pudu

PuduBot

User manual V1.4

PD1、PD6、PD8、PD9

Legal information

User manual

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Declaration

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different

from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

FCC ID:2AV7T-PDI

5G WIFI statement
The device is restricted to indoor use when operated in 5150MHz~5350MHz to reduce the potential for interference.

CATALOG

Safety Instructions

Product Composition

Product Use

Service functions

Product Maintenance

Troubleshooting

After-sales Service

Safety Instruction

Instructions for use

1. DO NOT place any item with weight over the load of the tray: metal tray 13kg/layer，obturated box 10kg/layer.

2. Click Finish to deliver the next task immediately, please take the food before clicking Finish.

3. Do NOT pick up and drop the food when the robot is moving, if necessary, please click the screen to pause the robot, and then pick and drop the food.The pause time of cruise mode is 20s, and the pause time of other modes is 10s, after the pause, the robot will resume walking automatically.

4. DO NOT press hard on the screen or tap the screen.

5. DO NOT pull the robot during operation.

6. DO NOT push the robot backwards while the robot is powered on.

7. The food shall NOT exceed the size of the tray, otherwise the sensor may beblocked, and the robot may not move properly.
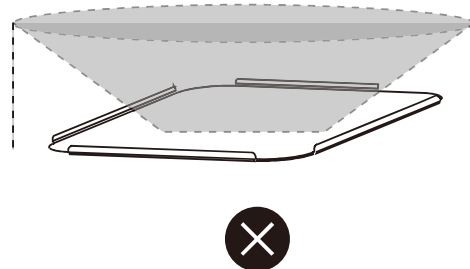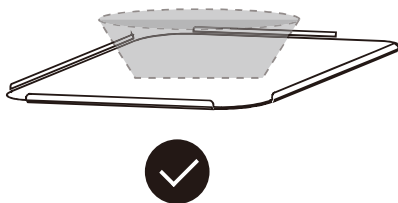

8. If the robot enters the wrong position due to factors such as blockage, please pause the task and push it to the correct route to continue the task.

9. In the event of a collision, please cancel the current task or pause, re-enter the task, DO NOT artificially block the robot.

10. In the absence of special custom-made trays, it is not recommended in principle to deliver soup with PuduBot.When using, be sure to prevent the soup from being splashed and being scalded by the hot water.

11. Pay attention to the change of state of the robot during its travel, please avoid the robot when it is carrying hot tableware or soup pot to prevent collision with the robot and high temperature burns.

12. The top camera is used for precise positioning of the robot, DO NOT block it with a cover during starting and running.

13. DO NOT tap or make other actions to the robot, otherwise it may easily cause equipment damage.

Environmental notes

1. The robot is suitable for use in flat environments such as floors, tiles, and thin carpets, it is not suitable for use in environments where there are steps, the slope is too large, or the environment is too tight.

2. It is not recommended to use the robot on wet or obviously watery ground.

3. Any kind of debris such as the power cord that has been scattered on the ground may catch or wrap the robot, be sure to remove it before use.

4. The use of this product in the case of obvious protrusions such as sills may cause the food to sprinkle, please make sure that the height of the protrusions is within 1cm.

5. The minimum travel width of the robot should be greater than 80cm, the width of the long pass should be greater than 1m; if the width is greater than 2m, two robots can be set to travel side by side in opposite direction (the specific width is evaluated by the technical staff based on the actual scenario), otherwise it will move by making the way; the standard entrance of the kitchen should be greater than 1.2m, and less than 1.2m may cause certain human-machine congestion.

Minimum pass width is 0.8m

Minimum pass width is 2m
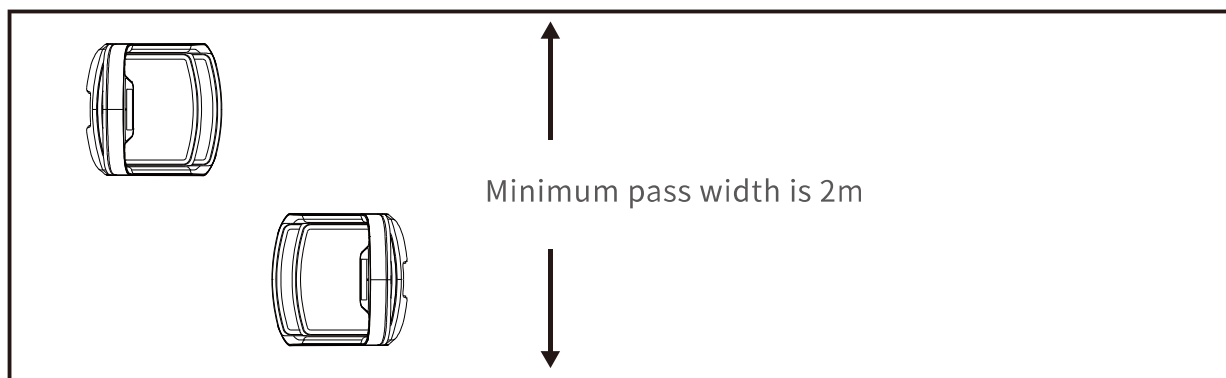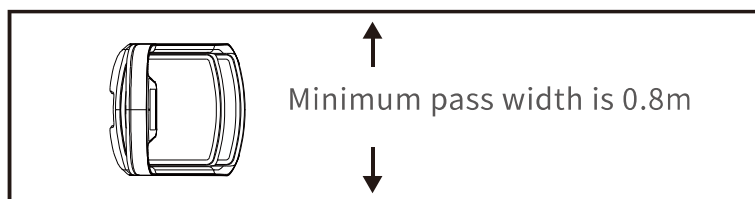
6. The pure black (such as skirting), mirror surface (such as wall), or full transparency (such as floor-to-ceiling glass) items within 10cm from the ground, it may interfere with the robot radar reflection, causing the robot to move abnormally, and it may be necessary to make some modifications to the site so that the radar can reflect (such as applying stickers).

] 10cm
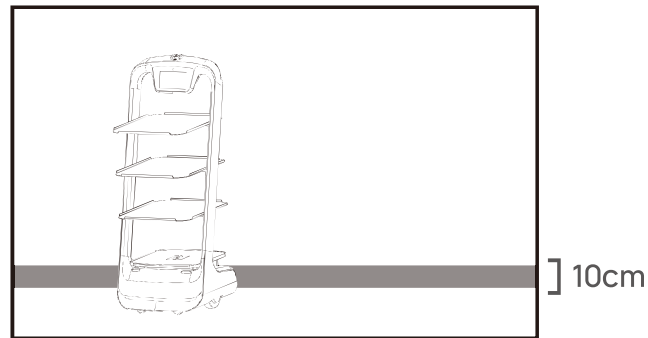
7. The ceiling height is within the range of 2-8 meters (higher or lower may require technical evaluation); taking the height of 3 meters as an example, it is necessary to apply a graphic mark every 2 meters or so, there is no lighting fixture or other strong light source in the 30cm area around the graphic mark. (Data for specific interval needs to be provided by Technology Dept.)

