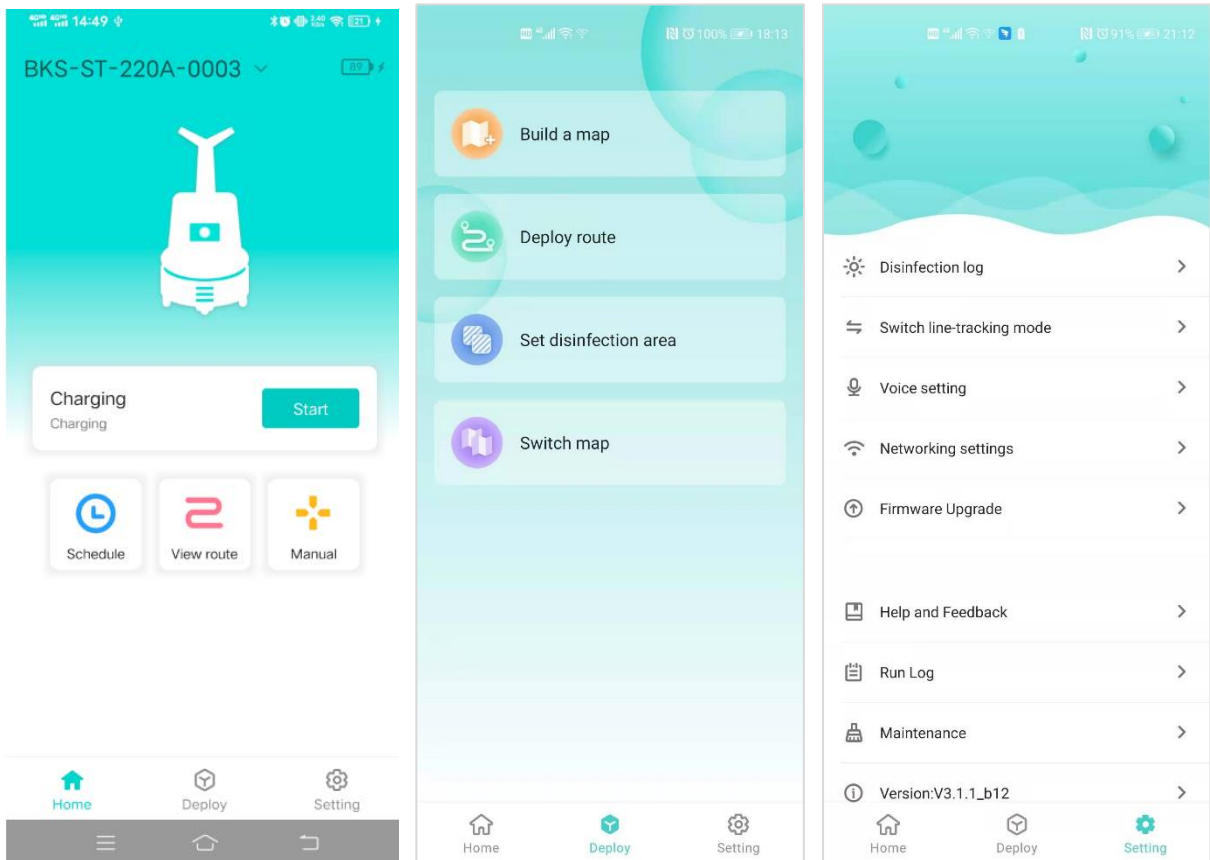


- 3) Open the App, you will find the robot beginning with "BKS-ST-220A-0003" (as shown in the following figure), click "login"



4) Open the App to show the interface shown in the following figure.

Screenshots of App interface and function buttons:



App homepage:

- Robot name and battery
- Robot status
- Scheduled disinfection
- View route
- Manual control

App deployment:

- Build map
- Deploy route
- Set disinfection area
- Switch map

App setting:

- Disinfection log
- Switch loop mode
- Volume
- Networking setting
- Firmware update
- Help and feedback
- Run log
- Maintenance
- App version information

