ROBOTIC CLEANER
SERVICE MANUAL

MODEL : VR657* LVMP
VR657** LVMP
VR95** Ser
VR86** Ser

Caution
Please read the safety cautions of this booklet
before the maintenance of the product.

P/NO : MFL67646518

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Product Specifications

■ Main Unit

ITEM	LG Robot Cleaner
MODEL	VR657*LVMP / VR657**LVMP / VR95** Ser / VR86** Ser
Battery (Fully Charging)	Li ion, DC 16.8V
Power Consumption	58W
Charging Time	3 hours
Use Time	Approx. 100 minutes (based on general wooden floor)
Traveling Velocity	0.35 m/s
Cleaning Mode	zigzag cleaning / Cell by Cell Cleaning / My Space Cleaning / Spot Cleaning
Weight	3kg
External Dimensions	340mm x 340mm x 89mm
Accessary	Home station / remote controller / Filter / Cleaning Brush / Brush
Main Function	Turbo Mode / Learning Mode / Obstacle Sensing / Anti-Plunge function / Scheduled Cleaning / Error Displaying / Navigation / Auto/Manual Recharging / Corner Clean / Voice Messaging / Map Drawing / Spot Cleaning / Repeat Cleaning / My Space Cleaning / Cell by Cell cleaning / Zigzag Cleaning /

■ Home Station

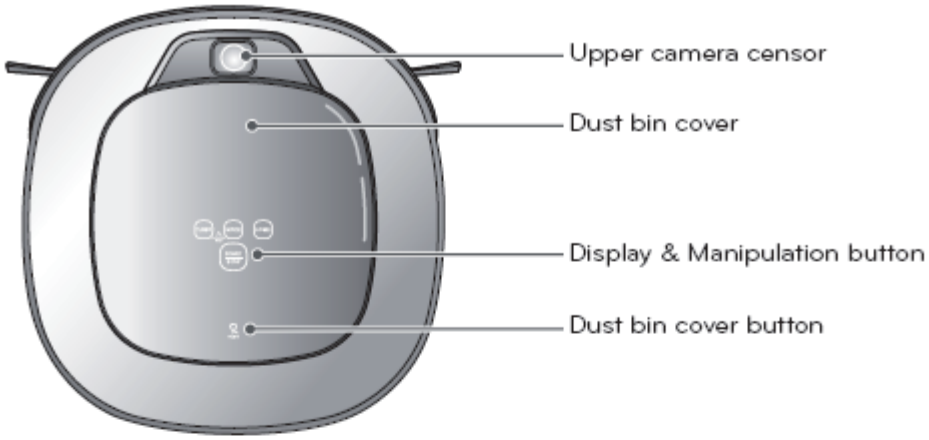
ITEM	Home Station
Model	VR621
Rating	AC 220V, 60Hz
Power Consumption	23W
Output Voltage/Current	DC 17.1V / 1.1A

■ Remote Controller

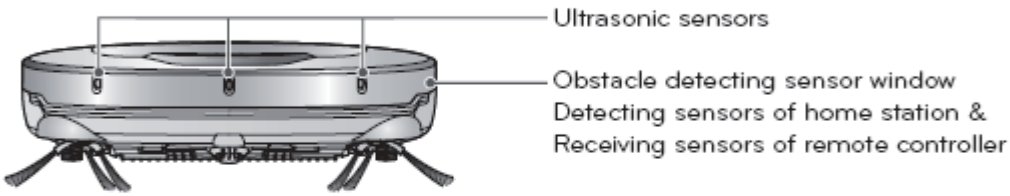
ITEM	AKB73296002
Battery	DC 3V(AAA, 2ea)
Type	Infra Red(38kHz)
Operating Range	5m
Size(WxLxH)	45 X 22 X 115 mm

Structure and Name of Each Part – Robot Cleaner

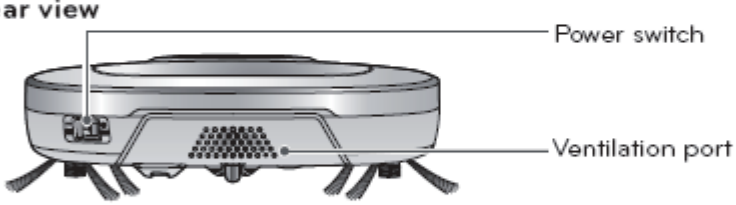
Plan view



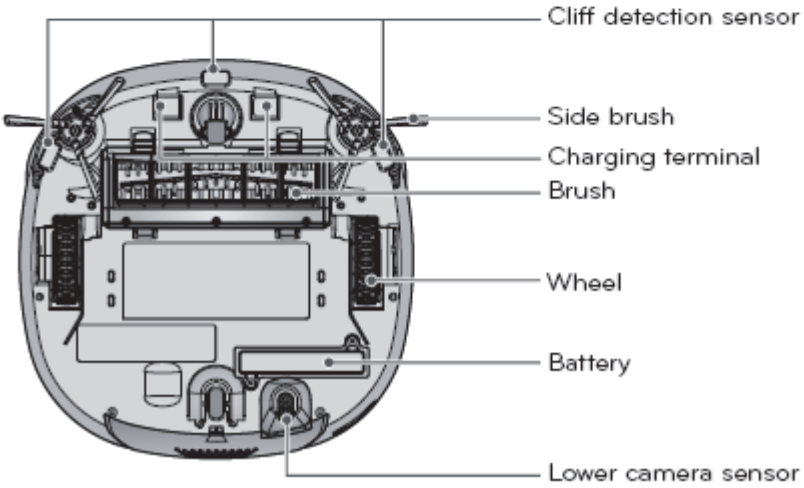
Front view



Rear view



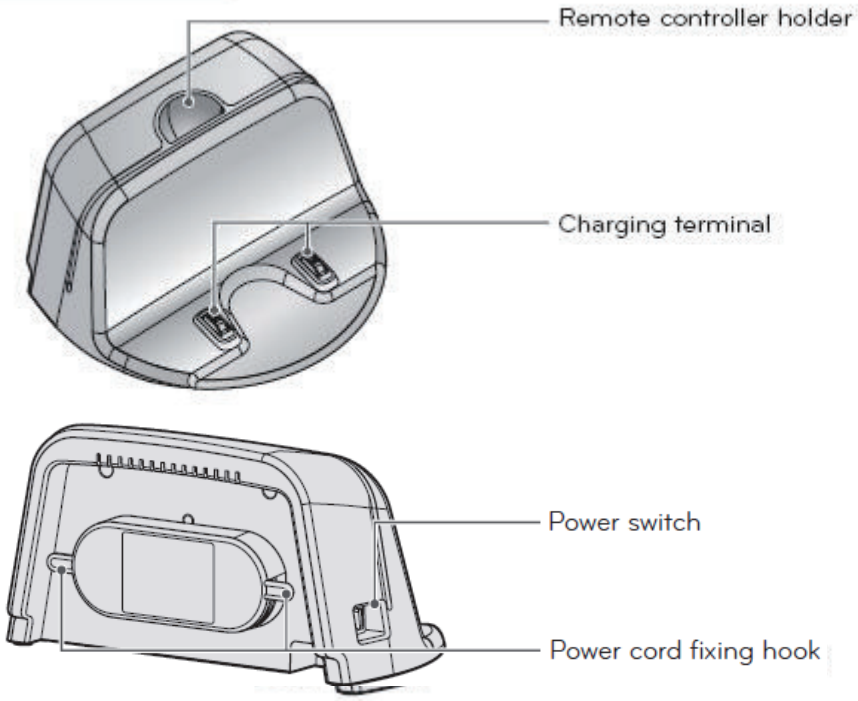
Bottom view



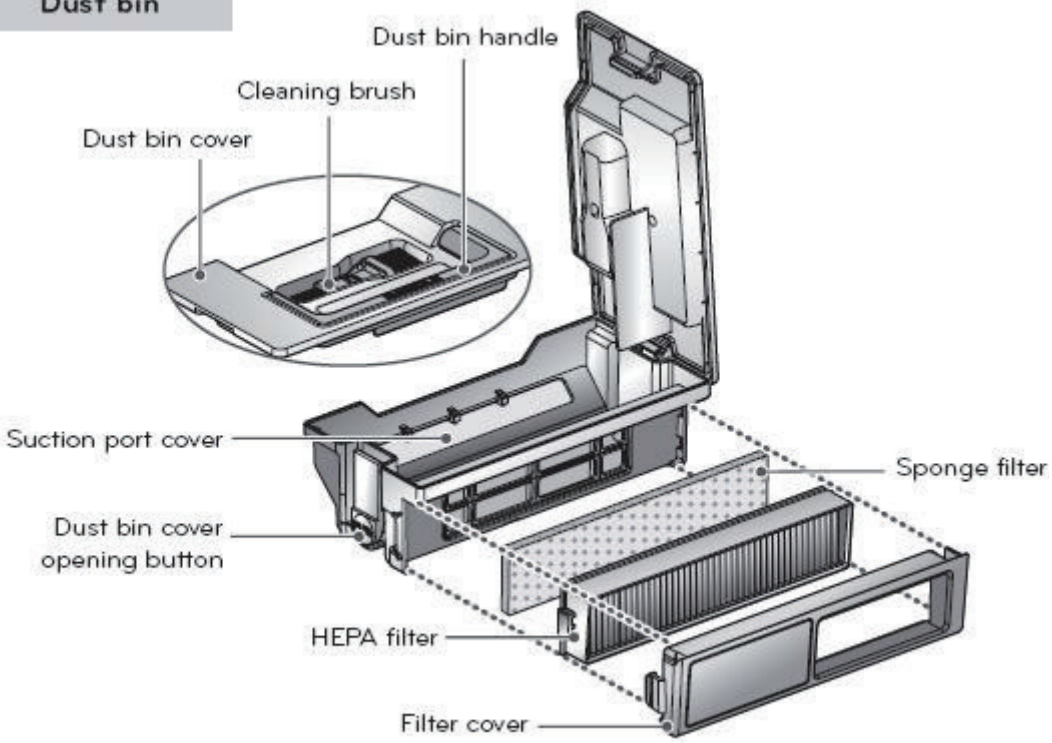
► Figures can be different from actual objects.

Structure and Name of Each Part – Robot Cleaner

Home station



Dust bin



► Figures can be different from actual objects.

Cautions and Methods during the Usage

The purpose of the safety precautions described below is for the user to use the product safely and correctly to prevent any unexpected risk of injury or damage.

Basic safety precautions

After reading this manual, please keep it in an easily accessible location.

⚠ This is the safety alert symbol. This symbol alerts you to potential hazards that can result in property damage and/or serious bodily harm or death.

⚠ **WARNING** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

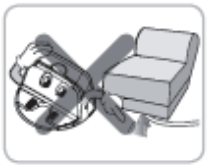
⚠ WARNING

For your safety, do not remove the battery from the Robot Cleaner. If you need to replace the battery or the Robot Cleaner, take it to the nearest authorized LG Electronics service center or dealer for assistance.

Failure to follow this warning can cause fire or product failure.

Never use the Robot Cleaner with a battery and/or home station from any other product than the Robot Cleaner.

Doing so can cause fire or product failure.



Make sure the power cord of the home station is not crushed under a heavy object or damaged by contact with sharp objects.

Failure to follow this warning can cause electric shock, fire or product failure. If the power cord is broken, do not plug it in. Take the product to an LG Electronics Authorised service repairer.

Do not use the Robot Cleaner when candles or fragile objects are placed on the floor.

Doing so can cause fire or product failure.

Do not place the home station and the Robot Cleaner near a heating device.

Doing so can cause product deformation, fire, or product failure.

Always use a dedicated outlet with 5A or above.

If multiple appliances are connected to an outlet simultaneously, they can generate enough heat to cause a fire.

Do not force the power plug to bend. Do not use the power plug when it has been damaged or loosened.

Doing so can cause fire or product failure.

When pulling out the power plug, always pull it out by grabbing the plug, not the cord. When pulling out the power plug, do not to touch the prongs with your fingers.

Doing so can cause an electric shock.

Do not touch the power plug with wet hands.

Doing so can cause electric shock.

Do not allow children or pets to play with or rest upon the Robot Cleaner at any time. Do not use the Robot Cleaner while an object is hanging from it.

Doing so can cause injury or product damage.

Cautions and Methods during the Usage

⚠ WARNING

Do not spray or suck in inflammable materials, surfactants, or drinking water in the vicinity of the Robot Cleaner.

Doing so can cause fire or product failure.
* Inflammable materials: gasoline, thinner, etc.
* Surfactant: detergent, articles for bath, etc.

Turn the power supply off immediately if any abnormal sound, odor, or smoke is generated from the Robot Cleaner.

Failure to do so can cause fire or product failure.

Do not insert any part of the body, such as a hand or foot, below the brush or wheels of the Robot Cleaner while in use.

Doing so can cause injury or product damage.

Do not operate the Robot Cleaner in a room where a child is sleeping.

Doing so can cause injury or product damage.

Do not operate the Robot Cleaner on narrow and high furniture such as a wardrobe, refrigerator, desk, table, etc.

Doing so can cause injury, product failure or damage which is not covered by the warranty.

Do not leave Children or pets near the Robot Cleaner unsupervised.

Doing so can cause injury or product damage.

⚠ CAUTION

Frequently empty the dust bin and maintain its cleanliness.

The dust collected in the dust bin can trigger allergies and may contain harmful insects.

Do not drop the Robot Cleaner or subject it to strong impacts.

Doing so can cause injury or product failure not covered by the warranty.

Use the Robot Cleaner indoors only.

Using it outdoors can cause product failure and irreparable damage to the unit.

Do not expose the Robot Cleaner to cold temperatures (less than -5°C) for a long period of time.

Doing so can cause product failure.

Close the cover of the dust bin on the main unit before start cleaning.

If the cover is not closed, it can cause injury or product damage.

Remove any cable or long string on the floor.

Cable or string can get tangled in the wheels of Robot Cleaner to cause product failure or the cord can be disconnected.

DO NOT use Robot Cleaner around a banister, staircase or any other dangerous place.

Otherwise, the user or the product can be exposed to damage.

Make sure Robot Cleaner is not put on a tale or desk, with the power ON.

It may result in injury of the user or damage in the product.

Cautions and Methods during the Usage

⚠ CAUTION

In rare cases, the Robot Cleaner's brush can damage the carpet. If this happens, immediately stop the cleaning operation.

When a carpet has long tassels, the tassels can be damaged.

Do not allow the Robot Cleaner to sweep up liquids, blades, thumb tacks, kindling, etc.

These items can cause product failure.

Do not let the main unit and charging terminal of the home station come into contact with metallic objects.

Doing so can cause product failure.

Do not put sharp objects into the opening of the Robot Cleaner's supersonic sensor.

Doing so can cause product failure.

Do not put water, detergent, etc. into the Robot Cleaner.

Doing so can cause product failure. Do not put any water or detergent on the Robot Cleaner. If liquids get inside of the Robot Cleaner, turn off the power supply and contact an LG Electronics sales agent or customer care center.

Do not use the Robot Cleaner when the dust bin is completely filled up.

Doing so can cause product failure.

If the floor is wet or has wet spots, wipe them up before using the Robot Cleaner. Do not use the Robot Cleaner on a wet surface.

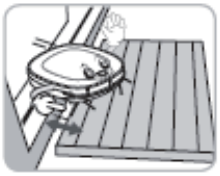
Failure to do so can cause product failure.

When the robot cleaner is operating, it may hit the chair leg, desk leg, table leg or other narrow pieces of furniture.

For quicker and better cleaning, place the dining chairs on top of the dining table.

When attaching the mop, do not block the bottom camera sensor.

Blocking the bottom camera sensor may not allow the product to work smoothly.



Make sure the plate on the floor is above 3 cm from the ground before start cleaning.

If the threshold is low, Robot Cleaner can go over it all the way to front door.

Tip Check the following items before use:

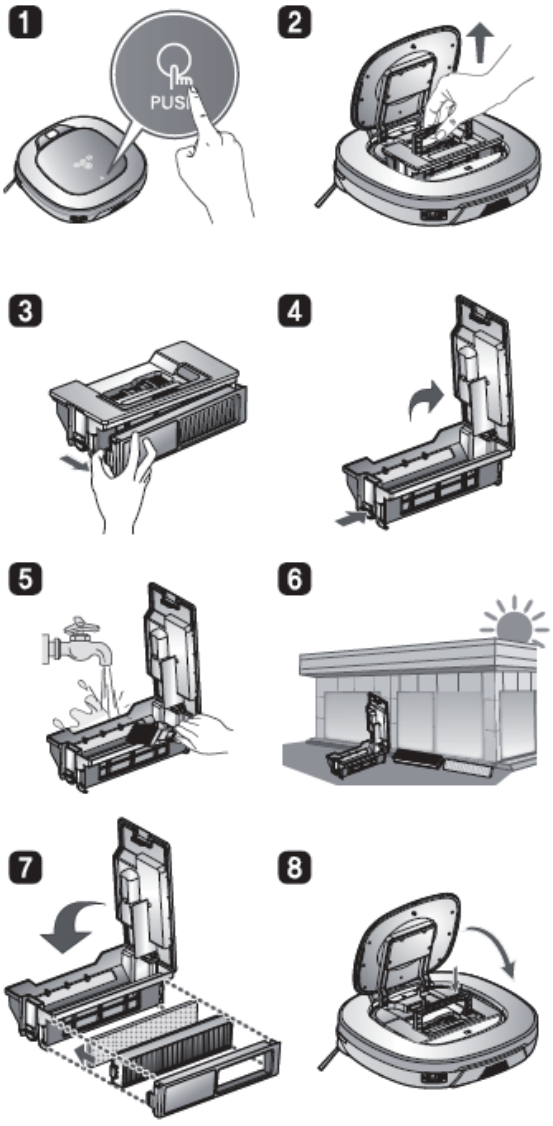
- Empty the dust bin after if fills up.
- Remove any cables or long strings from the floor.
- Remove any moisture from the floor before cleaning.
- Close the cover of the dust bin before cleaning.
- Remove fragile or unnecessary objects from the room to be cleaned.
  For example, remove expensive ceramics and valuables from the floor.
- Confirm whether the battery has sufficient power, and if it is low, recharge it.
- Close the doors of any room that you do not want the Robot Cleaner to enter.
  During cleaning, the Robot Cleaner may enter another room and continue cleaning.
- Do not use this product in the room where a child is sleeping alone. The child can be hurt.
- Remove towels, foot towel or any other thin cloth from the floor as they can get caught by the brush.
- Cleaning will not proceed smoothly on carpets with tassels or carpets thicker than 8 mm (0.315 in). It may be more convenient to arrange them before using the product.

Cautions and Methods during the Usage

1. About Dust Bin

If the dust bin is full, suction power can be weakened. Clean the dust bin before and after each cleaning session. Clean the dust bin using the following sequence:

1. Open the dust bin cover by pressing the PUSH button on the Robot Cleaner.
2. Grab the handle of the dust bin and pull it upward.
3. Pull the hook on the left of HEPA filter module on the rear of Dust Bin to separate the filter and the sponge in it.
   ※ Note that separating the filter may involve some dusts dropping.
   ※ Refer to p.27 when cleaning the Dust Bin Filter.
4. Lift the cover upward while pressing the separation button on the dust bin.
5. Empty the dust bin and clean it with a cleaning brush or under running water.
6. After cleaning with water, completely dry the dust bin in a well-ventilated area out of the direct sunlight.
7. When finished with cleaning on Dust Bin, close the cover and put in the Sponge and HEFA Filter.
   ※ Refer to p.27 for detailed assembly guides.
8. Put the dust bin into the Robot Cleaner and close the dust bin cover.



Tip

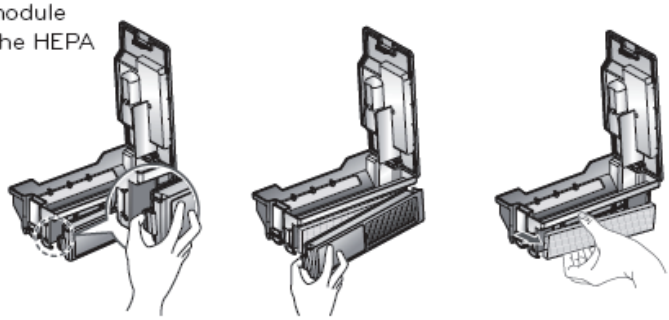
- If you close the Filter Cover onto Dust Bin, with no filters available, it can involve dusts coming inside to cause a failure.
- After cleaning the Dust Bin, make sure to assemble the filter into Dust Bin.
  If you put Robot Cleaner to operation, with no filters available or Filter Cover not assembled, a voice message will come out which says "Check if there is a Dust Bin with a filter assembled into it."

2. About Filter

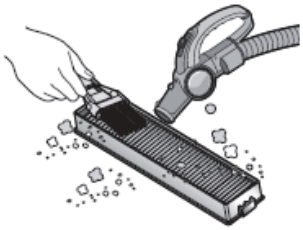
■ Dust Bin Filter

It is recommended to clean the dust bin filter with HEPA 11 once a week. During the cleaning, clean thoroughly with cleaning brush and the cleaner. Never clean the filter with water. When it is washed with water, the cleaning performance will be degraded.

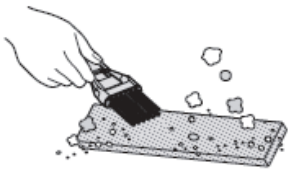
1. Pull the hook on the left of HEPA Filter module on the rear side of Dust Bin to separate the HEPA Filter and the sponge in it.



2. Clean thoroughly the fine dust particles on HEPA Filter, with a vacuum cleaner or brush.
   ※ Do NOT wash the HEPA Filter with water. Its suction power may weaken.



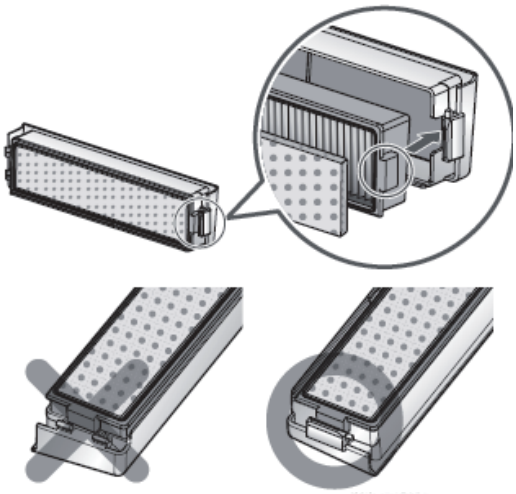
3. Use a brush to clean the Sponge Filter. If you have used water to clean it, dehydrate it completely in a shade.



4. Assemble the HEPA and Sponge filters onto the Cover as the following sequence.

   ※ Fit the rectangular figure beside HEPA Filter into furrows of the Cover.

   ※ Be careful not to incorrectly assemble HEPA and Sponge Filter onto the Cover.



Make sure to install the dust bin filter (HEPA filter, sponge filter) to the dust bin after the cleaning.

If the dust bin or dust bin filter is not installed, dust may enter inside Roboking and cause disorder.

3. About Agitator

If foreign object is stuck in the agitator, it decreases the rotation speed and degrades the cleaning performance to cause disorder. Especially, after cleaning hair or hair of pets, make sure to clean the agitator. Clean periodically after 10 usages in ordinary homes.

If the agitator stops by foreign object during the cleaning, a voice alarm of “check foreign object in the agitator at the bottom” will sound. At this time, remove the foreign object stuck in the agitator before the usage.

Side agitator rotates synchronized with the bottom agitator. If the bottom agitator does not rotate, the side agitator will not rotate either.

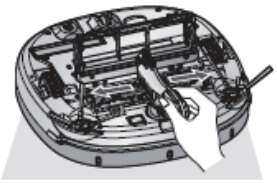
The Brush, located on the bottom of Robot Cleaner, helps absorb dusts. Clean the Brush as the following sequence.

※ **Before turn over the main unit, lay a soft cloth on the floor and remove the Dust Bin. Otherwise, the main unit can get scratches or dusts poured down from Dust Bin.**

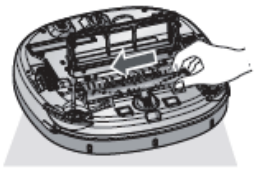
1 Turn the Main Power Switch OFF before starting the clean. Put the Robot Cleaner upside down on a soft cloth.

2 After checking for alien materials, press down the Fixing Hook and pull it up to separate the Cover.

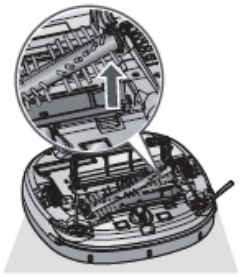
3 By using a cleaning tool, clear hairs and other alien materials on the Brush.



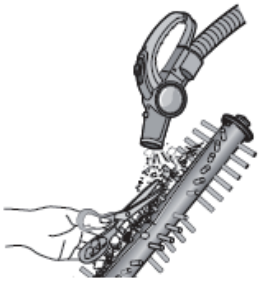
4 Wearing gloves, thrust the Brush all the way to a yellow protrusion.



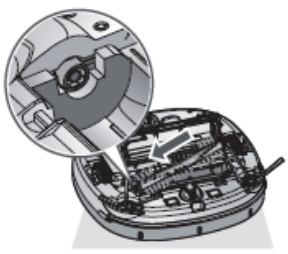
5 While pushing the Brush, lift the yellow protrusion part up to separate it from the main unit.



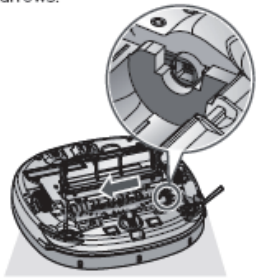
6 Clean the Brush with a vacuum cleaner or scissors.



7 Fit the Fixing Hook (a rectangular shape) on the side of Brush into the furrows, with the colors matching.

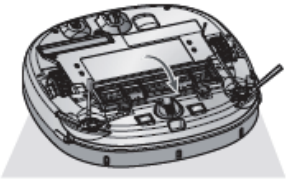


8 Thrusting the Brush to the arrow direction, fit the Fixing Hook (a rectangular shape) on the opposite side into the furrows.



9 Press down and close the Cover until a 'crack' sound is heard from both sides of Fixing Hook.

※ Be careful not to make the Brush on the side stuck into the Cover.



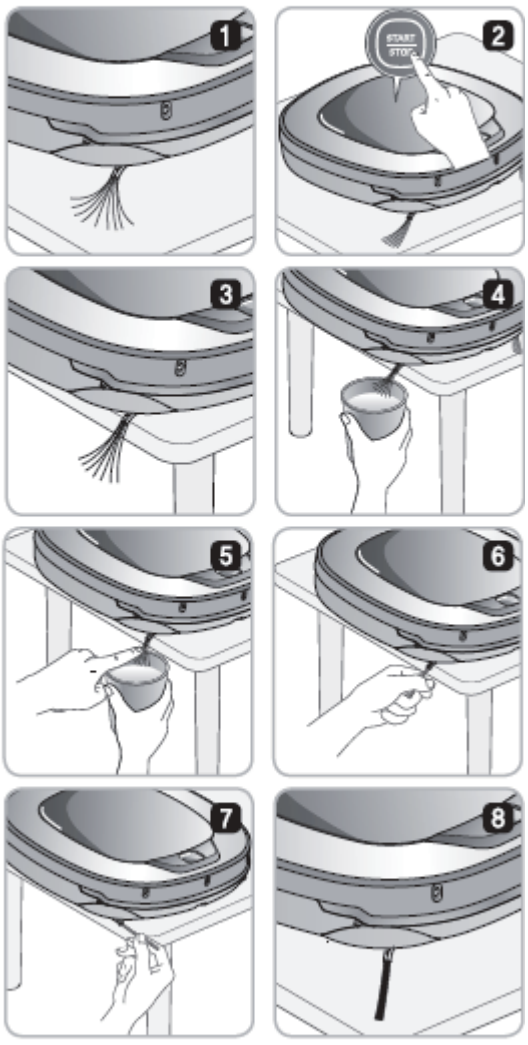
4. Cleaning the Side Brush

Foreign objects/materials such as hair can easily adhere to the side brush. Remove such materials at least once a week.

If excessive amounts of foreign materials are stuck to the brush, there is the risk of damage to the brushes.

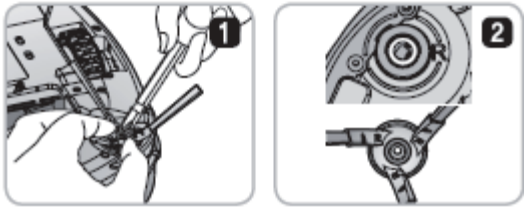
If the floor is rough or walls are frequently cleaned, the side brush may bend or become damaged. In this case, use the following method to straighten the side brush.

1. The following procedure is helpful in restoring deformed brushes.
2. Turn off the power supply by pressing the START/STOP button on the Robot Cleaner for two seconds.
3. Place the Robot Cleaner at the end of a table to make cleaning the side brush easier. Make sure that the Robot Cleaner is not in danger of falling.
4. Soak the side brush in warm water.
5. Press down on the side brush for about ten seconds so that it is completely submerged in the water.
6. Slowly wipe the side brush by sliding it through your hand.
7. Rotate the side brush and repeat steps 4-6 for each section of the brush.
8. Use the side brush only after it has completely dried.



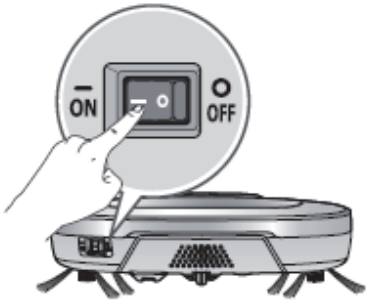
Side Brush management

1. Remove the screws by using a driver and separate the Side Brush from the main unit.
2. Assemble the Side Brush to replace onto the bottom of Robot Cleaner, with the 'R' and 'L' marking of the Brush fit to the counterparts on Robot Cleaner.



5. Cleaning the Sensor / Charging Terminal

There are sensors on the Robot Cleaner that can detect obstacles, stairways and the home station for charging the battery. In order to maintain the performance of the Robot Cleaner, regularly clean the sensors and charging terminal as follows:

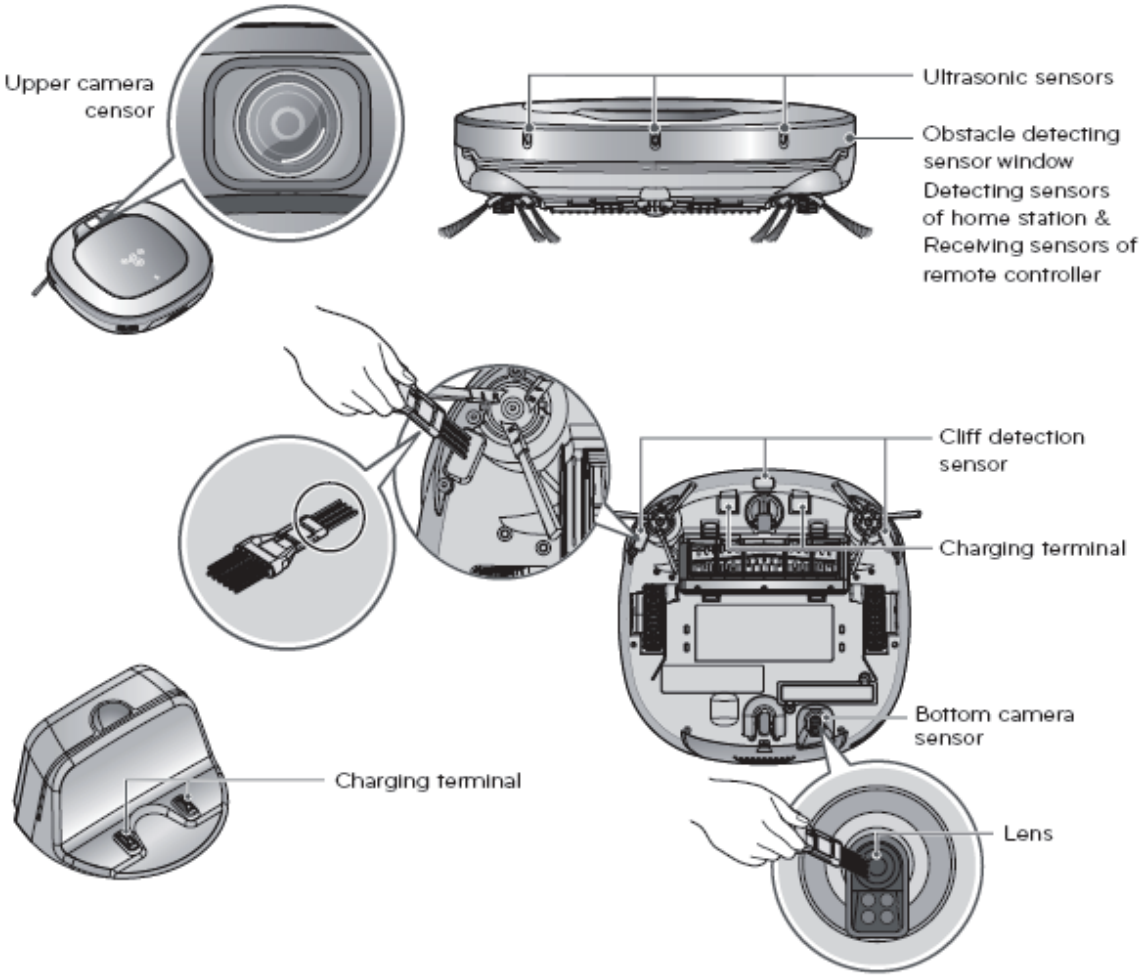


1. Lay a smooth cloth on the floor, overturn the Robot Cleaner and put it on the cloth.

※ **Please make sure to remove the dust bin before flipping the main body. Otherwise, the dust in the dust bin may fall out.**

2. Turn off the power switch on the bottom of the Robot Cleaner. Injury can be caused by the activation of the Robot Cleaner if the main power is not turned off.

3. Use a smooth cloth or cleaning brush to wipe the dust off each sensor and the charging terminal as described below.



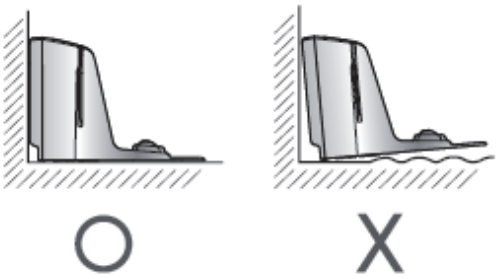
Tip

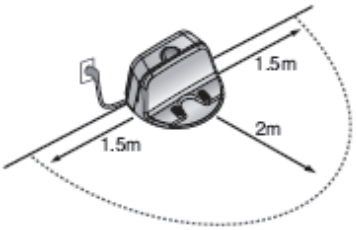
- Do not clean the Robot Cleaner by directly spraying it with water, thinner, benzene, etc.
- Call the service center if the sensor or charging terminal is damaged. Sensor and terminal damage can cause the product to malfunction.

6. How to Install the Home Station

1. Position the home station against a wall, to prevent sliding during docking, on hard level flooring.

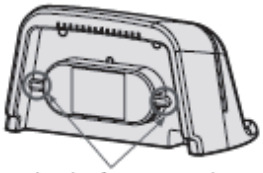
   Remove objects within 4.5 ft. to the right and left side and within 6 ft. to the front.

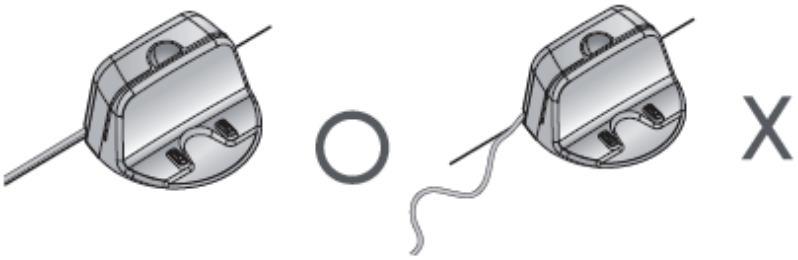




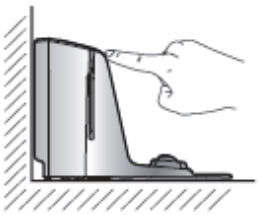
2. Plug the power cord into an outlet.

   Wrap the power cord around the fixed hook on the back side of the home station or along the wall surface so that the travel path of the Robot Cleaner will not be obstructed.

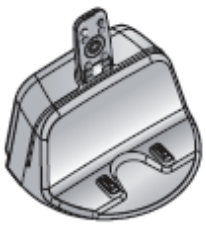

Fixing hook of power cord



3. Fix the home station against the wall so that it does not move.



4. When the remote controller is not used, store it on the remote controller holder on the home station.



Tip • Always keep the home station plugged in. If the home station is not plugged in, the Robot Cleaner will not return to the station to charge automatically.

< Warning > Do not operate the Robot Cleaner if it has a damaged cord or plug, if it is not working properly, or if it has been damaged or dropped. To avoid hazard, the cord must be replaced by LG Electronics, Inc. or a qualified service person.

7. How to Charge the Battery

Automatic charging

The Robot Cleaner returns to the home station at the end of a cleaning cycle or when its battery is running low.

※ If 10 minutes elapse with Robot Cleaner not moving and the battery uncharged, the power will automatically be OFF.

※ **Do NOT turn OFF the Main Power Switch since the battery will not be recharged. If the machine is recharged with the Main Power Switch OFF, it shows an error message, "The Power Switch on the back is OFF. Please, turn the Switch ON."**

※ In the event that the unit returns to the Home Station due to a low battery, cleaning will be started, after the charging, from the nearest place of the area which has not been cleaned before. (Page 17)

※ If Robot Cleaner is unable to dock to the home station on its first attempt, it will try again until it docks successfully.

※ When Robot Cleaner completed all areas that it can clean, it will return to the home station even when the battery level is not low.

Manual charging

If using the Robot Cleaner for the first time or when charging the battery during cleaning, you can manually charge the battery.

Method 1. Attach the Robot Cleaner to the home station by aligning to the front side of the home station. A melody sound will be generated along with an audio message to start charging.

※ If a voice message, "The Power Switch on the back is OFF. Please, turn the Switch ON" comes out on and on, make sure the Main Power Switch is ON.

Method 2. When the HOMING button of the remote control or the Robot Cleaner is pressed, charging will start by automatically generating a searching sound and returning the Robot Cleaner to the home station.

※ If the Robot Cleaner does not start cleaning from the home station or if the Robot Cleaner is manually charged by pressing the charge button, it may take slightly longer to find the home station.

※ If the Robot Cleaner stays within 10 cm (3.9 in) of the front of the charging terminal while the power supply is turned on, it will automatically be returned to the home station and charging will begin.

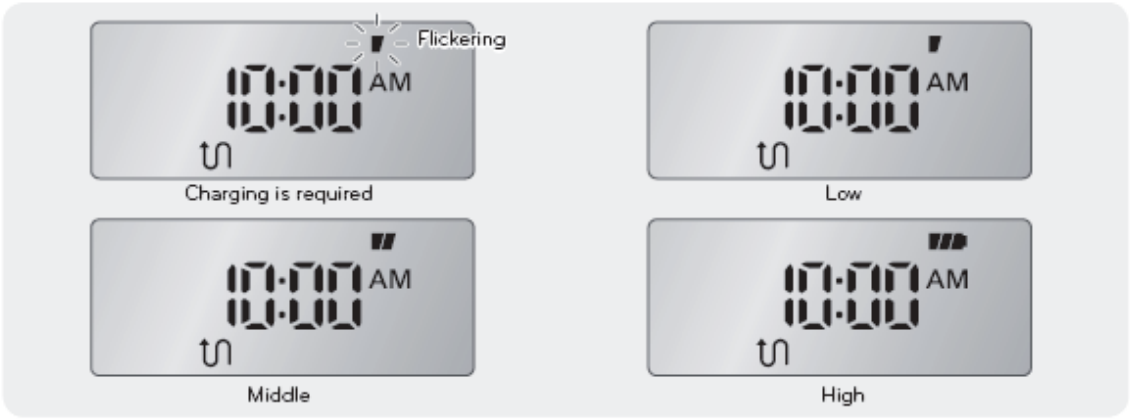
Tip Take the following precautions when using the home station:

- If foreign material is caught in the charging terminal, charging may not proceed smoothly. Wipe the terminal from time to time with a dry cloth after the power plug is disconnected.
- To prevent electric shock, do not touch the charging terminal with any metallic objects.
- To avoid fire or electric shock, never disassemble or modify the home station.
- Do not to place the home station or power plug near to a heating appliance.