Marker
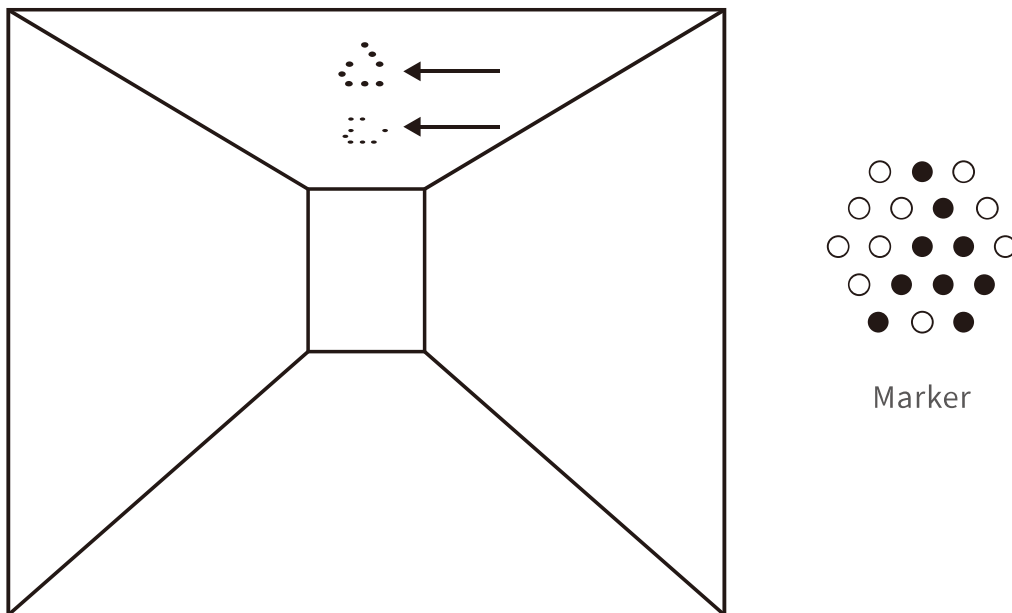
8. The designed maximum climbing angle of the robot is 10°, but in order to prevent the dishes from being poured, it is recommended that the slope of the dishes is within 5°; to prevent the robot from falling accidentally on the slope, the width of the slope should not be less than the minimum passing width of 0.80cm, and the rollover angle should not exceed 5°.
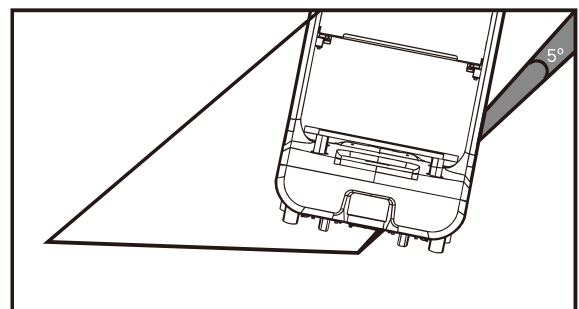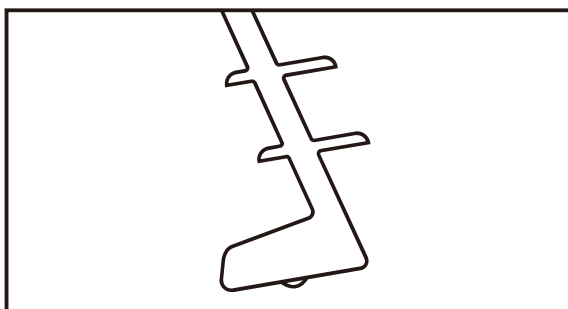
9. There is a 35cm space between the two robots placed side by side at the standby point, and a clearance of 15cm from the rear wall and 35cm from the side wall.
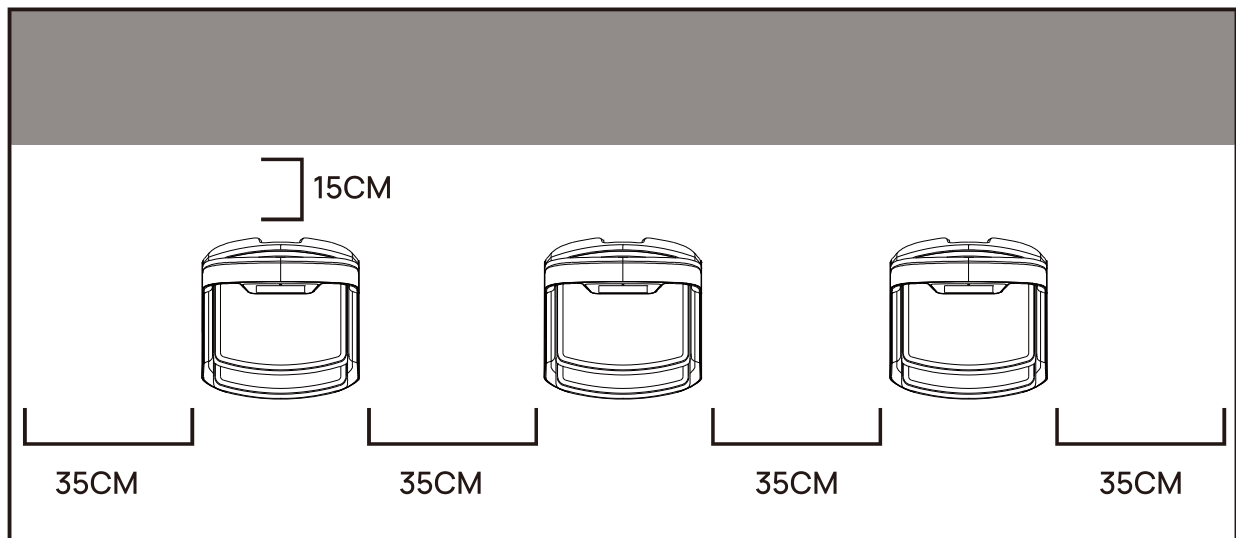
10. It is necessary to add fences or other blocking protection at the locations, such as the edge of the stairs and entrance of the downhill, where there is a risk of the robot falling.

Power and power requirements

1. When the remaining power of the robot is less than 10%, please charge it in time, as low battery operation for a long time may shorten battery life.

2. After charging, please disconnect the power supply in time, be sure not to charge for a long time when the robot is fully charged.

3. If the robot is not used for a long time, please power off the product in time to protect the battery.

4. ALWAYS use the original rechargeable battery and charging device, NEVER use a non genuine charger to charge the robot.

5. Charge the main unit according to the power supply voltage indicated on the nameplate of charger.

6. Make sure that the power supply voltage meets the voltage indicated on the charger, otherwise the charger may be damaged.

7. Carefully protect the power cord from pulling and twisting.

8. Please designate a full-time staff to charge the robot, be sure not to charge it unattended.

9. Be sure not to charge the robot near flammable or explosive objects.

10. Please keep the robot's storage and charging position dry and at normal temperature, it is strictly prohibited to place the robot and charger in high temperature area (>40℃), and it is forbidden to allow water entering the robot and charger.

11. It is strictly forbidden that the charger collides with foreign objects, causing damage to the charger.

12. If the charger is found damaged or the charging current is abnormal, please replace the charger in time.

13. When receiving a robot alarm, disconnect the charging device immediately.

Safety instructions

1. DO NOT place any open flame on the tray, and DO NOT place any flammable solids, gases or liquids.

2. It is forbidden to do cleaning and maintenance work when the machine is powered on.

3. To ensure safety, it is recommended to adjust the robot speed to medium or below, and it is forbidden to play in front of the robot to avoid unnecessary injury.