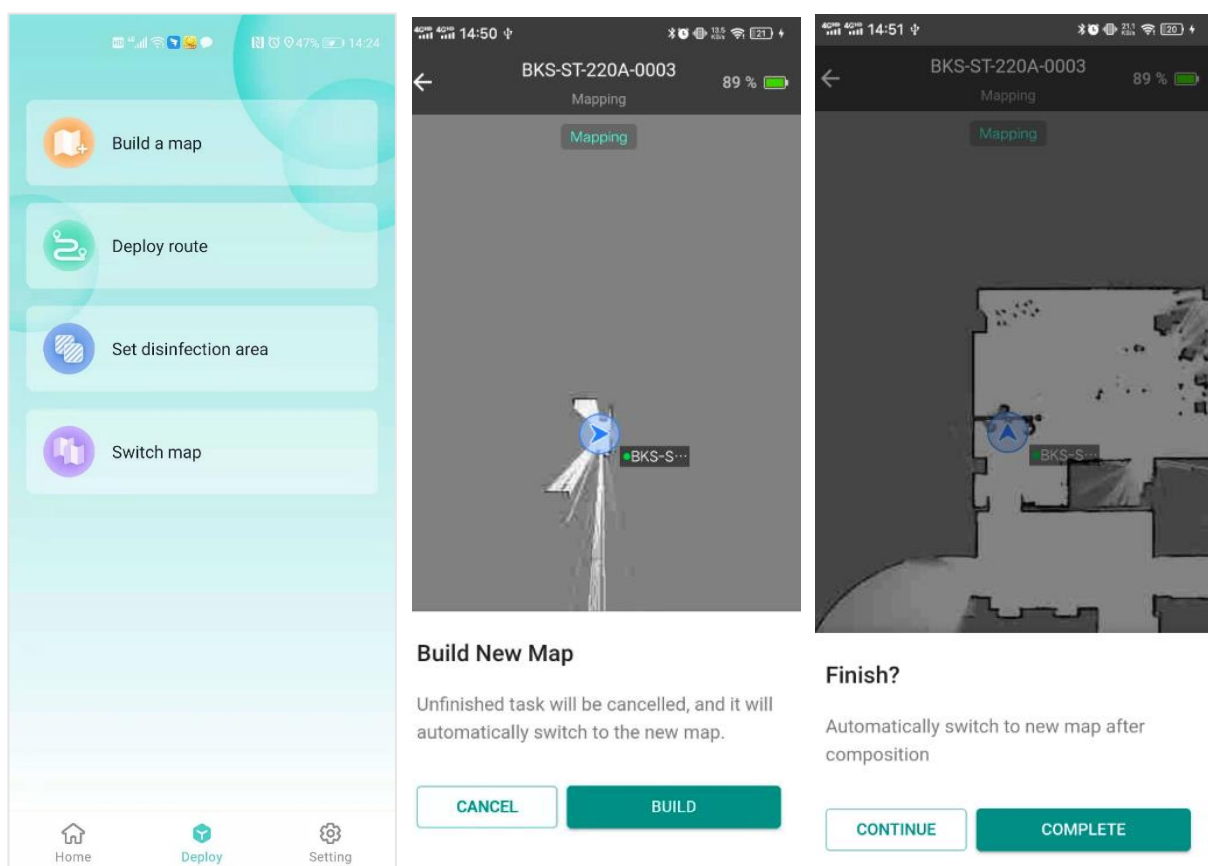
5.6. Build the spraying map

1) Preparation before building the map

- Push the robot **0.5-1m** in front of the charging pile
- Robot power >**50%**

2) Start building the map

Click "Deploy" on the homepage of App to show the "Build Map" button. Click the button to build a two-dimensional spraying map, as shown in the following figure (**Push the robot by hand to build the map**):



Legends:

- White radius—the range scanned by the laser;
- Black thick line—the scanned obstacles (special objects such as transparent glass may not be identified);
- Gray area: Area that has not been scanned.

After the map is built, the robot can locate and navigate on the new map.

⚠ Attention:

- ① When mapping by hand, push the robot forward slowly in the scene from the **charging pile as the starting point**, and finally return to the charging pile to form a large circle;

- ② When mapping, don't be too close to the wall and keep a distance of at least **0.5m**;
- ③ The operator must stand behind the robot to avoid leaving noise on the map;
- ④ When turning, **walk slowly** so that the robot can collect as much characteristic point data as possible;
- ⑤ As laser radar does not recognize accurately in abnormal environment (glass, mirror, pure black object, grid, etc.), it is recommended to carry out appropriate treatment, such as pasting frosted sticker, gray adhesive tape, etc.;
- ⑥ If the working scene is too large/noise, you can use "**Incremental composition**" to enlarge/repair the map;
- ⑦ When passing the QR code, stay in front for more than 1 second, and there will be a **voice prompt** after the entry is successful.