8. Remaining Battery Charge Indicator

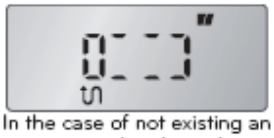
Remaining Battery Charge Indicator

Battery level is indicated on Status Display, as follows.
- If recharging is under way, Battery Level Lamp flickers.
- If recharging is complete, only the 'Battery' and 'Clean Mode' icons are displayed to save the energy.
- Upon the need for recharging, only the first level of Battery Level Lamp is ON, flickering.

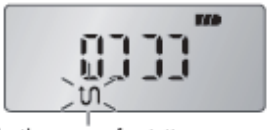


※ If Robot Cleaner comes back to Home Station, with a low level of battery, the 'Clean Mode' lamp starts to flicker.
- When 'Clean Mode' lamp starts to flicker and after recharging is complete, Robot Cleaner will find spots and clean them which were not covered.
- Pressing 'Start' button on Remote Controller or 'Stop' button on main unit, with the 'Clean Mode' lamp flickering, may make Robot Cleaner find and clean uncovered spots.
- Pressing 'Mode' button on Remote Controller will let Robot Cleaner start cleaning from the beginning.

The status indication lamp while the robot is charged (In spatial Zigzag mode)



In the case of not existing an area to be cleaned

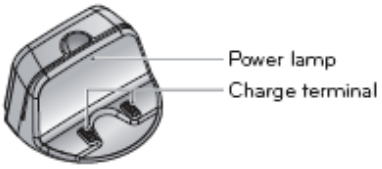


In the case of existing an area to be cleaned (Flickering)

If the Battery is Not Charging

Check 1:

If the battery is not charging even when the Robot Cleaner is attached to the home station, check the following items.
- Turn the power switch on the bottom of the Robot Cleaner off once and then on again.
- Check the power lamp of the home station.
- Wipe the terminal on the home station with a dry cloth



How to Use Main Body Operation Buttons and Remote Controller

■ Turning ON/OFF the Power Button

The power switch at the left backside of the main body is connected between the battery and the Main circuit to function to supply or block the power. Also, it is connected between the recharging connector of the main body and the Main circuit to functions to supply or block the power of the recharging station.

When the main body power switch remains in ON state, the product can be turned on by pressing the button on the main body, and recharge is possible. **If the power is not turned ON even if the power button on the main body is pressed, or if power is not turned on even if the main body is connected to the recharging station, check the status of the main power switch at the left backside of the main body.**

※ When you turn on the main power button, do not turn it on while pressing the button at the top of the cleaning robot. Button operation may be delayed.

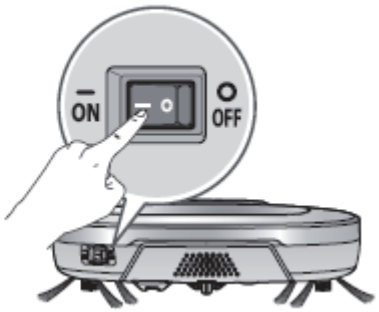
Turning on the main power supply

Make sure the Main Power Switch on the rear-left of the machine.

If the power is OFF, turn the switch ON.

※ When turning on the power switch, do not press the button located at the upper section of the Robot Cleaner. Operation of the button can be delayed.

※ Turn off the power switch if the Robot Cleaner will not be used for a long period of time, in order to protect the battery.



Even if the main body power switch is turned on, Micom does not operate, so there is no change is the status indication window. To start Micom, press the start/stop button of the main body for 1 second after turning on the main body power switch. Then, Micom will start, LED of the screen display window will be turned on, and Booting will start. Booting time may be different for each model, and when the Booting is over, it converts to standby state with a melody.

In the standby state, if the start/stop button of the main body is pressed for 2 seconds or longer, the power will be turned off with the ending melody.

It is the state with the power off, but a small amount of electricity is used for button operation, so when it is left alone for long period of time, the battery may be consumed and power may not be turned on. When it is not used for long period of time, please store it with the power switch turned off.

Turning on from Stand By power.

With the power of Robot Cleaner OFF, press 'Start/Stop' button for min. 1 second until a "Ting" sound is heard. In about 10 seconds, the power will be on with a melody coming out.

※ If 10 minutes elapse with Robot Cleaner not moving and the battery uncharged, the power will automatically be OFF.

How to Use Main Body Operation Buttons and Remote Controller

■ How to Start and Stop Cleaning

Using the buttons on the Robot Cleaner

After the Robot Cleaner main power switch is turned on, press the START/STOP button to begin cleaning. A melody will sound and cleaning will begin.

Press the START/STOP button during the cleaning cycle to stop cleaning.

※ When the 'START/STOP' button is pressed while the power supply of the Robot Cleaner is in Standby, the power will be turned on. Press the 'START/STOP' button one more time to start cleaning.

Using the remote controller

After the Robot Cleaner is turned on press the '▶‖' button on the remote controller. A melody will sound and cleaning will begin.

Press the ▶‖ button during the cleaning cycle to stop cleaning.

※ When the power is off, press the 'Power' button on the remote controller to turn the power on.

※ During cleaning, collisions can happen when the sensor cannot detect objects because of their shape (Thin chairs and table legs, furniture corner). When this happens, the internal impact detecting sensor will react by using a backward motion.

※ If the Robot Cleaner is set to start cleaning at a location away from the home station, put the Robot Cleaner on a flat floor in order to prevent a malfunction of the obstacle detecting sensor. In addition, start cleaning from a location where there are no obstacles . For example, curtains or walls must be 30cm from the Robot Cleaner.

Tip For best results:

- Briefly scan the area to be cleaned for big and small objects that will cause difficulty for the Robot Cleaner.
- If cleaning is started when the Robot Cleaner is at the home station, the device can rapidly be returned to the home station as the current home position has been accurately read.
- When the mop plate is installed, to prevent a 2nd contamination from the contaminated mop, it will not go over door sills of 5 mm or higher.

How to Use Main Body Operation Buttons and Remote Controller

■ Time Setting

You can set or change the current time on the Robot Cleaner.
Pressing 'Clock' button on the Remote Controller, when the Robot Cleaner is in standby mode, will start the clock setting mode.

 Select by using '◀ ▶' buttons on the Remote Controller. The function can be heard through the voice guide.		Set the hour by using '▲▼' buttons on Remote Controller.
		Set the minutes using '▲▼' buttons on Remote Controller.
		Set the AM/PM using '▲▼' buttons on Remote Controller.
		Pressing 'Clock' or '⏯' button on Remote Controller will complete the time setting process.

Tip
- Any scheduled cleaning will be activated based on the time on the Robot Cleaner. You must set the clock before setting scheduled cleaning.
- If there is no input for 10 seconds, the clock setting is canceled.

How to Use Main Body Operation Buttons and Remote Controller

■ Schedule Cleaning

You can schedule cleaning so that the Robot Cleaner starts cleaning at a scheduled time. Pressing 'Schedule' button on Remote Controller, only when the Robot Cleaner is recharging, will start the scheduled cleaning setting.

Setting/Cancelling the schedule cleaning is only possible when the unit is recharging on the home station

Select a setting by using '◀ ▶' buttons on Remote Controller.

'Once reservation'

'Daily reservation'

Select 'Once reservation' or 'Daily reservation' option by using '▲▼' buttons on Remote Controller.
A voice message will confirm the schedule.

Set the hour by using the '▲▼' buttons on Remote Controller.

Set the minutes by using the '▲▼' buttons on Remote Controller.

Set the AM/PM using the '▲▼' buttons on Remote Controller.

Pressing 'Schedule' or '▶|| ' button on Remote Controller will then complete the scheduling process.

Tip

- When the scheduled time comes up, Robot Cleaner will start cleaning by itself.
- Scheduled cleaning can only be set when the Robot Cleaner is recharging.
- While recharging, by pressing the 'Schedule' button on the Remote Controller for 3 seconds will cancel the set schedule.
- If there is no input when setting the schedule time within 10 seconds, the setting is canceled.

How to Use Main Body Operation Buttons and Remote Controller

■ Cleaning Modes

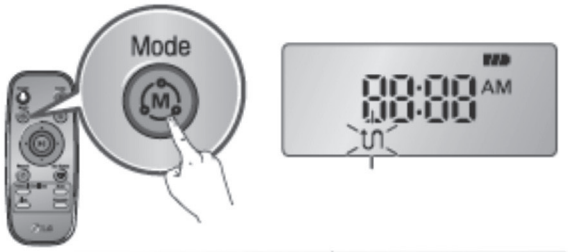
※ If you want to change the mode during the operation, press ⏯ and select the mode.

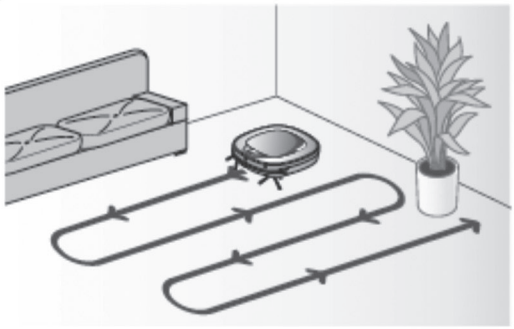
Zigzag Cleaning

In 'Zigzag' mode, Robot Cleaner repeats a zigzag operation to clean each and every spot in the cleaning area.

If you need to quickly clean an area choose 'Zigzag' mode.
Press 'Mode' button on Remote Controller or main unit to select 'Zigzag' mode and press ' ⏯ ' button.

※ Factory release default setting is 'Zigzag'.





Cell by Cell Cleaning

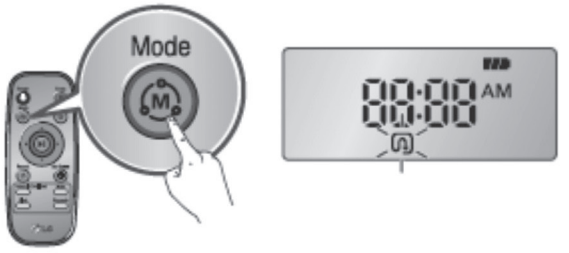
In 'Cell by Cell' mode, Robot Cleaner cleans the area by dividing it into rectangular spaces.
For meticulous cleaning, select this mode.

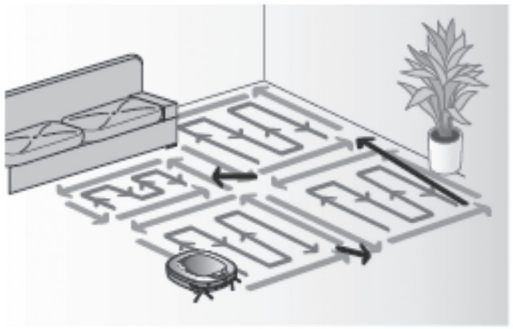
Press 'Mode' button on Remote Controller to select 'Cell by Cell' mode and press ' ⏯ ' button.

The 1st stage:
The maximum outline of 3 m x 3 m of cleaning area will be cleaned. (The size of the outline may vary in accordance with the shape of the area to be cleaned.)

The 2nd stage:
The 2nd stage of Cell by Cell cleaning engages a Zigzag mode automatically.

When the 1st, and 2nd stages are completed, the cleaned area will be cleaned again through the repetition of the above cleaning method as the device advances to the next part of cleaning area.





Tip

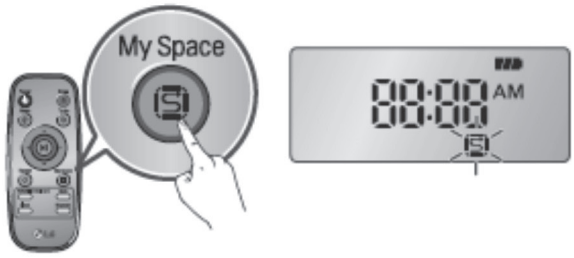
- Once set up, the cleaning mode(Zigzag, Cell by Cell) setting will be maintained even after the power supply is turned off.
- During operation, if a mode change is required, press the ⏯ button and then select the mode. Cleaning will then start from the beginning.

How to Use Main Body Operation Buttons and Remote Controller

■ My space clean

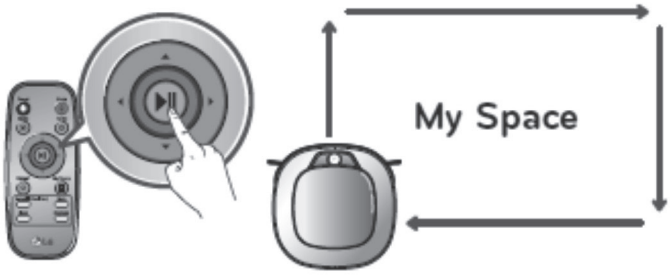
My Space Cleaning

Pressing 'My Space' on the Remote Controller will set the My Space cleaning mode with a voice message.
For cleaning of particular spaces, select this mode.



The 1st stage:
Use the Remote Controller to manually set the parameters of each cleaning block.

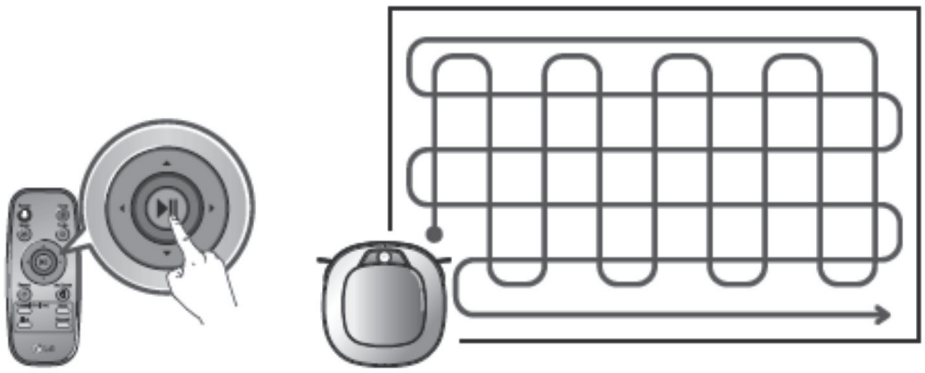
※ This cleaning mode will be accepted when the distance of the start and end position is less than 1 m in area.



The 2nd stage:
Pressing the ' ⏯ ' button will then make the Robot Cleaner clean the manually outlined area by itself.

※ Upon failure to correctly outline a zone, a voice will announce, which says "Area does not meet the specified conditions. Please continue to make specified area for cleaning process."
Use the Remote Controller to assign a zone, again.

※ Upon completion of cleaning for all selected areas, the Robot Cleaner will resume the cleaning mode (Zigzag or Cell by Cell) which it was last set to.



Tip
- While recharging, you cannot activate 'My Space' mode.
- To change the cleaning mode while the Robot Cleaner is in operation, press ⏯ button first then select a cleaning mode. The cleaning will then start from the begining.

How to Use Main Body Operation Buttons and Remote Controller

■ Manual Cleaning and Spot Cleaning

Manual Cleaning

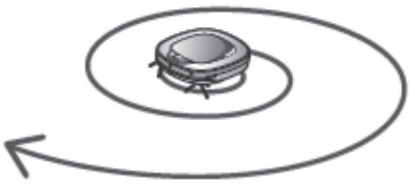
By pressing a direction key on the Remote Controller, you can move the Robot Cleaner manually.
Robot Cleaner will clean the area, by pressing the forward/backward/left/right buttons accordingly on the keypad of the remote control.
While in 'Manual' mode, the robot cleaner will run into obstacles placed behind it if the backward key on the remote is pressed or held down.

Spot Cleaning

Is best used to clean certain parts of the house.
Press 'Mode' button on the Remote Controller to select 'Spot' mode, which will then indicate on the Status Display, then press the ⏯ button, then Robot Cleaner will start Spot cleaning an area of 1.5 m in diameter around it.

※ While recharging, 'Spot' cannot be selected.

It stops at the started position after completing the cleaning(takes 4~5 min.).



How to Use Main Body Operation Buttons and Remote Controller

■ Turbo Mode, Repeat Mode and Learning Mode

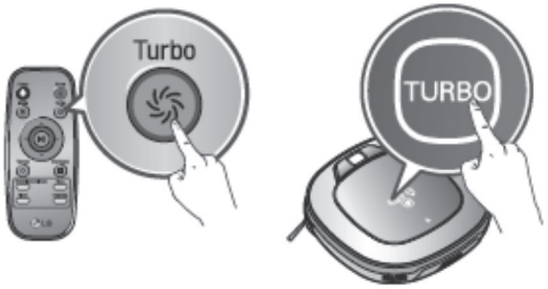
Turbo Mode

Pressing the 'Turbo' button on the Remote Controller or main unit will activate 'Turbo' mode, with a voice message.

While in 'Turbo' mode, pressing the same button will cancel 'Turbo' mode, with a voice message.

In 'Turbo' mode, Robot Cleaner runs more intensely for a powerful clean. Turbo mode will reduce the battery duration.

※ **<Turbo Mode (Floor Master Function)>**
'Turbo mode' will automatically operate when the Robot Cleaner cleans carpets.



Repeat Mode

Pressing 'Repeat' button on Remote Controller will activate 'Repeat' mode, with a voice message.

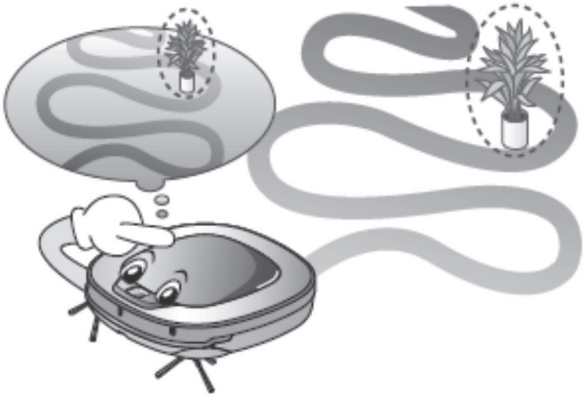
While in 'Repeat' mode, pressing the same button will cancel 'Repeat' mode, with a voice message.

In 'Repeat' mode, Robot Cleaner repeats the cleaning in progress until the battery runs out without returning to the home station.

Learning Mode

The Robot Cleaner is capable of memorising the cleaning environment through its Learning mode for an intelligent cleaning operation.

※ 'Learning Mode' is available only when the machine starts cleaning from the Home Station.



Tip

- Precautions with Smart Operation
  - This Learning mode enables memorizing locations with obstacles to help bypass them. Robot Cleaner memorizes every aspect of the environment it was subjected to from when it started cleaning from the Home Station to the moment it finishes its course.
  - Robot Cleaner learns new conditions again when the location of Home Station has been changed.
  - If the learning mode is accepted, a voice message will say "Environment has been studied by learning process."

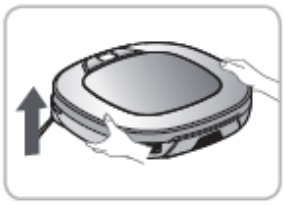
How to Use Main Body Operation Buttons and Remote Controller

■ Location Search Function

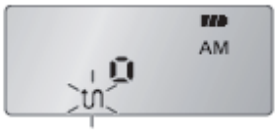
Robot Cleaner remembers its location while cleaning.
If the user moves the Robot Cleaner while it is operating, it will search its location with the location search function to continue from previous location.

When the user removes any abnormal condition of Robot Cleaner or moves the location arbitrarily, the location search function will activate.

※ The navigating function will be activated after Robot Cleaner adequately recognizes the cleaning conditions.

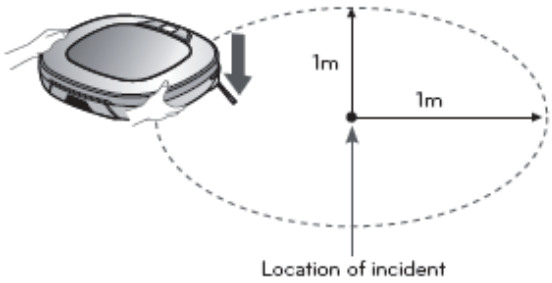


Change location



When the location search function is activated, the cleaning mode of the status indicator will flash

1. Locate Robot Cleaner near the location where Robot Cleaner was moved.
   ※ Location search is more effective when Robot Cleaner is closer to the location where it was moved.
   ※ If it goes out of diameter of 1m from the occurrence position, it becomes difficult to search the position.



2. Press the START/STOP button on Robot Cleaner or START button on the remote controller.
   Robot Cleaner will start the location search function along with an audio guide.
   ※ When the location search is successfully completed, it will continue to the cleaning from where it was moved.
   If position search fails, it will start again from the beginning.

Tip

- When the power is turned off after the location search function is set, the location search function will be canceled.
- Location search is more effective when Robot Cleaner is closer to the location where it was moved.
- After position search function is set, if timer is set or it is recharged, then the setting will be cancelled.

How to Use Main Body Operation Buttons and Remote Controller

■ Smart Diagnosis

Robot Cleaner uses this Smart Diagnosis feature to run a self-diagnosis.
If any irregularity is found from the diagnosis, please contact the local LG Electronics service center.

※ During Smart Diagnosis, the Robot Cleaner will move about within a 50 cm radius. So, make sure no objects are in the way within a 1 m radius around the Home Station, before starting Smart Diagnosis.

1. Smart Diagnosis will operate when the main power switch of the Robot cleaner and the Home station are turned on, and the unit docked on the Home station.

   ※ Smart Diagnosis is only possible when the Robot Cleaner is attached to the Home Station.

2. Press 'Diagnosis' button on the Remote Controller, then the process will start with a voice message which says "Roboking smart diagnosis will be started. Please step away and clear around 1 meter around the home station."

   ※ If the Mop Plate is attached, the process will not be activated.

3. When the Smart Diagnosis has successfully finished, Robot Cleaner will return back to the Home Station and inform the result through a voice message. After the voice message, pressing the 'HOME' button on the Remote Controller or main unit will allow the voice message to be repeated. To terminate the diagnosing process, press the ' ⏯ ' button on the Remote Controller or main unit.

   ※ After the Smart Diagnosis voice message, the Robot Cleaner will start recharging after 1 minute.

   ※ If an error is detected with any of the Sensors whilst in Smart Diagnosis, a voice message will announce, and the unit will not return to the home station.

Tip

- Be careful not to touch the Robot Cleaner or disturb its operation before Smart Diagnosis is complete. If it is accidently interrupted, turn the main power switch OFF then ON again to resume the diagnosis.
- Smart Diagnosis will not be activated in each of the following cases. In each case, check the problem and try again.
  - Robot Cleaner is detached from Home Station
  - Battery level is insufficient
  - No Dust Bin Filter is fitted.
  - Mop Plate is attached

How to Use Main Body Operation Buttons and Remote Controller

■ Smart Diagnosis

If a voice message comes out after Smart Diagnosis, refer to the following table to take proper actions.

Voice message	Measures (for reference)
Start the diagnosis. Step back from Robot cleaner and clear any object within a 1 m radius around Home Station.	Clear any object within a 1 m radius around Home Station, and stay back until the diagnosis is complete.
Smart Diagnosis is available only when Robot cleaner is recharging itself. Move the robot to Home Station.	Move Robot cleaner to Home Station to recharge it.
No irregularities found from the diagnosis.	
Battery is not enough to place the robot in 'Smart Diagnosis' mode. Recharge the battery and try again.	Try the Smart Diagnosis again after recharging the battery.
Check if there is a Dust Bin with a filter built in.	Open the Dust Bin Cover and examine the bin.
Robot cleaner does not attempt to recharge itself, due to an error in Infrared Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
Robot cleaner does not attempt to recharge itself, due to an error in Ultrasonic Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
Robot cleaner does not attempt to recharge itself, due to errors in the three Cliff Sensors on the front bottom. Clean these sensors.	Clean the three Cliff Sensors on the front bottom.
Clean the lens of Camera Sensor on the bottom-right.	Clean the lens of Camera Sensor on the bottom-right.
Clean the lens of Obstacle Sensors on the left-right.	Clean the lens of Obstacle Sensors on the left-right.
There is an error in Gyro Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
Check for alien materials on the left wheel.	Check for alien materials on the left wheel.
Check for alien materials on the right wheel.	Check for alien materials on the right wheel.
An error in the Left Wheel Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
An error in the Right Wheel Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
Check for any alien material stuck in the Brush on the bottom.	Check for any alien material stuck in the Brush.
An error found in Absorption Motor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
An error found in Acceleration Sensor.	Run Smart Diagnosis again and, if the same message comes out, contact the local LG Electronics service center.
If you need to check again the diagnosis result, press 'Recharge' button, or press 'Stop' button to finish the diagnosis.	If you need to check again the diagnosis result, press 'Recharge' button, or press 'Stop' button to finish the diagnosis.
Turn OFF and ON the Main Power Switch to resume the diagnosis. If the problem persists, contact the local LG service center.	Turn OFF and ON the Main Power Switch to resume the diagnosis. If the problem persists, contact the local LG service center."
Cancel the Smart Diagnosis mode.	
Cannot enter the Diagnosis mode due to the Mop Plate attached. Remove the plate and try again.	Run Smart Diagnosis again after removing the Mop Plate.
Failed to complete Smart Diagnosis. Turn OFF and ON the Main Power Switch to resume the diagnosis.	Turn OFF and ON the Main Power Switch to resume the diagnosis. Do NOT touch the robot or disturb its operation until the diagnosis is complete.
Check for contamination of Charging Terminal.	Clean the bottom of the machine and Charging Terminal on Home Station.

■ Suction Motor

Manufacturer: Nidec

Nidec

SPECIFICATION FOR DC BRUSHLESS MOTOR

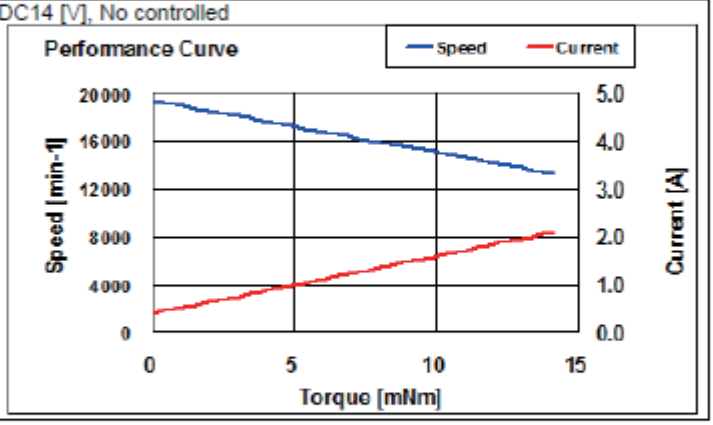
1. Application
This document defines the specification for DC brushless motor.

2. Ratings

No.	Item	Specification	Note
1	Rated voltage	DC 14[V]	-
2	Minimum operating voltage	DC 12[V]	-
3	Maximum operating voltage	DC 16.8[V]	-
4	Type	3phases 12poles brushless motor with 3 hall sensors.	-
5	Rotation direction	CCW	View from rotor side

3. Characteristics
・ Characteristics should be specified at a temp. of 20±5[℃] and normal humidity.

No.	Item	Specification	Note
1	No load current	600 [mA] Max.	DC14 [V],No load, No controlled, 10[s] after started.
2	No load speed	19200 ±15% [min^{-1}]	DC14 [V],No load, No controlled.
3	load current	1750 [mA] Max. Rev.A *1	DC14 [V],10mN・m load, No controlled,10[s] after started.
4	load speed	13400 [min^{-1}] Min Rev.A *2	DC14 [V],10mN・m load, No controlled,10[s] after started.
5	Axial play	0.55 [mm] Max.	
6	Noise	55 [dB(A)] Max.	DC14 [V], No load, No controlled, Set on sponge. Microphone at 30[cm] aligned on the motor axis.,
7	TI-TN curve (Typical performance)	DC14 [V], No controlled	



REV					
	APPROVED	P.LI	2014-10-30	MODEL	20N698L040
	DESIGNED	Q.ZHANG	2014-10-30		
	APPROVED	Z.HAN	2014-10-07	DRAWING No.	3DSPC149006A
	CHECKED	P.LI	2014-10-07		
	DESIGNED	P.LI	2014-09-29	DC BRUSHLESS MOTOR	Sheet 2 of 9
	DRAWN	X8.ZHANG	2014-09-29		

NIDEC CORPORATION

■ Agitator Motor

Manufacturer: STANDARD

ITEMS 项目	CONDITIONS 条件	SPECIFICATIONS 规格
1.0 **STANDARD OPERATING CONDITION** 标准使用状态		
1.1 RATED VOLTAGE 额定电压	DC constant power supply between motor terminal 在马达及端子间使用直流电稳定电源	12.0V
1.2 OPERATING VOLTAGE RANGE 使用电压范围		10.0 V ~ 14.0 V
1.3 RATED LOAD 额定负载	Pulley load 滑轮负载	3.5 mN.m ≒ 35.7 gf.cm
1.4 DIRECTION OF ROTATION 旋转方向	View point: Shaft output direction 视点:输出轴方向	CCW & CW
1.5 OPERATING TEMP./HUMID. RANGE 使用温度/湿度範圍		-10 ℃ ~ 60 ℃ 5 %RH ~ 95 %RH
1.6 STORAGE TEMP./HUMID. RANGE 保存温度/湿度範圍		-10 ℃ ~ 60 ℃ 5 %RH ~ 95 %RH
2.0 **TESTING CONDITION** 测定状态		
2.1 POWER SUPPLY 电源		DC onstant power supply 直流电稳压电源
2.2 MOTOR MOUNTING POSITION 马达安装姿势		Shaft output side w/ any direction 输出轴全方向放置
2.3 TEMPERATURE/HUMIDITY 温度/湿度		10 ℃ ~ 30 ℃ 5 %RH ~ 95 %RH Refer to JIS standard (20°C±2°C, 65%±5%) in case of problems 如有疑问，按JIS标准作准(20°C±2°C，65%±5%)
2.4 DIRECTION OF ROTATION 旋转方向	View point: Shaft output direction 视点:输出轴方向	CCW
3.0 **ELECTRICAL CHARACTERISTICS** 电气特性	General 通用	
3.1 NO LOAD CURRENT 无负载电流	30~60sec run-in period before measurement taken 测试前作30~60秒间的初期运转	155 mA (MAX.)
3.2 NO LOAD SPEED 无负载转速		9600 rpm ± 15%
3.3 RATED LOAD CURRENT 额定负载电流		550 mA (MAX.)
3.4 RATED LOAD SPEED 额定负载转速		8300 rpm ± 15%
3.5 STALL CURRENT 停动电流	Based on measurement at two different load (3.5mN.m & 13mN.m) 2点法（3.5mN.m &13mN.m)	3.8 A (MAX.)
3.6 STALL TORQUE 停動扭矩		23 mN.m (min.)
3.7 INSULATION RESISTANCE 絕緣抵抗	Applied between motor housing and terminal without failure 应用于馬達大殼及端子之間, 無異常	10 MΩ 500 V DC 1 minute 1 分钟
3.8 DIELECTRIC STRENGTH 耐电压	Between motor terminal and motor metal housing 马达端子与大壳之间	50~60Hz Ac600V 2mA 1 second 1 秒
3.9 PERFORMANCE CURVE 参考线图		RP365-ST-1895
4.0 **MECHANICAL CHARACTERISTICS** 机械特性		
4.1 SHAFT END PLAY 轴向间隙		0.05 mm ~ 0.25 mm
4.2 MOTOR COMPOSITION 马达结构		DWG NO. 图番号 ZP-R365ST-012
4.3 EXTERNAL APPEARANCE 外观	Eye sight verification 目视判定	DWG NO. 图番号 WG-R365T-T10

Technical Descriptions of the Parts

■ Wheel Motor

Manufacturer: SHARP

DOCUMENT NO. 文件编号 SQJ-BF24-008

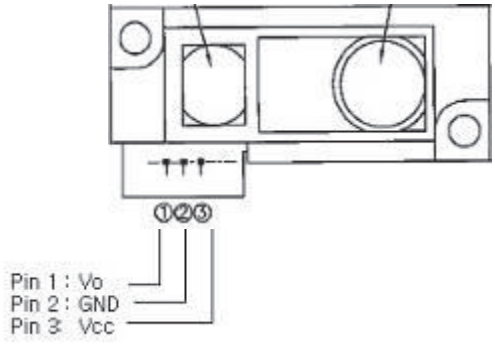
ITEMS 项目	CONDITIONS 条件	SPECIFICATIONS 规格
1.0 **STANDARD OPERATING CONDITION** 标准使用状态		
1.1 RATED VOLTAGE 额定电压	DC constant power supply between motor terminal 在马达及端子间使用直流电稳定电源	12.0V
1.2 OPERATING VOLTAGE RANGE 使用电压范围		10.0 V ~ 14.0 V
1.3 RATED LOAD 额定负载	Pulley load 滑轮负载	2.3 mN.m ≒ 23.5 gf.cm
1.4 DIRECTION OF ROTATION 旋转方向	View point: Shaft output direction 视点:输出轴方向	CCW & CW
1.5 OPERATING TEMP./HUMID. RANGE 使用温度/湿度范围		-10 ℃ ~ 60 ℃ 5 %RH ~ 95 %RH
1.6 STORAGE TEMP./HUMID. RANGE 保存温度/湿度范围		-10 ℃ ~ 60 ℃ 5 %RH ~ 95 %RH
2.0 **TESTING CONDITION** 测定状态		
2.1 POWER SUPPLY 电源		DC onstant power supply 直流电稳压电源
2.2 MOTOR MOUNTING POSITION 马达安装姿势		Shaft output side w/ any direction 输出轴全方向放置
2.3 TEMPERATURE/HUMIDITY 温度/湿度		10 ℃ ~ 30 ℃ 5 %RH ~ 95 %RH Refer to JIS standard (20°C±2°C, 65% ±5%) in case of problems 如有疑问，按JIS标准作准(20°C±2°C, 65%±5%)
2.4 DIRECTION OF ROTATION 旋转方向	View point: Shaft output direction 视点:输出轴方向	CCW
3.0 **ELECTRICAL CHARACTERISTICS** 电气特性	General 通用	
3.1 NO LOAD CURRENT 无负载电流	30~60sec run-in period before measurement taken 测试前作30~60秒间的初期运转	110 mA (MAX.)
3.2 NO LOAD SPEED 无负载转速		7100 rpm ± 15%
3.3 RATED LOAD CURRENT 额定负载电流		270 mA (MAX.)
3.4 RATED LOAD SPEED 额定负载转速		6500 rpm ± 15%
3.5 STALL CURRENT 停动电流	Based on measurement at two different load (2.3mN.m & 7.5mN.m) 2点法（2.3mN.m &7.5mN.m)	1.7 A (MAX.)
3.6 STALL TORQUE 停動扭矩		13 mN.m (min.)
3.7 INSULATION RESISTANCE 絕緣抵抗	Applied between motor housing and terminal without failure 应用于馬達大殼及端子之間, 無異常	10 MΩ 500 V DC 1 minute 1 分钟
3.8 DIELECTRIC STRENGTH 耐电压	Between motor terminal and motor metal housing 马达端子与大壳之间	50~60Hz Ac600V 2mA 1 second 1 秒
3.9 PERFORMANCE CURVE 参考线图		RS365-ST-12115
4.0 **MECHANICAL CHARACTERISTICS** 机械特性		
4.1 SHAFT END PLAY 轴向间隙		0.05 mm ~ 0.25 mm
4.2 MOTOR COMPOSITION 马达结构		DWG NO. 图番号 ZP-R365ST-014
4.3 EXTERNAL APPEARANCE 外观	Eye sight verification 目视判定	DWG NO. 图番号 WG-R365T-T13

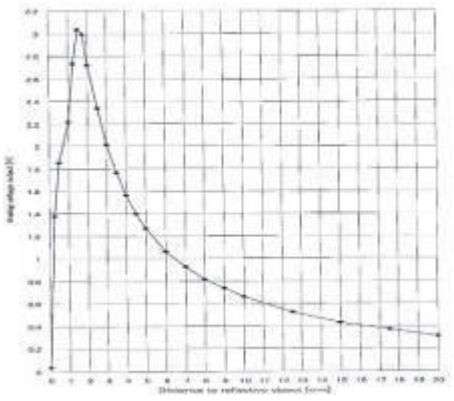
Technical Descriptions of the Parts

■ Wheel Motor

Manufacturer: SHARP

Model Name	**GP2Y051SK0F**
Operation Voltage	DC 4.5V ~ 5.5V
Measurable Distance	2 ~ 15 cm
Connector Voltage Output (L=30)	Min = 0.25 / Typ = 0.4 / Max = 0.55 (V)
Minimum/Maximum Distance Voltage Difference	Min = 1.95 / Typ = 2.25 / Max = 2.55 (V)
Average Current Supply	Typ = 12 / Max = 22 (mA)





(Ta=25℃, Vcc=5V)

Parameter	Symbol	Ratings	Unit	Remark
Supply voltage	Vcc	-0.3 to +7	V	-
Output terminal voltage	Vo	-0.3 to Vcc+0.3	V	-
Operating temperature	Topr	-10 to +60	℃	-
Storage temperature	Tstg	-40 to +70	℃	-

Operating supply voltage

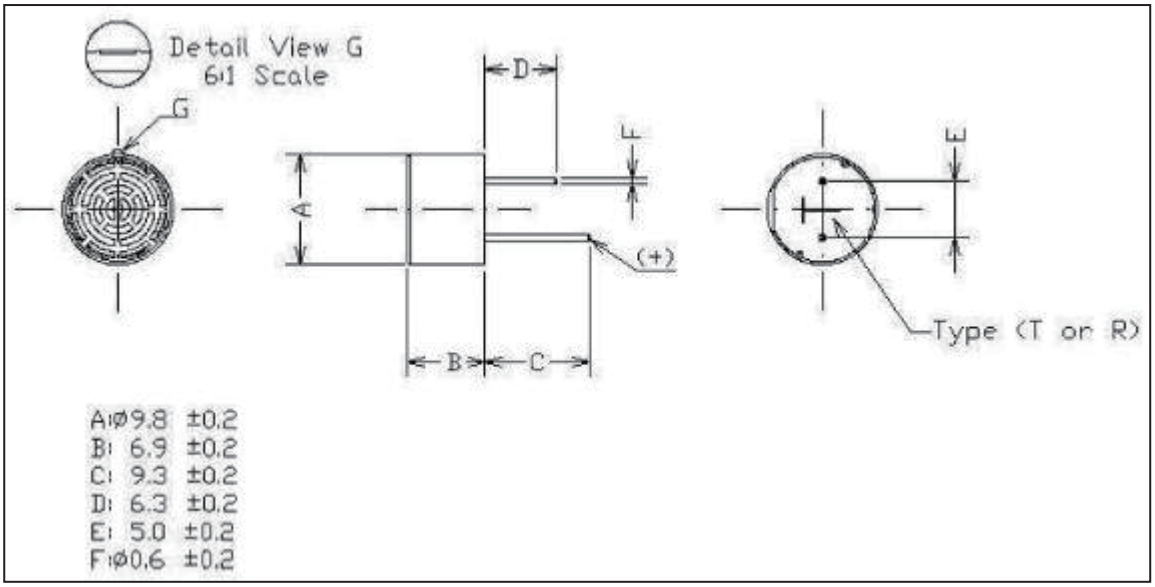
Symbol	Rating	Unit	Remark
Vcc	4.5 to 5.5	V	-

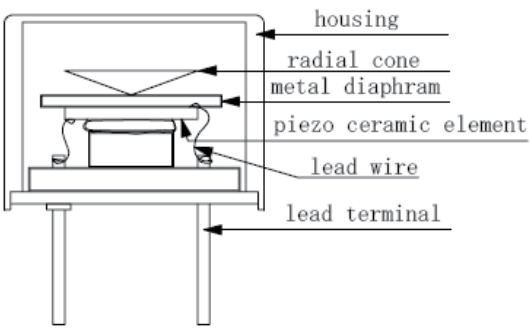
Technical Descriptions of the Parts

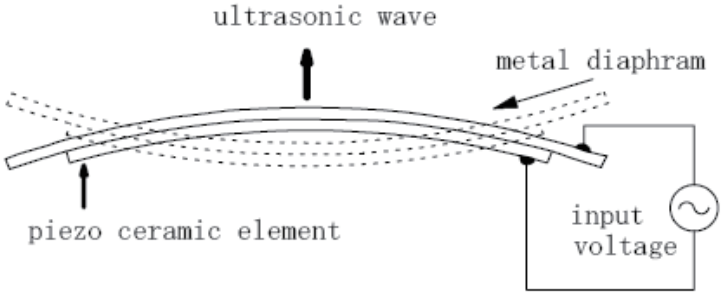
■ Wheel Motor

Manufacturer: SensorTech

Category	Specification	Remark
Applied frequency	40 ± 1	
Transmission Sound Pressure Level	122.00 ~ 123.16	0dB = 0.02mPa, 10Vrms, 30cm
Reception Sensitivity	-58.06 ~ -54.54	0dB = 10V/Pa, 30cm
Angle of Beam Spread	90 ± 10°	-6 dB down angle
Capacitance	2100 ± 20%	@1KHz
Max Input Voltage	20 Vrms	
Operation Temperature Range	-30 ~ 80	
Storage Temperature Range	-40 ~ 85	







■ Battery

Manufacturer: LG Chem.