4. Temporary tray loading adjustment is prohibited during the robot's travel, all operations should be performed after clicking the screen to make the robot pause.

5. When the robot delivers food to the designated table number area, DO NOT perform the operation such as picking up the food before the machine body is stopped, so as to avoid the loss of food or personal injury caused by accidental collision.

6. If the robot is going away and the screen operation is invalid, or other emergency situations occur, please use the toe to kick the emergency switch at the charging port.

7. This product is a wheeled robot, which is limited to indoor flat environment (smooth ground, slope less than 5 degrees, protrusions not higher than 1cm), DO NOT use it in outdoor environments (such as open balconies) or on rugged floors (such as stairs).

8. DO NOT use it in an environment where the ambient temperature is above 50°C or below 0°C, or if there is any liquid or viscous material on the floor.

9. Please put away all kinds of wires on the ground in the environment before use to avoid dragging when the main unit is running. Remove sharp objects on the ground (such as decoration waste, glass, nails, etc.) before use to avoid damage to the machine chassis.

10. To push or move the robot while it is moving, first tap the screen to pause it.

11. DO NOT spill any liquid into the product.

12. DO NOT place any non-transportable objects (including children, pets) on a stationary or moving robot.

13. The robot has automatic obstacle avoidance function, but it is strictly forbidden to block the robot suddenly during the high-speed operation, otherwise it may cause a safety accident.
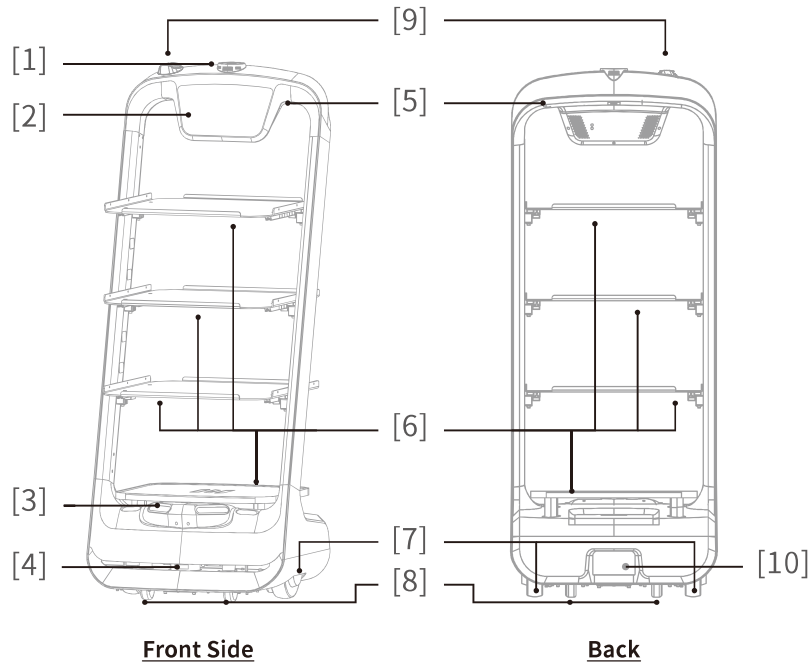
14. The blind-spot recognition area of the robot is shown below.

87°

87°
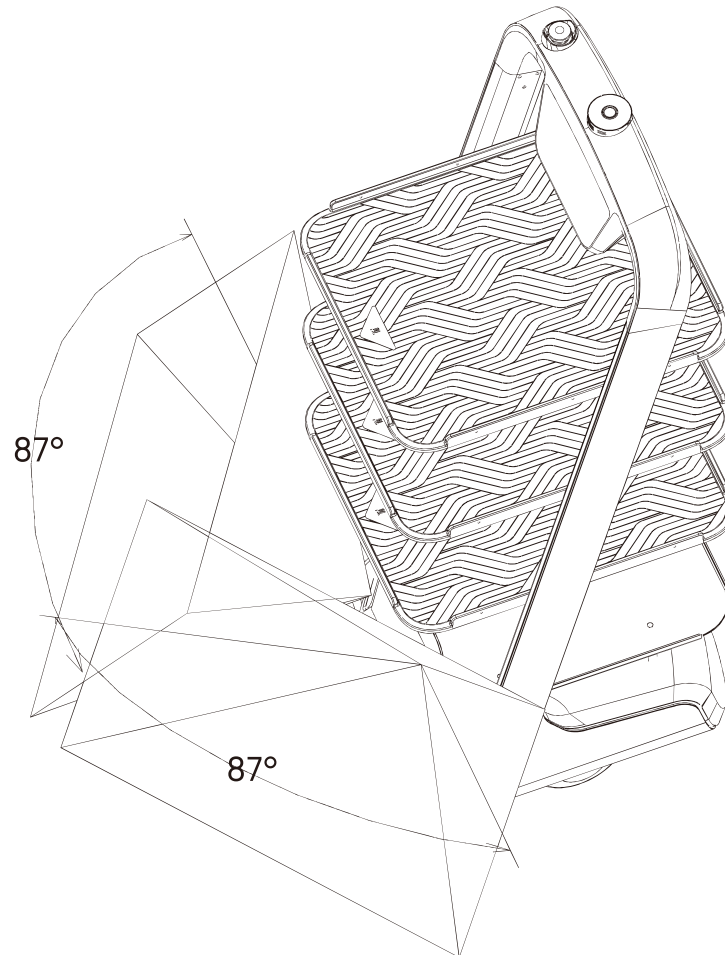
* Our company does not assume any responsibility for all accidents caused by improper operation.
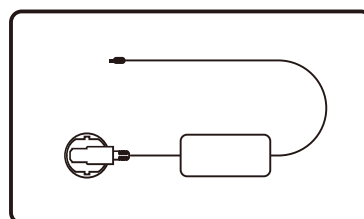
Product Composition

Component description

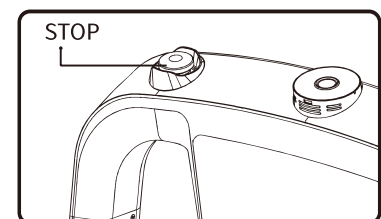
Front Side

Back

[1] Vision positioning
    sensor

[2] Screen

[3] Depth vision sensor

[4] Lidar

[5] Power Switch

[6] Tray

[7] Drive Wheel

[8] Auxiliary Wheel

[9] E-stop Switch

[10] Charging Jack

[11] Obturated box

Close

Open
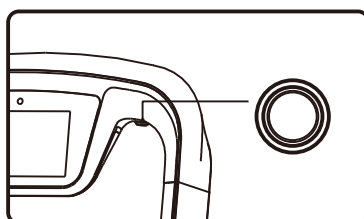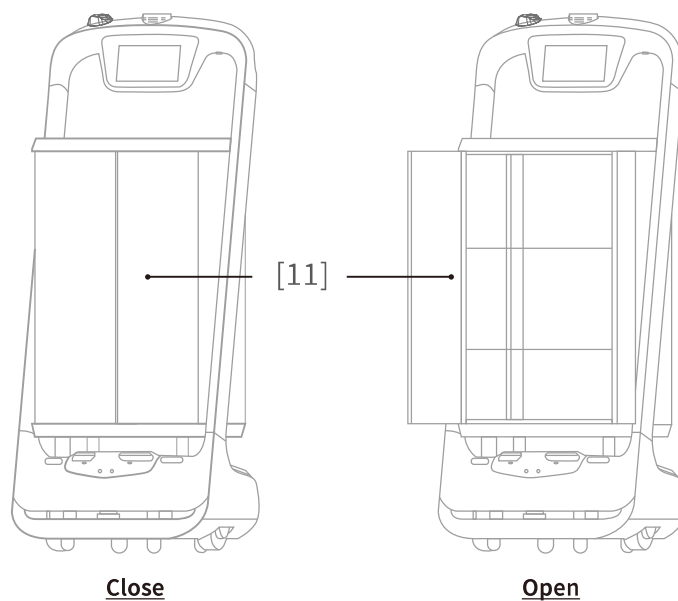
Power Switch