5.7. Deploy route setting

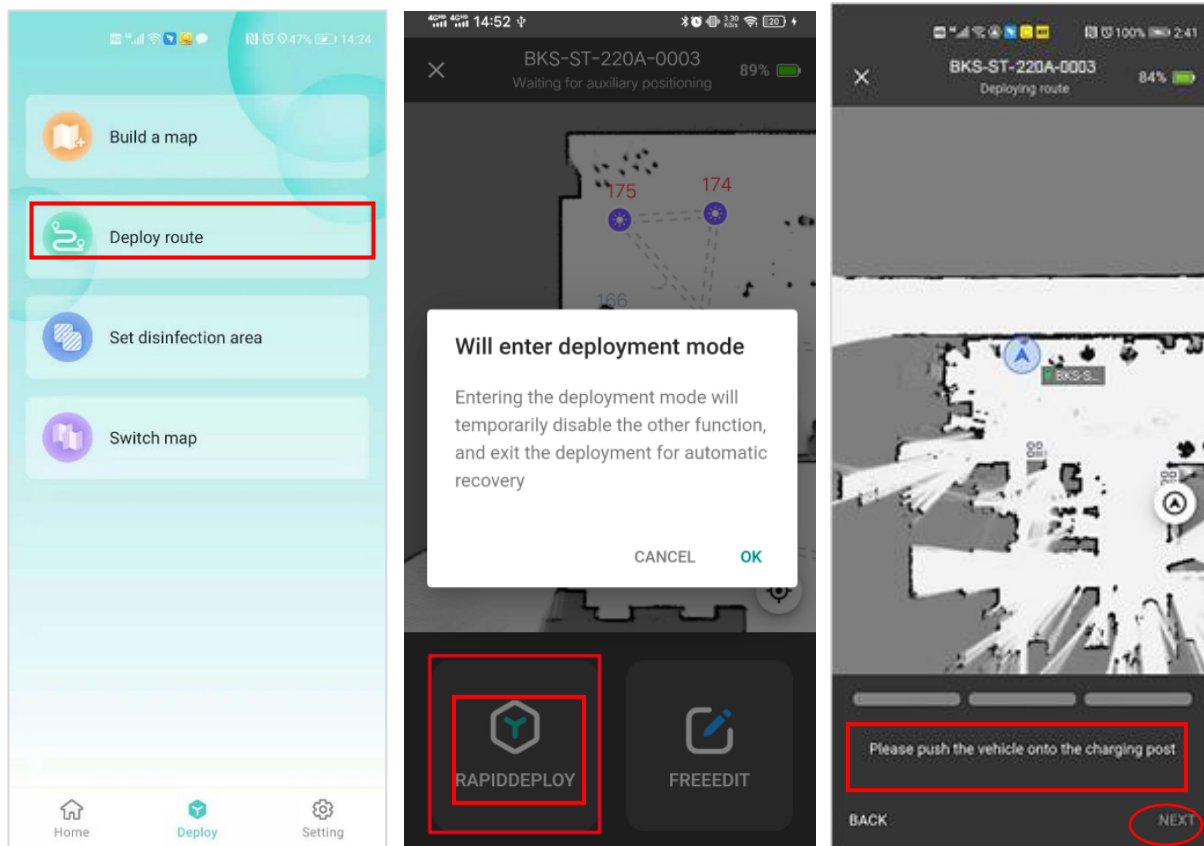
The working path of robot consists of the starting point, path points and the disinfection points in series.

Specific setting procedures follow the instructions of App, as shown below:

1) Rapid deployment


➤ **Charging point:** The position of the robot docking the charging pile .


Click "Deploy route" to enter the route setting mode; push the robot to the charging pile for docking as guided, and click Next to complete the setting.



➤ **Path points and disinfection points:** deploy the points by pushing robot /dragging map



Mark the required location on the map, and then set the corresponding path point/disinfection point (The small blue icon is the corresponding location point)

Path points  need to be set for the route that the robot passes through, such as turns and gates, which must be marked (as shown in Figure 2 below: gray points are path points).

Disinfection points  are set as required for the environmental site (as shown in Figure 3 below: purple icons are disinfection points).



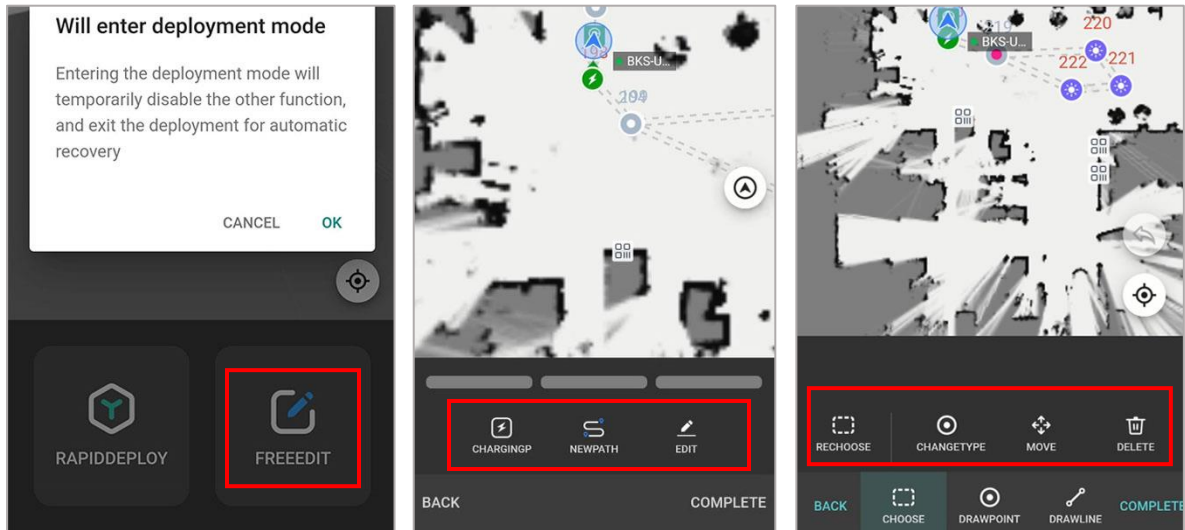
“Change”、“Connect” function: Mainly used to connect “nearby points” in series.