2.1 Electrical Spec

No	Item	Test Method and Condition	Criteria
1	Standard charge	Charging the pack initially with constant current at 1250mA and then with constant voltage at 16.8V till charge current declines to 100mA	
2	Rated Capacity	The capacity means the discharge capacity of the pack, which is measured with discharge current of 500mA with 12.0V cut-off voltage after standard charge	≥32.9Wh (2290mAh)
3	Cycle Life	Charge : 16.6V, 1.6A, 200mA cut off Charge rest : 10min Discharge : 38W to 14V Discharge rest: 10min Cycle times : 500times	Residual capacity ≥80%
4	Self-discharge	After the standard charging, storied the pack under the condition at the 25℃ for 30 days, then measured the capacity with 0.5C till 12.0V	Residual capacity ≥85%
5	Initial impedance	Internal resistance measured at AC 1kHz after 100% charge	≤160mΩ
6	Shipping voltage	As of shipment	14.2 ~ 14.7V (within 1month after pack build)
7	Temperature Characteristics	1. Charge: Standard charge at 23±5℃. 2. Capacity: comparison at each temperature, measured with constant discharge current 0.2C with 12.0V cut-off. Percentage as an index of the capacity compared with 100% at 25℃	

■ PCM(Protection Circuit Module)

Manufacturer: LG Chem.

3.1. 1st Level Protection

3.1.1 Cell Under voltage, Over voltage

The R2J24060F turn off the charge and discharge FETs if pack depletion is detected during discharge. Pack depletion is detected if the minimum cell voltage drops below **Discharge stop voltage**.

C-FET is turn off if maximum cell voltage is detected over charge voltage during charge

Item	Criteria	Remark
Discharge stop voltage	2.8Volt	
Over charge voltage	4.24Volt	

3.1.2 Over-charge and discharge current

The R2J24060F turn off the charge and discharge FETs if Current() exceeds **Over Charge Current** for **Over charge current judgment time**. Recovery is by discharging current detection or after 60secs.

The R2J24060F turn off the discharge FETs if Current () exceeds **Over discharge Current** for **Over discharge current judgment time**. Recovery is by charging current detection or after 60secs.

Item	Criteria	Remark
Over Charge Current	3000mA	
Over charge current judgment time	4sec	
Over discharge Current	9000mA	
Over discharge current judgment time	4sec	

3.1.3 Hardware Over current and Short Circuit

The R2J24060F can detect and protect the load from and over-current (OC) or short circuit (SC).

Item	Criteria	Remark (Delay Time)
Discharge over current	15A	31msec
Discharge Short circuit current1	40A	1msec
Discharge Short circuit current2	20A	1msec

■ Battery

Manufacturer: LG Chem.

Temperature for charging. The Manufacturer Access() status is set to Overheat and recovery is by a temperature within the allowable range and below **Discharge Reset Temperature** if discharging, or between **Charge Start Low Temperature** and **Charge Start High Temperature** if charging, or by removal

In addition, the R2J24060F will set the ManufacturerAccess () status to Overheat during discharge if pack temperature exceeds **Discharge Alarm Temperature**, while leaving the FETs on. This provides warning to the system that the pack is about to overheat.

Item	Criteria	Remark
Discharge Lower Temperature	-20degC	
Discharge High Temperature	60degC	
Charge Low Temperature	0degC	
Charge High Temperature	60degC	
Discharge Reset Temperature	50degC	
Charge Start Low Temperature	0degC	
Charge Start High Temperature	60degC	

3.2. 2nd Level Protection (Permanent Failure)

The R2J24060F provides features that can be used to indicate a more serious fault via the SAFE output. This output can be used to blow an in-line fuse to permanently disable the battery pack from charge or discharge activity

Item	Criteria	Remark
Over Voltage	4.385V, 5sec	
Over Discharge	1.3V, 10sec	
Cell Temperature	90degC, 5sec	
Cell imbalance	Charging current ≧ 500mA & Max cell voltage ≧ 3800mV & (max cell voltage – min cell voltage) ≧ 300mV, 10sec	
FET Error	100mA, 30sec	

■ PCM(Protection Circuit Module)

Handling and Cautions

8.1 Disassembly: Never disassemble the battery pack. If the pack is damaged and short circuit is caused by conductive material inflow, overcurrent will flow and there is a risk of device damage or heat generation.

8.2 Handling: It may cause the falling out of soldered area or welded area, so be careful during the handling of the battery pack.

8.3 Short circuit: Be careful of the short circuit of the batter pack. If there is a short circuit in the batter pack, over-current will flow and there is a risk of device damage or heat generation. Do not expose it to heat.

8.4 Exposure to moist environment: Do not use the battery pack in a moist state. The current leakage by the moist of the insulating material inside the pack may cause degradation of the performance.

8.5 Recharging station: Use only the recharging station specified for this battery pack. Using other recharging station other the specification may cause heat generation, flame, or an explosion.

Safety Cautions and Verifications During the Repair

1. Make sure to convert the power to “Off” state when you check, disassemble, or repair the cleaning robot. (Turn off the power button at the left backside of the main body.)

2. The circuits used in the cleaning robot are sensitive to static electricity, so repair in an environment without static electricity. (Wear antistatic gloves and sleepers.)

3. During the electricity applied inspection of the circuit, do not have pin or coin contact with the recharging part.

4. Make sure to use the designated parts for replacement parts during the repair.

5. Use appropriate tools for repair.

6. Make sure to check the damage of the power cable, etc. before the repair. If the sheath is peeled or if there is a short circuit, make sure to firmly connect it and wrap it with insulation tape.

7. Check the parts with problems using the diagnosis program before and after the repair.

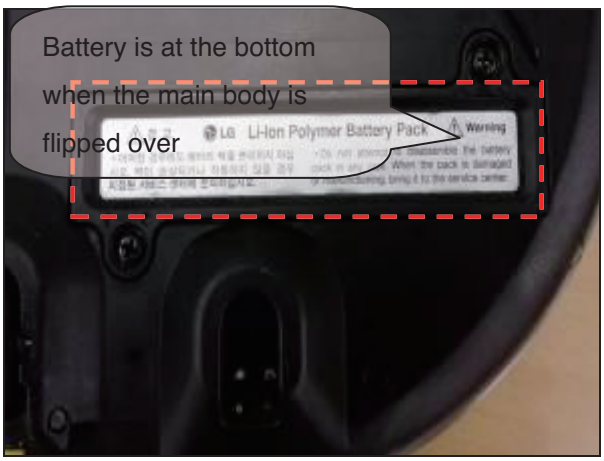
8. Check if the upper part and lower part of the main body are completely combined. (It may cause degradation of the suction power or noise generation. Especially, check the handling of the lead line.)

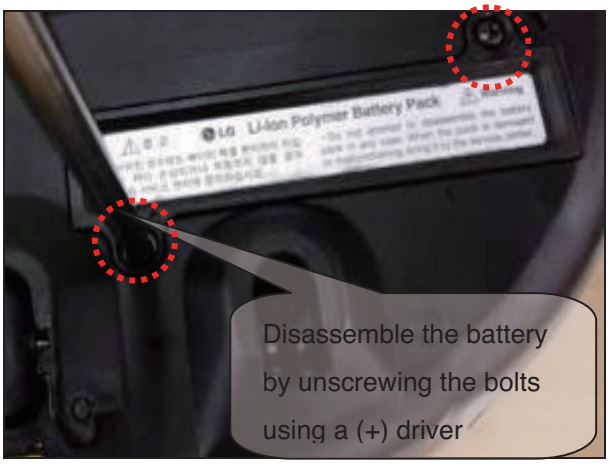
9. Make sure to carry out the insulation test of the motor. (It is OK if it is 5MΩ or more between the impeller cover of the motor and the power connector.)

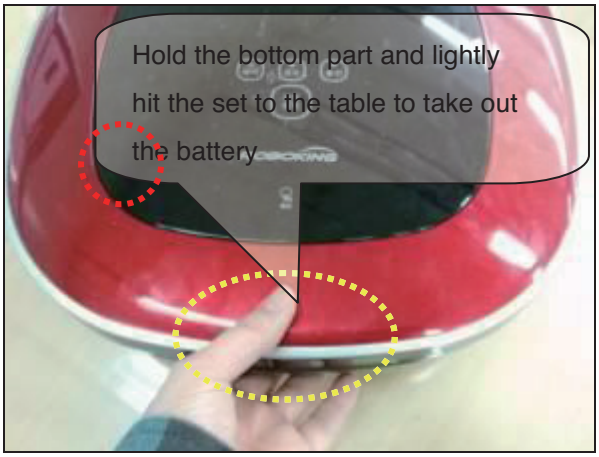
How to Disassemble/Assemble Major Parts

■ Battery Disassembly

Make sure to disassemble the battery before the disassembly/assembly work. After setting power switch to OFF, then unscrew two battery screws by using a (+) driver and disassemble the battery.





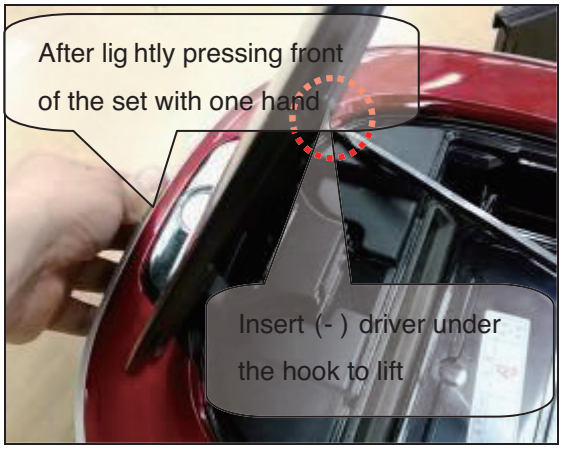


How to Disassemble/Assemble Major Parts

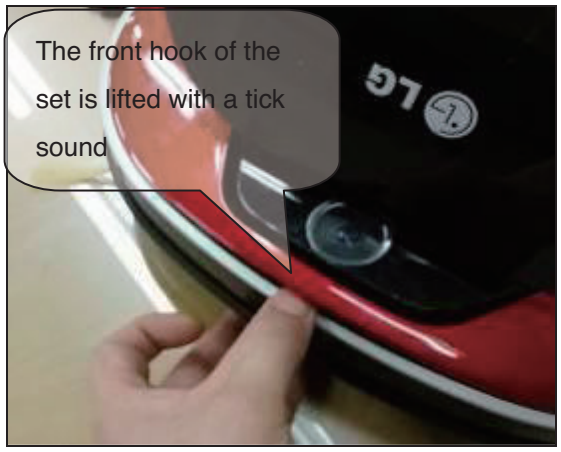
■ Cover Assembly

1. Open COVER

2. Take out Dust Bin



3. Separate DÉCOR COVER



3. Separate DÉCOR COVER

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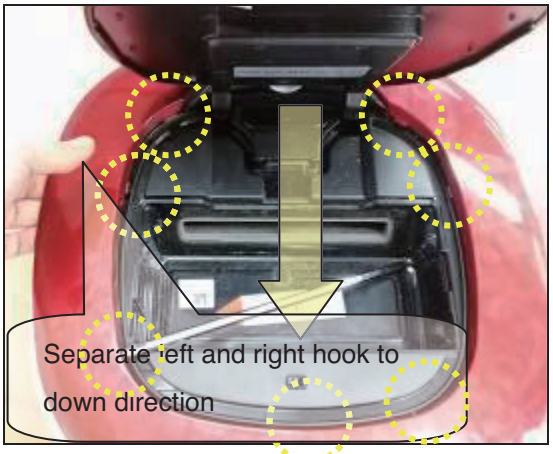
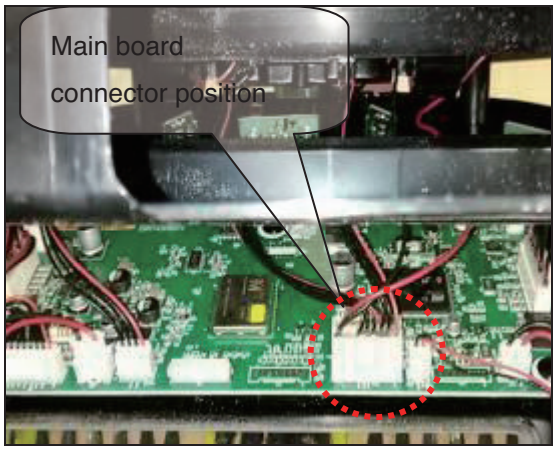


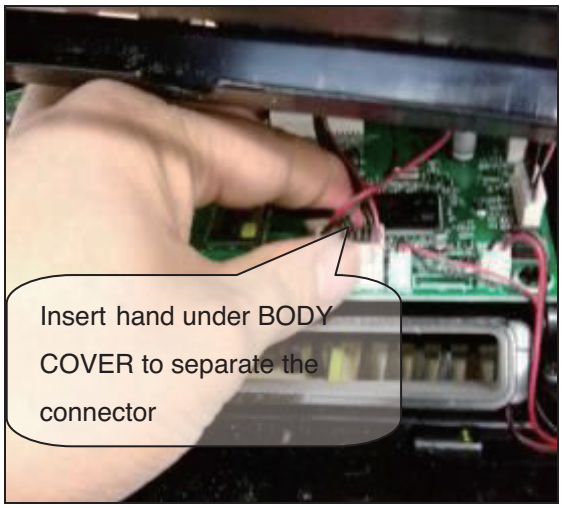
3. Separate DÉCOR COVER

3. Separate DÉCOR COVER

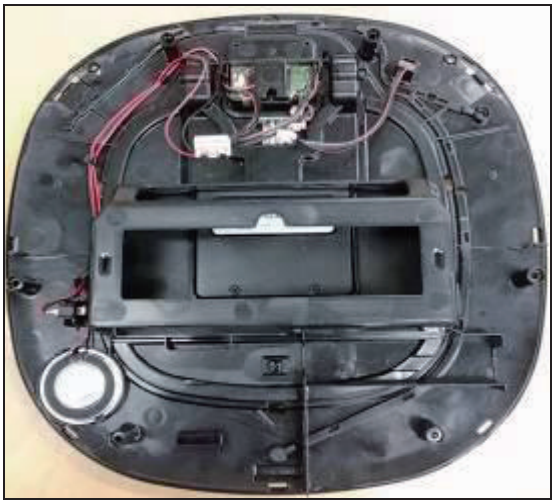
3. Separate DÉCOR COVER

4. Separate BODY COVER

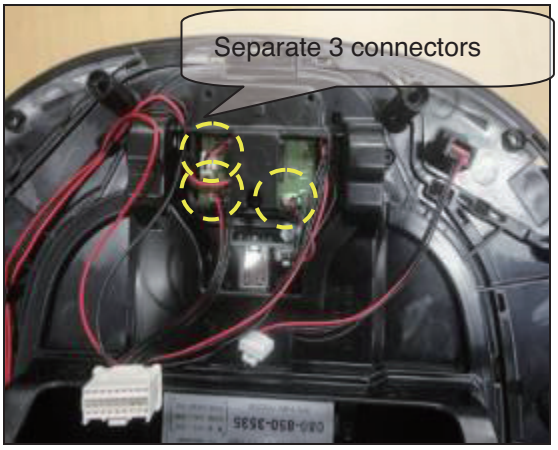




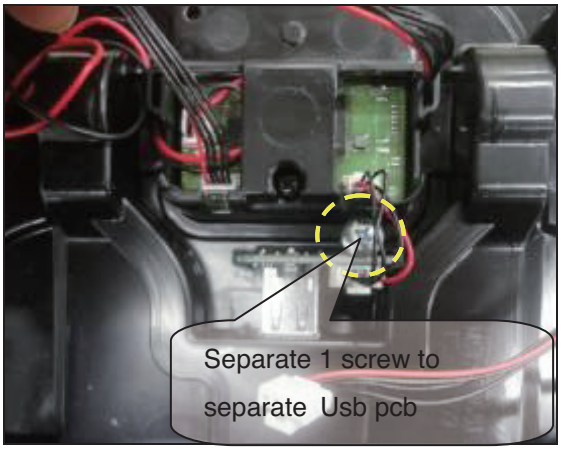
4. Separate BODY COVER



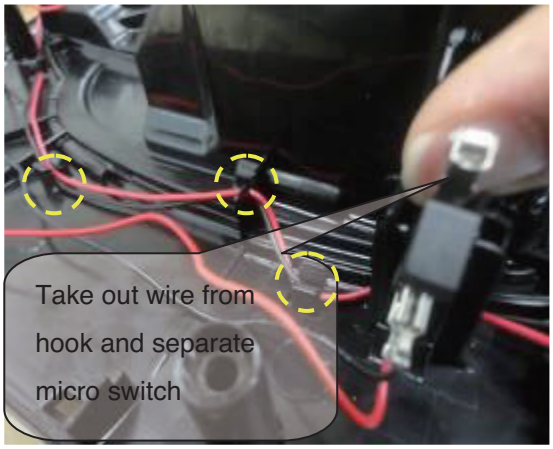
5. After separating COVER ASSEMBLY



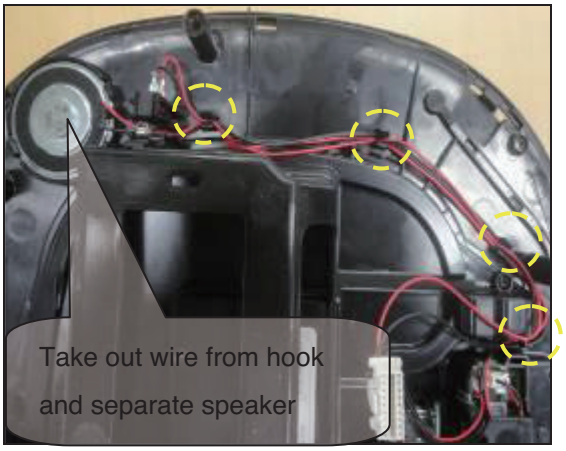
6. Separate VISION BOARD wire



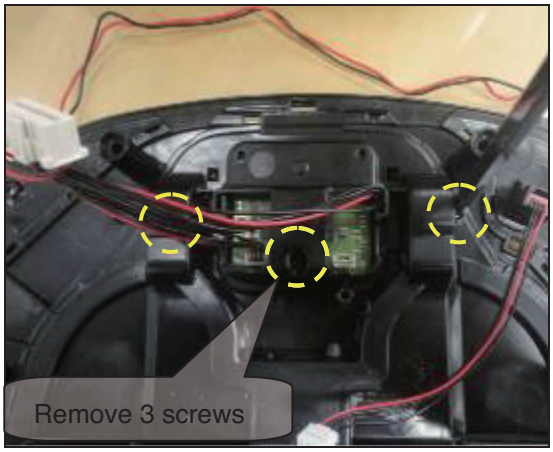
7. Separate USB PCB



8. Separate Dust Bin Sensor Switch

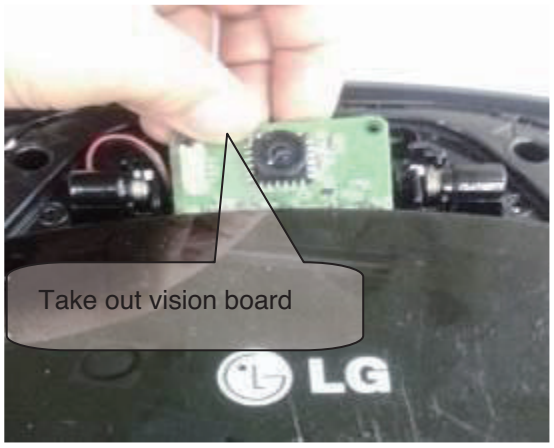


9. Separate Speaker

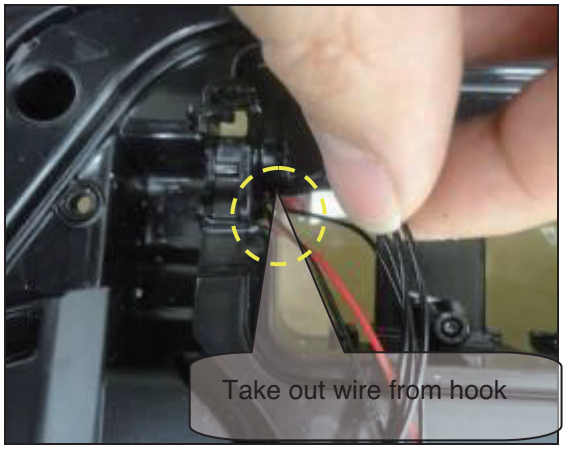


10. Separate WINDOW GLASS

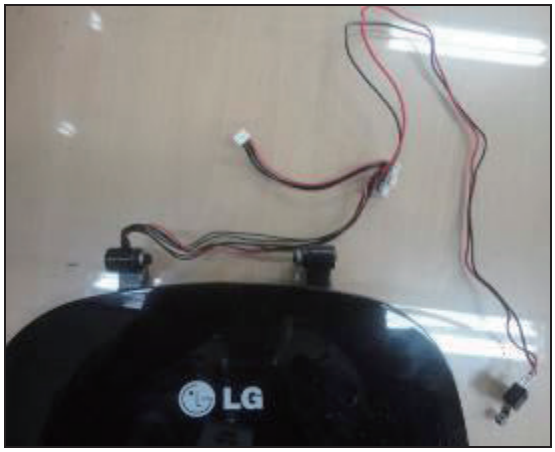
10. Separate WINDOW GLASS



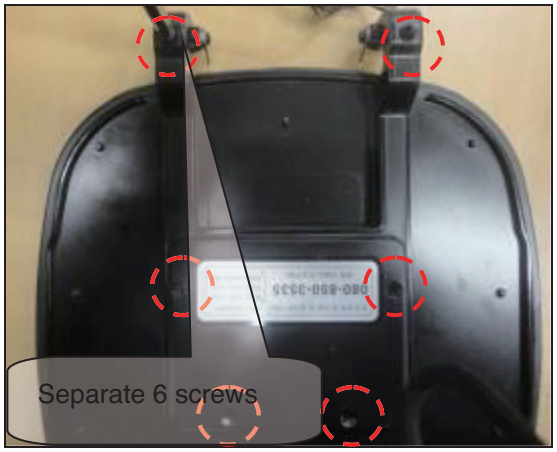
11. Separate VISION BOARD



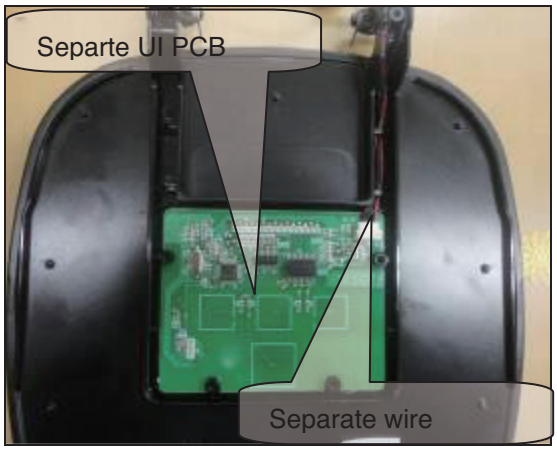
12. Separate TOP COVER ASS'Y



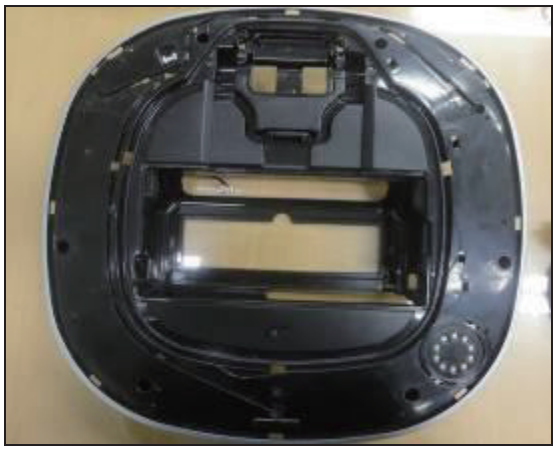
13. After TOP COVER ASS'Y is separated



14. Separate HOLDER

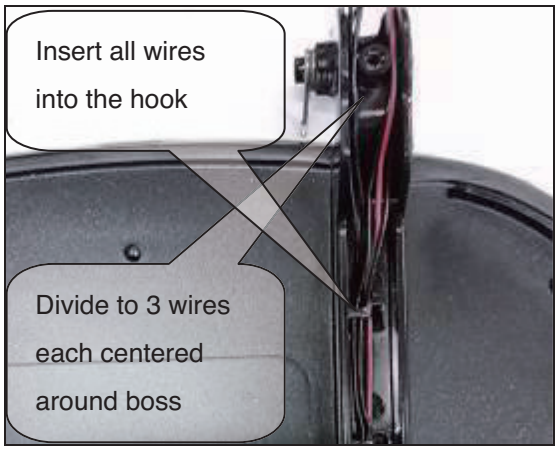


15. Separate UI PCB, wire

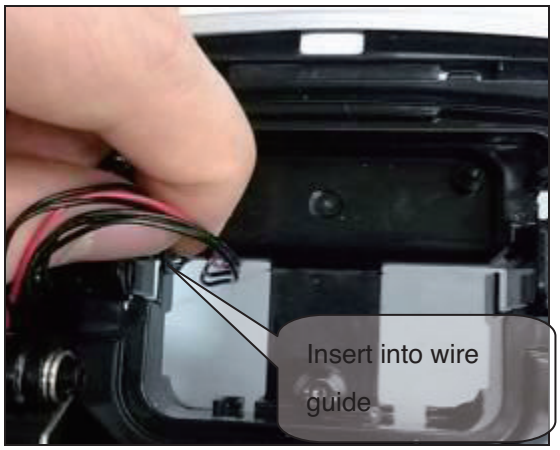


16. After INNER COVER is separated

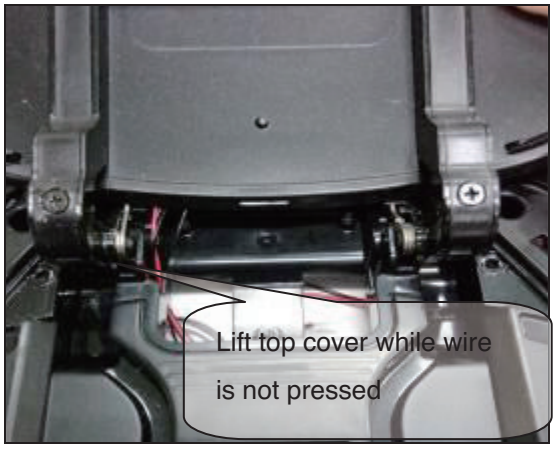
■ Cautions during Top Cover reassembly



During the assembly, wire may be imprinted, so insert into the hook to divided to groups of 3

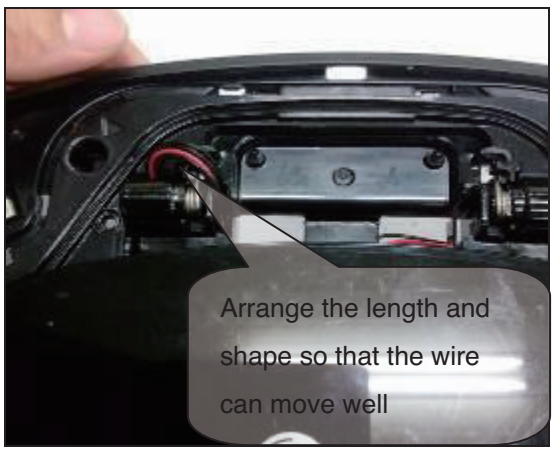


If it is not inserted in to the guide, wire may be pressed by the vision board and disconnected



Arrange the wires not to be stuck in the top cover and lock spring to top cover

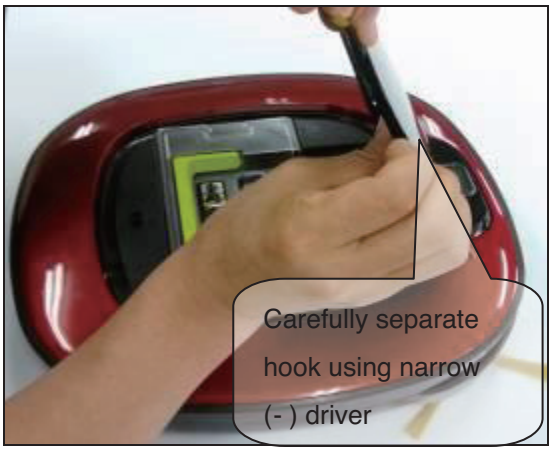
Assembly by pressing the ends of both springs using (-) driver



Arrange well after top cover assembly so that the wire can move well

■ Window viewing disassembly

1. Separte left hoo
   (Be careful not to break)



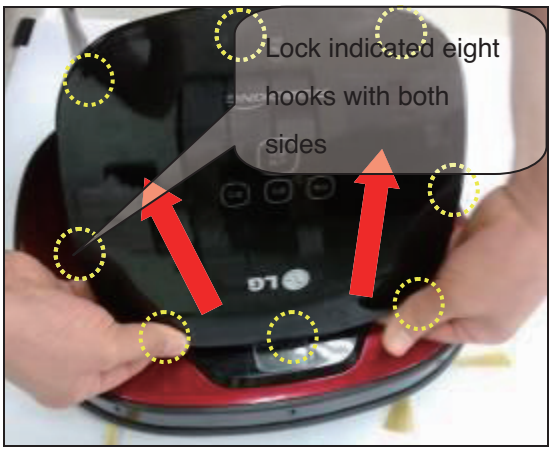
2. Separate right hook
   (Be careful not to break)

3. Separate center hook

(Be careful not to break)

4. Separate WINDOW VIEWING (1)

5. Separate WINDOW VIEWING (2)

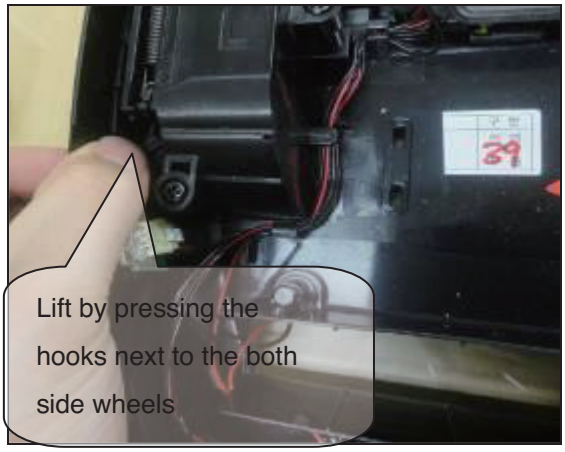


6. Reassemble WINDOW VIEWING

How to Disassemble/Assemble Major Parts

■ Base Assembly

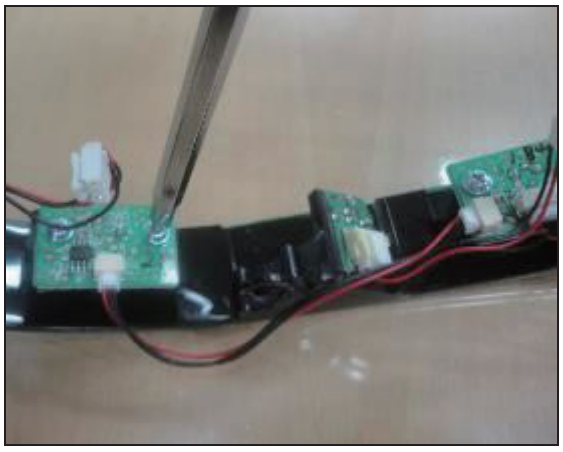
1. Shape of BASE ASSEMBLY



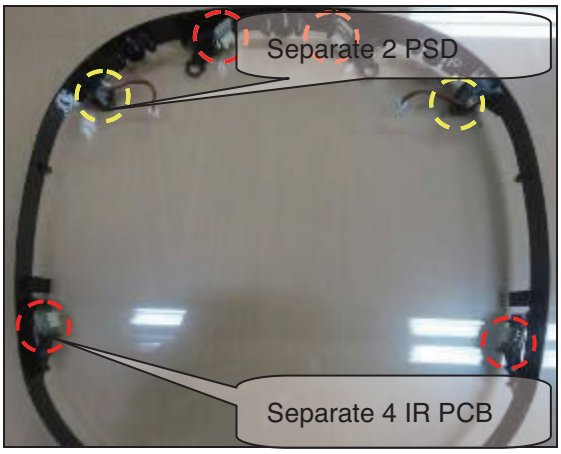
2. Separate WINDOW LED

2. Separate WINDOW LED

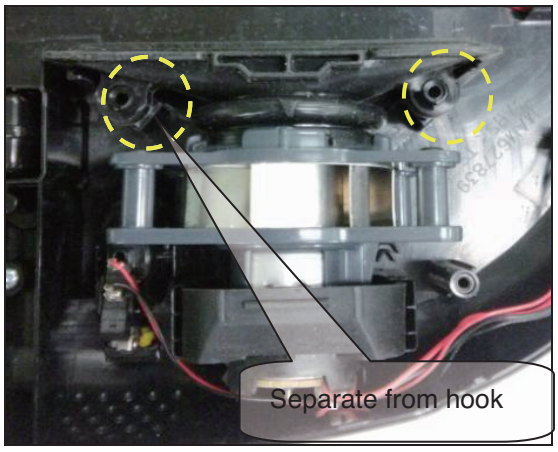
2. After WINDOW LED is separated



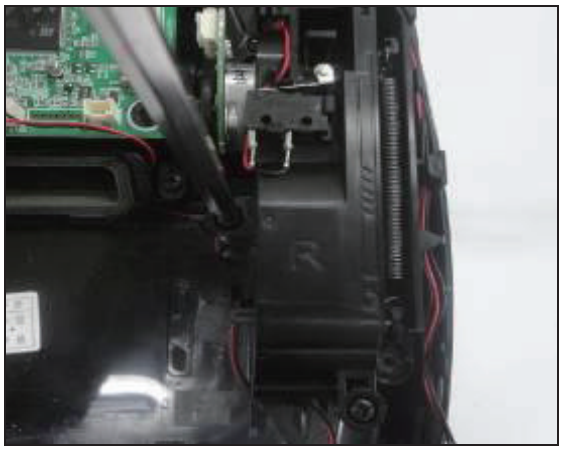
3. Separate Ultrasonic Sensor



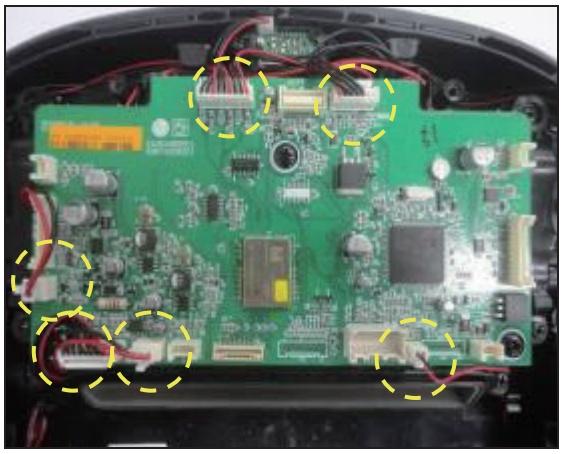
4. Separate IR PCB, PSD sensor



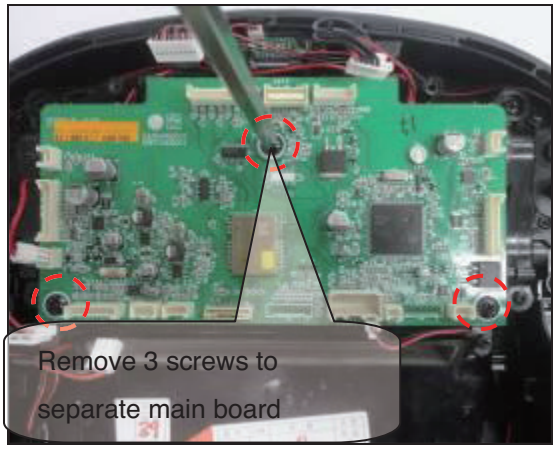
5. Separate SUCTION module



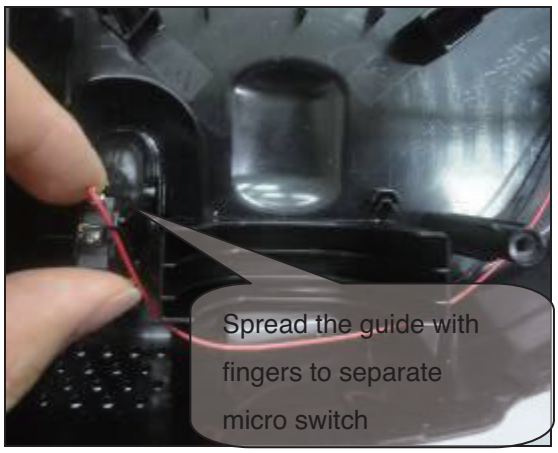
6. Separate both side WHEEL ASS'Y



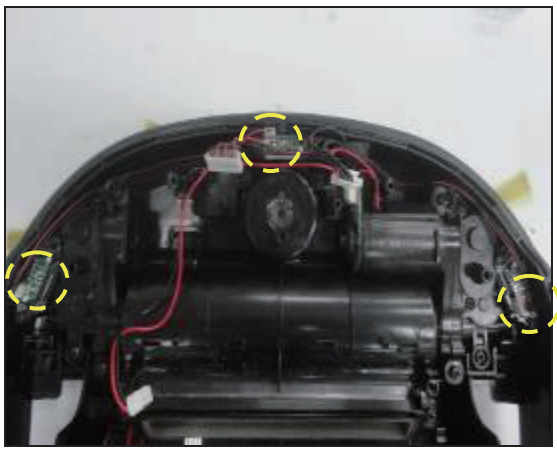
7. Separate main board connector



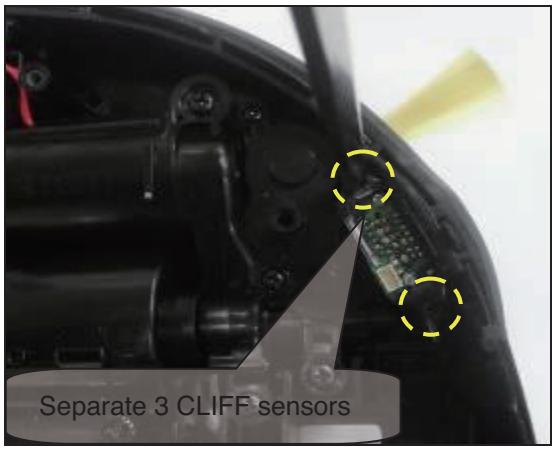
8. Separate main board



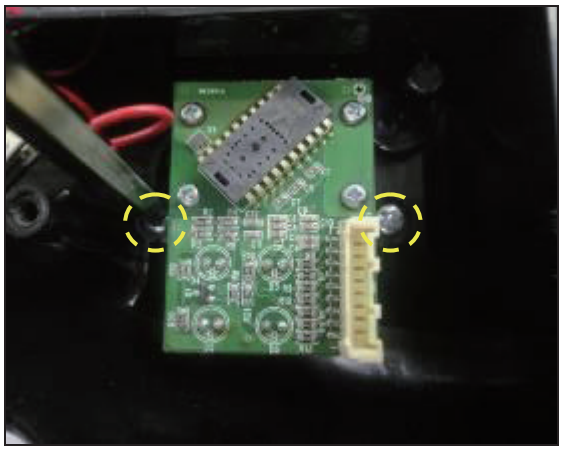
9. Separate MOP sensor wire



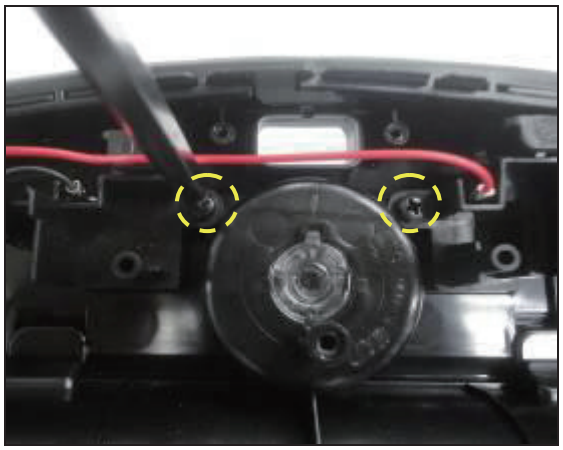
10. Separate CLIFF sensor wire



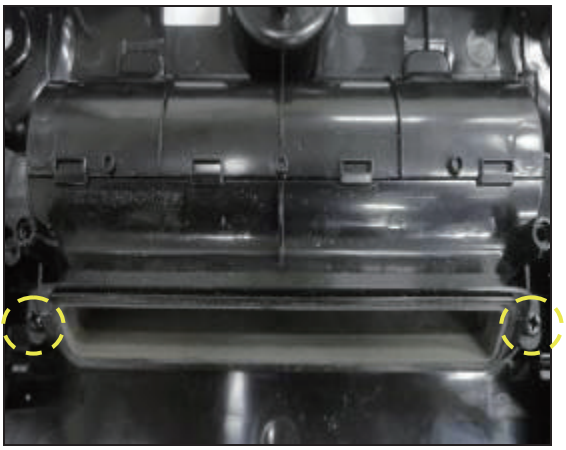
11. Separate CLIFF sensor



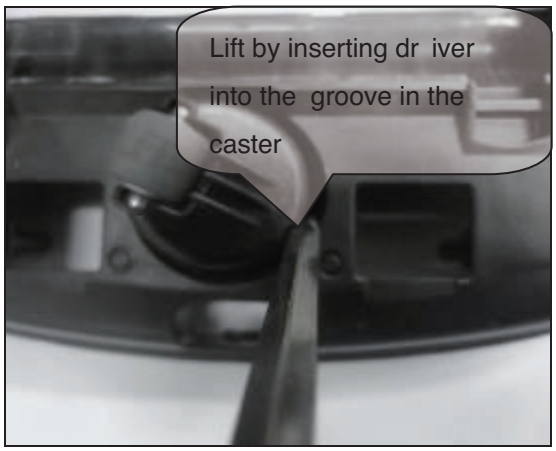
12. Separate OFS sensor



13. Separate recharging connector



14. Separate AIR guide

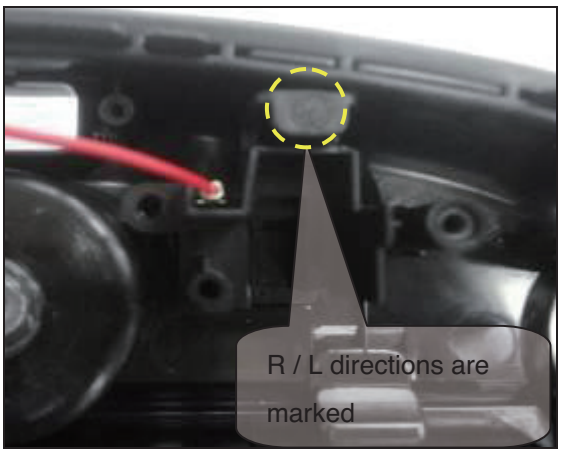


15. Separate front caster

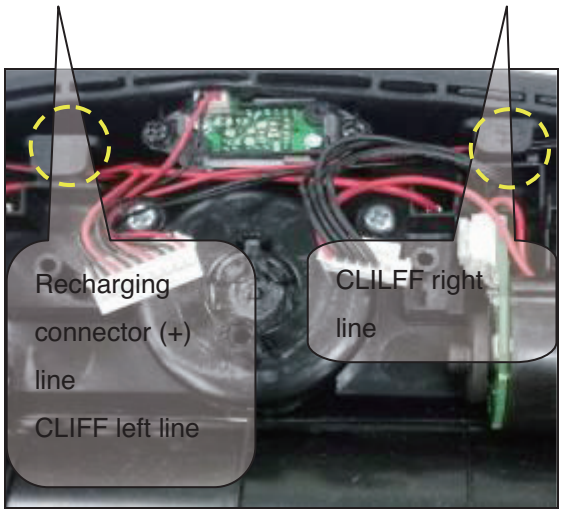
16. Separate rear caster

■ Cautions during Base assembly reassembly

Assemble power switch according to the assembly directions and be careful for the dust prevention cap not to be taken off during the assembly.