Charging Cable

E-stop Switch

STOP

Performance parameters

|	
Model	PD1 Standard/ PD6 enclosed/PD9 Anti-sunlight/ PD8 Hign ceiling
Operating voltage	DC 23-29V
Power input	AC 100-240V, 50/60Hz
Power output	29.4V-3.5A
Charging time	4h
Battery lifetime	10~24h
Cruise speed	0.5~1.2m/s adjustable
Number of trays	PD6: 3 layers PD1/PD9/PD8: 4 layers
Tray load	Metal tray 13kg/layer max enclosed 10kg/layer max
Climbing slope	5° for safe delivery of dishes (depending on whether the dishes delivered are easy to be spilt)
Machine material	ABS/aviation-grade aluminum alloy
Battery capacity	15600mAh
Machine weight	PD6: 40Kg PD1/PD8/PD9: 35Kg
Machine size	516*500*1288(mm)
Screen specifications	7-inch HD color touch screen
Audio power	20W*2 Stereo
Design life	10 years
Working temperature	0~40°C
Storage temperature	-40~65°
Charging method	Manual plugging and charging
Operating humidity	85%RH
Environmental pollution	Grade 3
Operating altitude	below 2000m
Working environment	Indoor environment, flat and smooth ground
Enclosure	IP20
Light intensity	supporting maximum 2000lux/70000lux
Indoor floor height	supporting 2~5m and 2~8m

Loading area size

Tray size
500mmx432mm

Top layer height
154mm

Layer height between trays
220mm

Bottom layer height
245mm

Bottom tray size
394.5mmx406mm

PD1/PD8/PD9

Tray size
398mmx396mm

Top layer height
238mm

Layer height between trays
238mm

Bottom layer height
178mm

PD6
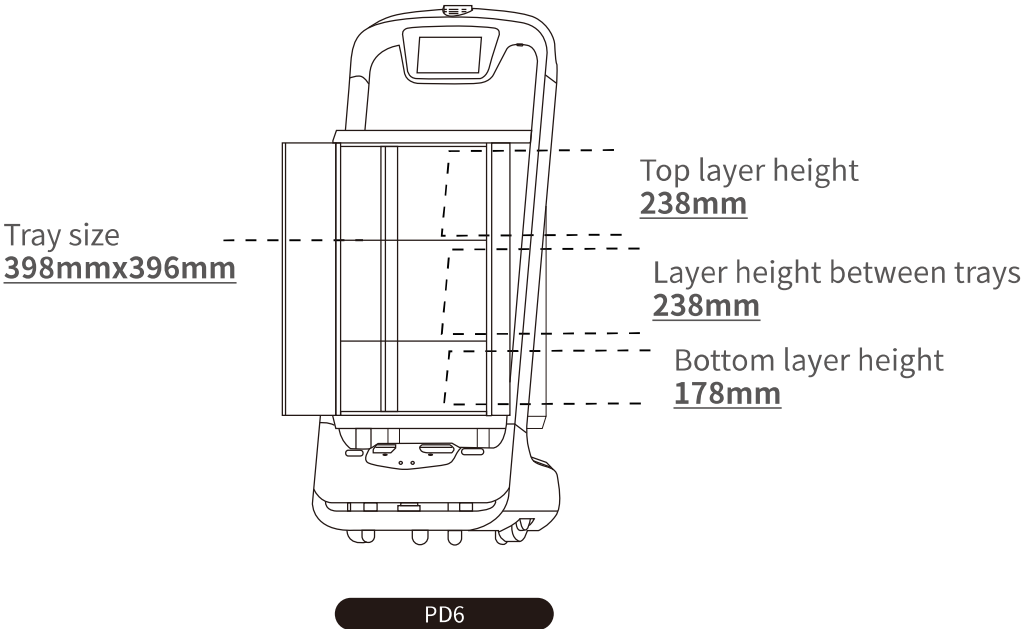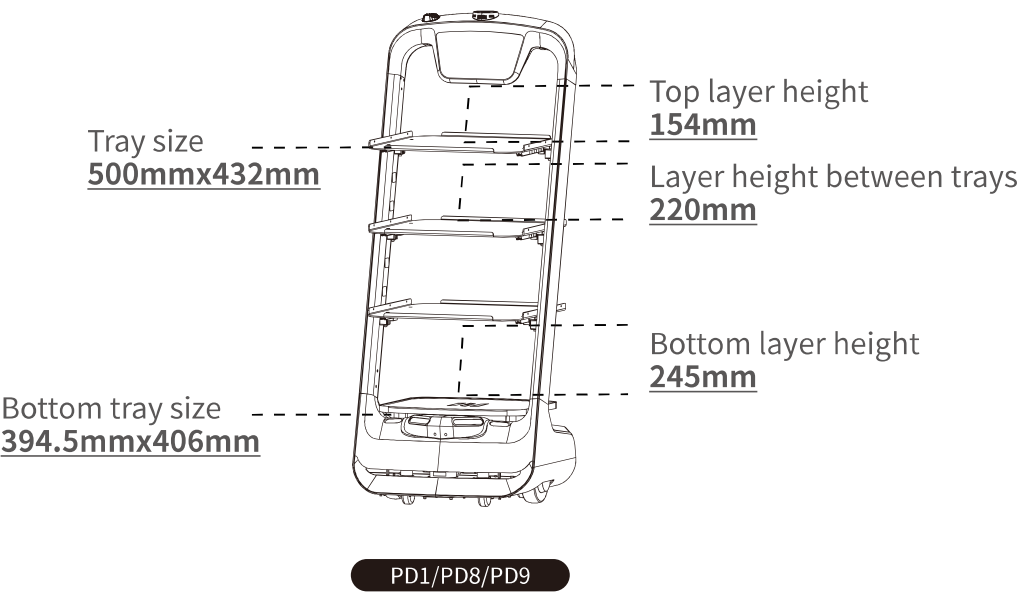
Product Use