“Change”  “is to switch point, that is, changing the current point of the robot to the selected nearby point. After this operation, you can click “Connect”  ” to connect the robot's previous path point or disinfection point with the current point.

“Change”and “Connection”, these two functions are mainly designed to facilitate route editing.

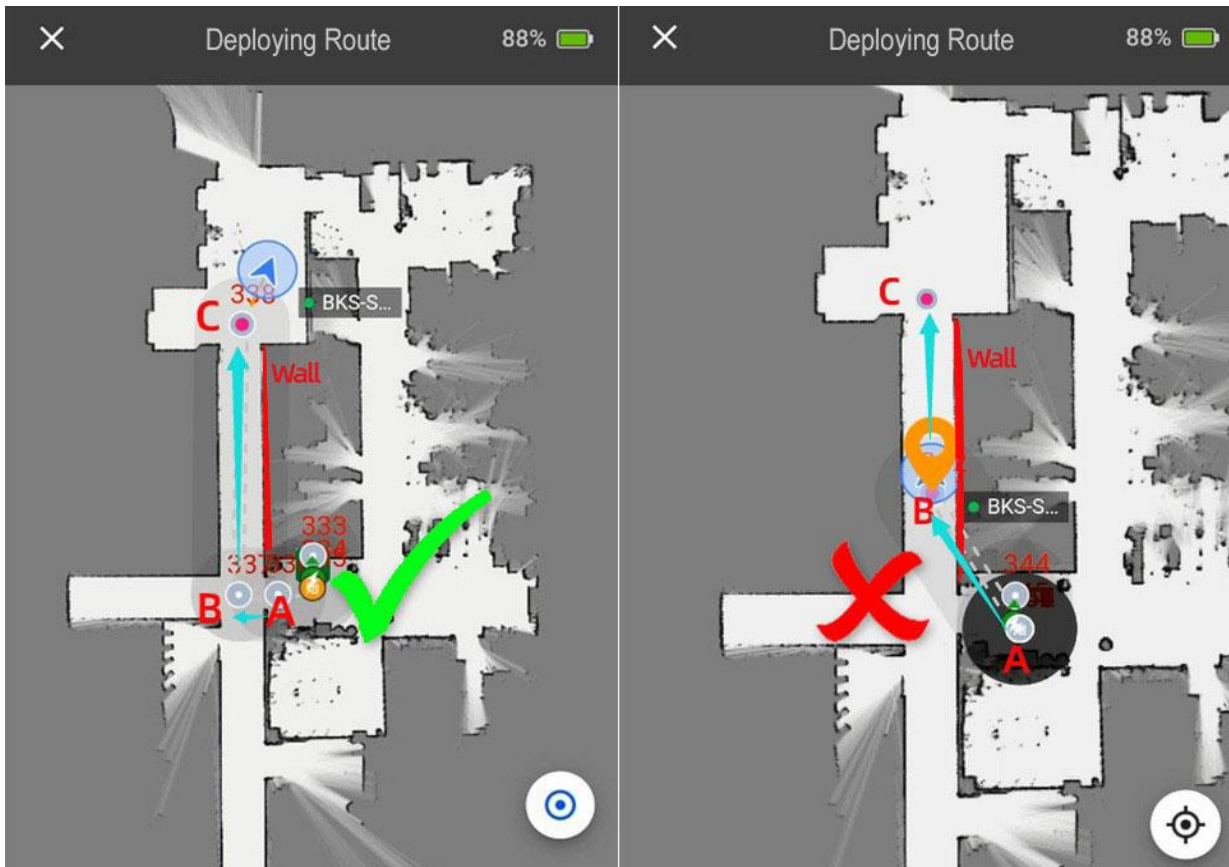
2) Free editing-adjust path

- If the route by rapid deployment is not applicable, click “**Free Edit**” to adjust the route. The robot supports adding/deleting/moving points, changing running route, changing disinfection points, etc.