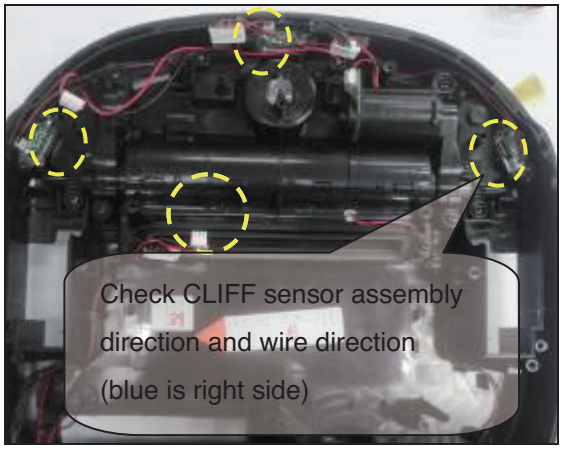


Connector CONTACT has R / L markings, so assemble according to the directions

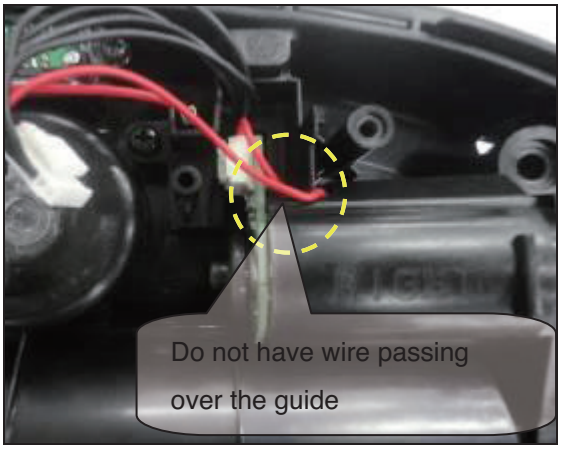


Assemble harness in the connector CONTACT guide to prevent assembly defect

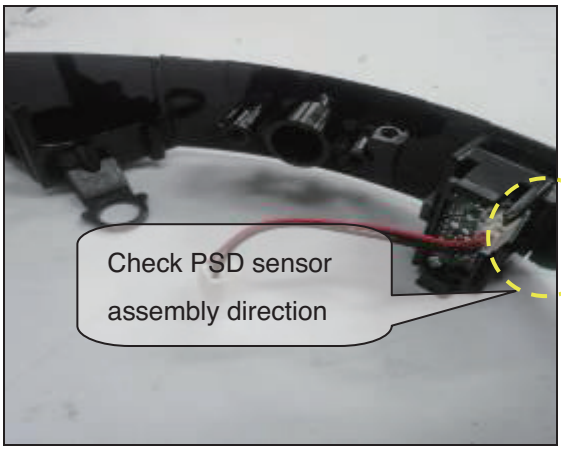
First insert the connector, and then assemble CLIFF to minimize the insufficient insertion of the connector during the assembly.



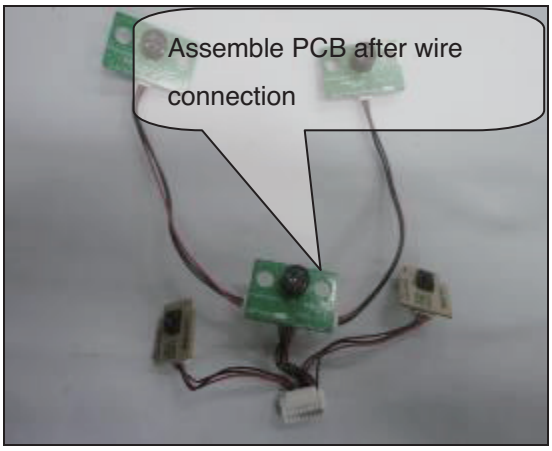
Assemble both side CLIFF to have the connector to be at the bottom, and the central CLIFF to be at the left side



If wire is over the guide, it may be pressed by the main board during the assembly, and it may cause short circuit.

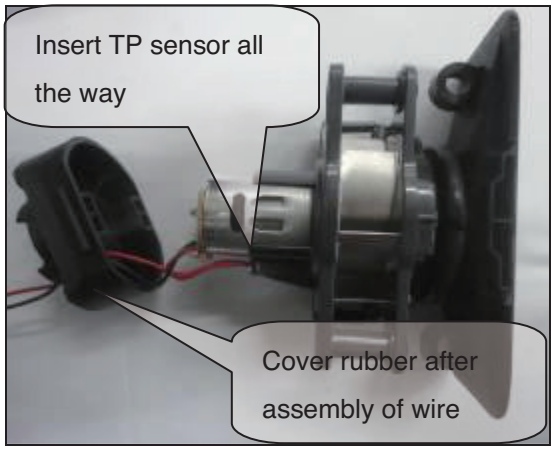


First insert the connector, and assemble both sides PSD for the connector to be at the top

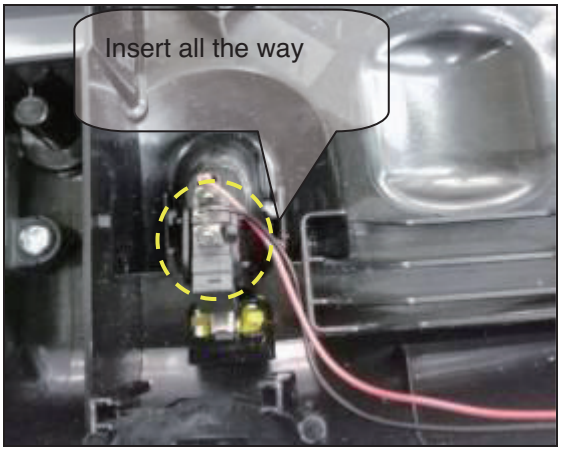


Assemble after inserting all connectors before the assembly of front IR and ultrasonic.

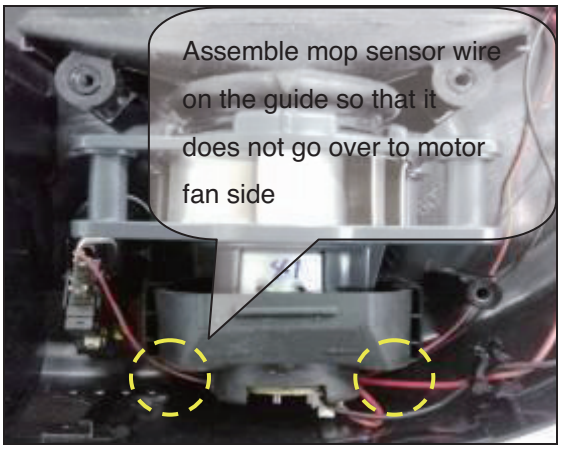
During the assembly of WINDOW LED in BASE, be careful not to have the rear IR wire pressed



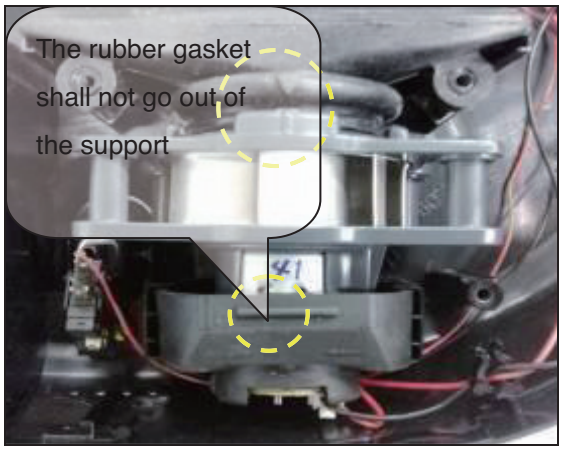
After pushing in wire into rubber, assemble TP sensor fully in the guide, and insert connector,



If it is not properly inserted, the mop sensor function will not work properly, so check whether it works after the assembly



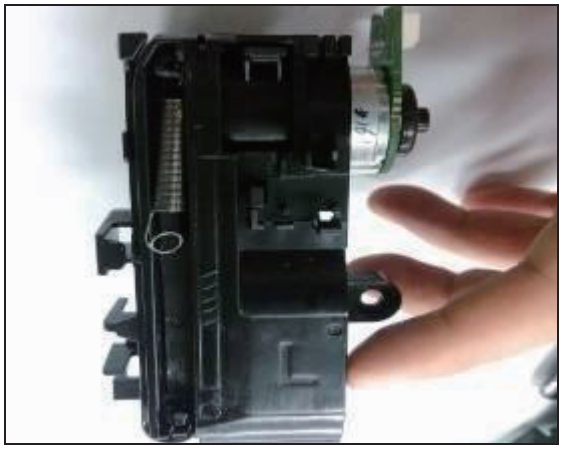
If the wire touches the fan, it causes abnormal noise, so firmly fix to the guide.



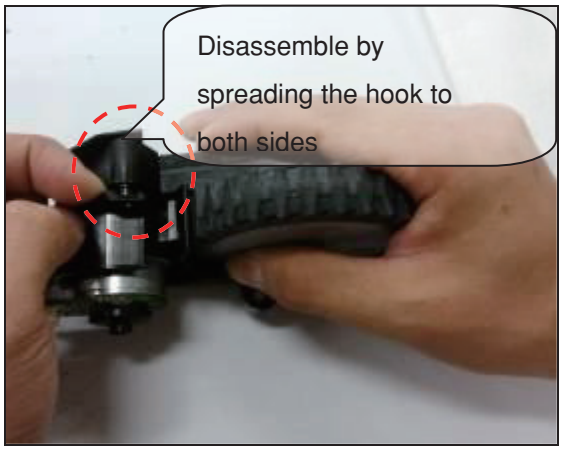
Assemble the marked part to face upward, and assemble rubber gasket inside the support

How to Disassemble/Assemble Major Parts

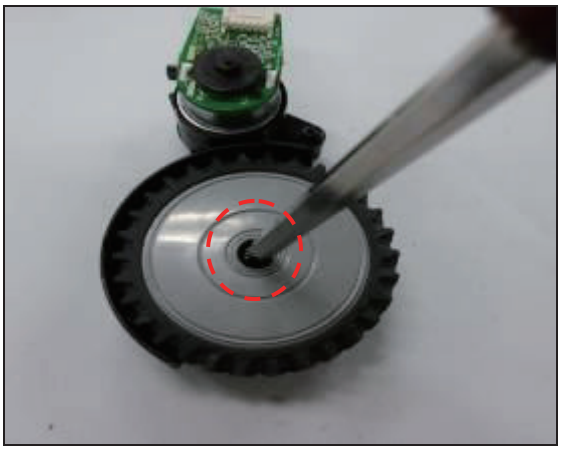
■ Separate Wheel



1. Separate harness and spring

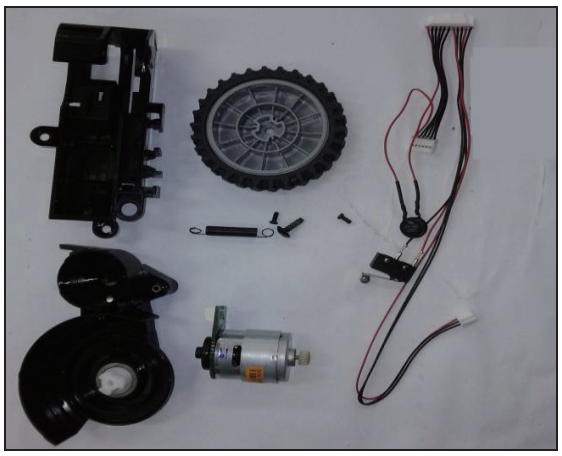


2. Separate COVER WHEEL



3. Separate WHEEL

4. Disassemble Motor

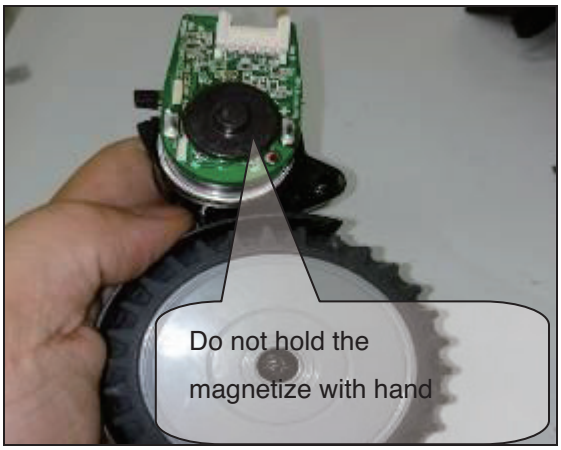


5. When WHEEL is disassembled

How to Disassemble/Assemble Major Parts

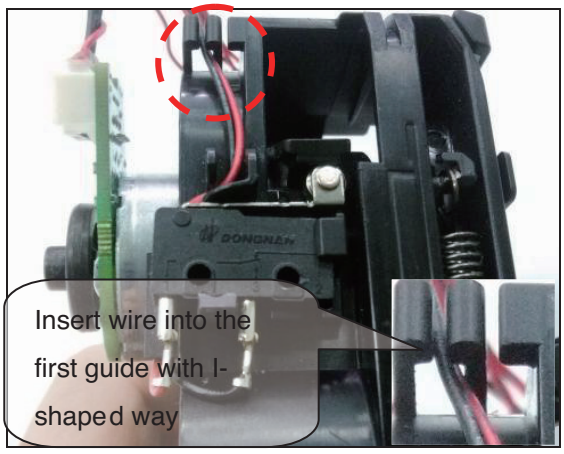
■ Cautions during the reassembly of the Wheel

After inserting motor in the COVER, rotate left and right to assemble according to the 3 holes of the motor and the COVER

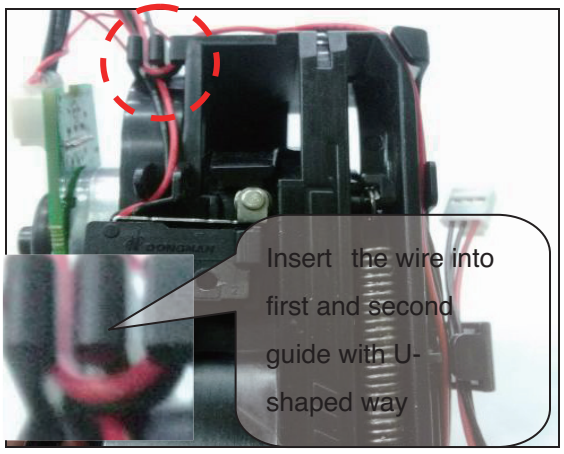


Do not impose unnecessary force on motor PCB or magnetize during the reassembly.

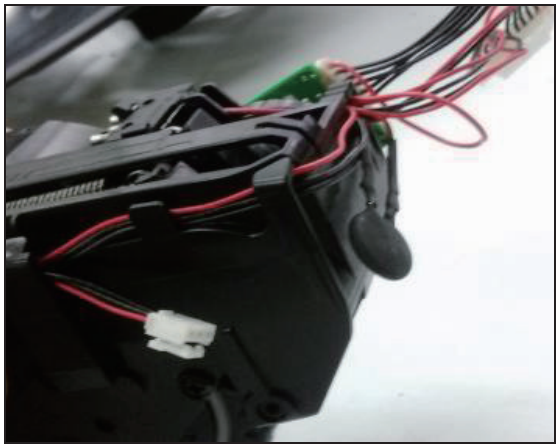
■ Cautions during the reassembly of the Wheel Wire



First, insert 2-line wire into the guide after assembly the micro switch



Insert IR signal wire into first and second guide with u-shaped way and wheel cover guide consecutively

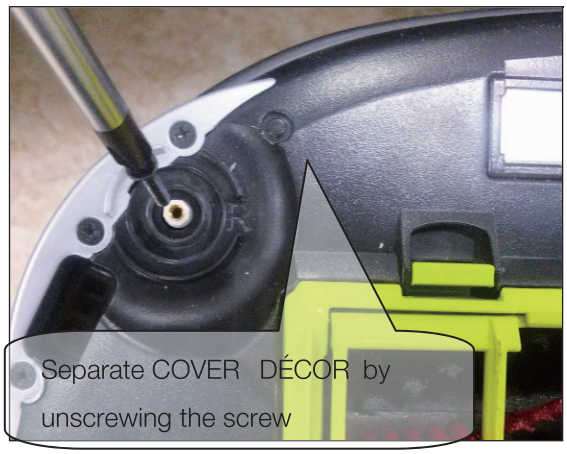


Insert NTC wire into wheel cover guide with U-shaped way and then arrange the NTC part.

Fasten the wire and NTC with attaching EPDM not to be taken off from wheel assembly

■ Separate Agitator

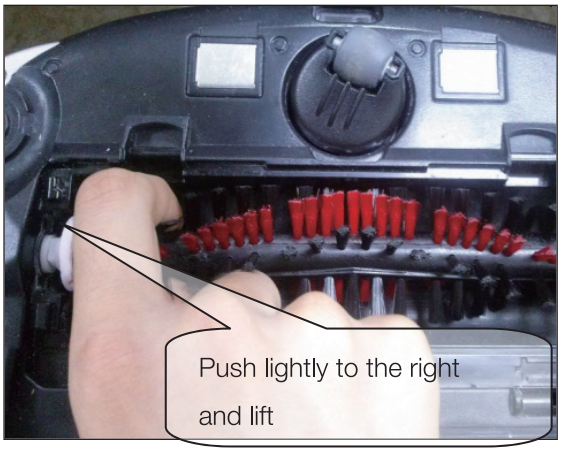
1. Separate SIDE brush



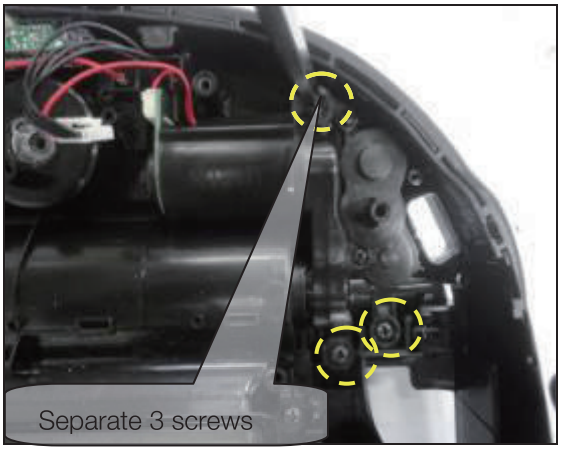
2. Separate COVER DÉCOR

3. Separate BASE ASS'Y nozzle

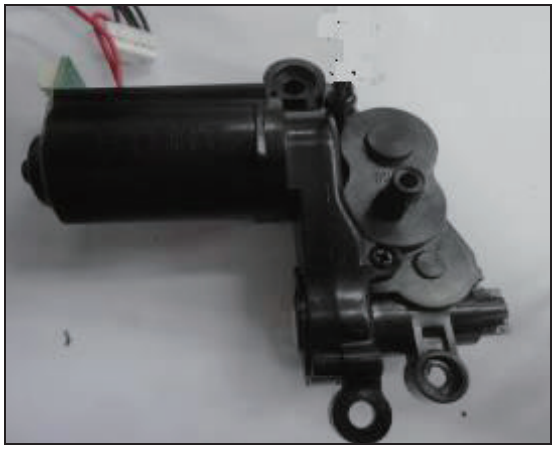
4. Separate BASE ASS'Y nozzle



5. Separate agitator brush



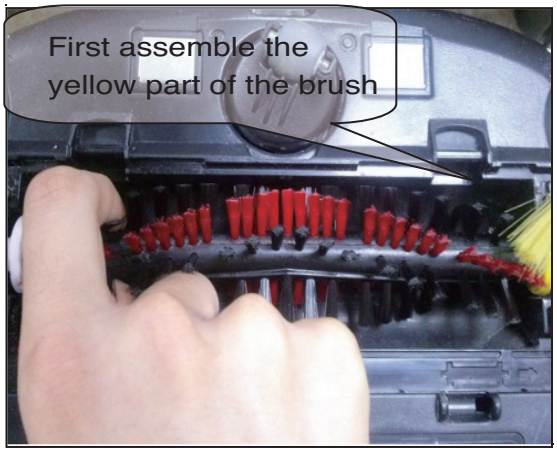
6. Separate agitator motor ASS'Y



7. Right side agitator motor ASS'Y

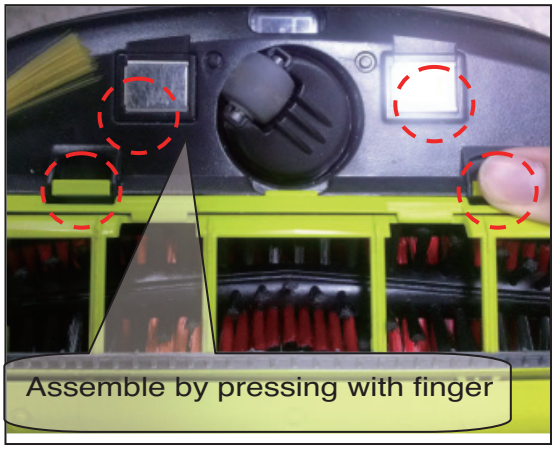
8. Left agitator motor ASS'Y

■ Cautions during the reassembly of Nozzle cover



First insert the yellow part, push the bar all the way to the right, and then assemble the left part.

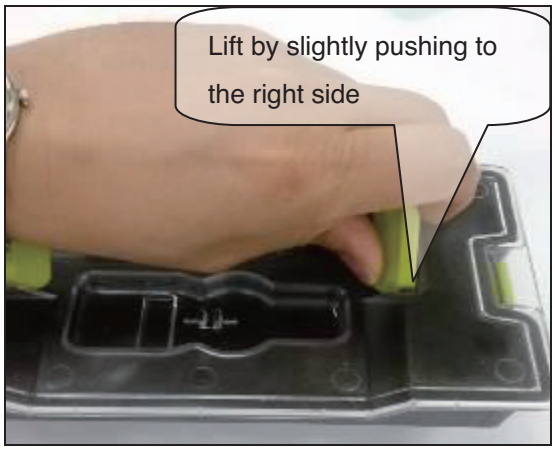
First assemble the left hook



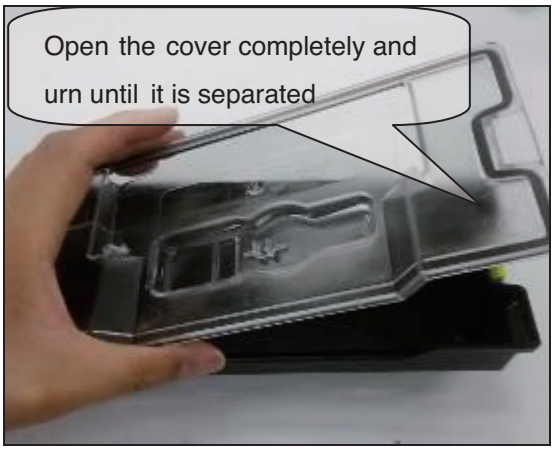
Assemble by pressing the upper side hook with a finger

Assemble the hook by pressing hard the right side hook with palm

■ Separate TANK ASS'Y DUST

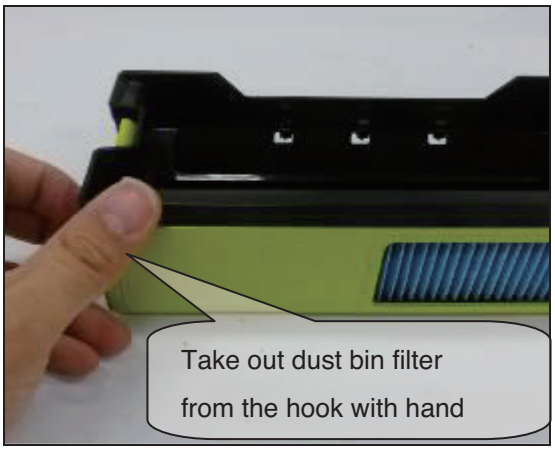


1. Separate handle



2. Separate dust bin cover

3. Separate PLATE COVER

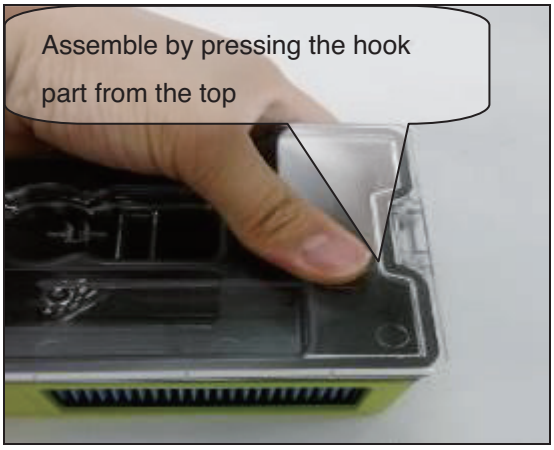


4. Disassemble dust bin filter

5. Dust bin deal drawing

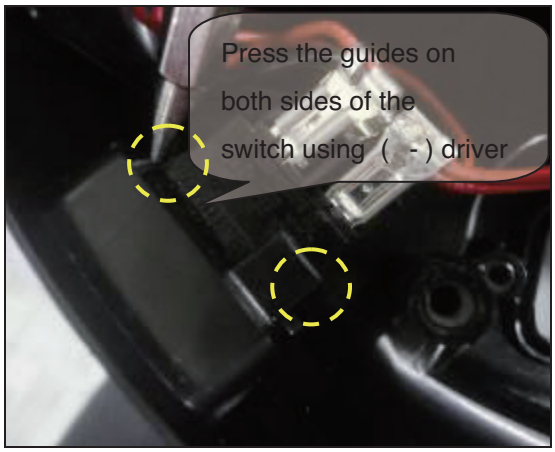
■ Cautions during reassembly of TANK ASS'Y DUST

Place the cover on the dust bin, and assemble by pressing the left part of the cover with hand

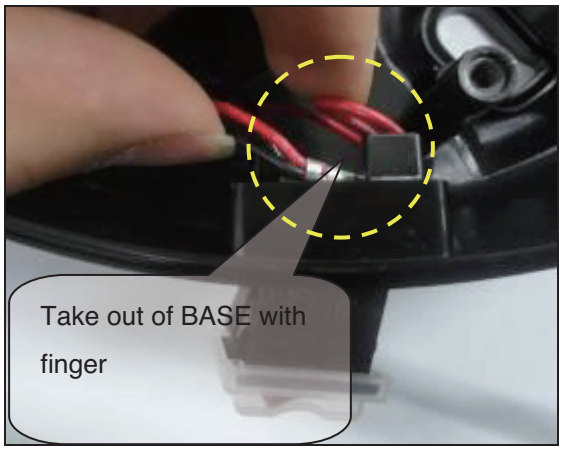


When you lightly hit the right part of the cover, it will be inserted.

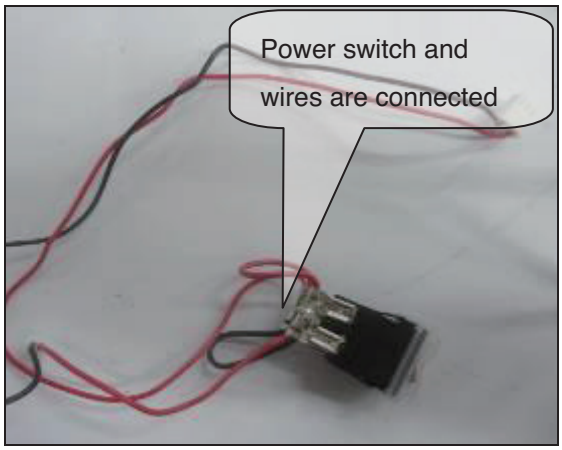
■ Separate power switch ASS'Y



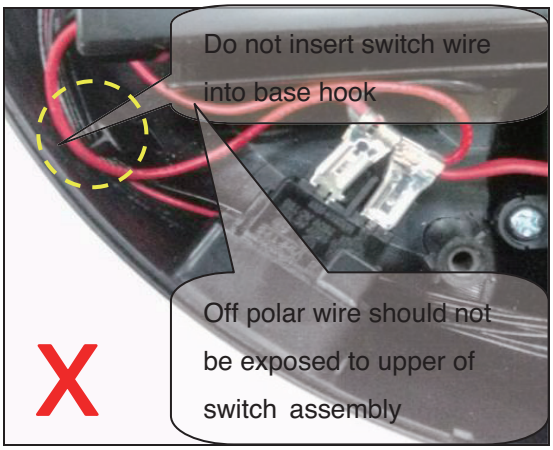
1. Separate power switch (1)

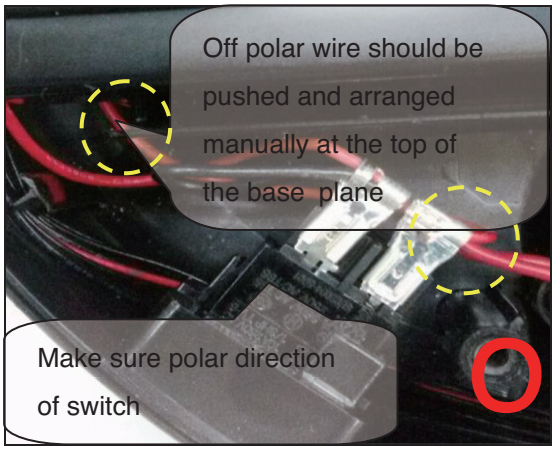


2. Separate power switch (2)

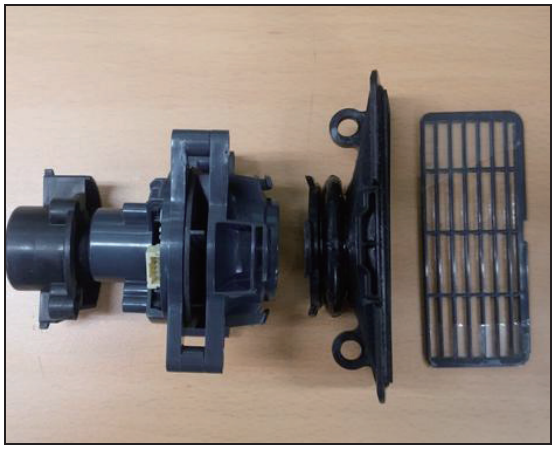


3. Separate power switch (3)



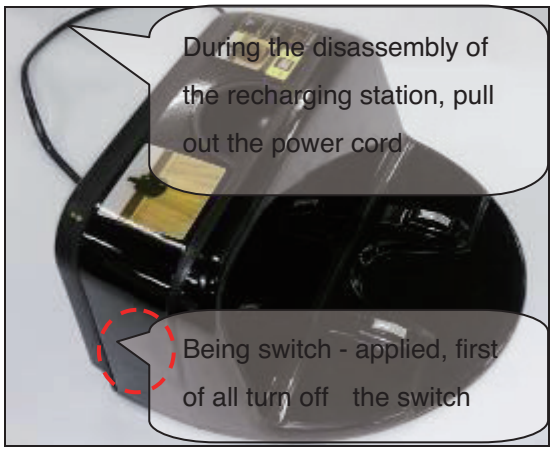


■ SUCTION module disassembly

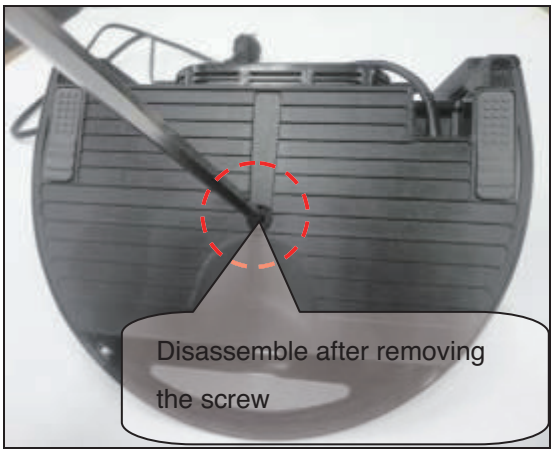


How to Disassemble/Assemble Major Parts

■ Separate Charger Battery Assembly

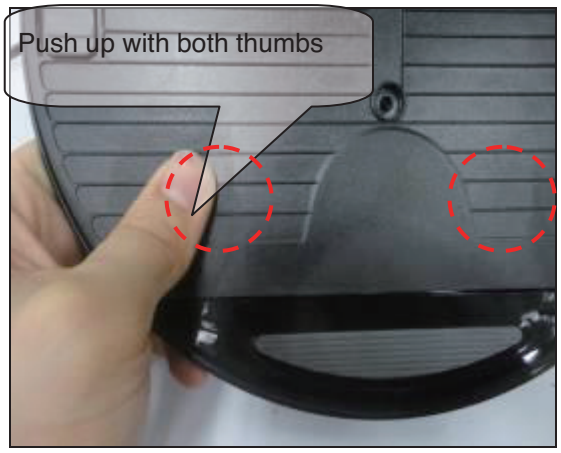


1. Disassemble power cord from condenser

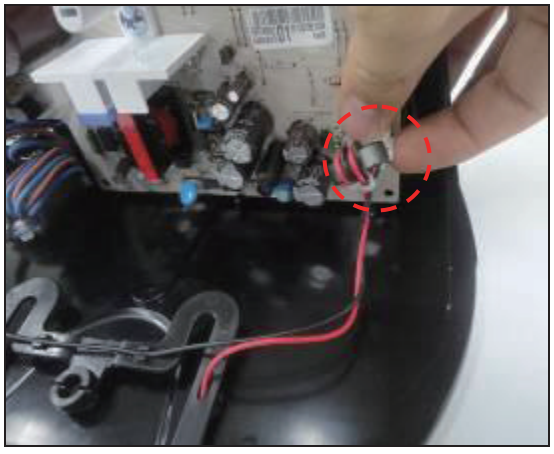


2. Disassemble BODY BASE

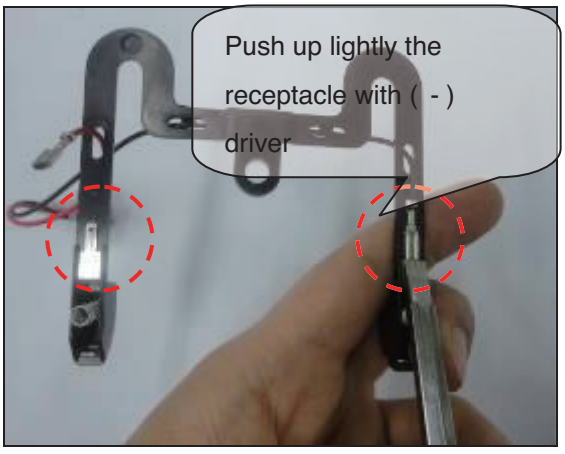
3. Disassemble COVER BODY



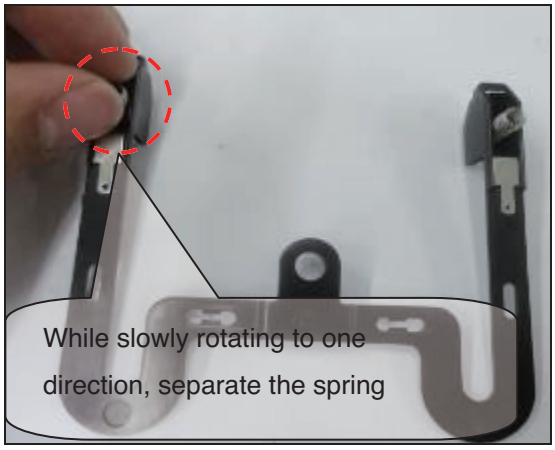
4. Disassemble COVER FRONT



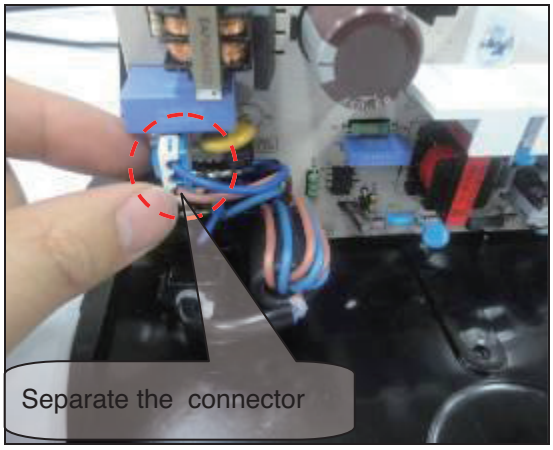
5. Separate connector



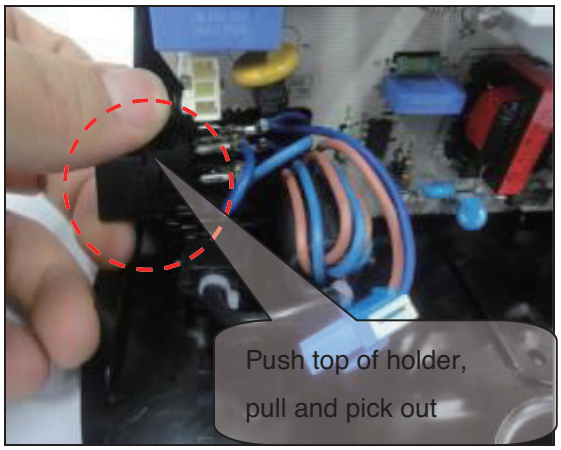
6. Separate wire



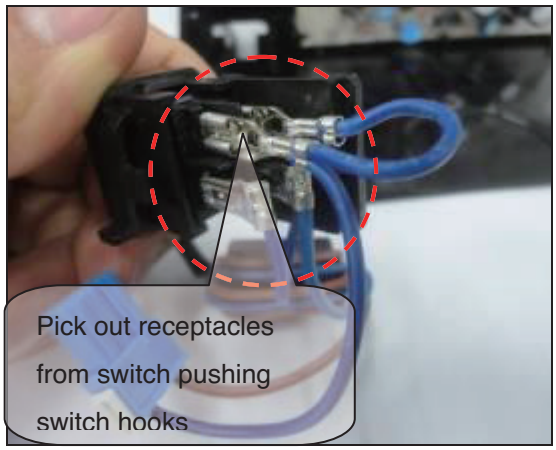
7. Separate spring



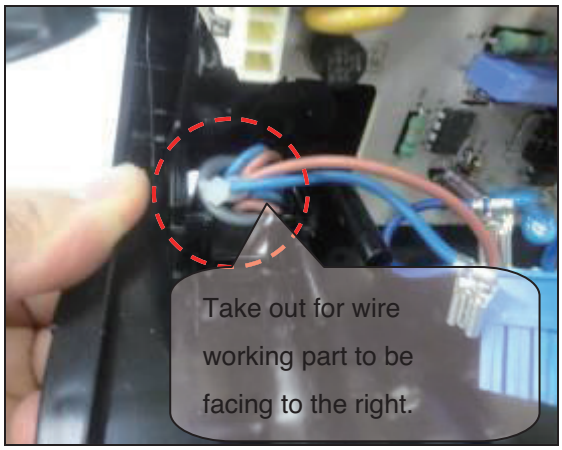
8. Separate power cord (1)f



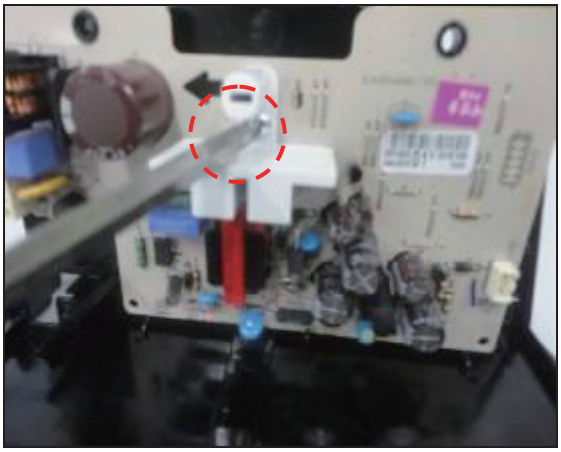
8. Separate power cord (2)
(switch-applied)