Adjustable tray assembly

1
2
3
4
5
6
7

Ensure that the outer edge of all trays is flush in the vertical direction.
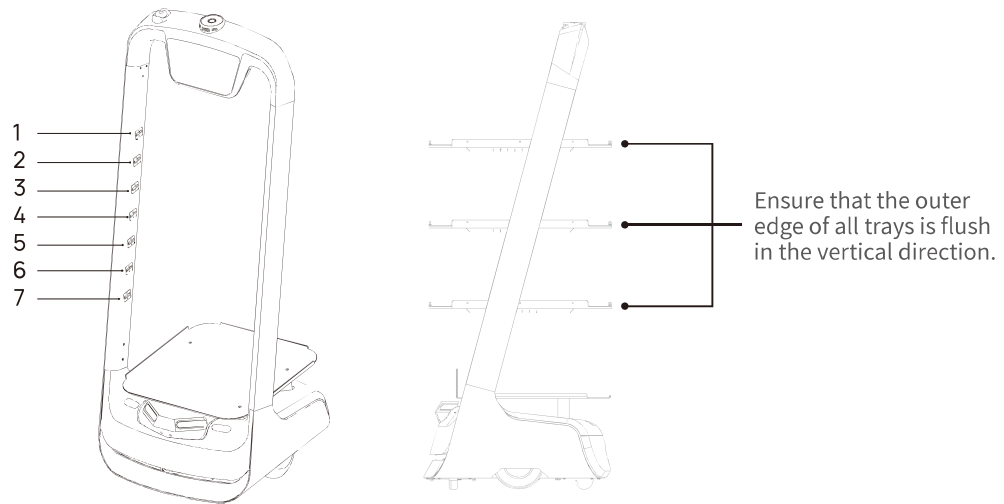
Supporting 7 DOFs, with tray height adjustable, when adjusting the height, it is necessary to ensure that the number of layers of section bar printing (From top to bottom) and the number of tray adjustable section bar printing (From back to front) are the same.

Obturated box assembly
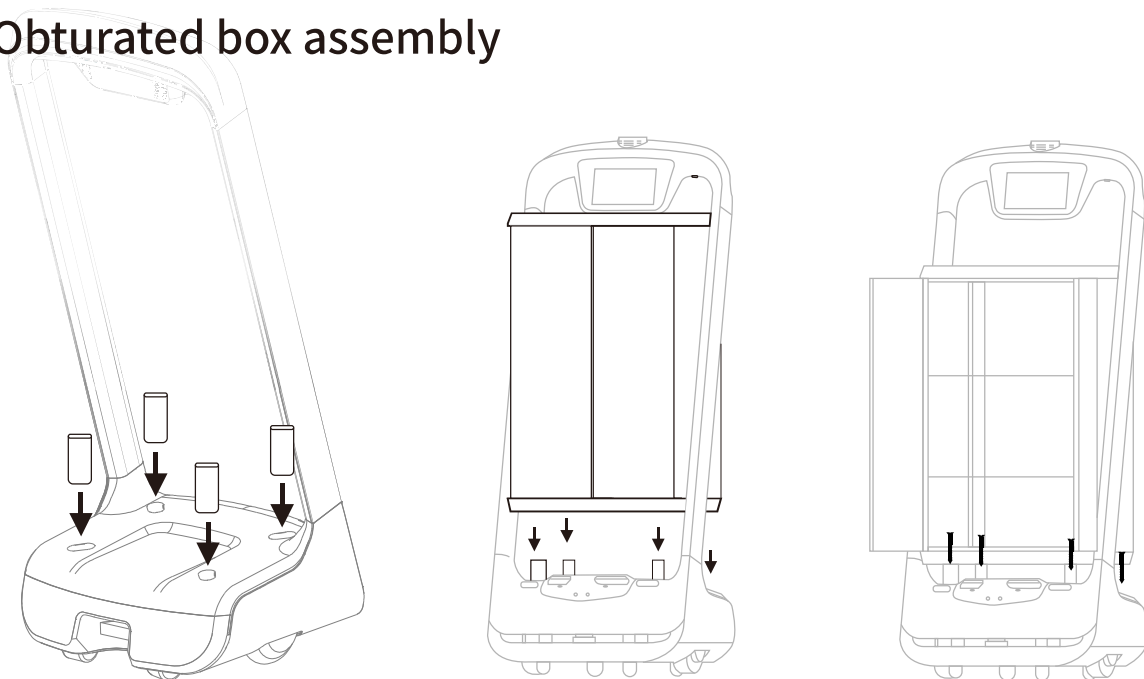
First remove the tray, tray support base and bottom bracket，fix the 4 supporting feet of the Obturated box on the base plate，install the enclosure to the support feet and secure with screws.

Charging instructions

Charging mode: Connect the charging interface of the robot to the charging cable to ensure that the charging port of the robot is connected to the charging cable, if the connection is successful, the robot will prompt it is charging.
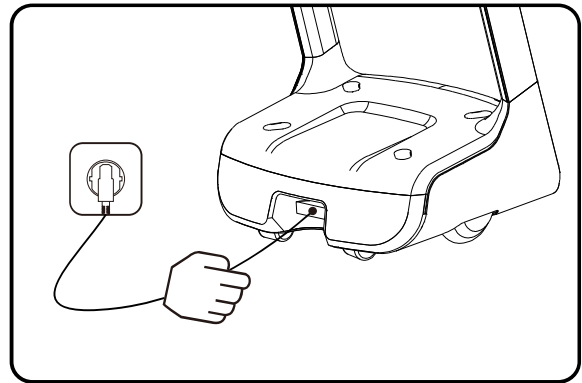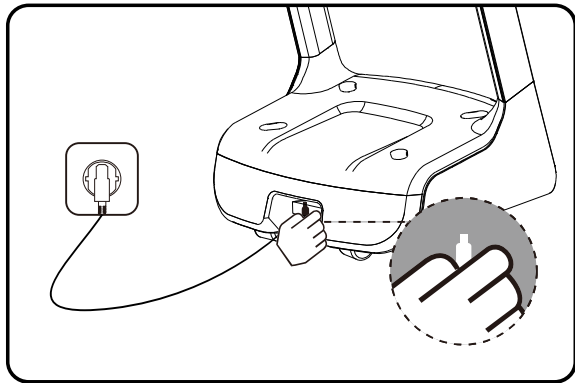
Power requirements:

1. In order to ensure the efficiency of the robot and battery life, please keep the robot power at 10% or more at any time;

2. When the power is lower than 10%, the robot is in a low battery state and needs to be charged as soon as possible;

3. When the power is lower than 2%, the battery is protected, the robot will not be able to perform the task, and it needs to be charged before use.

Charging interface

Charging...

Charging completed
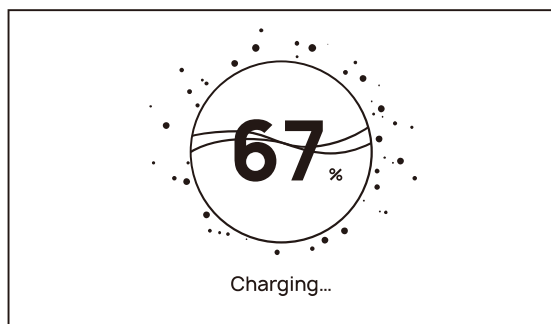
The screen displays an indication that charging is in progress, indicating that the machine is charging.
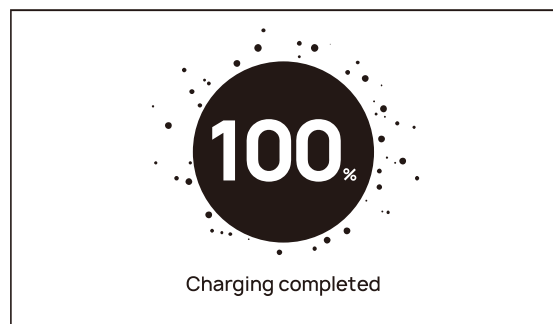
After charging is complete, the screen displays a reminder that the charging container is saturated.