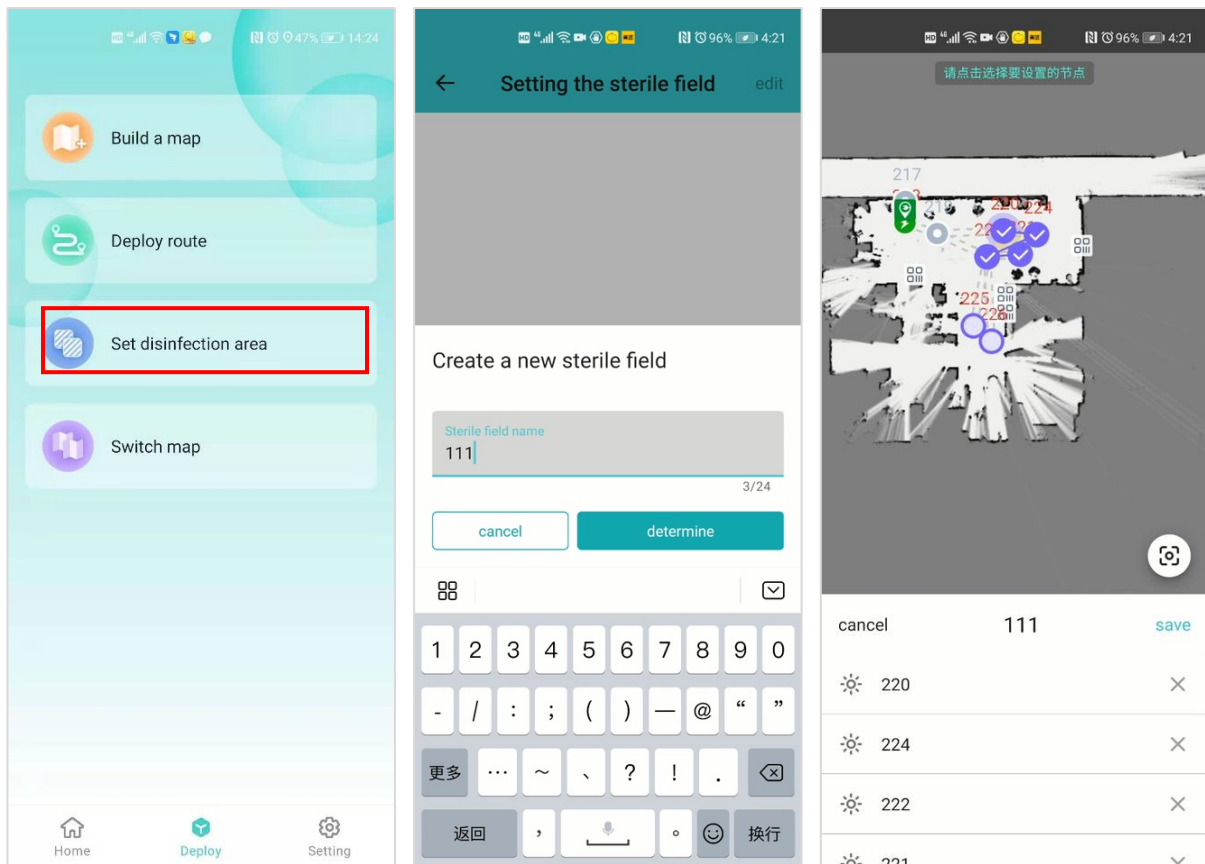
⚠ Attention:

When mapping, the turning should be deployed with waypoints which cannot pass through the wall, as shown in the figure below:



As shown in the figure above, when the robot has to move from A to C, but is obstructed by a wall or an unmovable obstacle in between, the correct path deployment should be A-B-C. B must be set as it is the key node of the turning. The figure on the right shows the wrong deployment, in which the path will go through the wall directly, causing the robot unable to walk.