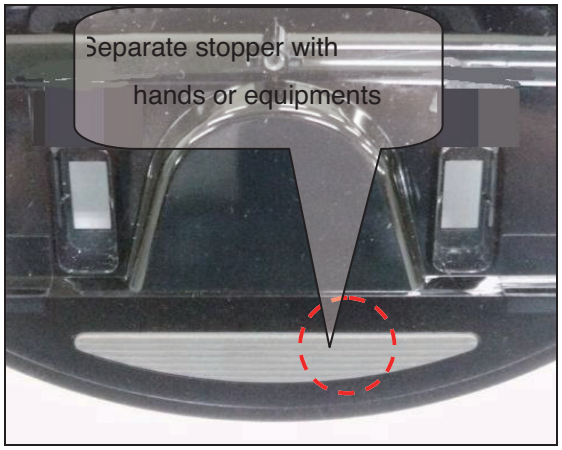
8. Separate power cord (3)
(switch-applied)



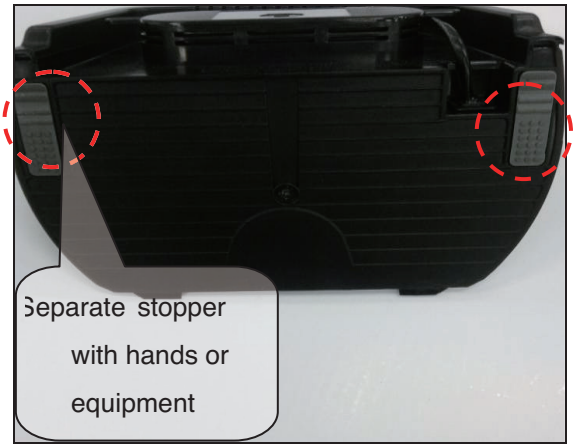
8. Separate power cord (4)



9. Separate PLATE GUIDE and PCB

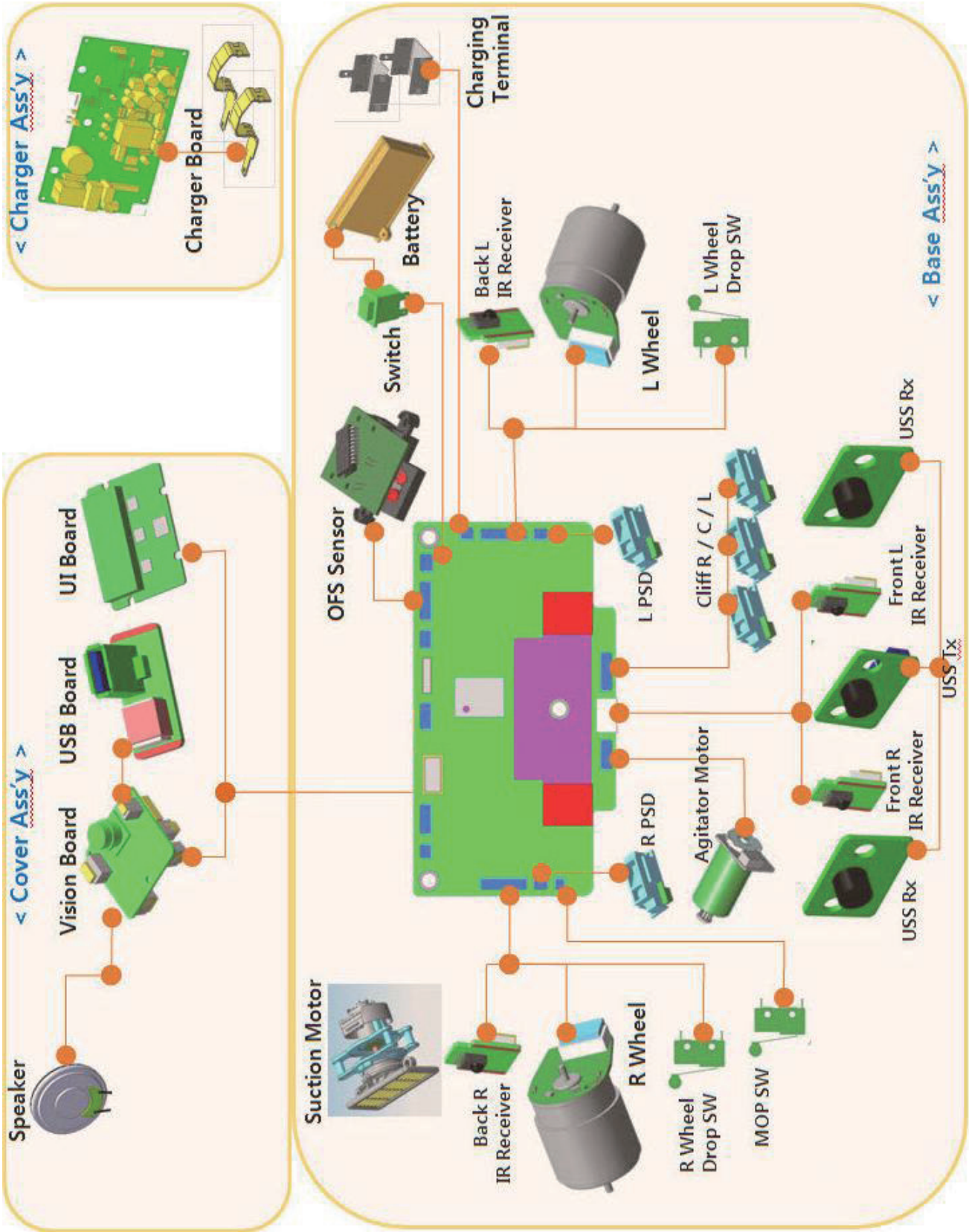


10. Separate STOPPER(1)



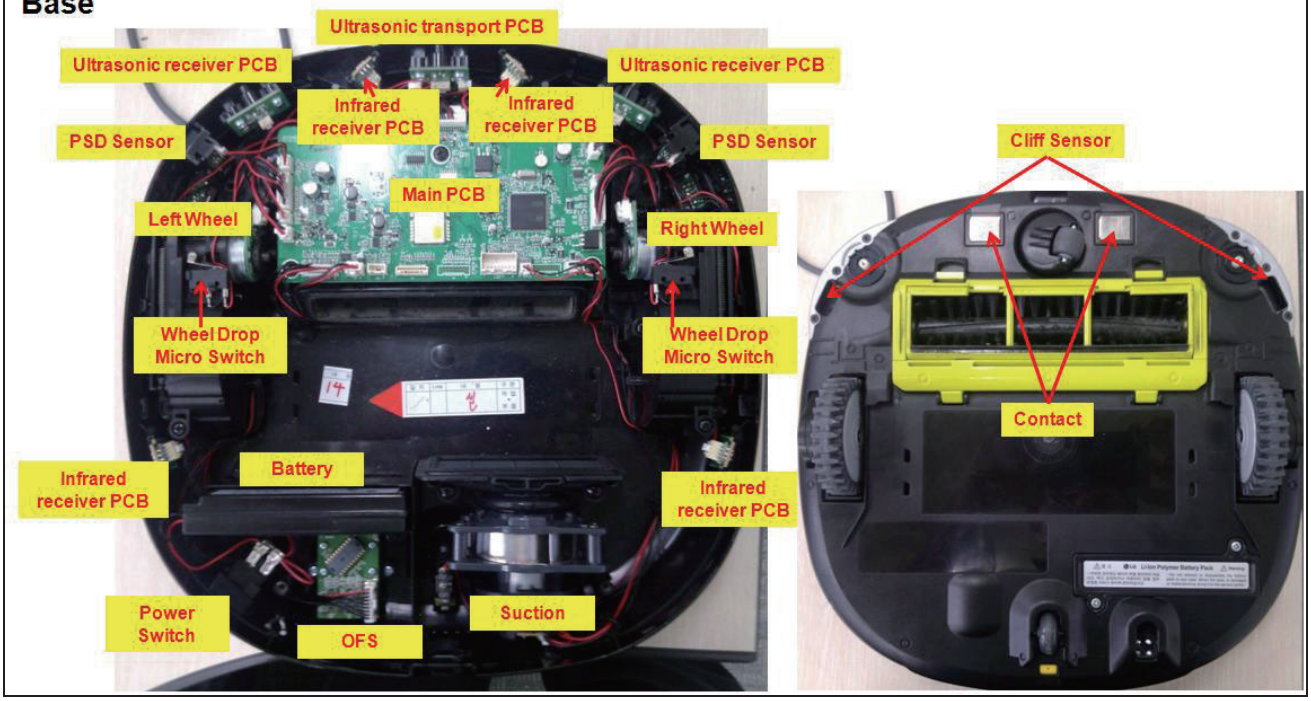
10. Separate STOPER(2)

Cabling Diagram



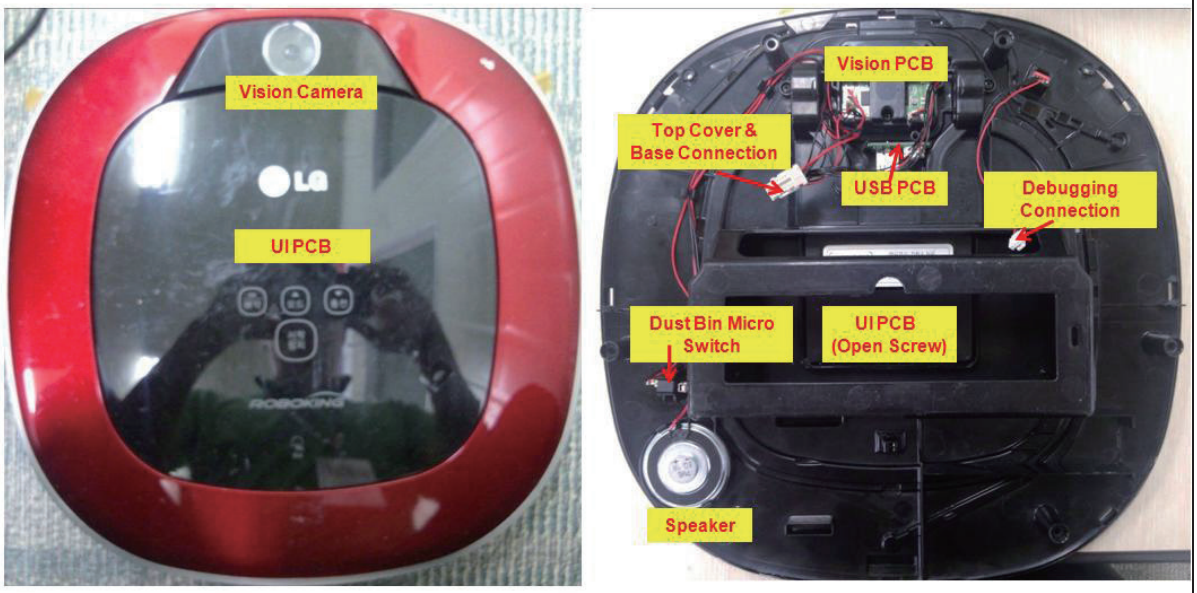
Description

Base



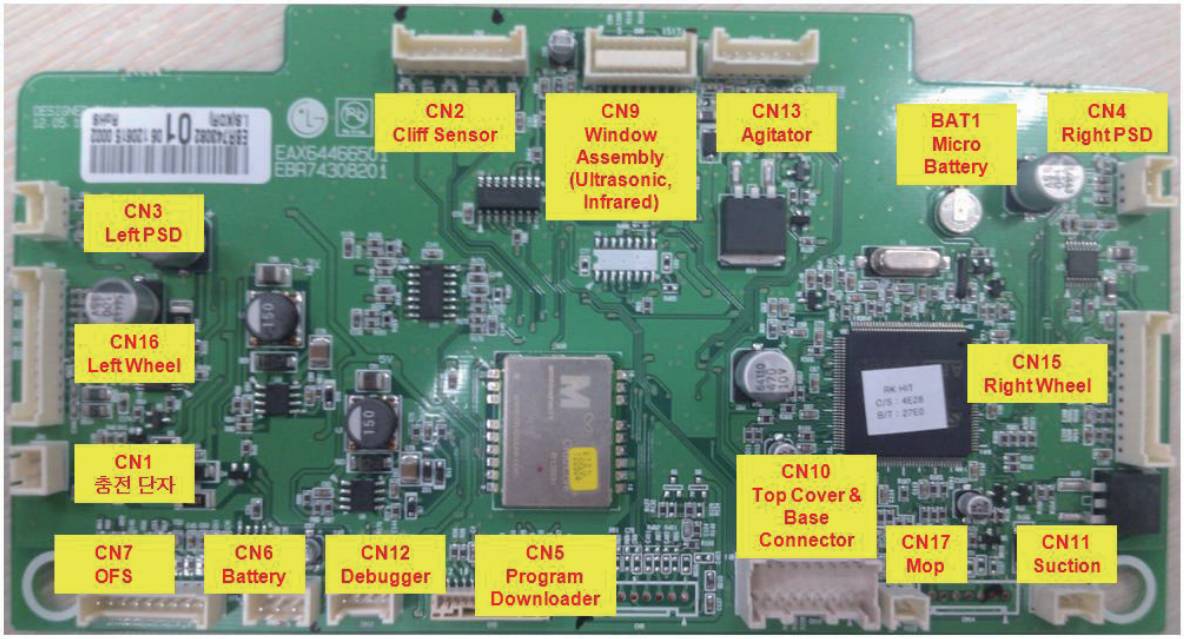
Description

Top Cover

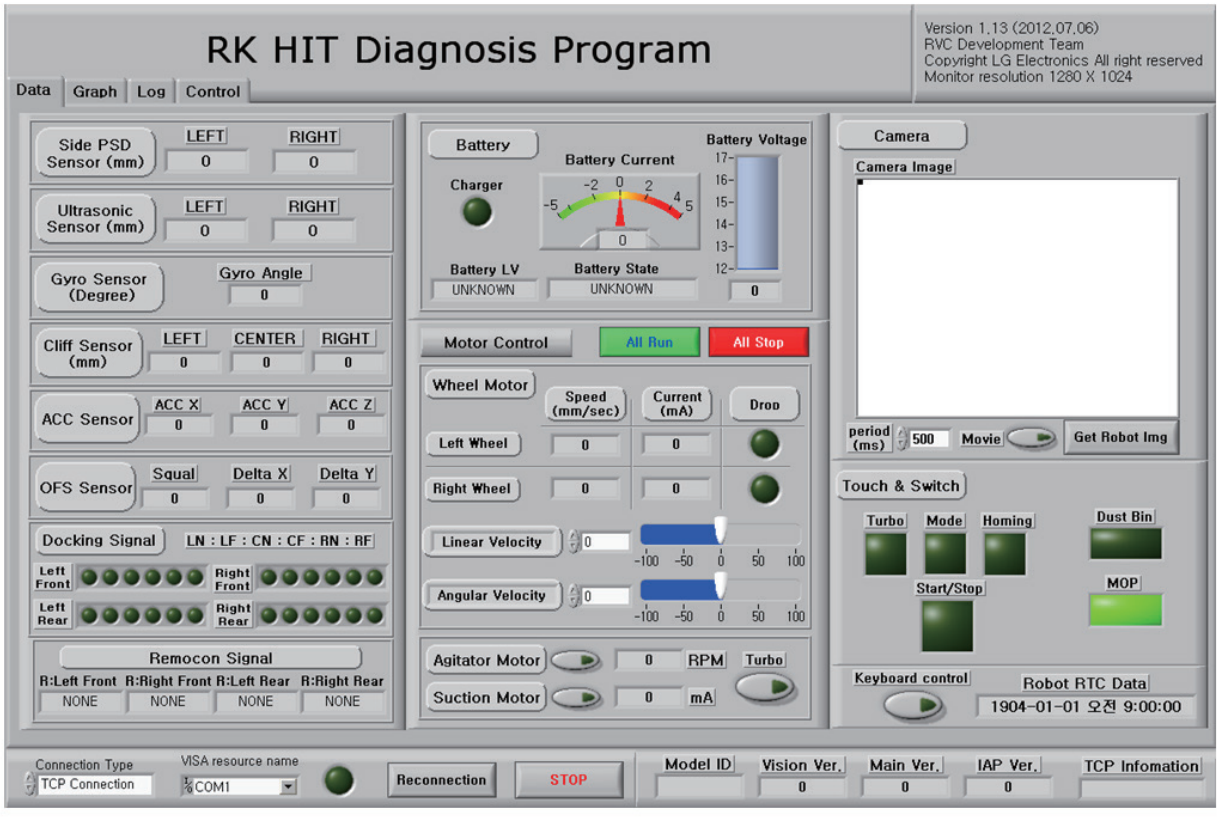


PCB Connection

Main PCB

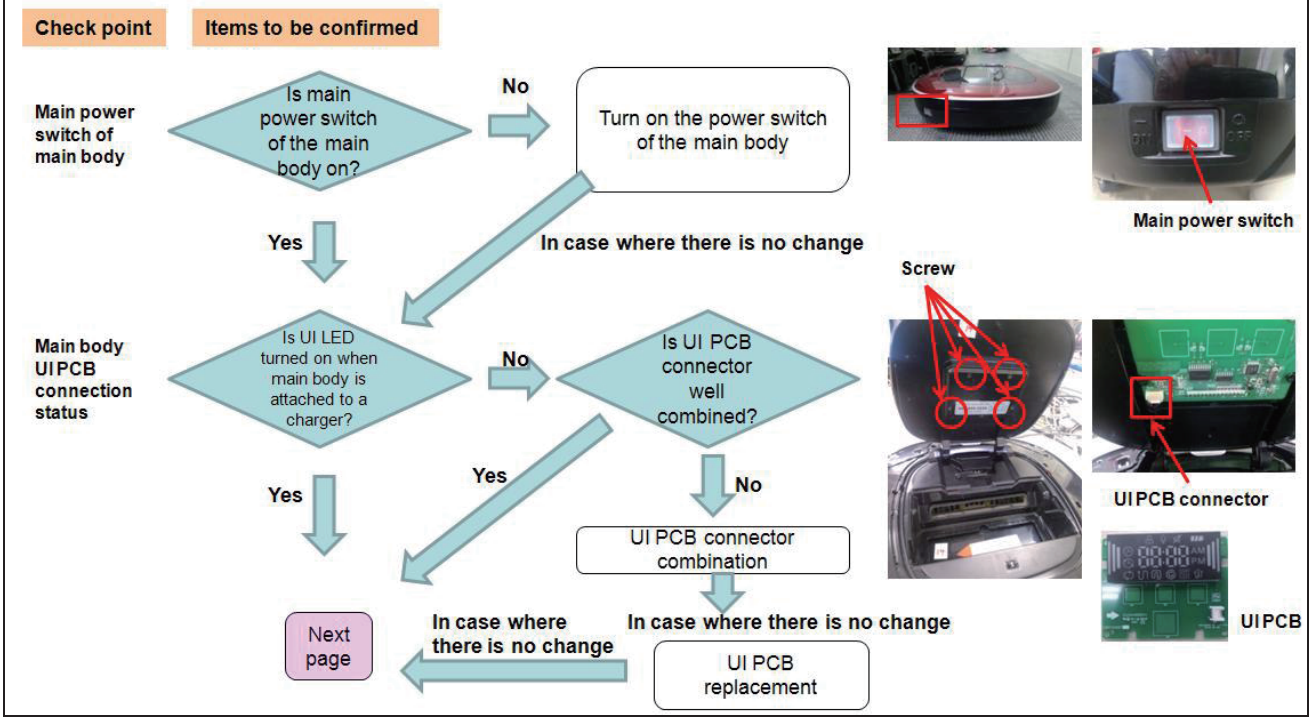


RK HIT DEFECT DIAGNOSIS PROGRAM(R-MANAGER, DEBUGGER)

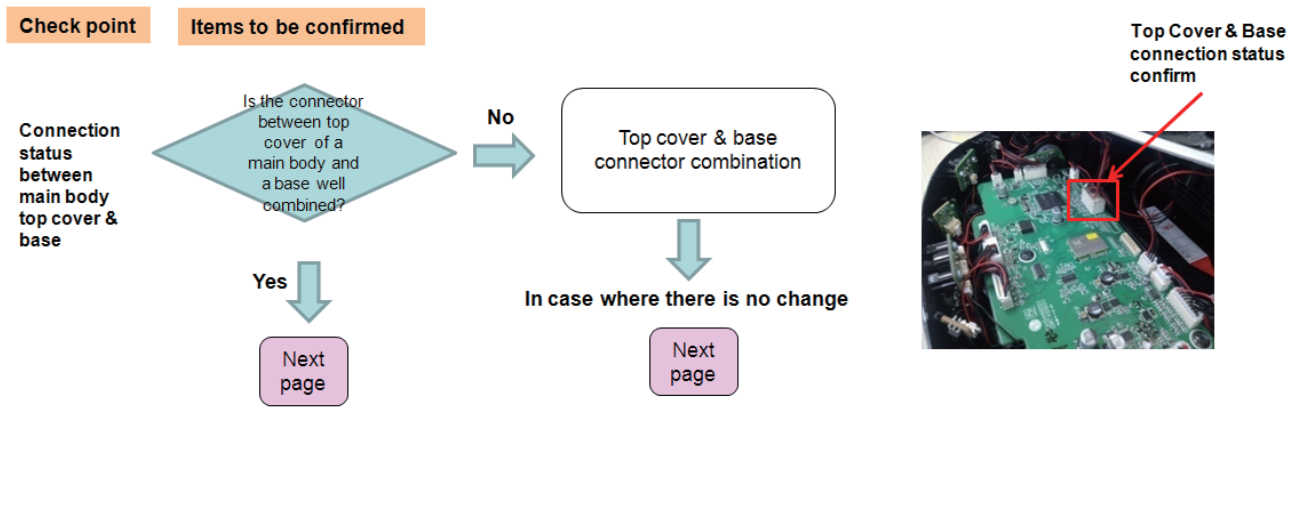


Power defect

In case where display is not turned on when touching power



Power defect



Types of Defects and the Countermeasures

Power defect

Check point

Main body battery connection status confirm

Items to be confirmed

Is the voltage of a battery 13.6V ~ 16.8V?

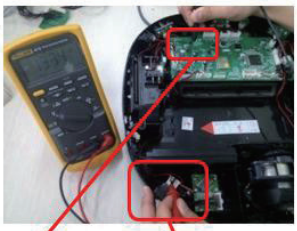
Yes → Next page

No → Is the voltage of battery single item 13.6V ~ 16.8V ?

No → Battery replace ment

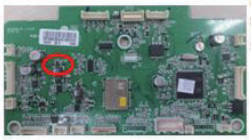
Yes → Is the resistance of main power switch of the main body short?

(+) Main power switch terminal
(-) Main PCB C90 left side terminal



C90 left side

Main power switch check point



Yes → Next page

No → Main power switch replacement

(+) Main power switch terminal
(-) Main PCB CN6 number 1 pin

Power defect

Check point

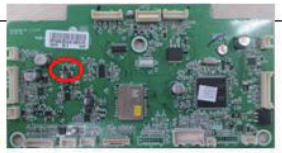
Main body main PCB confirm

Items to be confirmed

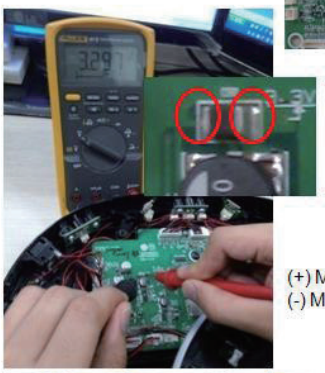
Is 3.3V of main PCB normally output when power is on?

Yes → Is 5V of main PCB normally output when power is on?

Yes → Normal
※ In case where there is a problem : Sub PCB confirm is required

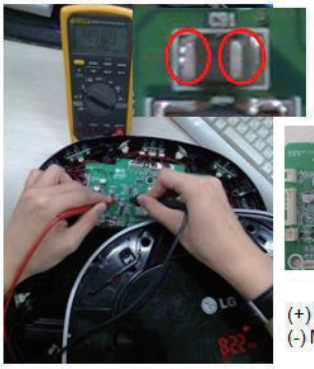


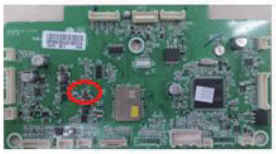
No → Try again after replacing main PCB



(+) Main PCB C90 right side terminal
(-) Main PCB C90 left side terminal

No → Try again after replacing main PCB





(+) Main PCB C91 right side terminal
(-) Main PCB C91 left side terminal

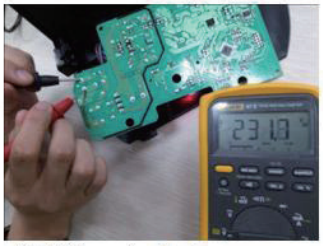
Charge defect

In case where charger power LED is not turned on

Check point | **Items to be confirmed**

Charger PCB AC input confirm

Is AC input voltage 220~230Vac?



(+) CN1 number 1 pin
(-) CN1 number 3 pin

No

Is charger power cord a normal product?

Yes

Charger PCB replacement

No

Power cord replacement

Normal product

Charge defect

In case where the charge display and sound are not output when the main body is placed on a charger

Check point | **Items to be confirmed**

Charge terminal foreign body confirm

Are the charger charge terminal and main body charge terminal clean?

No

Try again after removing foreign bodies of charge terminal

Yes

Charger charge terminal voltage confirm

Is charger terminal voltage 4.5V ~ 5.5V ?

No

Are charger and main body charge terminal single item normal?

No

Charge terminal connector replacement

Yes

Next page

Yes

Next page

Types of Defects and the Countermeasures

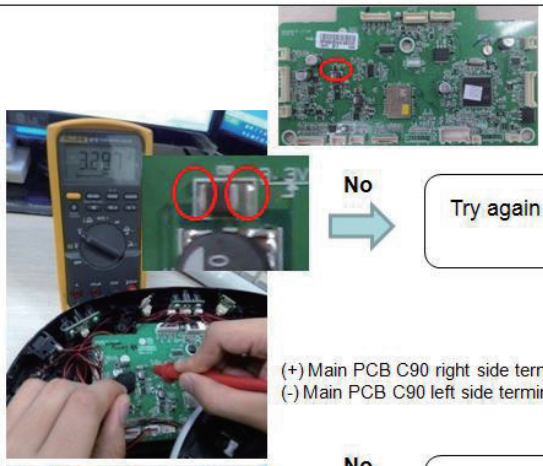
Charge defect

Check point | **Items to be confirmed**

Main body main PCB confirm

Is 3.3V of main PCB normally output when power is on?

No → Try again after replacing main PCB

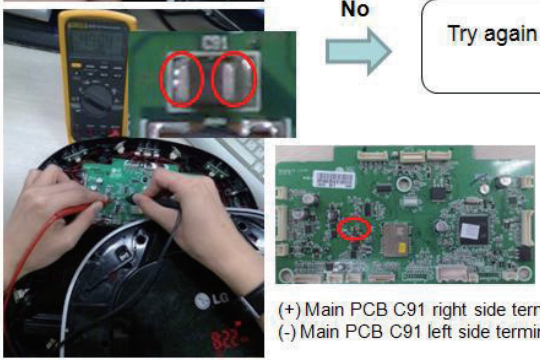


(+) Main PCB C90 right side terminal
(-) Main PCB C90 left side terminal

Yes

Is 5V of main PCB normally output when power is on?

No → Try again after replacing main PCB



(+) Main PCB C91 right side terminal
(-) Main PCB C91 left side terminal

Yes

Main PCB replacement

Charge defect

In case where the main body does not docking on a charger

Check point | **Items to be confirmed**

Docking signal confirm

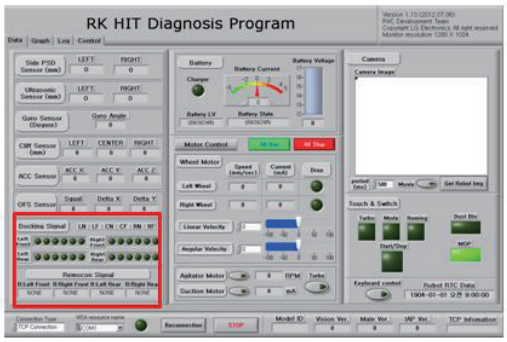
Is the docking signal on debugger received?

No

Charger dispatch part confirm

Is the docking signal of charger correctly dispatched?

No → Try again after replacing charger PCB



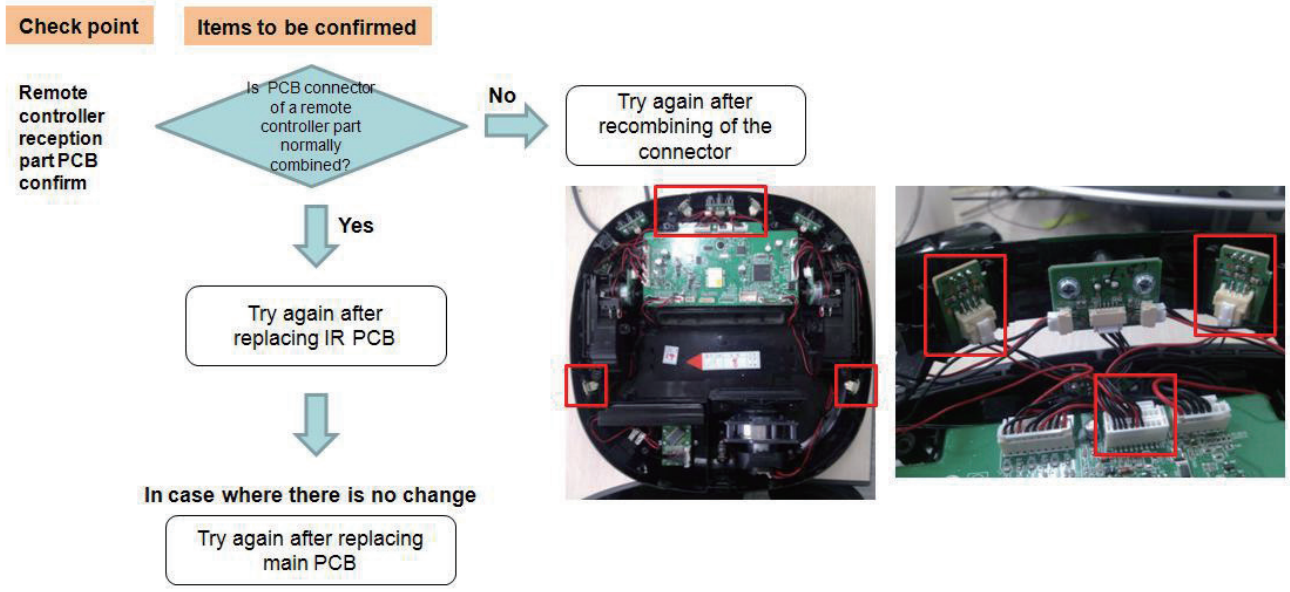
Possible to confirm that the light of infrared rays sensor is blinking when the reception part of charge PCB is filmed by a camera

Yes

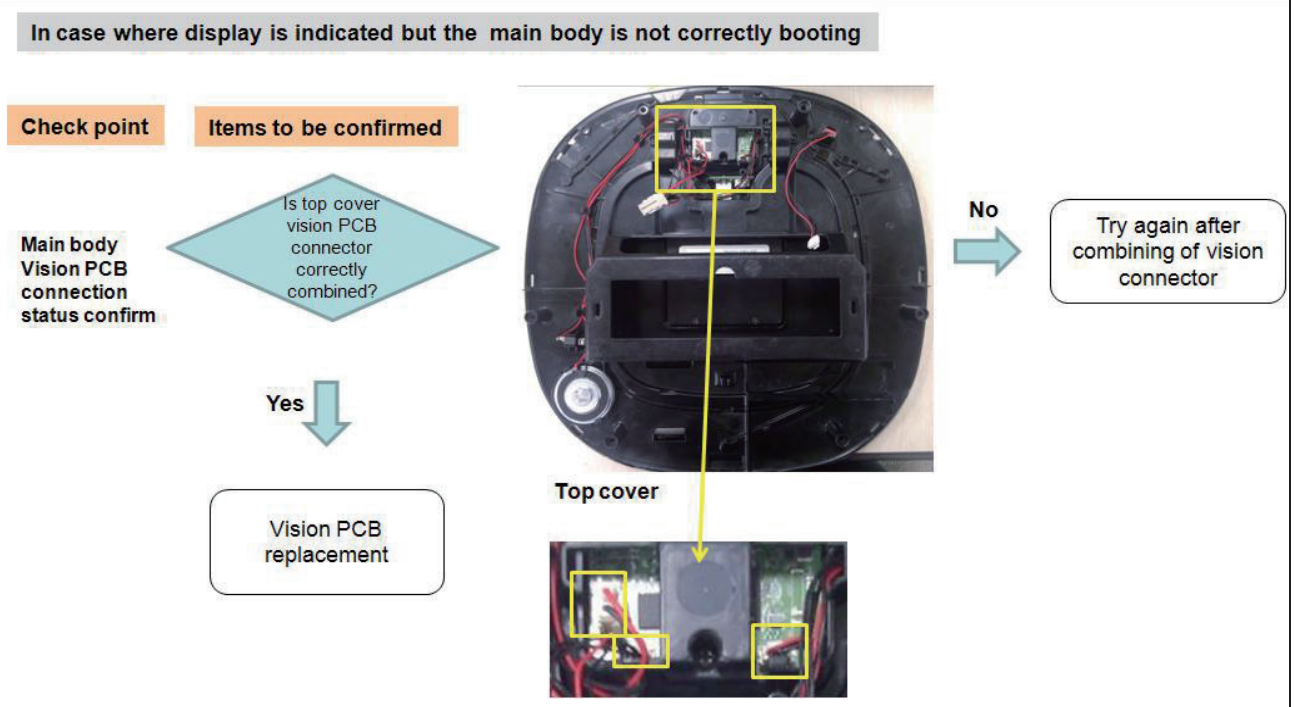
Main body reception part confirm

Next page

Charge defect



Booting defect



Time indication defect

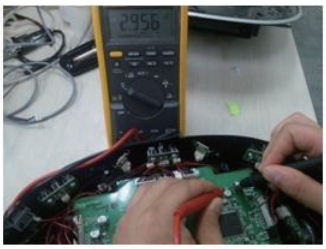
In case where time is indicated as 12:00 whenever main body is booting

Check point

Main body main PCB micro battery voltage confirm

Items to be confirmed

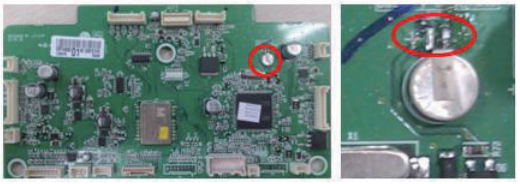
Is the voltage of both ends of BAT1 of main PCB 2.8V ~ 3.3V when a main power switch of the main body is on?