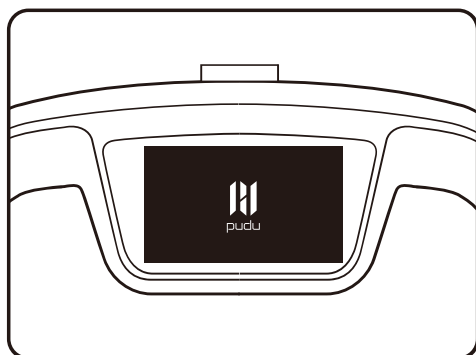# Power ON, Power OFF, Pause, Start
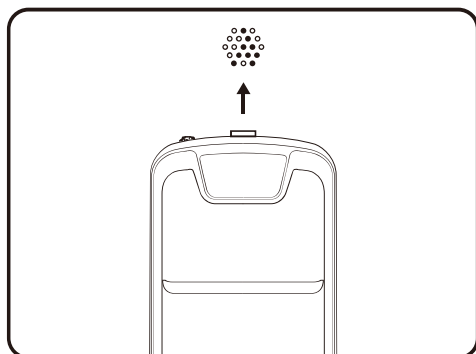
Before each power-on

Move the robot directly below the visual mark before each power-on.
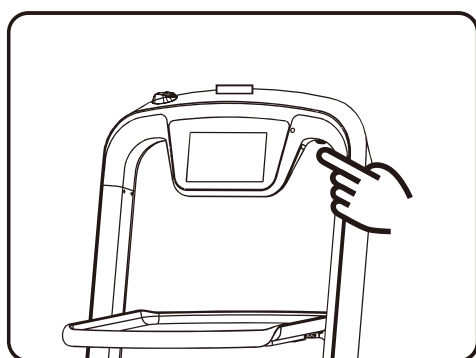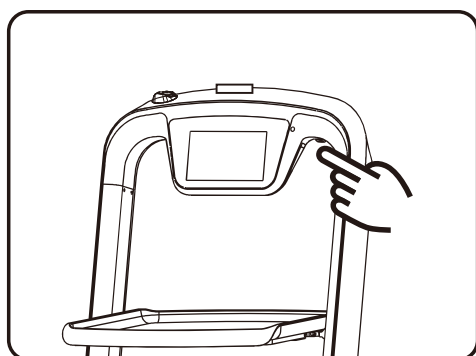
Power-on

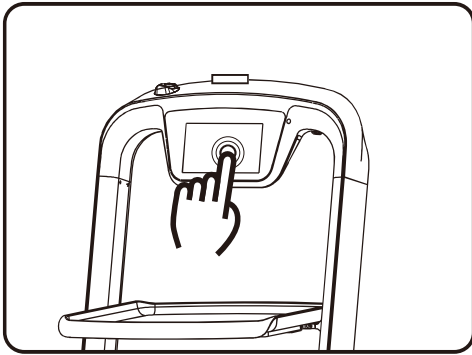Press and hold the power button for 3 seconds, and the bottom light strip will display blue.

starting up

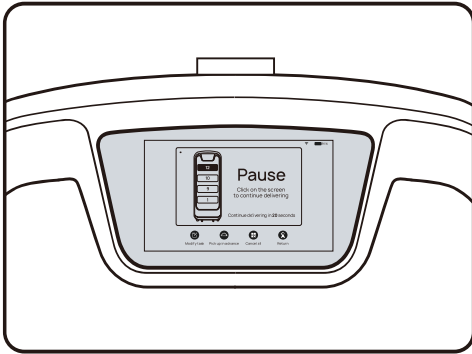The screen enters the working mode, indicating that the boot is successful.

Power-off

Press and hold the power off button for 3 seconds, the bottom light strip is off, and the screen is black, indicating that the shutdown is successful.
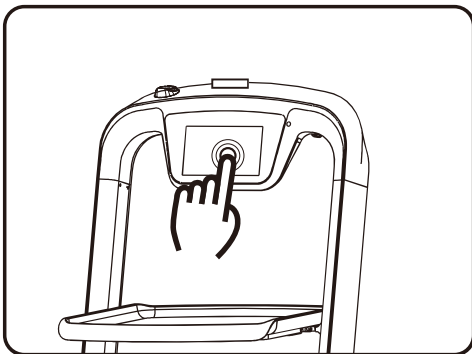
Pause

While the robot is running, touch the screen to make the robot pause.

Pauseing

The screen enters the pause interface.

Running

If it is necessary to continue running, you need to click the screen again.In cruise mode, if there is no other action in the pause interface, the robot will automatically resume walking after 20s, and after 10s in other modes

Mode selection

In order to be applicable in different business scenarios, the modes can be selected as required. The robot provides six mode selections, which are food delivery mode, cruise mode, direct delivery mode, B-day mode, special mode, and used plate collection mode. After the robot is turned on, the mode can be selected through the menu bar.
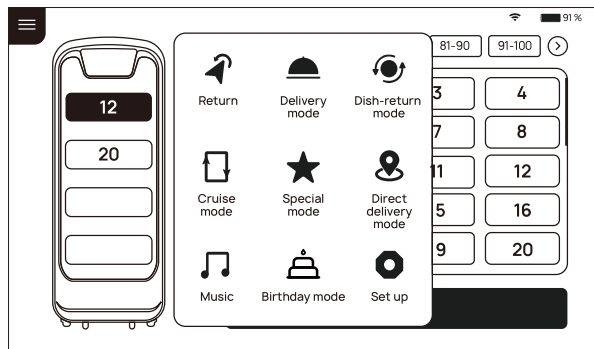
The direct delivery mode, B-day mode, and special mode require a purchase of license to be available, if you need it, please contact technical support personnel.

Food delivery mode

In delivery mode, the robot can be used for food delivery to multiple tables at the same time. Place the food ordered by different customers on several trays, then enter the corresponding table number, it can plan the best path and deliver the food. After the food is delivered, the robot will automatically return to the pick-up position.
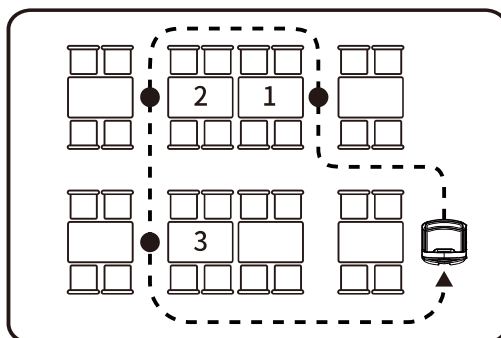

Cruise mode

In cruise mode, it can carry self-service drinks, dessert, snacks, or paper towels, moving along the customized circulation path by the waiter, and inviting customers to enjoy or taste through voice.
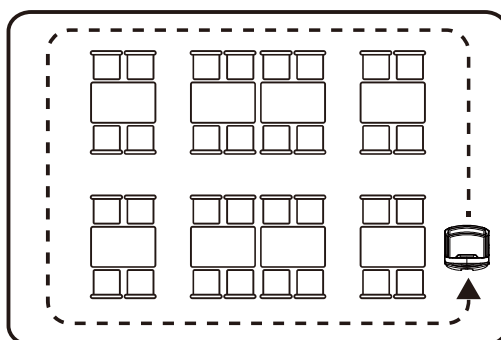
Direct delivery mode

In this mode, the robot can perform a one-way transport operation, you can set a table number, a dishwashing room or other places as the destination, after the delivery, the robot will automatically exit the task and will not return to the pick-up position, then you can enter the new destination again.
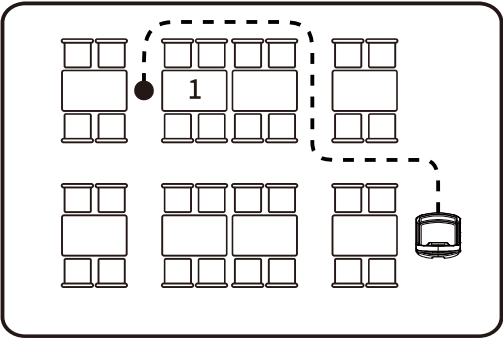

B-day mode

In B-day mode, the robot can provide the service of delivering birthday cakes or gifts, and automatically play the set music during the transport.