5.8. Area setting

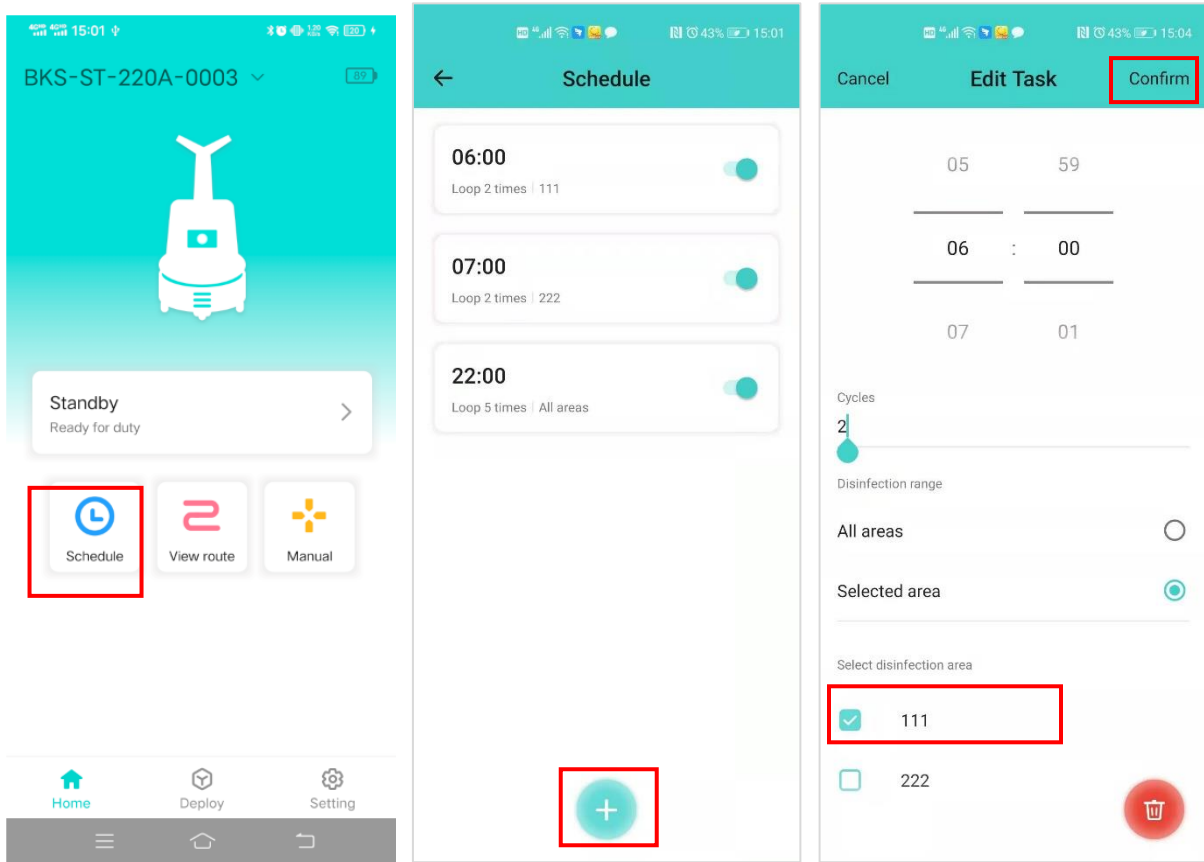


- Click "Set Disinfection Area" menu to "Create New Disinfection Area" and name each disinfection area separately;
- After creating a new disinfection area, click the purple nodes on the map to select the disinfection points in the area, as shown in Figure 4 above: 220、221、222 and 224 in the red box are the disinfection points selected in the disinfection area "111".

△Attention: Any area must have 2 or more disinfection points to work normally

5.9. Scheduled setting

You can freely set (add/modify) the disinfection schedule as required (see the figures below).



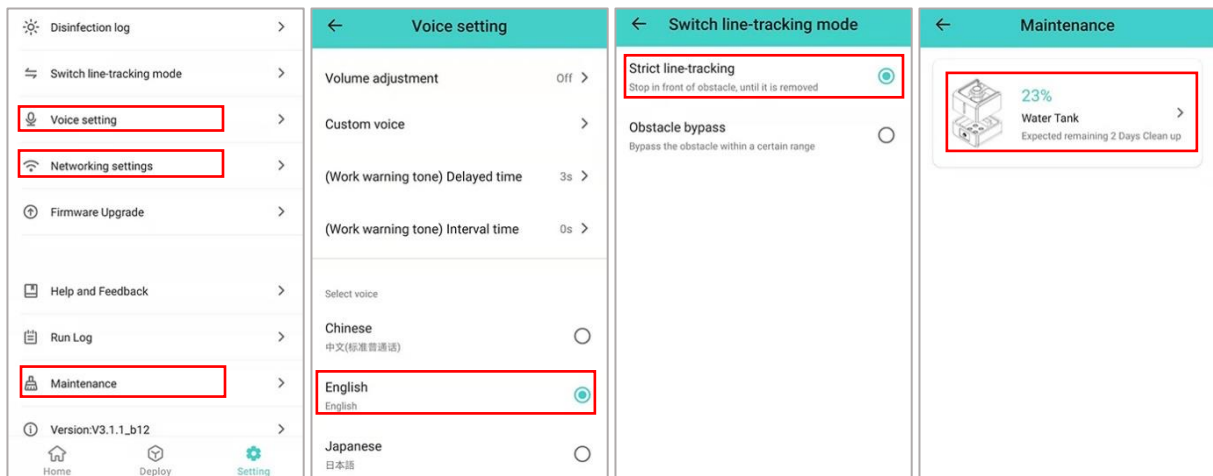
Click "Schedule" on the homepage to enter the editing interface

Then click "+" button to set the starting time and disinfection area

After the time and area are set, click "determine" in the upper right corner to save the setting

5.10. Other settings

There are also functions such as voice prompts, volume adjustment, maintenance prompts and other functions such as disinfection log, line patrol mode selection, firmware upgrade, etc.



6. Start to work

6.1. Add liquid

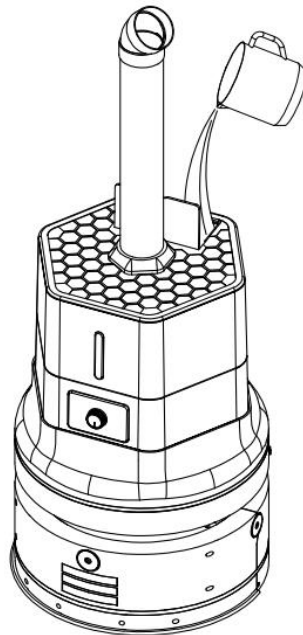
The working principle of BKS-ST-220A atomizing spray robot is purifying the air by rapidly atomizing the liquid and automatically spraying the area.

Support the use of conventional disinfectants such as hypochlorous acid and chlorine dioxide or fast water-soluble disinfection tablets. All disinfectants should be used immediately before use to avoid impairing the disinfection effect due to oxidation and volatilization.