(+) Main PCB BAT1 left side terminal
(-) Main PCB BAT1 right side terminal

No → BAT1 replacement (Soldering)

Yes → Main PCB replacement



BAT1 : Micro battery

Rotating at the same place

In case where the main body is rotated at the same place when cleaning starts or in the middle of cleaning

※ Begin after removing all the barriers within 1m of surrounding when inspecting

Check point

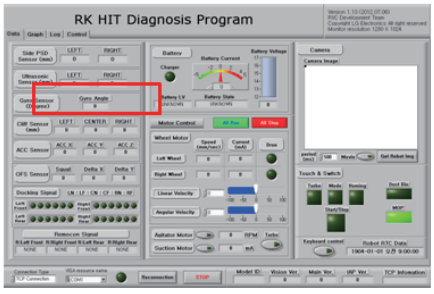
Main body ultrasonic waves confirm

Items to be confirmed

Is debugger value 250 when there is no barrier?

Yes → Is the value continuously changed when there is a barrier?

Yes → Ultrasonic waves sensor is normal



No → Is the connector well combined?

No → Connector combination

In case where there is no change → Ultrasonic waves PCB replacement

In case where there is no change → Main PCB replacement

Types of Defects and the Countermeasures

Circle around the same place / barrier sensing complaint_Untrasonic waves sensor confirm

In case where the main body is not be able to go out of a certain area when cleaning starts or in the middle of cleaning

※ Begin after removing all the barriers within 1m of surrounding when inspecting

Check point

Main body ultrasonic waves confirm

Items to be confirmed

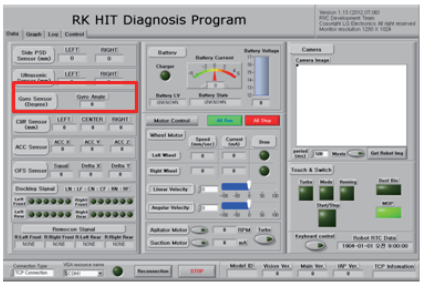
Is debugger value 250 when there is no barrier?

Yes

Is the value continuously changed when there is a barrier?

Yes

Ultrasonic waves sensor is normal



No

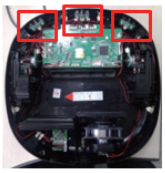
Is the connector well combined?

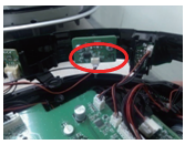
No

Connector combination

In case where there is no change

Ultrasonic waves PCB replacement





In case where there is no change

Main PCB replacement

Circle around the same place / barrier sensing complaint_Position sensor (PSD) confirm

Check point

Main body position sensor (PSD) confirm

Items to be confirmed

Is position sensor debugger value 150 when there is no barrier?

Yes

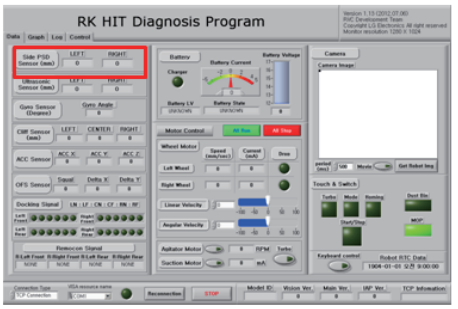
Is the value continuously changed when there is a barrier?

No

Next page

Yes

PSD sensor is normal



No

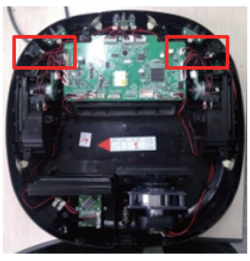
Is the connector well combined?

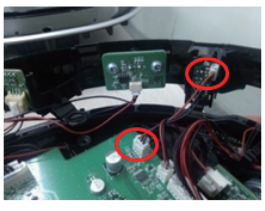
No

Connector combination

Yes

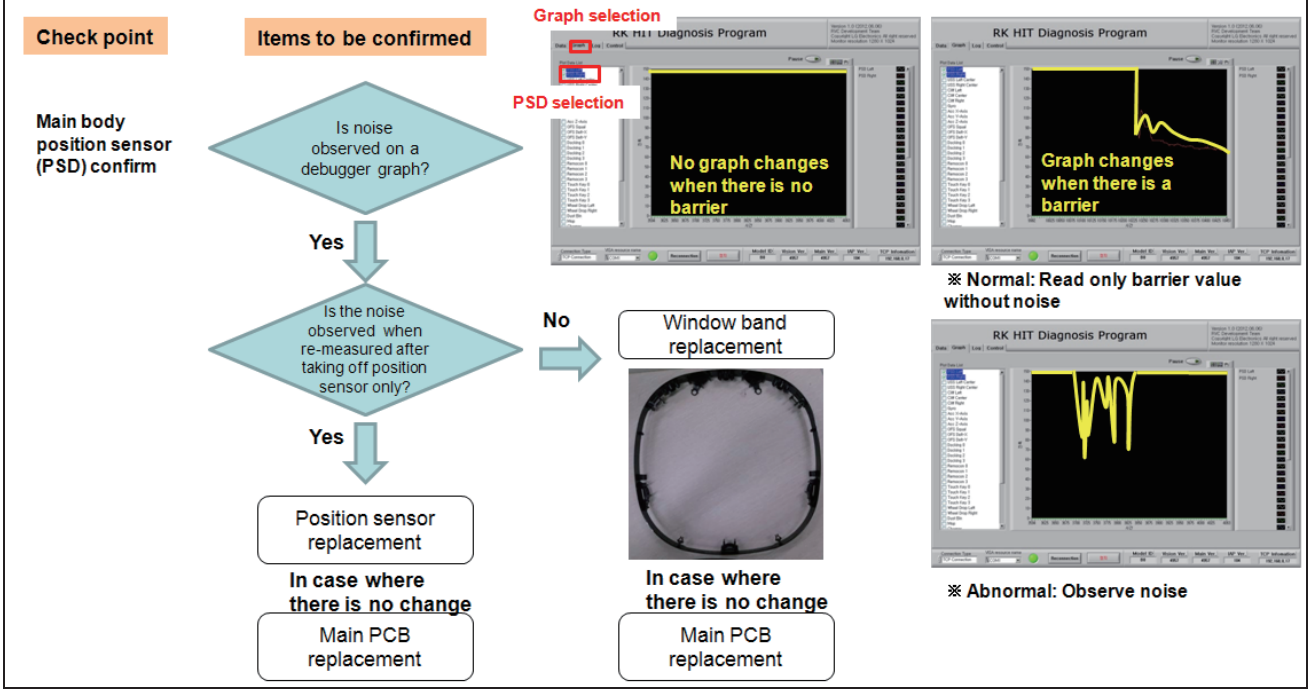
Next page



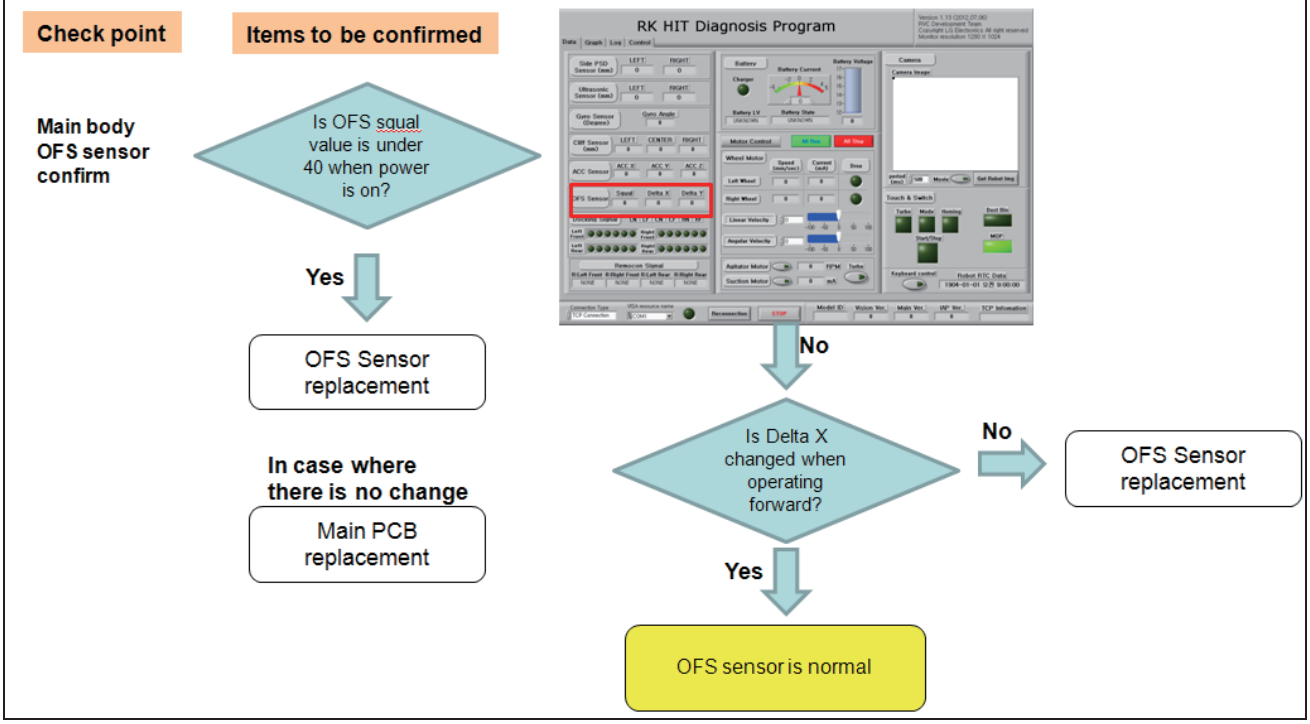


Types of Defects and the Countermeasures

Circle around the same place / barrier sensing complaint_Position sensor (PSD) confirm



Circle around the same place / barrier sensing complaint_ OFS sensor confirm



Circle around the same place / barrier sensing complaint _ Acceleration sensor confirm

Check point

Main body acceleration sensor confirm

Items to be confirmed

Are the acceleration s of (Acc) X, Y, and Z values 0, 0, and 100, respectively when power is on?

※ Allow errors of ±10 of each value

Yes

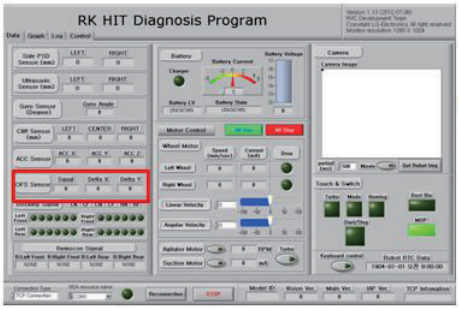
Is the corresponded sensor value changed when shaking in X, Y, Z axis?

No

Main PCB replacement

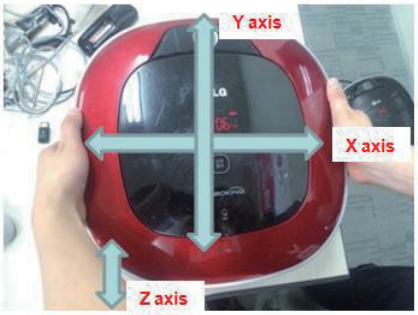
Yes

Acceleration sensor is normal



No

Main PCB replacement



Circle around the same place / barrier sensing complaint _ Cliff sensor confirm

Check point

Main body cliff sensor confirm

Items to be confirmed

Isn't side brush of main body blocked the sensor?

No

Try again after exposing of cliff sensor window by moving side brushes

Yes

Is each initial value of cliff sensor L,C,R 30~35 ?

No

Is cliff sensor connector well combined?

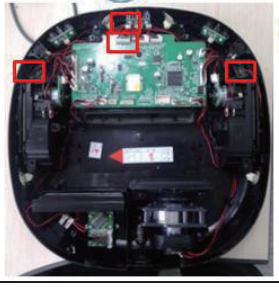
No

Connector combination

Yes

Next page

Yes



Cliff sensor : Indication part 3 unit parts
Main Connector : 1 unit part

Types of Defects and the Countermeasures

Non operating button

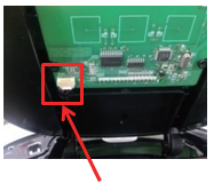
In case where power is not turned by touching even → Move to the power defect items

In case where the display is indicated but the button is not input after power is on

Check point	Items to be confirmed
Main body UI PCB connection status confirm	Is UI PCB connector well combined?

No → UI PCB connector combination and confirm

Yes → UI PCB replacement



In case where there is no change → Main PCB replacement

Wheel error

In case of delivering a message of wheel error while driving

Check point	Items to be confirmed
Wheel module foreign body confirm	Are foreign bodies inserted to the wheel module?

Yes → Try again after removing the foreign bodies of wheel module

No

Wheel drop confirm	Is an indication on the debugger changed when repeating the Wheel Drop motion?

Normal

Drop status

No → Micro switch replacement → **In case where there is no change** → Main PCB replacement

Yes

Confirm non-load current of wheel module	Is non-loaded current of wheel module 8~10 on a debugger?

No → Wheel module replacement

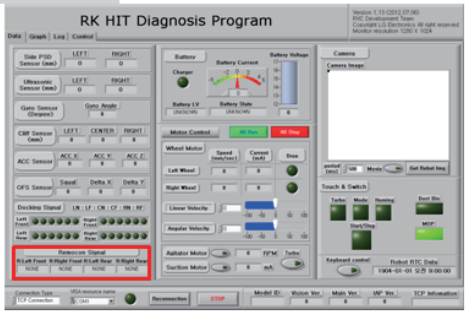
※ **Speed when driving straight : 50**

Yes → Wheel module is normal

Remote controller reception part defect

In case where remote controller reception does not operate

Check point	Items to be confirmed
Remote controller reception part confirm	Is the indicated value on the debugger changed when operating the remote controller?



Yes → Remote controller reception part is normal

No → Is the connector combined normally?

No → Try again after re-combining of the connection

Yes → Remote controller reception part PCB replacement

In case where there is no change

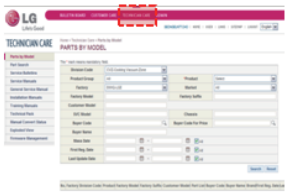
Main PCB replacement

Lab view run time installation

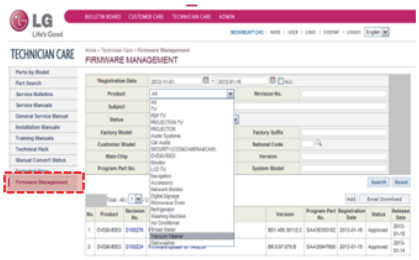
1. Lab view run time installation

Lab view run time 2010 should be installed in order to implement R-manager.
Download the lab view run time program in the server and then install as an order below

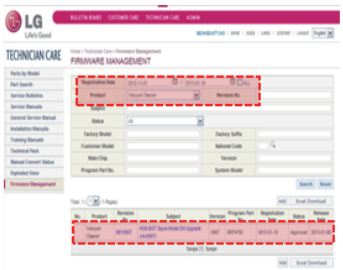
http://biz.lgservice.com
① Input employee number and pw



② Select TECHNICIAN CARE of SITE LINK on top



③ Select Firmware Management of SITE LINK on left



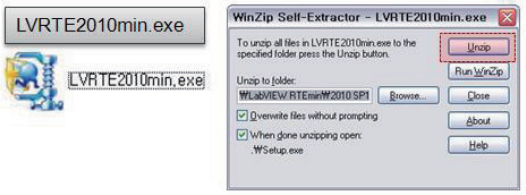
* R-manager program
- LVRTE2010min.exe
- visa462runtime.exe
- R-Manager.exe

④ Check the Registration Date and Product ('Vacuum Cleaner') and Click the Search button)

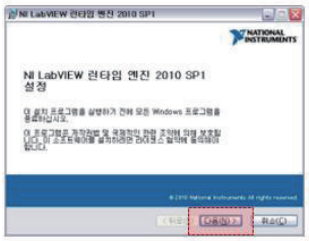
⑤ Select the program from a list and save in attached file USB (Use the formatted USB that is only for updating)

Lab view run time installation

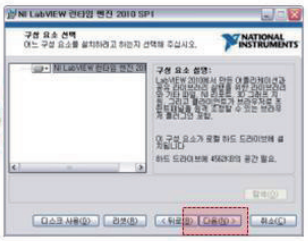
1. Lab view run time 2010 installation



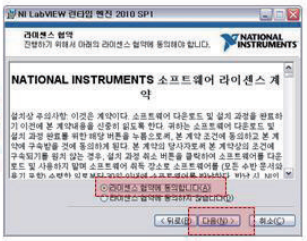
① Unzip



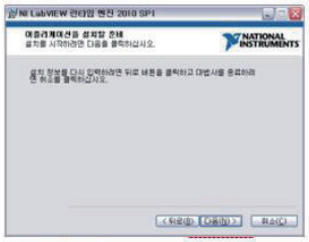
② Click next



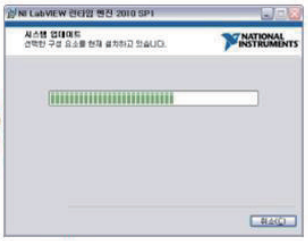
③ Click next



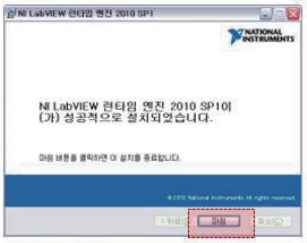
④ Make an agreement with the license and then click next



⑤ Click next



⑥ Waiting



⑦ Click next

Lab view run time installation

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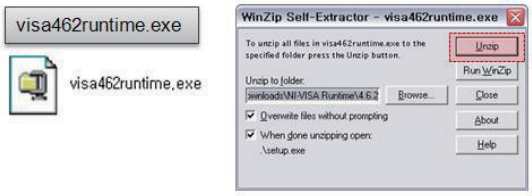
1. Lab view run time 2010 installation



① Unzip

② Click next ③ Click next

④ Click next ⑤ Uncheck the box and then click next ⑥ Completion

R-Manager RK diagnosis program use method

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2. R-Manager RK diagnosis program connection method

2.1. TCP connection method (1)

① Open the cover while power is off.

② Open USB cap, put wireless LAN card, and then close the cover.
(Order and use the TWM-100)

③ Turn the power on

P/No : EBM61201302

④ Press ▼(Down) button for more than 3 seconds while pressing time setting button at the same time by using a remote controller.
Confirm that the diagnosis program connection is ready by the sound of "Ring ring~ ring ring ring ~ Starting inspection mode."

R-Manager RK diagnosis program use method

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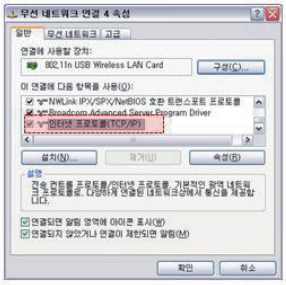
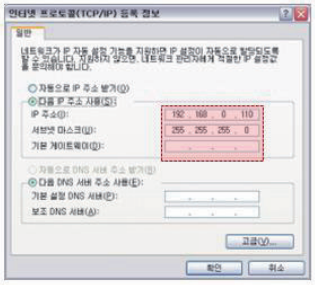
2. R-Manager RK diagnosis program connection method

2.1. TCP connection method (2)

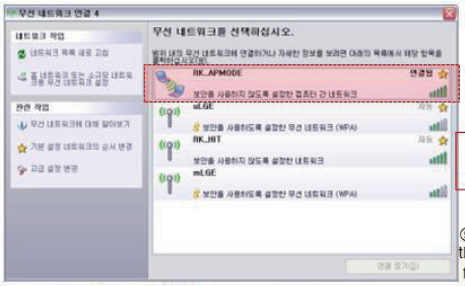
⑤ Set a wireless IP of the PC that will be connected to a robot



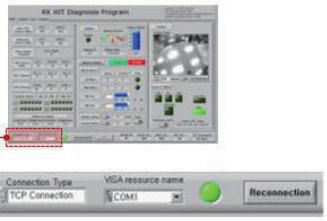
⑥ Select internet protocol (TCP/IP)



⑦ **IP address** : 192.168.0.110
Serve net mask : 255.255.255.0



⑧ Connect to **RK_APMOD** in a wireless network connection status setting window



⑨ Automatically connect to the set when confirming the program connection (**TCP Connection**) as a figure below after implementing R-Manager program. In case of no connection after pressing **Reconnection** button, re-implementing **from ④**

R-Manager RK diagnosis program use method

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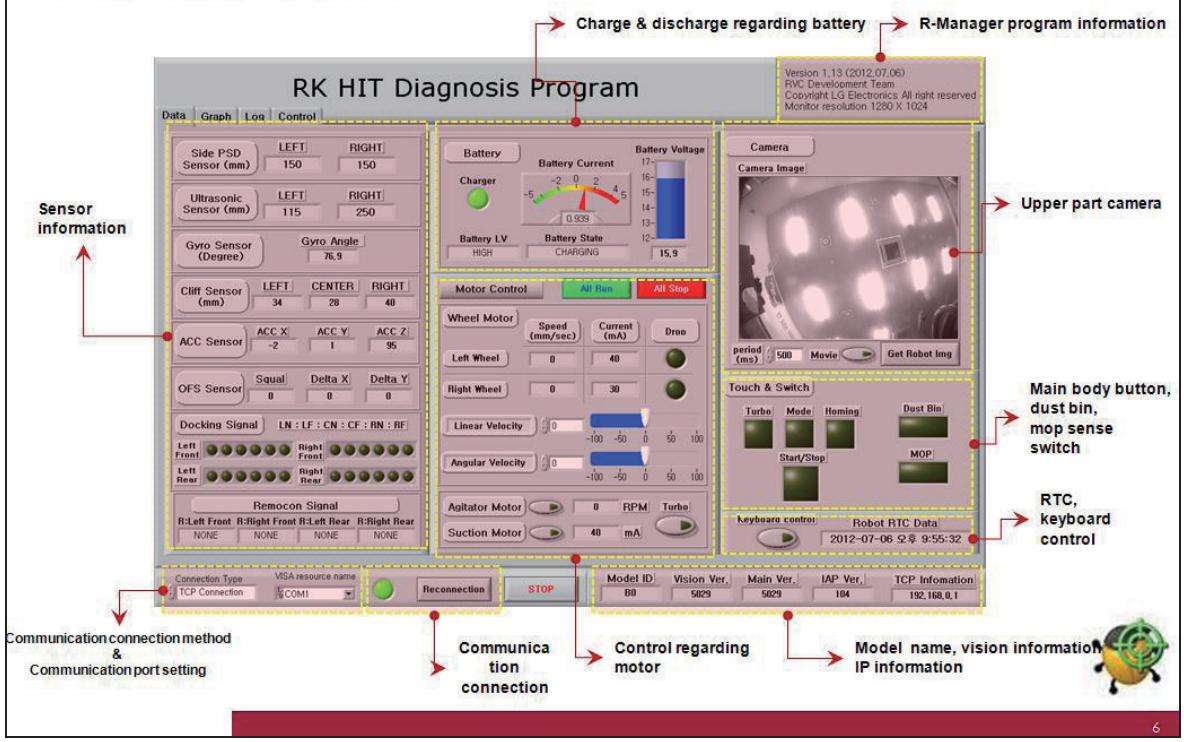
2. R-Manager RK diagnosis program use method

2.1. R-manager program (Main screen)



R-Manager RK diagnosis program use method

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2. R-Manager RK diagnosis program use method

2.1. R-manager program (Main screen)

2.1.1. Communication connection method & communication port setting

➢ Connection Type
- TCP connection : Wireless LAN card use.
- UART connection : Serial cable use.

➢ VISA resource name
- Communication port setting button when UART connection is selected as a connection type

➢ Communication connection
- Green light is on when connection is activated

2.1.2. Model name, vision information, TCP information

➢ Model ID
- B0 : VR627xLVM Ser., VR626xLVM Ser.

➢ Vision Ver.
- Vision board (Upper part camera) program version

➢ Main Ver.
- Main board program version (Note* : Should be the same number with vision ver.)

➢ IAP Ver.
- Main board boot loader version

➢TCP Information
- IP information of robot

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R-Manager RK diagnosis program use method

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2. R-Manager RK diagnosis program use method

2.1. R-manager program (Main screen)

2.1.3. Sensor information

*** Side PSD sensor [mm] – Side PSD sensor**

➢ Function : Wall drive / Map Building

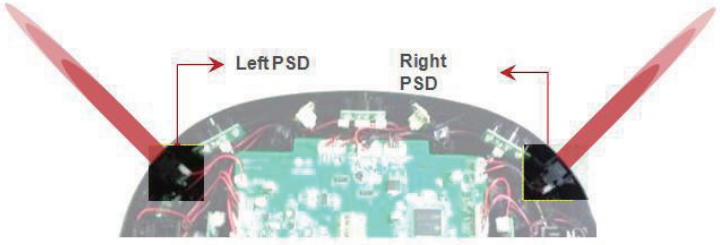
➢ Sense distance : 20~ 150 mm

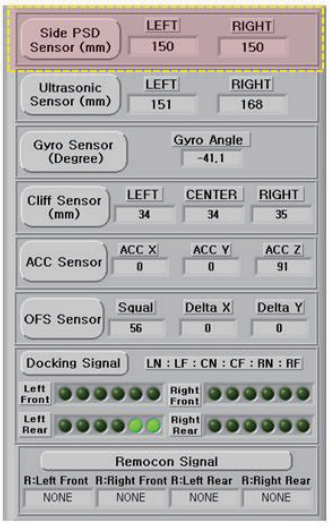
➢ In case where there is no barrier : 150 mm

➢ Sensor characteristic

Advantage : Possible to calculate the straight distance to the barrier and position accurately

Disadvantage : Narrow sense range and greatly influenced by external light interference (외란광)





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R-Manager RK diagnosis program use method

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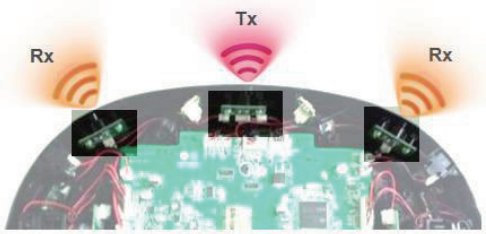
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

*** Ultrasonic sensor [mm] – Ultrasonic sensor**

- Function: Barrier sense / Wall drive
- Sense distance: 50 ~250 mm
- In case where there is no barrier : 250 mm
- Sensor characteristic

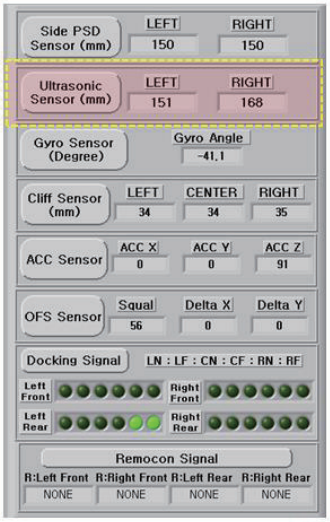
Advantage – Possible to sense a wide range with a small amount of sensors

Disadvantage –Difficult to sense thin and angulated barriers such as legs of a desk and a chair



Tx: Transmitter (Transmission part)

Rx: Receiver (Reception part)



R-Manager RK diagnosis program use method

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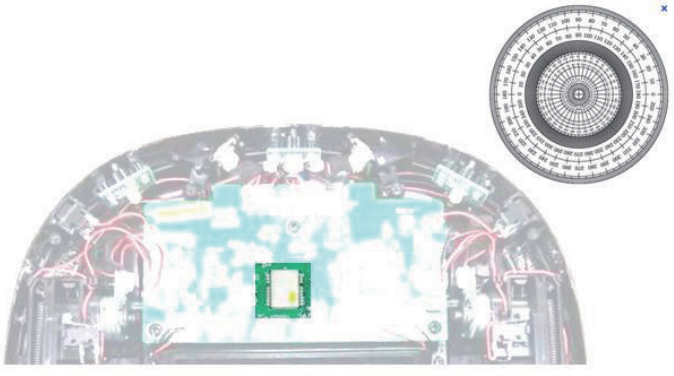
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

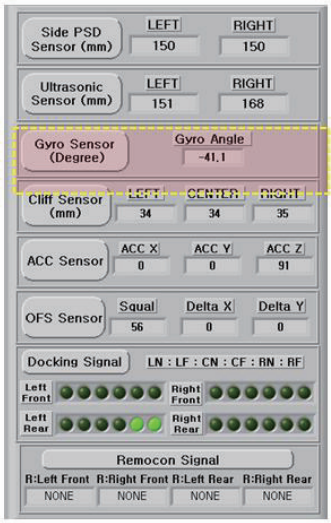
*** Gyro Sensor [mm] – Angle sensor**

- Function: Angle measurement
- Operation range: -180.0 ~ 180.0 (Degree)
- Initial value : 0 (CW: Clock wise - / CCW: Counter clock wise +)
- Sensor characteristic

Advantage – Correct the straight drive by measuring relative angles

Disadvantage – Not resistant to temperature changes and external shock





R-Manager RK diagnosis program use method

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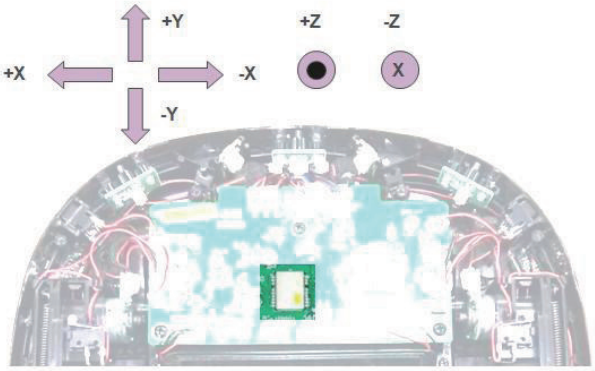
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

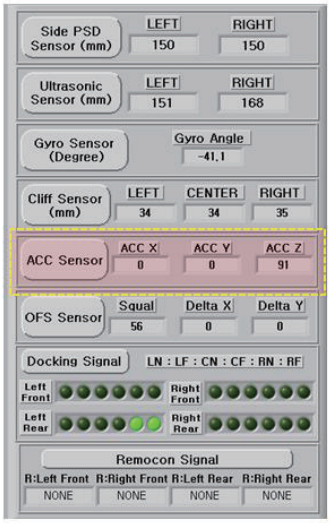
*** Accelerometer Sensor - Acceleration sensor**

- Function: Acceleration (Shock) measurement
- Operation range: -2048~+2048(-2G ~+2G)
- Sensor characteristic

Advantage – Sense collision by measuring the amount of speed change (Mechanic bumper replacement)

Disadvantage – Not resistant to temperature changes and external shock





R-Manager RK diagnosis program use method

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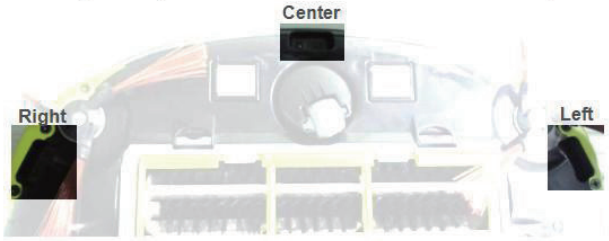
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

*** Cliff Sensor - Cliff/ doorsill sense sensor**

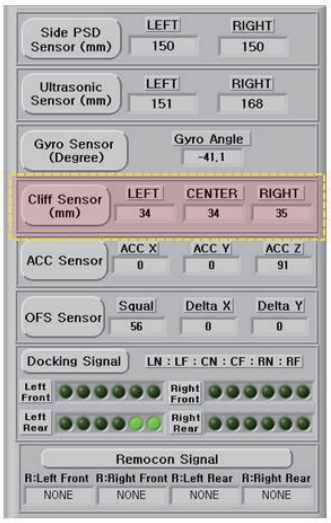
- Function: Cliff and doorsill sense
- Sense distance: -18 ~ 150(mm)
- In case where there is no barrier : 150(Doorsill: - / cliff: + floor : 35mm)
- Sensor characteristic:

Advantage – Less influenced by colors of barriers

Disadvantage – Mis-operation if there are marble and clear color changes



- Possible range of sensor correction [mm] : -30 ~ +40 / 35
- Sensor sensitivity adjustment time: When cleaning starts (Should start on the flat floor)
- Items to be confirmed : After rotating an agitator, left/ right sensor change should be confirmed by using graphs (-4 ~ +4)



R-Manager RK diagnosis program use method

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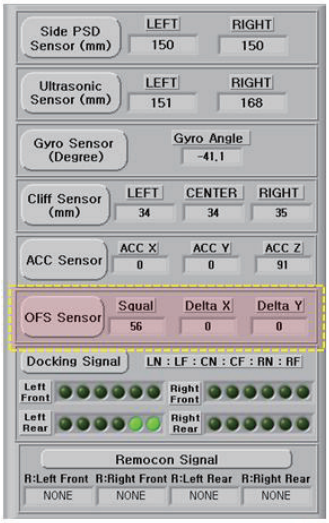
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

*** Cliff sensor - Doorsill/ cliff sensor**

- ➢ Function: Measure the relative migration distance of a main body
- ➢ Principle of sensor: Measure the migration distance and direction by taking an image of the floor surface image (3x3mm) every once in a while
- ➢ SQUAL: The number of characteristic dot of an floor image that can be used in calculation of the amount of migration
- ➢ Sensor characteristic

Advantage – Possible to measure the actual migration distance of a main body /Correct errors caused by slipping

Disadvantage – Decline performance on a floor without patterns/ mis-operation caused by dust



- SQUAL use range

In case of more than 40 → Use a migration value to position correction

In case of more than 23 → Use when judging a stuck sense of a main body

In case of less than 23 → OFS sensor should not be used

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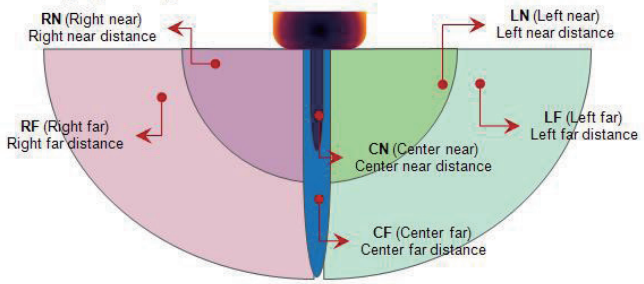
R-Manager RK diagnosis Program use method

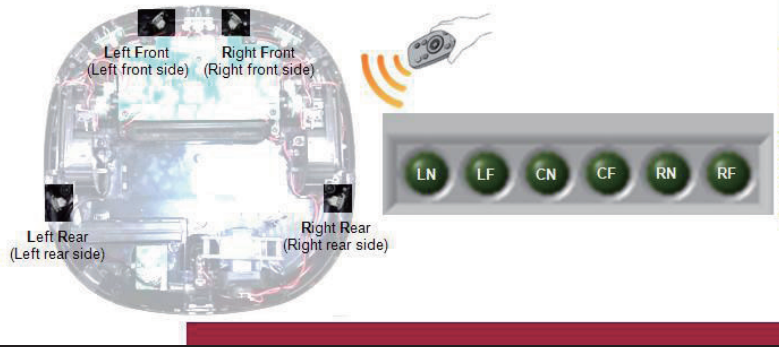
LG Life's Good

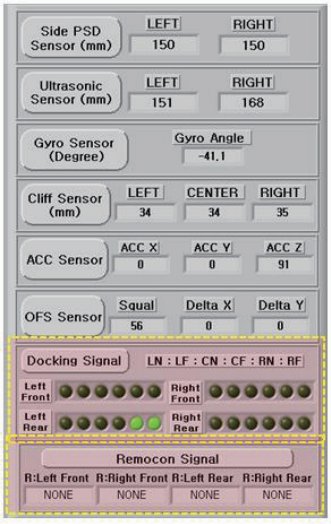
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.3. Sensor information

✓ **Docking signal range**



✓ **Automatic charge induction signal/ Place sensors sense remote controller signal**





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R-Manager RK diagnosis Program use method

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2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.4. Charge & discharge regarding batteries

*** Battery management system – Battery management**

➢ Voltage range: 12.7V ~16.8V

➢ Residual quantity level of a battery

High : More than 70%

Middle: 40% ~ 70%

Low : 20% ~

Dock: 5% ~20%

LB (Low battery): Under 5%

➢ Current range

When discharging: Average current 200~400mA

Motor derive 900 ~1100mA

When charging: 300 ~ 1100 mA

➢ Charger terminal contact confirm (Contact)

When contacting a charger, docking signal occurrence is blocked

➢ Battery state confirm (Battery State)

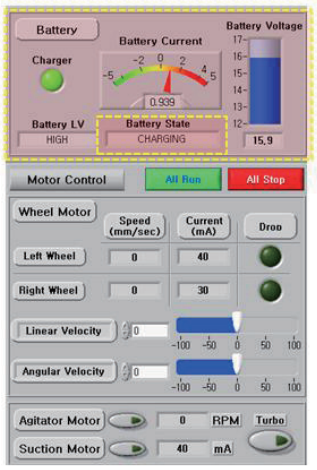
CONSUMING: Waiting

CHARGER CONTACT: Charge terminal connection

CHARGING : Charging

CHARGING COMPLETE : Charge completion

SWITCH ERROR : Main power switch of a main body is off



R-Manager RK diagnosis Program use method

LG Life's Good

2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.5. Control regarding motors

*** Motor control – Motor control**

➢ Wheel motor (Left/ right wheel motor)

Straight drive speed / rotation speed: Straight drive/ rotation speed [mm/sec] of a main body by wheel rotation

Speed :The current wheel speed [mm/sec] measured by wheel motor encoder

Current (Current): Wheel motor use current [10mA]

Drop (Wheel drop sense): Whether or not a wheel drop sense switch is operated

➢ Agitator motor (Agitator motor)

Agitator motor speed (RPM) – Error occurrence in case where less than 1000RPM

➢ Suction motor (Suction motor)

Suction motor current (10mA) –When a motor is stuck, current is increased drastically

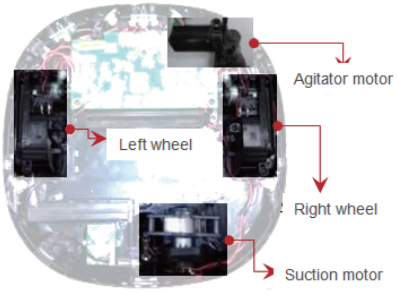
➢ All run / All stop (Whole motor control)

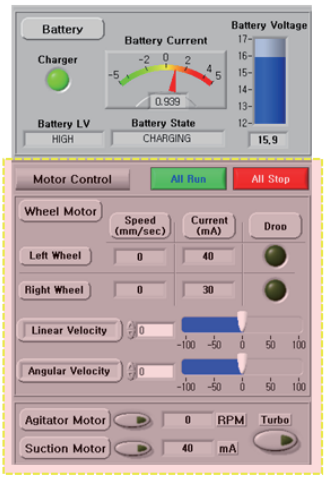
Whole motor (Agitator, suction, wheel) is on/off with a currently set speed

➢ Turbo

Agitator RPM : 1000 → 1200 RPM

Suction motor : 8500 → 10000 RPM





R-Manager RK diagnosis Program use method

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2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.6. Upper part camera

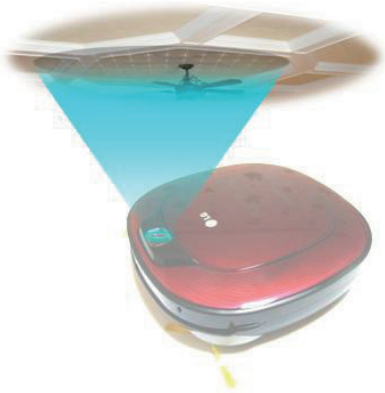
*** Ceiling vision sensor – Upper part camera**

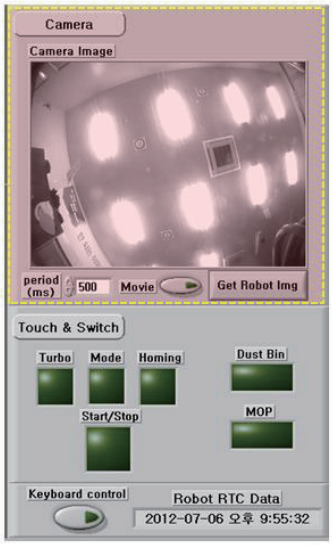
➢ Camera image confirm

Get Robot Img : Image capture

Movie button : Take images periodically which is set (Should be minimum 500ms)