Special mode

after selecting this mode, the interface will prompt to select background music. This mode is suitable for some special scenarios, such as marriage proposal and blessing, the robot can quickly select background music.

Used plate collection mode

After selecting this mode, the robot can perform the task of collecting plates, after the collection, you can choose to let the robot return to the dish-return site or the dishwashing room. Until exiting the used plate collection mode, the tasks of collecting the used plates from the table and return to the dishwashing room are performed in a loop.
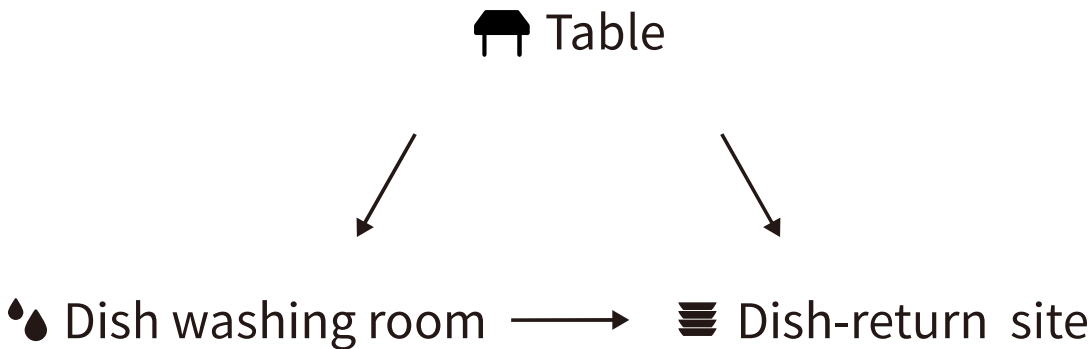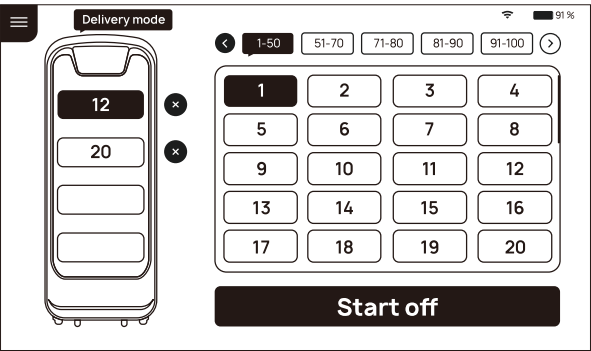
Food delivery mode

The food livery mode is a common mode, and the task delivery method is used for food delivery to a designated location, the specific steps are as follows:
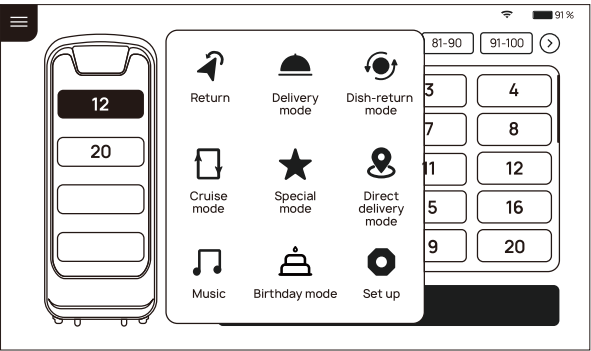
1. At the food delivery location, select the Delivery Mode.
2. Place the food on the tray.

3. Click on the tray where the food is located and select the destination table number. The higher trays are automatically selected by default, and you can select the corresponding table number.
4. After the table number is entered, click to start the delivery, and the robot will start executing the task.
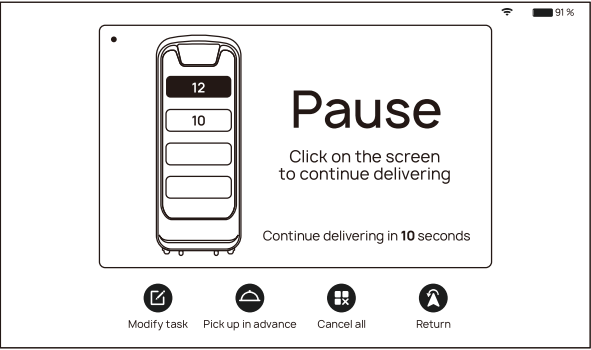
5. The robot quickly arrives at the designated location according to the established trajectory. During the delivery process, you can touch the robot screen to stop the command, and the robot will stop for waiting immediately, if a touch command is not received after 10 seconds, the robot will continue to perform the task.
6. After the robot is paused, the screen enters this interface, you can perform operations such as modifying the task, bringing food in advance, canceling all tasks, and returning.

Click to modify the delivery table number

Click to cancel the current delivery task

Click to cancel all delivery tasks

Click to return to the dish ready point
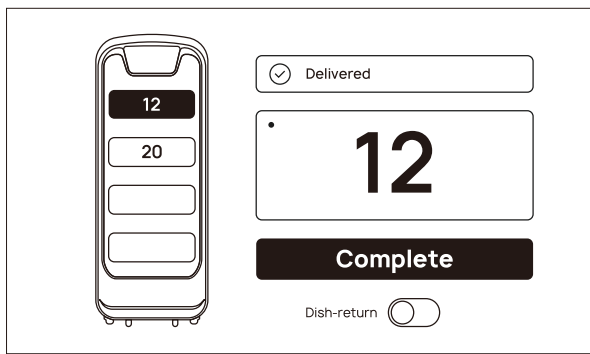
7. At the task destination, the robot will have a voice prompt to the guests that the food has arrived, and the guest can tap the screen to get the food.