⚠ Attention:

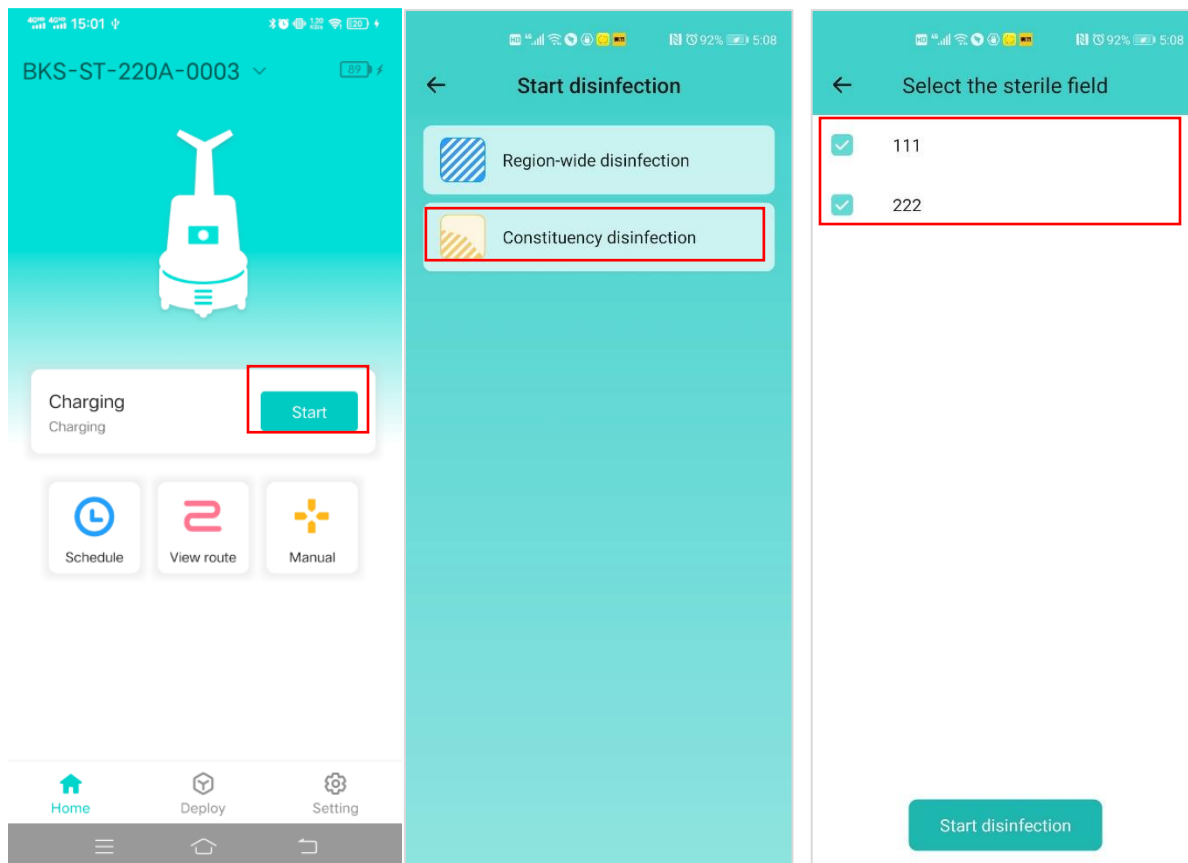
It is recommended that the maximum volume of liquid should not exceed **20L**, in order to avoid overflow in up and down ramps, access trenches, thresholds, emergency stops and other working conditions.

As shown in the figure:
open the cover of the
tank to add water and
other liquids.



6.2. Start spraying

When all preparations are ready, return to the homepage of App, click the "start" button, and the robot will start spraying according to the settings.

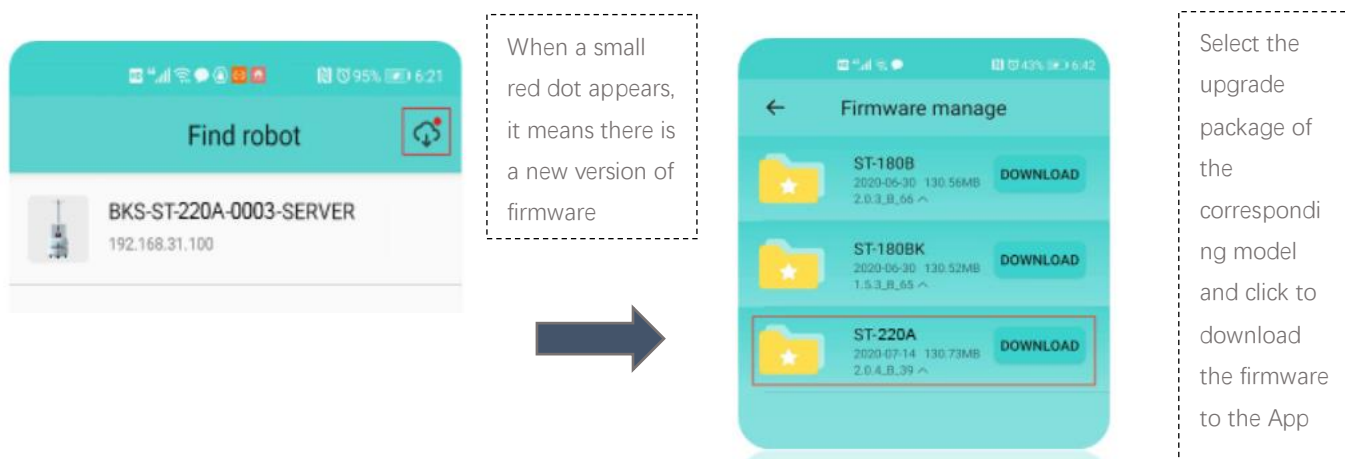


Thereafter, the robot will disinfect as scheduled every day.