CV-SLAM
Position detection and mapping A are performed at the same time from an image of ceiling





R-Manager RK diagnosis Program use method

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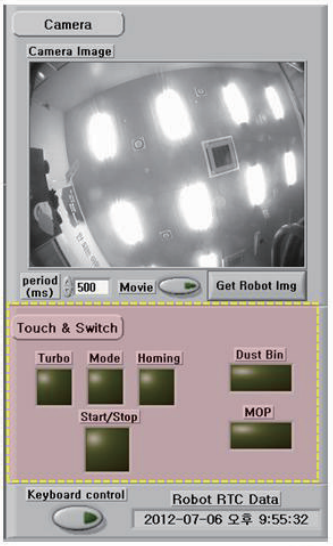
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.7. Infrared light reception & micro SW

*** On / off switch check – Switch type inspection**

➢ Cover touch button (Upper part touch button)

➢Dust bin sense switch

➢Mop sense switch



R-Manager RK diagnosis Program use method

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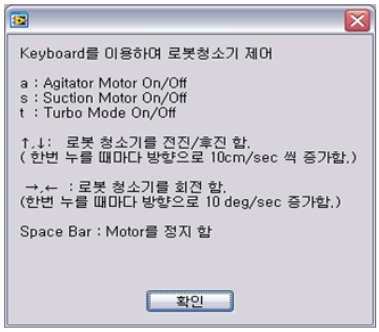
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Main screen)
2.1.8. RTC, keyboard control

*** PC keyboard control / RTC time –Computer keyboard control / main body set time**

- **a** : Agitator motor on / off
- **s** : Suction motor on / off
- **t** : Turbo mode on / off
- ↑, ↓ : Reverse speed control before setting
  Set speed is accelerated/ decelerated by 10 cm/sec when clicking
- ‹ , › : Set left and right rotation speed control
  Set speed is accelerated/ decelerated by 10 deg/sec when clicking
- **Space bar** : All motor off



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R-Manager RK diagnosis Program use method

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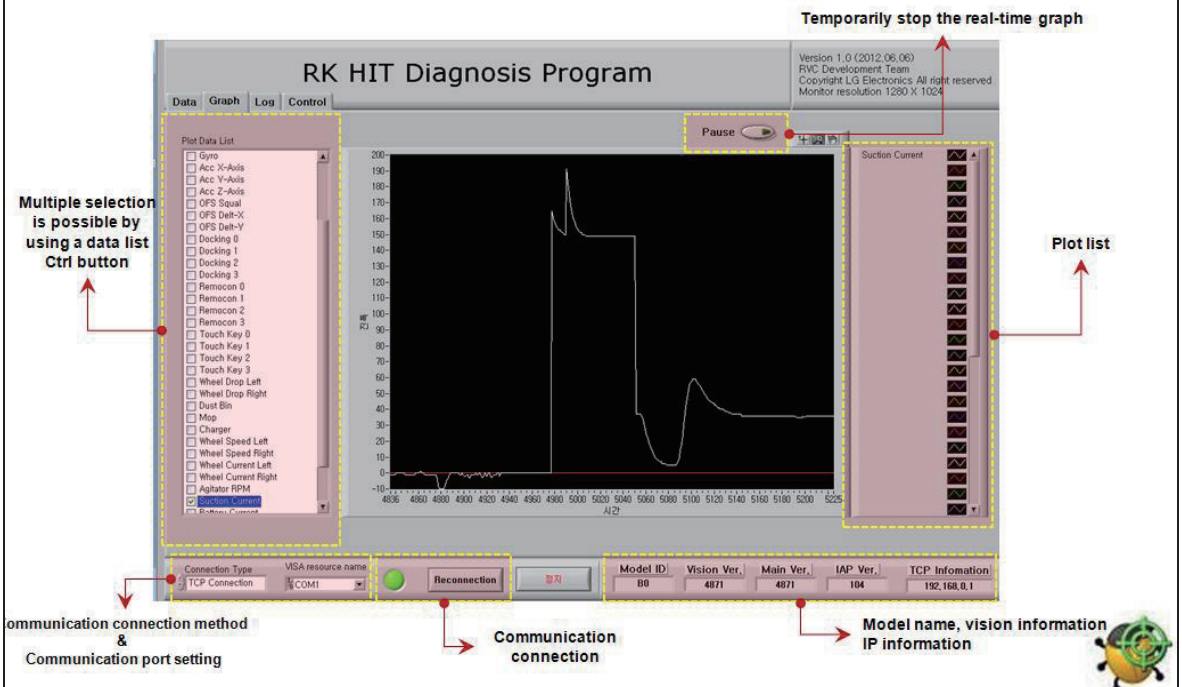
2. R-Manager RK diagnosis program use method
2.1. R-manager program (Graph screen)



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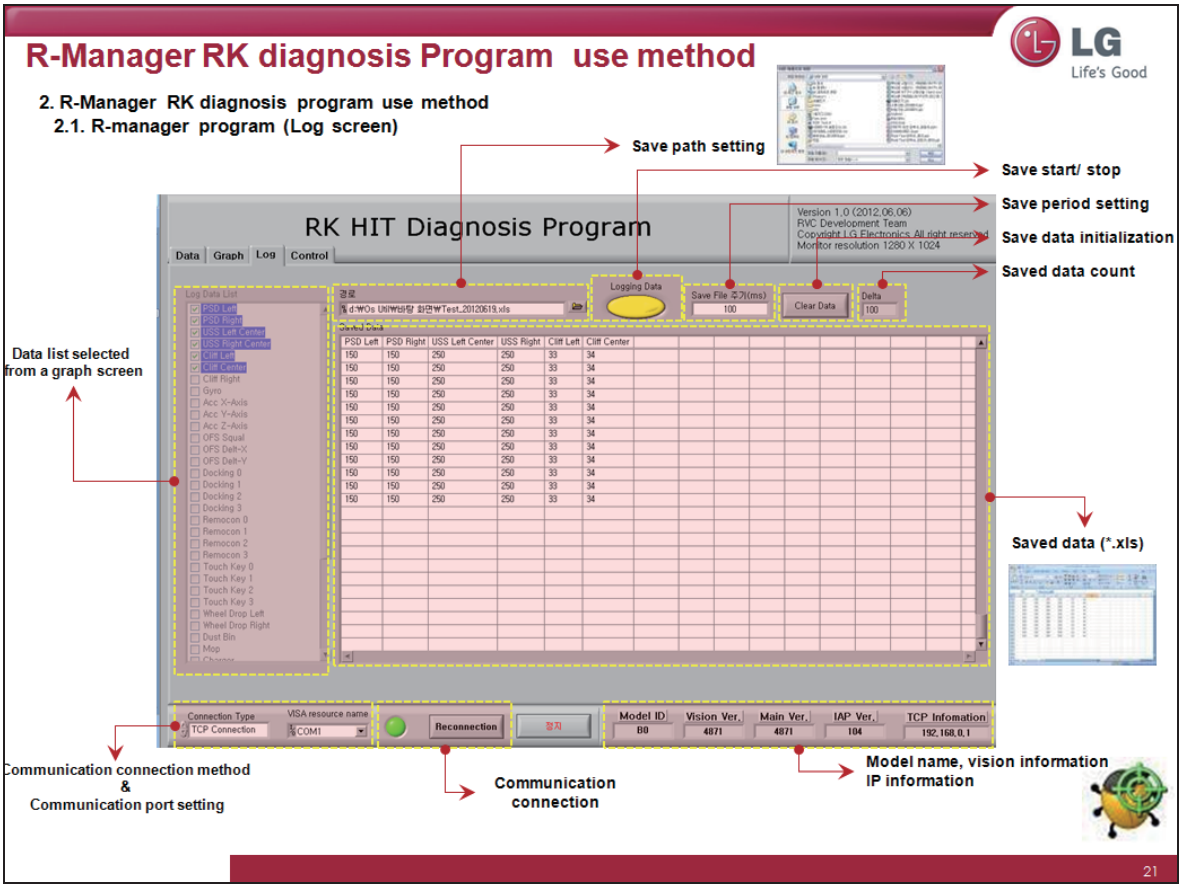
R-Manager RK diagnosis Program use method

2. R-Manager RK diagnosis program use method
2.1. R-manager program (Log screen)



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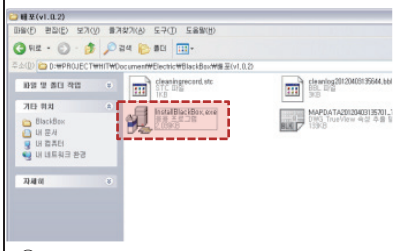
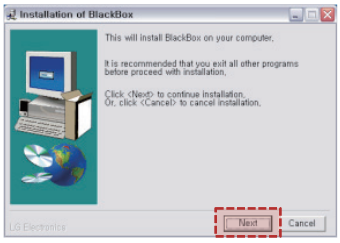
Black box viewer manual

1. Black box viewer installation method

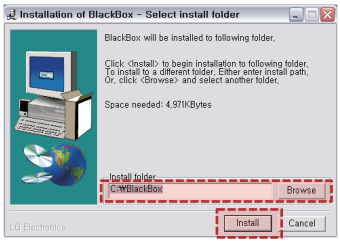
Download Black Box Install file from a server (http://biz.lgservice.com=> GCSC) and then install as an order below



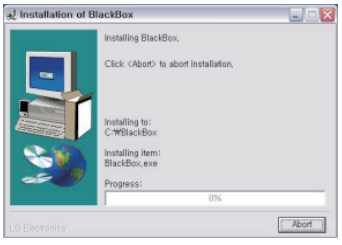
① Perform install program



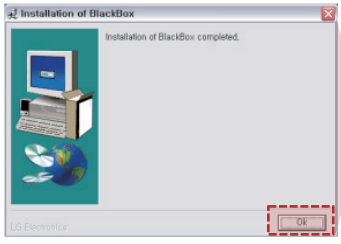
② Click **Next**



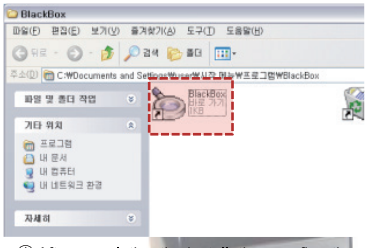
③ Select the path which black box viewer program is installed and then click **Install** button



④ Install progress status



⑤ Click install end **OK** button



⑥ After completing the installation, confirm the implemented file

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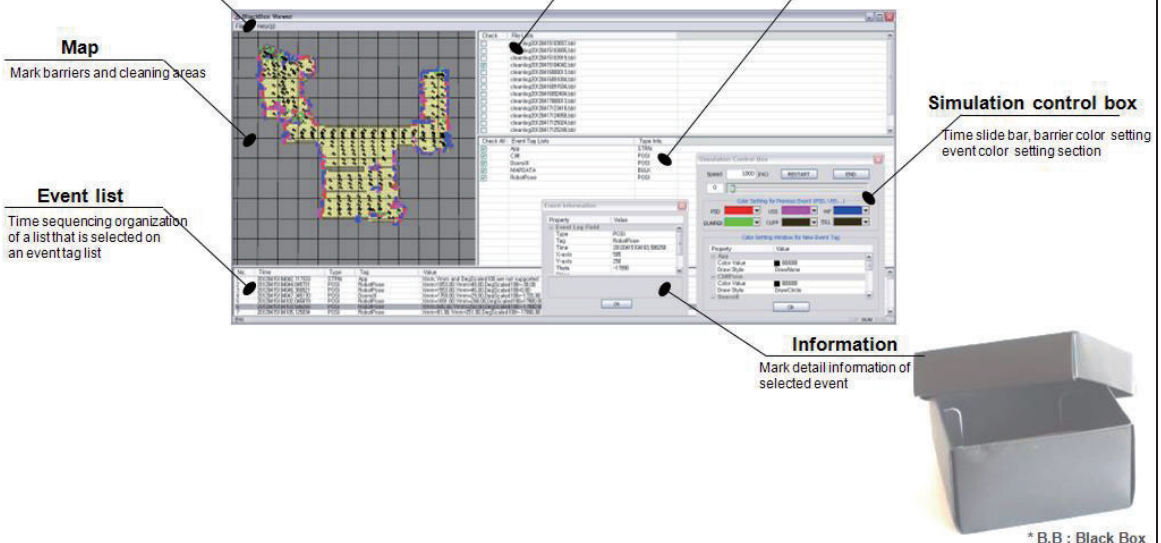
Black box viewer manual

LG Life's Good

2. Black box viewer explanation



* B.B : Black Box

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Black box viewer manual

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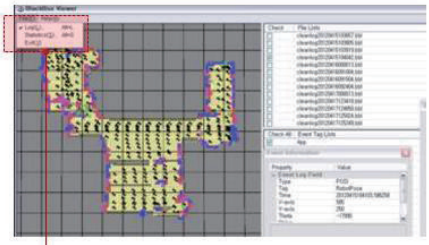
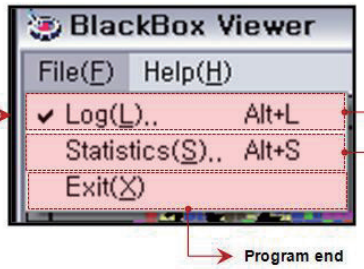
2. Black box viewer explanation

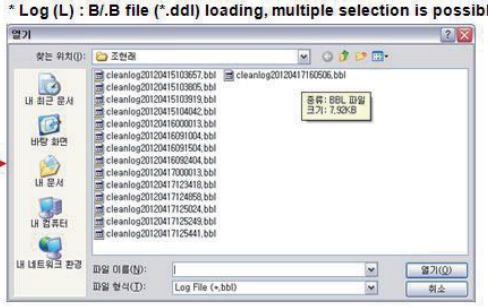
2.1. Manu Bar



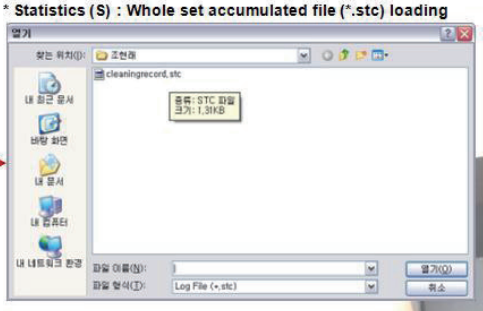


Program end

* Log (L) : B/.B file (*.ddl) loading, multiple selection is possible



* Statistics (S) : Whole set accumulated file (*.stc) loading



* B.B : Black Box

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Black box viewer manual

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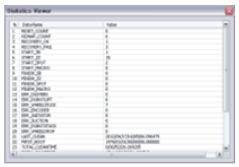
2. Black box viewer explanation

2.1. Manu bar

Statistics (S) : Whole set accumulated file (*.stc) data list (1)

Statistics viewer screen



Confirm accumulated data of Roboking since outgoing

No.	Indication	Error classification	Indication method
1	RESET_COUNT	Accumulated number of reset occurrence	Times
2	KIDNAP_COUNT	Accumulated number of kidnap occurrence	Times
3	RECOVERY_OK	Accumulated number of kidnap success	Times
4	RECOVERY_FAIL	Accumulated number of kidnap failure	Times
5	START_SB	Accumulated number of meticulous cleaning mode start	Times
6	START_ZZ	Accumulated number of zigzag mode start	Times
7	START_SPOT	Accumulated number of intense cleaning mode start	Times
8	START_MACRO	Accumulated number of designated area mode start	Times
9	FINISH_SB	Accumulated number of meticulous cleaning completion	Times
10	FINISH_ZZ	Accumulated number of zigzag cleaning completion	Times
11	FINISH_SPOT	Accumulated number of intense cleaning completion	Times
12	FINISH_MACRO	Accumulated number of designated area cleaning completion	Times
13	ERR_DUSTBIN	Accumulated number of dust bin error occurrence	Times
14	ERR_ROBOTLIFT	Accumulated number of main body lifting error occurrence	Times
15	ERR_LWHEELSTUCK	Accumulated number of stuck error occurrence on left wheel	Times
16	ERR_RWHEELSTUCK	Accumulated number of stuck error occurrence on right wheel	Times
17	ERR_AGITATOR	Accumulated number of stuck error on main body floor agitator	Times
18	ERR_SUCTION	Accumulated number of stuck error on suction motor	Times
19	ERR_ROBOTSTUCK	Accumulated number of stuck error on main body	Times
20	ERR_WHEELDROP	Accumulated number of wheel lifting error	Times
21	ERR_ENCODER_L	Accumulated number of left wheel encoder error	Times
22	ERR_ENCODER_R	Accumulated number of right wheel encoder error	Times
23	ERR_MOTOR_L	Accumulated number of left motor short error	Times
24	ERR_MOTOR_R	Accumulated number of right motor short error	Times

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Black box viewer manual

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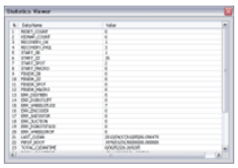
2. Black box viewer explanation

2.1. Manu bar

Statistics (S) : Whole set accumulated file (*.stc) data list (2)

Statistics viewer screen



Confirm accumulated data of Roboking since outgoing

No.	Indication	Error classification	Indication method
25	ERR_MOTOR_RCV	Accumulated number of motor short sense trial	Times
26	START_RESERV	Accumulated number of reserved cleaning start	Times
27	VOICE_COMEHERE	[Voice] Accumulated number of "Come here Roboking "	Times
28	VOICE_START	[Voice] Accumulated number of "Roboking cleaning start"	Times
29	VOICE_PAUSE	[Voice] Accumulated number of " Roboking"	Times
30	VOICE_SPOT	[Voice] Accumulated number of "Intense cleaning"	Times
31	VOICE_HOMING	[Voice] Accumulated number of " Roboking charge"	Times
32	VOICE_WAIT	[Voice] Accumulated number of "Roboking wait"	Times
33	CURRENTBUMPING	Accumulated number of wheel bumping occurrence	Times
34	LAST_CLEAN	Last cleaning time	Year/month/date/time /minute/second
35	FIRST_BOOT	First booting time	Year/month/date/time /minute/second
36	TOTAL_CLEANTIME	Accumulated time of total cleaning	Date/time/minute/sec ond
37	TOTAL_RUNTIME	Accumulated time of total power on	Date/time/minute/sec ond
38	TOTAL_CARPET	Accumulated time of carpet cleaning	Date/time/minute/sec ond
39	VER_REVISION	Vision program version	no.
40	VER_REV_DATE	Update date	Year/month/date/time /minute/second
41	VER_REPOSITORY	svn path	Dir.
42	VER_BOOTLOADER	Mainboard Bootloader version	no.
43	VER_MAINSW	Mainboard program version	no.
44	MODEL_NO	Model number (0xB0)	no.

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Black box viewer manual

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2. Black box viewer explanation

2.2. B.B file lists

Check	File Lists
☐	cleanlog20120415103657.bbl
☐	cleanlog20120415103805.bbl
☐	cleanlog20120415103919.bbl
☑	cleanlog20120415104042.bbl
☐	cleanlog20120416000013.bbl

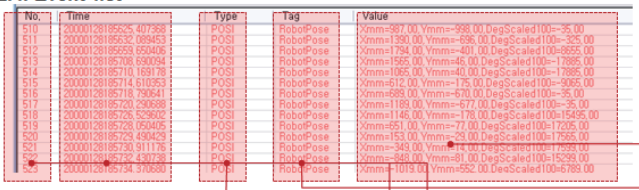
- Black box list saved in the Roboking
  => It is saved with a file of **cleanlog year month date time minute second.bbl**

2.3. Event tag lists

- The event list will be organized in a time sequencing as checking of an event that you want to look at by using an event tag list save in the black box

Information classification : Letter, position, bulk transmission,
Event tag list : Application, error (Bumping,), MAP DATA, ,
Event tag list classification

2.4. Event list



- Event list defined in the event tag of B.B file is organized in a time sequencing.

*** Coordinate starting point is (550.0, 50, 0°)**
When double clicking while playing, directly move to the correspond position

Image capture position : X coordinate, Y coordinate, angle
Event tag list classification
Event tag list classification
Image capture time : Year month date time minute second
Time No. : The order of image capture to the upper camera while driving

Black box viewer manual

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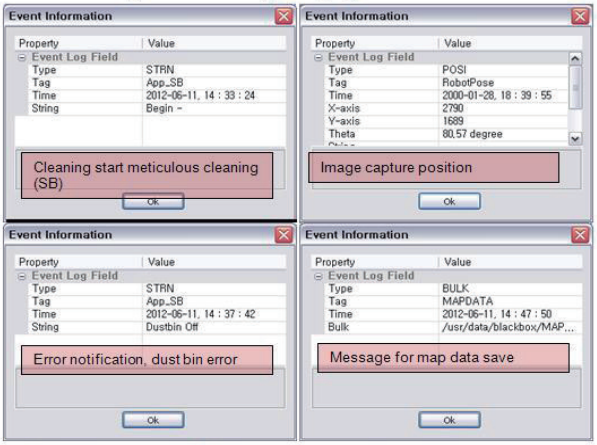
2. Black box viewer explanation

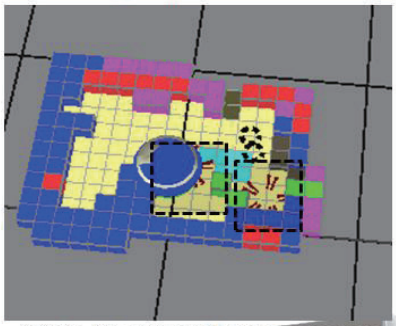
2.5. Information

When clicking information (Example)



- Possible to see the details of correspond event list
  => Event type, tag, occurrence time, coordinate, angle event explanation

When clicking display



- Indicate the correspond event on the map

Black box viewer manual

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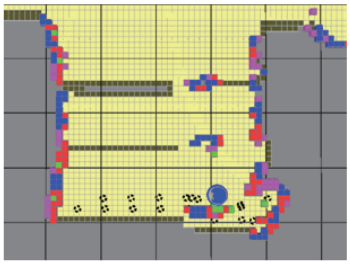
2. Black box viewer explanation

2.6. Map



- Driving information saved in B.B can be confirmed visually
- Debugging can be done by confirming the event (Cliff, doorsill)
- Each color can be set and confirmed in the simulation control box
- Classified three areas (Cleaning area/ non-cleaning area/barrier)

2.7. Simulation control box

Possible to set regarding map
- Possible to play and stop based upon an event list content
- Possible to set color and shape of occurred event

Black box viewer manual

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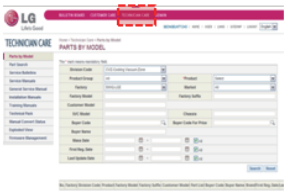
3. Black box viewer use method

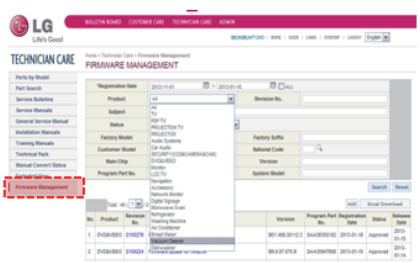
3.1. Program download for black box data upload

Black box save implementation script should be downloaded from the server

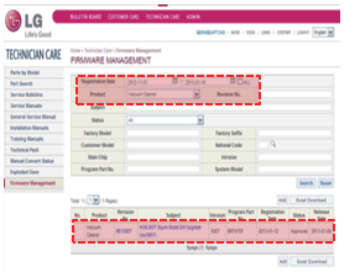
http://smile.lge.com
① Input employee number and pw



② Select TECHNICIAN CARE of SITE LINK on top



③ Select Firmware Management of SITE LINK on left



④ Check the Registration Date and Product ('Vacuum Cleaner') and Click the Search button)

⑤ Select the program from a list and save in attached file USB
(Use the formatted USB that is only for updating)

*** File list**
- blackbox.sh (File)
- blackbox (Folder)

Place above tow files at the top path of the USB
B.B data is automatically saved under the black box folder

Black box viewer manual

LG Life's Good

3. Black box viewer use method

3.1. Program download for black box data upload

⑥ Open the cover while power is off.

⑦ Open USB cap and put USB memory that the program for black box upload is saved. Then close the cover

⑧ Turn the power on

⑨ Booting starts by showing a booting animation,
Upload starts with a voice guidance of **"Black box data loading is starting."** ,
Upload completion is notified with a voice guidance of
"Black box data loading is completed." Then booting starts automatically.

Black box viewer manual

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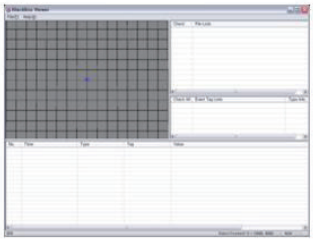
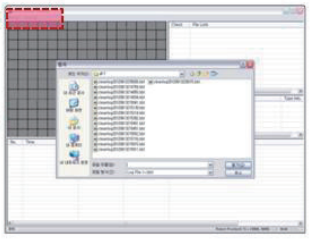
3. Black box viewer use method

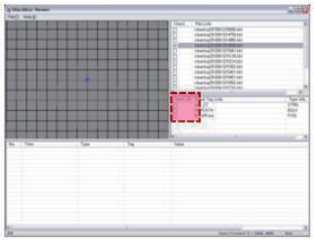
3.1. Program download for black box data upload



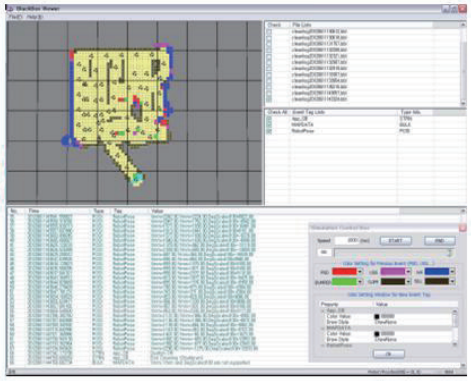
① Black box viewer program implementation



② Click File -> Log and load log file



③ Click the list which you want to look at on the check box of the event tag list



④ Upload completion
Debugging by using the loaded file
=> Find out the error type and position
=> Improve robot key use environment for users

⑤ Implement start/end/color selection by using a simulation control box

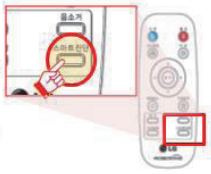
Smart diagnosis

1. Smart diagnosis perform

• Function that the problematic information of main parts such as sensor and motor of the main body is found out itself and guides customers with a method to take action via voice

Operation condition : Press "Smart diagnosis" button on the remote controller while charging

*** Smart diagnosis start condition**
- While charging the charger
- In status of non-installation of mop (Prevention sensor misjudgment)
- In status of installation of dust bin
- Minimum battery status is more than medium
- In status of non-lifted wheels



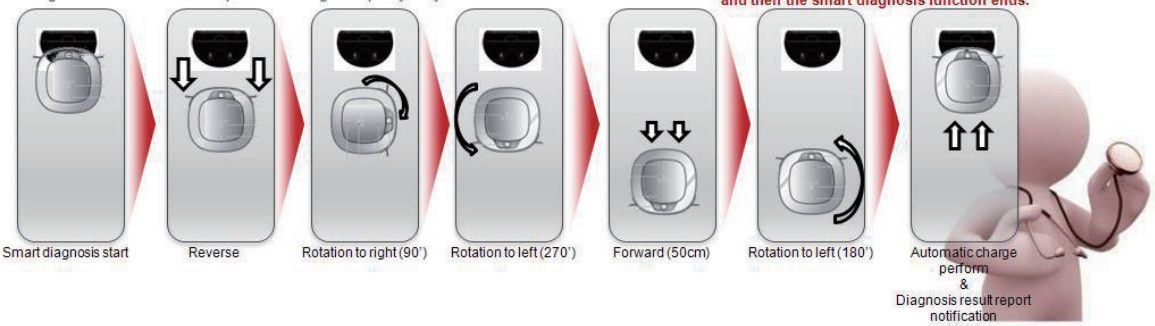
*** If a reservation is set, the reservation is canceled and then the diagnosis starts**

2. Diagnosis result voice message repetition function and diagnosis mode removal

- Diagnosis result voice message can be repeated as much as the users want (Implement by pressing the charge key)
- Diagnosis mode removal is possible using a stop key only

※ When there is no operation for a minute after a voice message guidance, it automatically returns to the charge mode

※ In case where there is any problem in barrier sense sensor, ultrasonic sensor, cliff sense sensor, only voice message is provided without returning to the charger and then the smart diagnosis function ends.



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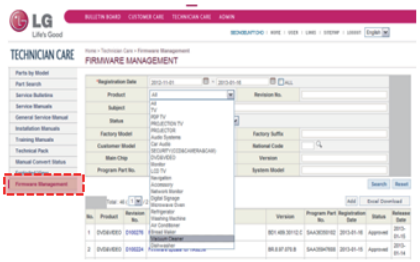
Program upgrade

1. Use program download method

The file to upgrade should be downloaded from the server and then upgrades as an order below

http://smile.lge.com
① Input employee number and pw

② Select TECHNICIAN CARE of SITE LINK on top



③ Select Firmware Management of SITE LINK on left

④ Check the Registration Date and Product ('Vacuum Cleaner') and Click the Search button)

⑤ Select the program from a list and save in attached file USB (Use the formatted USB that is only for updating)

*** File list**
- RKHIT_verxxxx.zip
(xxxx is a program version)

1

Program upgrade

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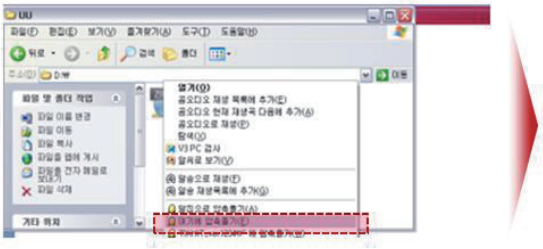
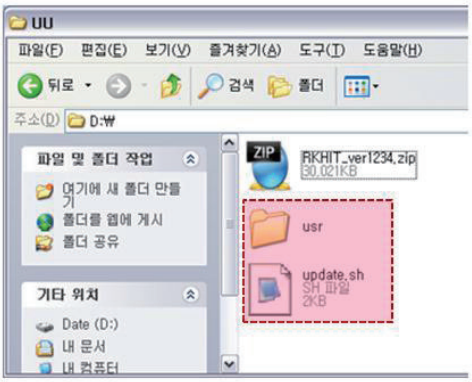
1. Update program download method (2)

⑥ USB open



⑦ Implement unzip here



⑧ Confirm whether the **usr folder and update.sh** file are positioned on the top of the USB

Program upgrade

LG Life's Good

1. Update program download method (3)

⑨ Open the cover while power is off.

⑩ Open USB cap and put USB memory that update program is saved. Then close the cover.

⑪ Turn the power on

⑫ Booting starts by showing a booting animation,
Update starts a voice guidance of **"Software update is starting."**,
Update completion is notified with a voice guidance of
"Software update is completed." and the power turns off.
Then booting starts with the updated program.

Program upgrade method (3)

LG Life's Good

2. Program version confirm method

Program version is informed by voice when pressing the order listed below using a remote controller
(ex) In case where version is 1234 "One two three four")

Turbo → Turbo → Mode change → Mode change → Mode change →
Turbo → Turbo → Repeat → Repeat

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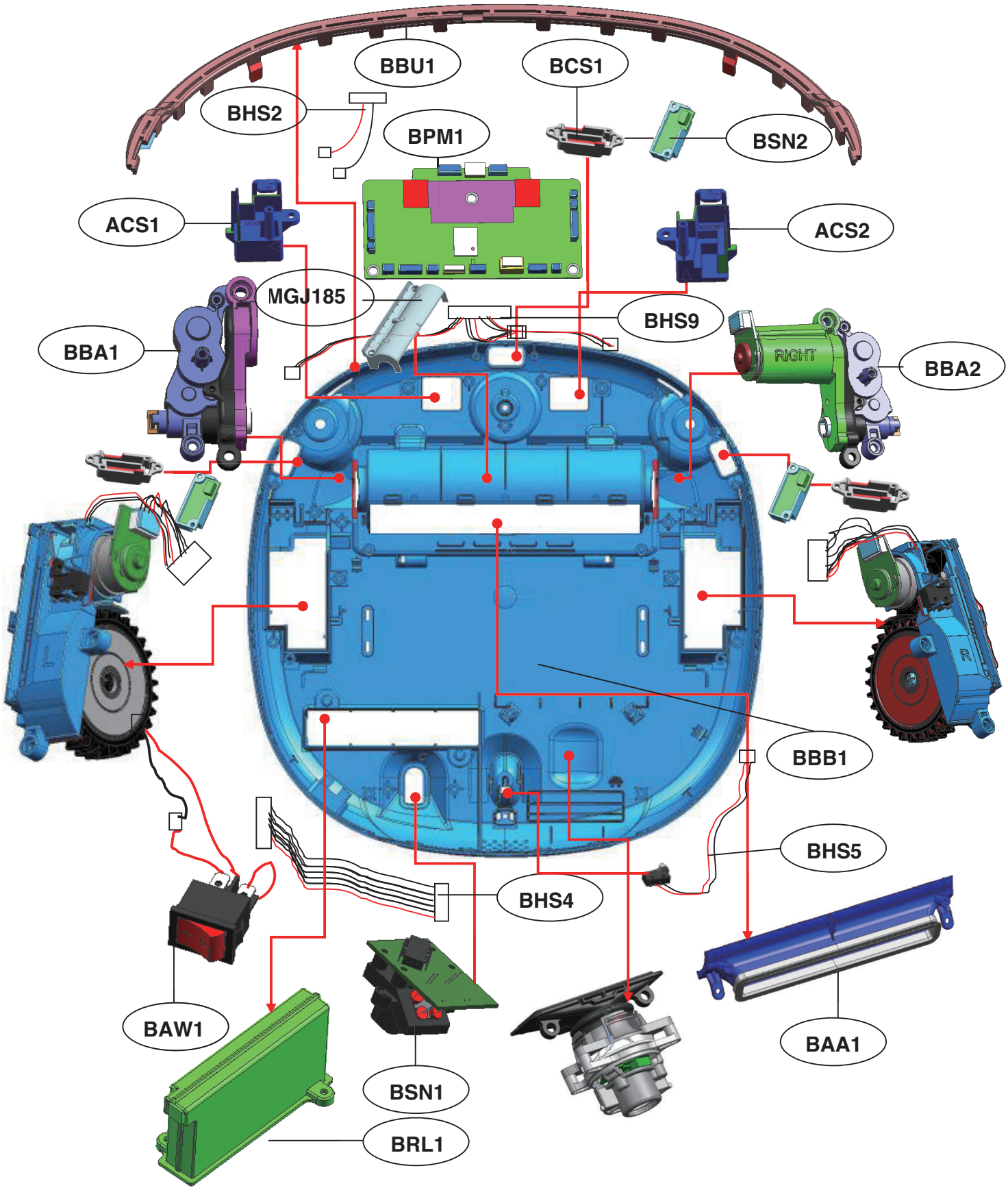
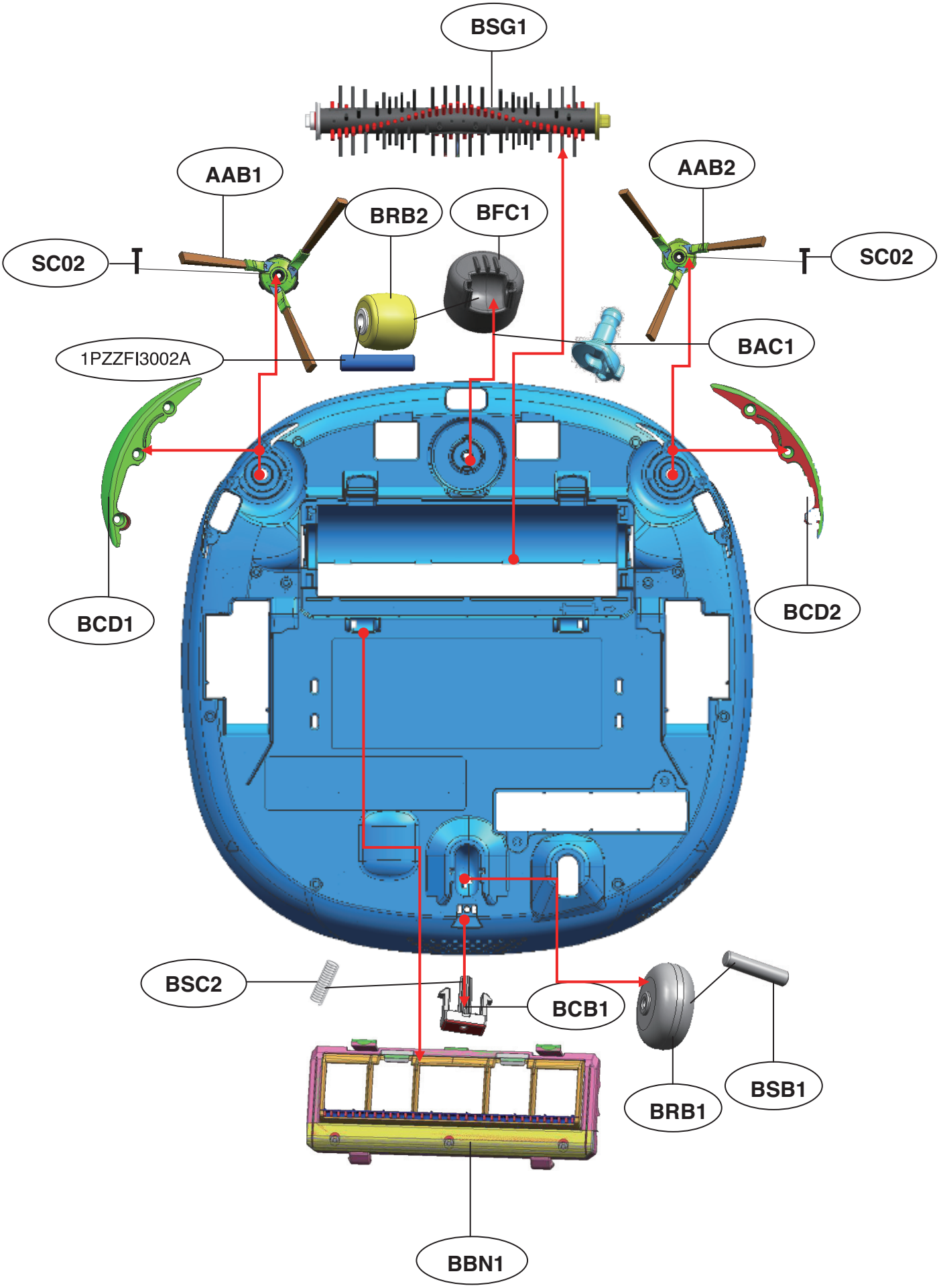
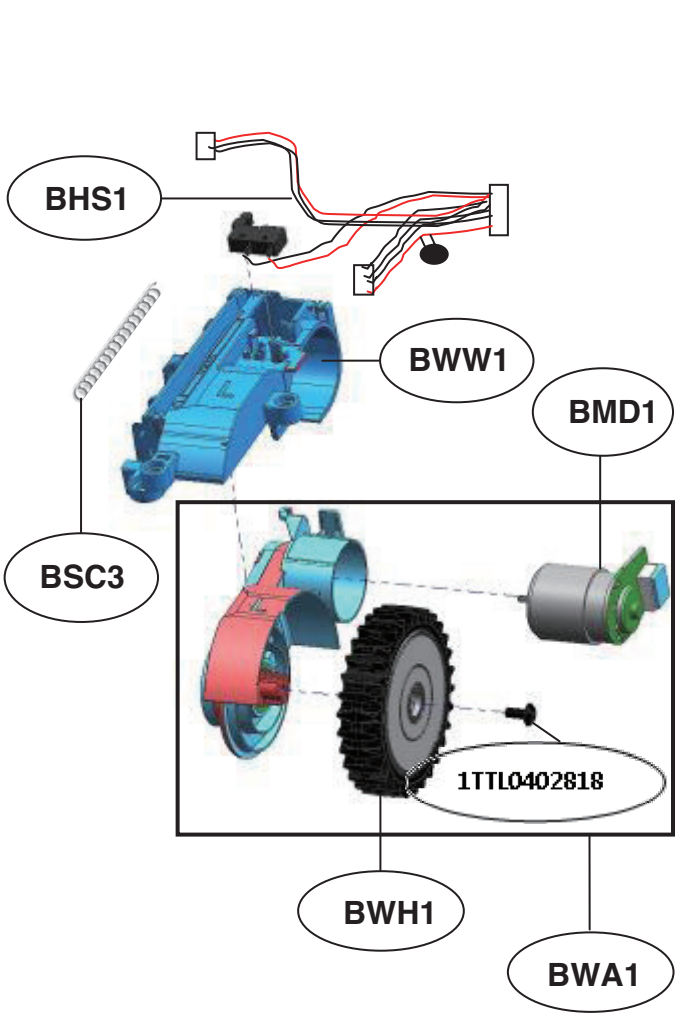
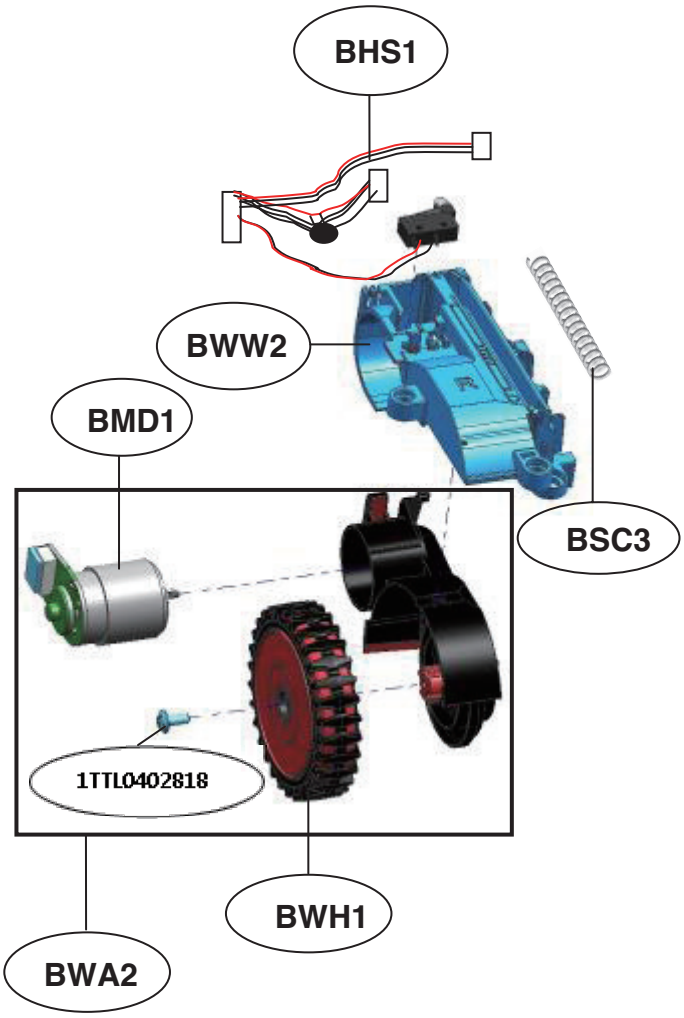
Deal Drawing of the Structure and List of Parts