8. The robot will automatically return to the food pick-up position and wait for the next task.
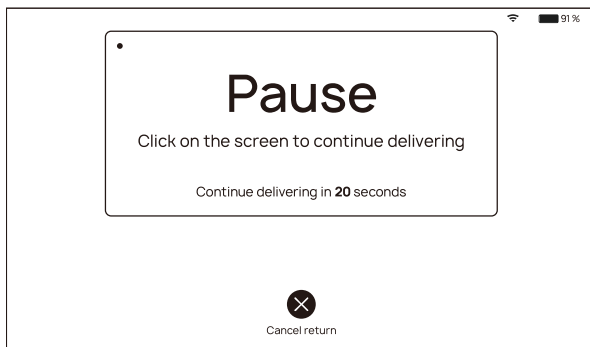
Cruise mode

Cruise mode is a commonly used mode, the robot patrols in a specific environment, covering a large area, and the specific steps are as follows:
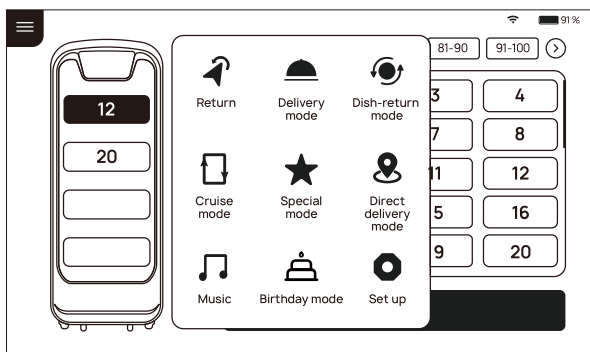
1. At the start of food delivery, select cruise mode.
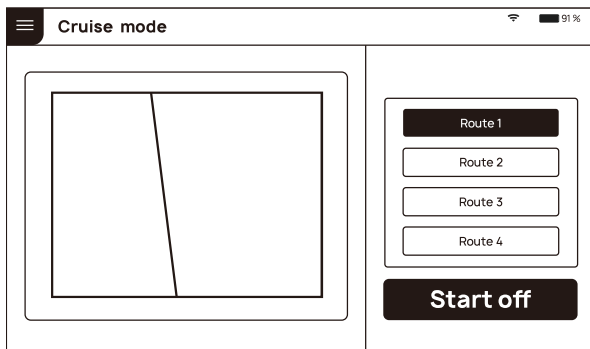
2. Select the automatic cruise route.
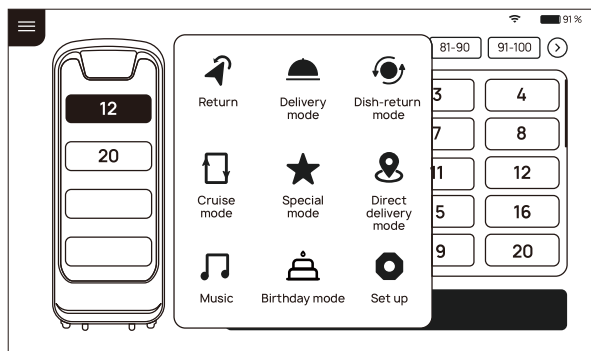3. Select Start and the robot will start the cruise task.

4. During the cruise process, you can touch the robot screen to stop the command, and the robot will stop for waiting immediately, if a touch command is not received after 20 seconds, the robot will continue to perform the task.

5. When picking up the food, please stand in front of the robot or touch the robot display screen, the robot stops running, and the screen enters the pause page, indicating that the robot stops running, and the diners can pick up food at will.
6. After the food is completely picked up, the diners only need to click again on the robot display or pause to wait for over 20 seconds, the robot returns to the operation mode again from the original stop.

B-day mode

The B-day mode is used to deliver gifts and play birthday songs for birthday scenario, the specific steps are as follows:


1. At the food delivery location, select the B-day Mode.
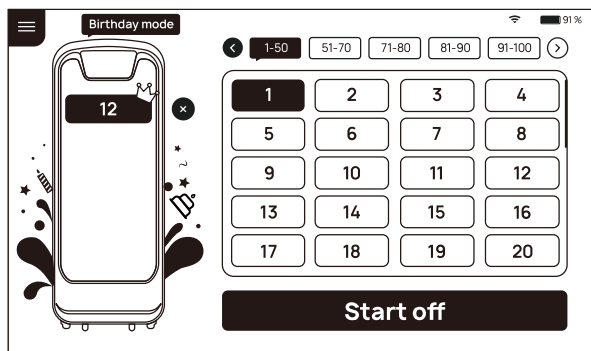
2. Place the gift on the tray, supporting only one destination at a time.
3. Select the table number of target destination.
4. After the table number is entered, click to start the delivery, and the robot will start executing the task. The robot starts playing the playlist set in B-day mode.
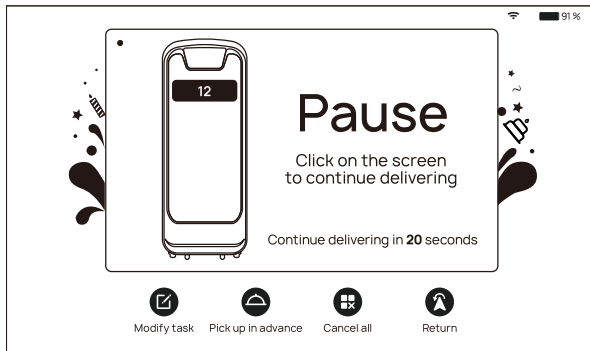
5. The robot quickly arrives at the designated location according to the established trajectory. During the delivery process, you can touch the robot screen to stop the command, and the robot will stop for waiting immediately, if a touch command is not received after 5 seconds, the robot will continue to perform the task.After the pause, the screen enters this interface, you can perform operations such as modifying the task, bringing food in advance, canceling all tasks, and returning.
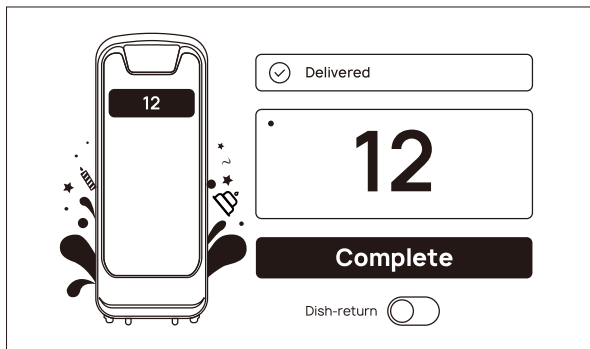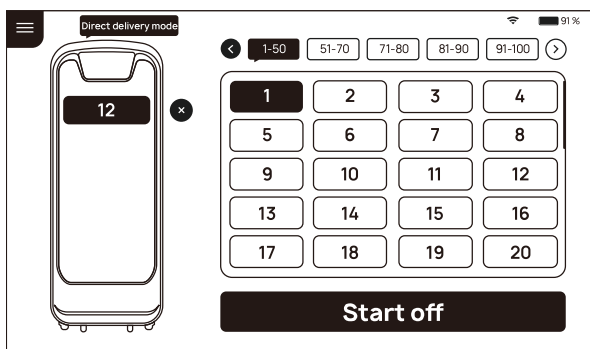

6. After reaching the task destination, click "Finish" to return to the food pick-up position.

Direct delivery mode

In the direct delivery mode, the robot can set any table, transfer position or food delivery position, the specific steps are as follows:
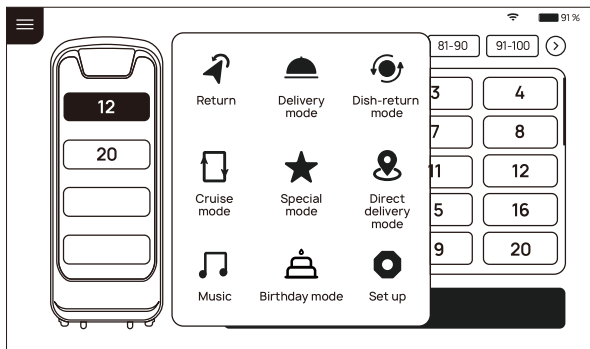
1. Select the Direct Delivery Mode.

2. Select a destination, the direct delivery mode only allows you to select one destination.
3. Confirm the destination, the robot starts execution.