Attachment: update instructions

Step1: Download the firmware

Connect the mobile phone to the external network (LAN/4G), open the App -find the robot, if there is a small red dot in the upper right corner, it means there is a new version of the firmware that can be upgraded

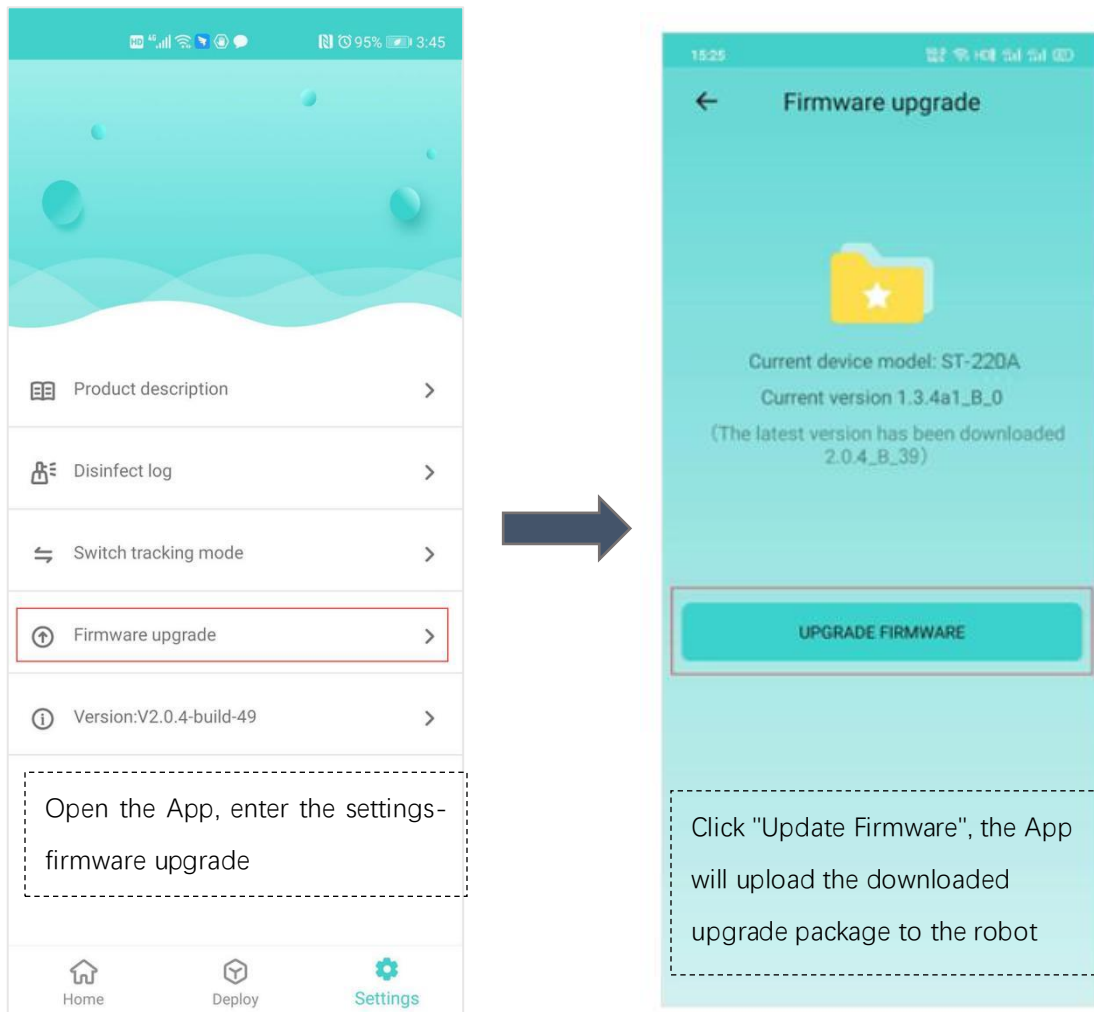


Step 2: Connect to the robot and upload the firmware to the robot body for upgrade

Turn on the mobile phone wifi, find the robot, enter the password "robot123" to connect :



Step 3: App upgrade firmware to robot



⚠ Special attention:

- ① When upgrading, please do not power off or turn off the power;
- ② The whole process of firmware upgrade is about **5 minutes**. During this period, any operation on the robot is prohibited.



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