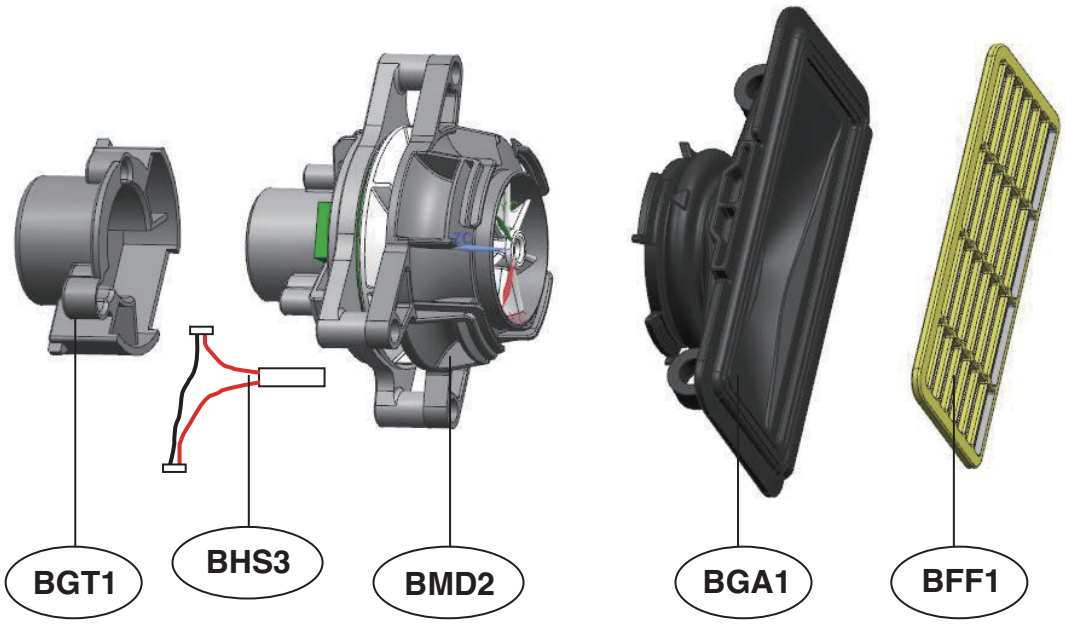
■ Base Assembly

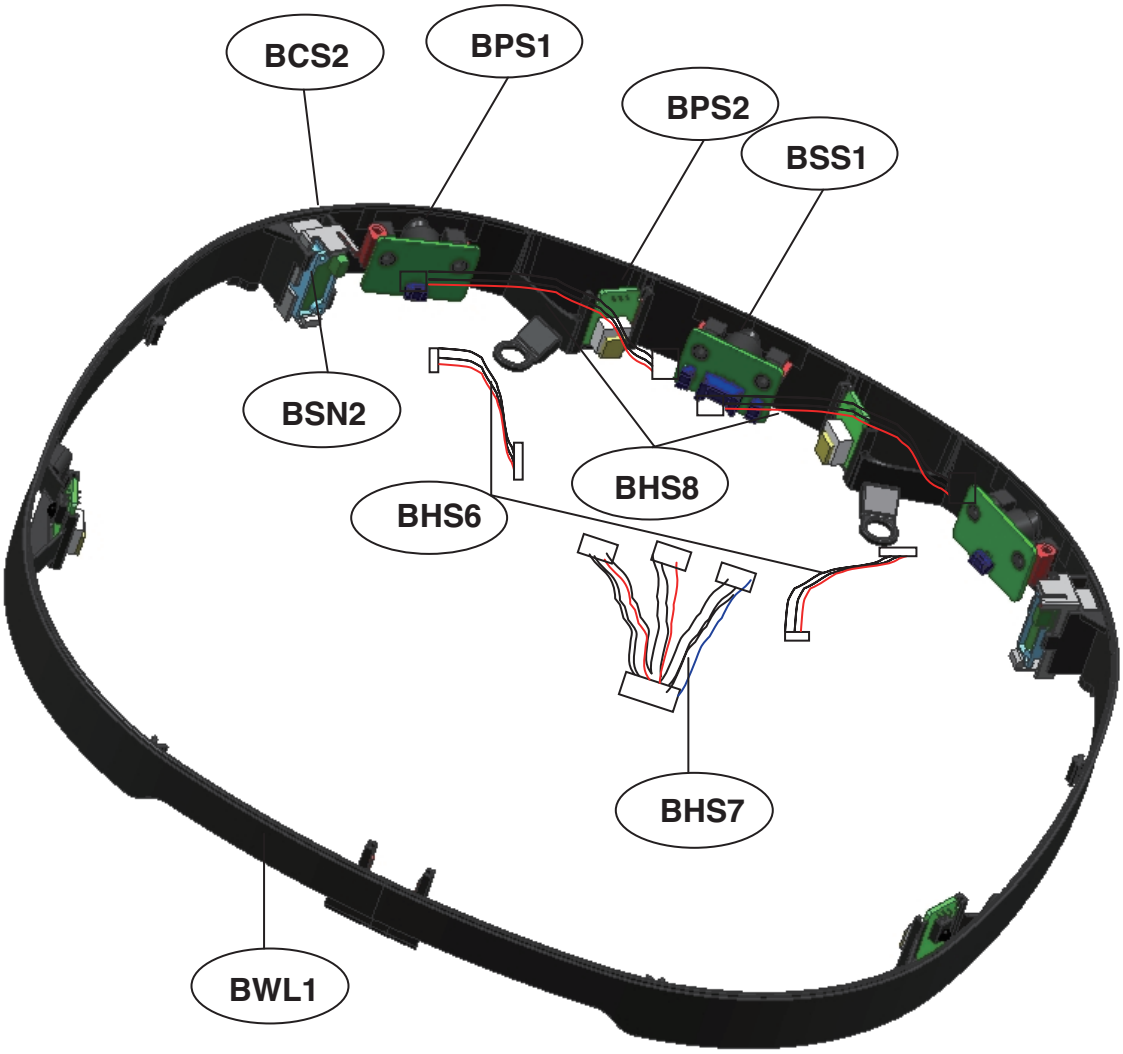



BSG1
AAB1
AAB2
BRB2
BFC1
SC02
SC02
1PZZFI3002A
BAC1
BCD1
BCD2
BSC2
BCB1
BRB1
BSB1
BBN1


BHS1
BWW1
BMD1
BSC3
1TTL0402818
BWH1
BWA1

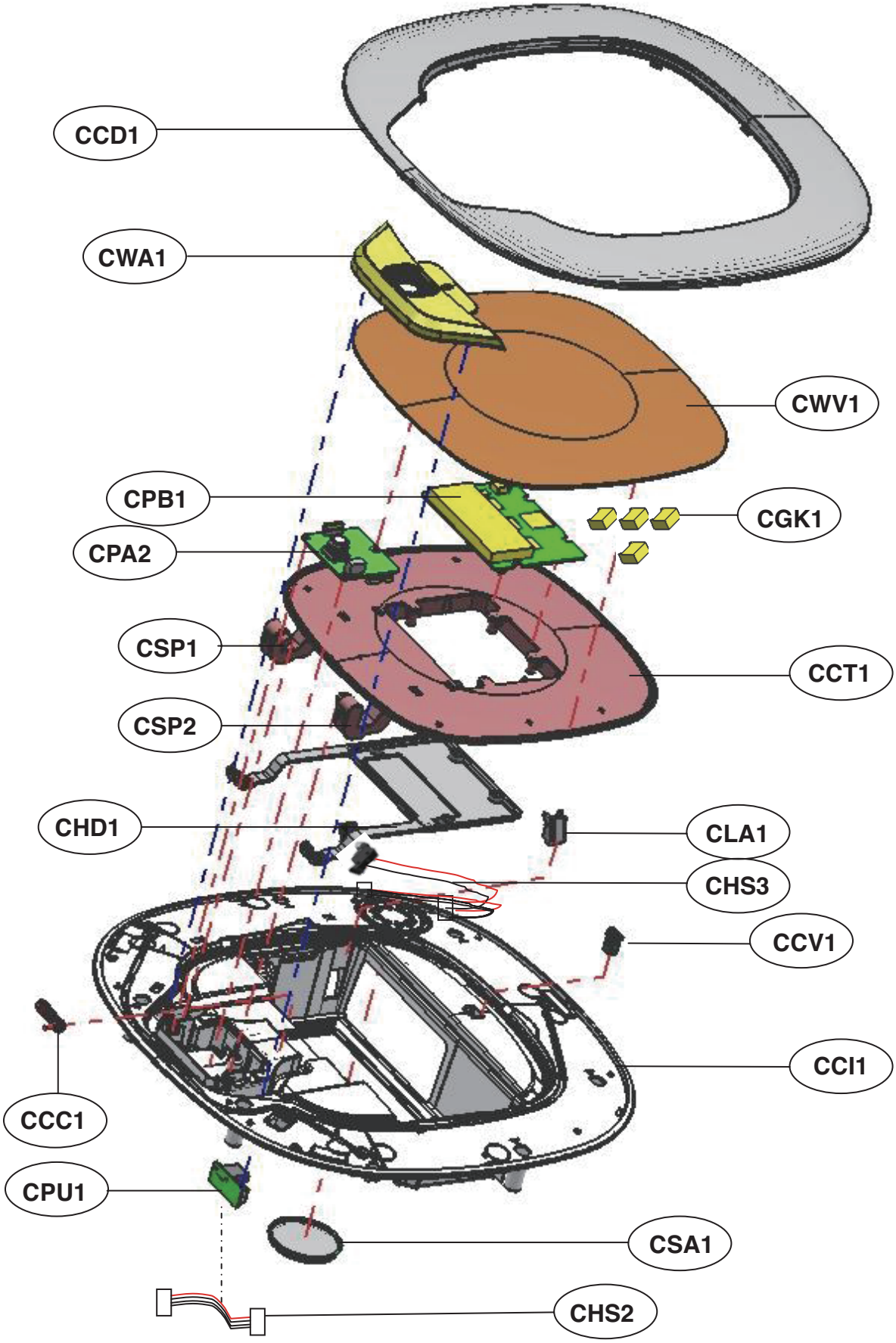

BHS1
BWW2
BMD1
BSC3
1TTL0402818
BWH1
BWA2


BGT1
BHS3
BMD2
BGA1
BFF1


BCS2
BPS1
BPS2
BSS1
BSN2
BHS8
BHS6
BHS7
BWL1

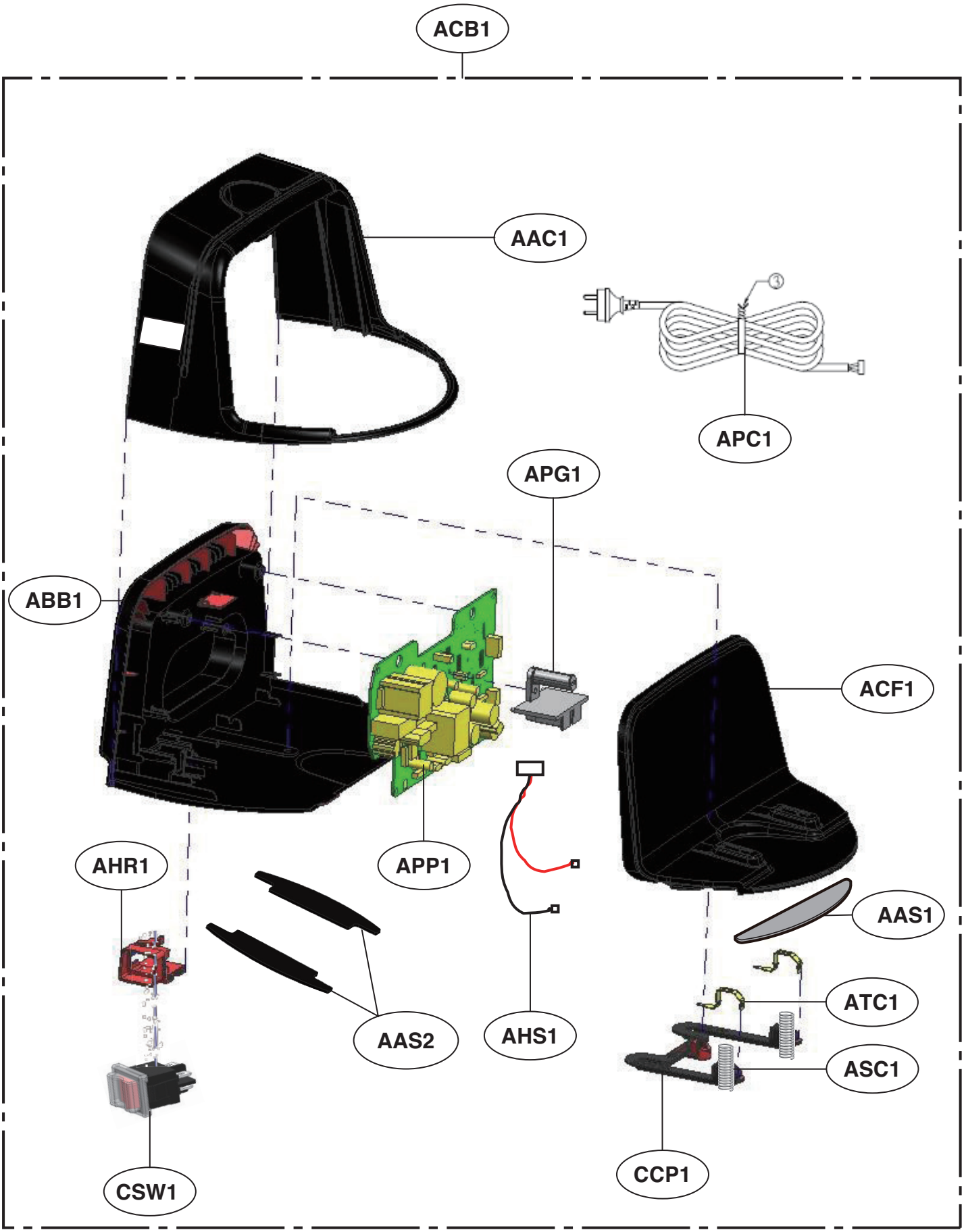
Deal Drawing of the Structure and List of Parts

■ Cover Assembly



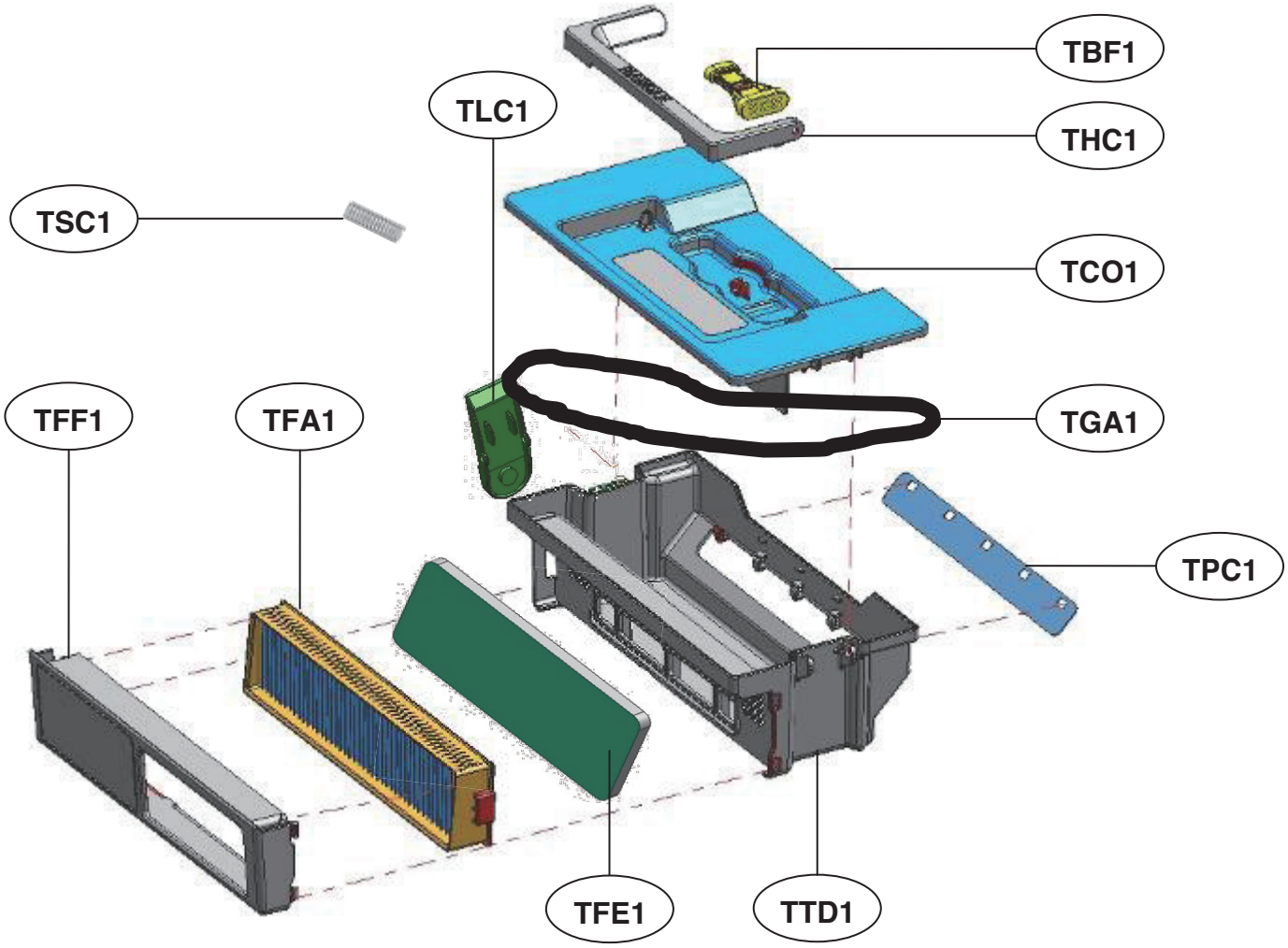
Deal Drawing of the Structure and List of Parts

■ Charger, Battery



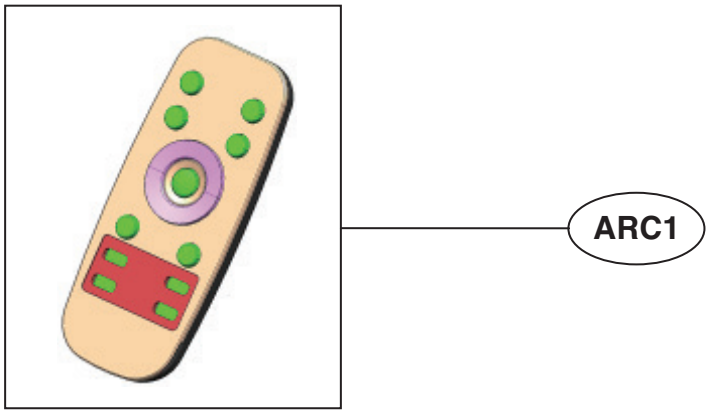
Deal Drawing of the Structure and List of Parts

■ Tank Assembly, Dust

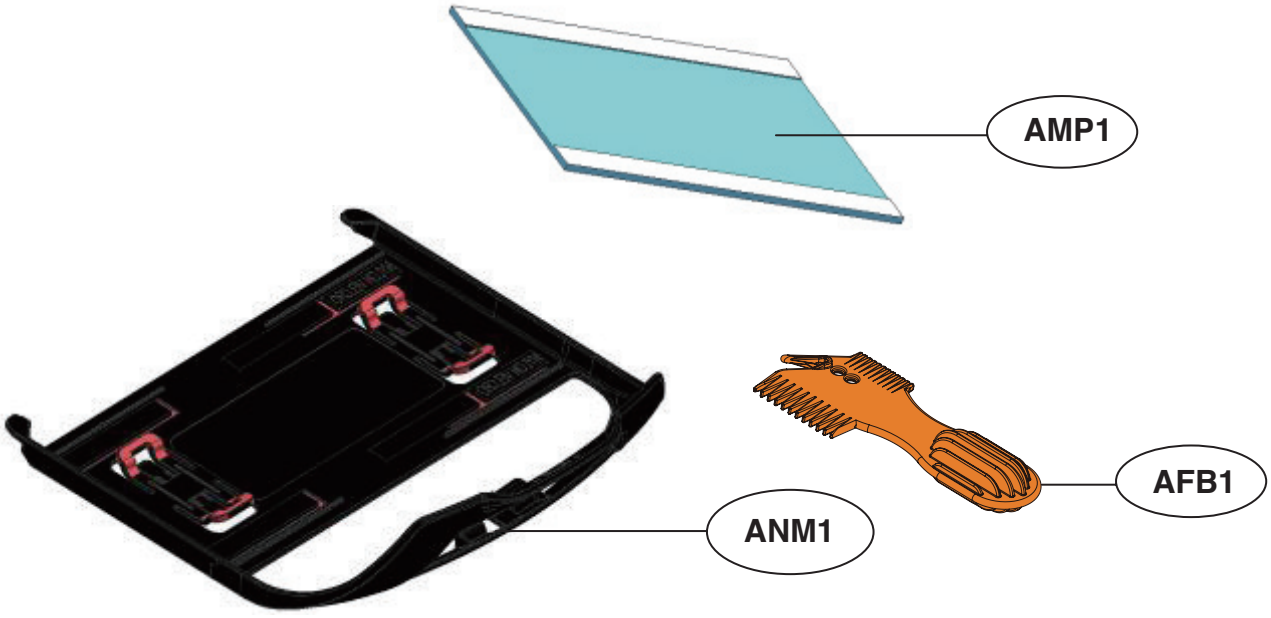


Deal Drawing of the Structure and List of Parts

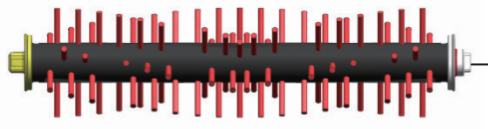
■ Remote Controller Assembly



■ Accessory Assembly



EBM61201302



■ VR9528BN (VR6570LVMP.ABOQGSF)

Location	Child	Description	Substitute	SVC Code
AAB1	ABC73130001	Brush Assembly		R
AAB2	ABC73129901	Brush Assembly		R
AAC1	MCK67105002	Cover,Body		R
AAS1	MJB63369701	Stopper		R
AAS2	MJB63349701	Stopper		R
AAS3	MJB63349801	Stopper		R
ABB1	MAM62784102	Base,Body		R
ACB1	EAY62789203	Charger,Battery		R
ACF1	MCK67124801	Cover,Front		R
ACS1	ACJ73310201	Connector Assembly		R
ACS2	ACJ73310101	Connector Assembly		R
AFB1	MDQ62897101	Frame,Brush		R
AHR1	MEG63058901	Holder,Cord		R
AHS1	EAD60813303	Harness,Single		R
AMP1	MFQ62022101	Mop		R
ANM1	AGB73332601	Nozzle Assembly,Mop		R
APC1	EAD62086101	Power Cord Assembly		R
APG1	MGJ63301201	Plate,Guide		R
APP1	EBR74309201	PCB Assembly,Power		R
ARC1	AKB73616014	Remote Controller Assembly		R
ASC1	MHY62904801	Spring,Coil		R
ATC1	MJP62031202	Terminal,Contact		R
BAA1	AEC73617801	Guide Assembly,Air		R
BAC1	MCD61842801	Connector,Pin		R
BAW1	EBF61755102	Switch Assembly		R
BBA1	ABA74252601	Bracket Assembly		R
BBA2	ABA74250201	Bracket Assembly		R
BBB1	MAM62783901	Base,Body		R
BBN1	AAN74050401	Base Assembly,Nozzle		R
BBU1	MBD62183801	Bumper,Body		R
BCB1	MCK67050601	Cover,Button		R
BCD1	MCK67144602	Cover,Decor		R
BCD2	MCK67046702	Cover,Decor		R
BCS1	MCK67065301	Cover,Sensor		R
BCS2	MCK67104901	Cover,Sensor		R
BFC1	MDQ63196401	Frame,Caster		R
BFF1	MDQ63236701	Frame,Filter		R
BGA1	MEA62910001	Guide,Air		R
BGT1	MDS65130101	Gasket		R
BHS1	EAD60810505	Harness,Single		R
BHS2	EAD60809905	Harness,Single		R
BHS3	EBD62665201	Sensor Assembly		R
BHS4	EAD60811503	Harness,Single		R
BHS5	EAD60842112	Harness,Single		R
BHS6	EAD60810403	Harness,Single		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
BHS7	EAD62085802	Harness,Single		R
BHS8	EAD60810205	Harness,Single		R
BHS9	EAD62085902	Harness,Single		R
BMD1	EAU61804301	Motor Assembly,DC		R
BMD2	EAU63063601	Motor Assembly,DC,Fan		R
BPM1	EBR79946701	PCB Assembly		R
BPS1	EBR74309101	PCB Assembly,Sub		R
BPS2	EBR74309801	PCB Assembly,Sub		R
BRB1	AHJ72909401	Roller Assembly		R
BRB2	AHJ73249901	Roller Assembly		R
BRL1	EAC62218205	Rechargeable Battery,Lithium Ion		R
BSB1	MHJ61848501	Shaft		R
BSC2	4970FI3224T	Spring,Coil		R
BSC3	4970FI3224W	Spring,Coil		R
BSG1	AHR73109804	Shaft Assembly,Agitator		R
BSA1	AHR73109805	Shaft Assembly,Agitator		R
BSN1	EBD60662502	Sensor Assembly		R
BSN2	EBD60661401	Sensor Assembly		R
BSS1	EBR74308901	PCB Assembly,Sub		R
BWA1	AJW73110501	Wheel Assembly		R
BWA2	AJW73110401	Wheel Assembly		R
BWH1	MKB62122701	Wheel		R
BWL1	MKC64259601	Window,LED		R
BWW1	MCK67066101	Cover,Wheel		R
BWW2	MCK67047001	Cover,Wheel		R
CCC1	MCK67046201	Cover,Connector		R
CCD1	MCK67125610	Cover,Decor		R
CCI1	MCK67065109	Cover,Inner		R
CCP1	MCK67105101	Cover,Spring		R
CCT1	MCK67064801	Cover,Top		R
CCV1	AFK73049601	Locker Assembly		R
CGK1	MDS61982205	Gasket		R
CHD1	MEG63078701	Holder,Fixing		R
CHS2	EAD61925506	Harness,Single		R
CHS3	EAD62086002	Harness,Single		R
CLA1	MCK66271101	Cover,Switch		R
CPA2	EBR74755261	PCB Assembly,Sensor		R
CPB1	EBR77901603	PCB Assembly,Display		R
CPU1	EBR77693901	PCB Assembly,USB		R
CSA1	EAB62588301	Speaker Assembly		R
CSP1	MHY61869605	Spring		R
CSP2	MHY61869606	Spring		R
CSW1	EBF61755002	Switch Assembly		R
CWA1	AJX73564902	Window Assembly		R
CWV1	MKC64259440	Window,Viewing		R
MGJ185	MGJ63841901	Plate,Cover		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
SC02	FAB31798901	Screw,Machine		R
TBF1	ABC73090101	Brush Assembly,Filter		R
TCO1	MCK67065401	Cover,Dust		R
TFA1	ADV74225701	Frame Assembly,Filter		R
TFE1	MDJ62305402	Filter,Exhaust		R
TFF1	MDQ63216601	Frame,Filter		R
TGA1	MDS61976904	Gasket		R
THC1	MEB62614101	Handle,Carrier		R
TLC1	4026FI3706E	Locker		R
TPC1	MGJ63261601	Plate,Cover		R
TSC1	4970FI3224F	Spring,Coil		R
TTD1	MJM62444801	Tank,Dust		R

■ VR65710LVMP (VR6570LVMP.AMSQEEU)

Location	Child	Description	Substitute	SVC Code
AAB1	ABC73130001	Brush Assembly		R
AAB2	ABC73129901	Brush Assembly		R
AAC1	MCK67105002	Cover,Body		R
AAS1	MJB63369701	Stopper		R
AAS2	MJB63349701	Stopper		R
ABB1	MAM62784101	Base,Body		R
ACB1	EAY62789229	Charger,Battery		R
ACF1	MCK67124801	Cover,Front		R
ACS1	ACJ73310201	Connector Assembly		R
ACS2	ACJ73310101	Connector Assembly		R
AFB1	MDQ62897101	Frame,Brush		R
AHR1	MEG63058901	Holder,Cord		R
AHS1	EAD60813303	Harness,Single		R
AMP1	MFQ62022101	Mop		R
ANM1	AGB73332601	Nozzle Assembly,Mop		R
APC1	EAD62086117	Power Cord Assembly		R
APG1	MGJ63301201	Plate,Guide		R
APP1	EBR74309201	PCB Assembly,Power		R
ARC1	AKB73616014	Remote Controller Assembly		R
ASC1	MHY62904801	Spring,Coil		R
ATC1	MJP62031202	Terminal,Contact		R
BAA1	AEC73617801	Guide Assembly,Air		R
BAC1	MCD61842801	Connector,Pin		R
BAW1	EBF61755102	Switch Assembly		R
BBA1	ABA74252601	Bracket Assembly		R
BBA2	ABA74250201	Bracket Assembly		R
BBB1	MAM62783901	Base,Body		R
BBN1	AAN74050401	Base Assembly,Nozzle		R
BBU1	MBD62183801	Bumper,Body		R
BCB1	MCK67050601	Cover,Button		R
BCD1	MCK67144602	Cover,Decor		R
BCD2	MCK67046702	Cover,Decor		R
BCS1	MCK67065301	Cover,Sensor		R
BCS2	MCK67104901	Cover,Sensor		R
BFC1	MDQ63196401	Frame,Caster		R
BFF1	MDQ63236701	Frame,Filter		R
BGA1	MEA62910001	Guide,Air		R
BGT1	MDS65130101	Gasket		R
BHS1	EAD60810503	Harness,Single		R
BHS2	EAD60809905	Harness,Single		R
BHS3	EBD62665201	Sensor Assembly		R
BHS4	EAD60811503	Harness,Single		R
BHS5	EAD60842112	Harness,Single		R
BHS6	EAD60810403	Harness,Single		R
BHS7	EAD62085802	Harness,Single		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
BHS8	EAD60810205	Harness,Single		R
BHS9	EAD62085902	Harness,Single		R
BMD1	EAU61804301	Motor Assembly,DC		R
BMD2	EAU63063601	Motor Assembly,DC,Fan		R
BPM1	EBR79946701	PCB Assembly		R
BPS1	EBR74309101	PCB Assembly,Sub		R
BPS2	EBR74309801	PCB Assembly,Sub		R
BRB1	AHJ72909401	Roller Assembly		R
BRB2	AHJ73249901	Roller Assembly		R
BRL1	EAC62218205	Rechargeable Battery,Lithium Ion		R
BSA1	AHR73109805	Shaft Assembly,Agitator		R
BSB1	MHJ61848501	Shaft		R
BSC2	4970FI3224T	Spring,Coil		R
BSC3	4970FI3224W	Spring,Coil		R
BSG1	AHR73109804	Shaft Assembly,Agitator		R
BSN1	EBD60662502	Sensor Assembly		R
BSN2	EBD60661401	Sensor Assembly		R
BSS1	EBR74308901	PCB Assembly,Sub		R
BWA1	AJW73110501	Wheel Assembly		R
BWA2	AJW73110401	Wheel Assembly		R
BWH1	MKB62122701	Wheel		R
BWL1	MKC64259601	Window,LED		R
BWW1	MCK67066101	Cover,Wheel		R
BWW2	MCK67047001	Cover,Wheel		R
CCC1	MCK67046201	Cover,Connector		R
CCD1	MCK67125623	Cover,Decor		R
CCI1	MCK67065109	Cover,Inner		R
CCP1	MCK67105101	Cover,Spring		R
CCT1	MCK67064801	Cover,Top		R
CCV1	AFK73049601	Locker Assembly		R
CGK1	MDS61982205	Gasket		R
CHD1	MEG63078701	Holder,Fixing		R
CHS2	EAD61925506	Harness,Single		R
CHS3	EAD62086002	Harness,Single		R
CLA1	MCK66271101	Cover,Switch		R
CPA2	EBR74755261	PCB Assembly,Sensor		R
CPB1	EBR77901603	PCB Assembly,Display		R
CPU1	EBR77693901	PCB Assembly,USB		R
CSA1	EAB62588301	Speaker Assembly		R
CSP1	MHY61869605	Spring		R
CSP2	MHY61869606	Spring		R
CSW1	EBF61755002	Switch Assembly		R
CWA1	AJX73564902	Window Assembly		R
CWV1	MKC64259447	Window,Viewing		R
MGJ185	MGJ63841901	Plate,Cover		R
SC02	FAB31798901	Screw,Machine		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
TBF1	ABC73090101	Brush Assembly,Filter		R
TCO1	MCK67065401	Cover,Dust		R
TFA1	ADV74225701	Frame Assembly,Filter		R
TFE1	MDJ62305402	Filter,Exhaust		R
TFF1	MDQ63216601	Frame,Filter		R
TGA1	MDS61976904	Gasket		R
THC1	MEB62614101	Handle,Carrier		R
TLC1	4026FI3706E	Locker		R
TPC1	MGJ63261601	Plate,Cover		R
TSC1	4970FI3224F	Spring,Coil		R
TTD1	MJM62444801	Tank,Dust		R
TTD1	MJM62444801	Tank,Dust		R

■ VR8604PR (VR6570LVP.AMRQGSF)

Location	Child	Description	Substitute	SVC Code
AAB2	ABC73129901	Brush Assembly		R
AAC1	MCK67105002	Cover,Body		R
AAS2	MJB63369701	Stopper		R
AAS2	MJB63349701	Stopper		R
ABB1	MAM62784102	Base,Body		R
ACB1	EAY62789230	Charger,Battery		R
ACF1	MCK67124801	Cover,Front		R
ACS1	ACJ73310201	Connector Assembly		R
ACS2	ACJ73310101	Connector Assembly		R
AFB1	MDQ62897101	Frame,Brush		R
AHR1	MEG63058901	Holder,Cord		R
AHS1	EAD60813303	Harness,Single		R
APC1	EAD62086117	Power Cord Assembly		R
APG1	MGJ63301201	Plate,Guide		R
APP1	EBR74309201	PCB Assembly,Power		R
ARC1	AKB73616014	Remote Controller Assembly		R
ASC1	MHY62904801	Spring,Coil		R
ATC1	MJP62031202	Terminal,Contact		R
BAA1	AEC73617801	Guide Assembly,Air		R
BAC1	MCD61842801	Connector,Pin		R
BAW1	EBF61755102	Switch Assembly		R
BBA1	ABA74252601	Bracket Assembly		R
BBA2	ABA74250201	Bracket Assembly		R
BBB1	MAM62783901	Base,Body		R
BBN1	AAN74050401	Base Assembly,Nozzle		R
BBU1	MBD62183801	Bumper,Body		R
BCB1	MCK67050601	Cover,Button		R
BCD1	MCK67144602	Cover,Decor		R
BCD2	MCK67046702	Cover,Decor		R
BCS1	MCK67065301	Cover,Sensor		R
BCS2	MCK67104901	Cover,Sensor		R
BFC1	MDQ63196401	Frame,Caster		R
BFF1	MDQ63236701	Frame,Filter		R
BGA1	MEA62910001	Guide,Air		R
BGT1	MDS65130101	Gasket		R
BHS1	EAD60810503	Harness,Single		R
BHS2	EAD60809905	Harness,Single		R
BHS3	EBD62665202	Sensor Assembly		R
BHS4	EAD60811503	Harness,Single		R
BHS5	EAD60842112	Harness,Single		R
BHS6	EAD60810403	Harness,Single		R
BHS7	EAD62085802	Harness,Single		R
BHS8	EAD60810205	Harness,Single		R
BHS9	EAD62085902	Harness,Single		R
BMD1	EAU61804301	Motor Assembly,DC		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
BMD2	EAU63063602	Motor Assembly,DC,Fan		R
BPM1	EBR79946701	PCB Assembly,Main		R
BPS1	EBR74309101	PCB Assembly,Sub		R
BPS2	EBR74309801	PCB Assembly,Sub		R
BRB1	AHJ72909401	Roller Assembly		R
BRB2	AHJ73249901	Roller Assembly		R
BRL1	EAC62218205	Rechargeable Battery,Lithium Ion		R
BSB1	MHJ61848501	Shaft		R
BSC2	4970FI3224T	Spring,Coil		R
BSC3	4970FI3224W	Spring,Coil		R
BSG1	AHR73109804	Shaft Assembly,Agitator		R
BSN1	EBD60662502	Sensor Assembly		R
BSN2	EBD60661401	Sensor Assembly		R
BSS1	EBR74308901	PCB Assembly,Sub		R
BWA1	AJW73110501	Wheel Assembly		R
BWA2	AJW73110401	Wheel Assembly		R
BWH1	MKB62122701	Wheel		R
BWL1	MKC64259601	Window,LED		R
BWW1	MCK67066101	Cover,Wheel		R
BWW2	MCK67047001	Cover,Wheel		R
CCC1	MCK67046201	Cover,Connector		R
CCD1	MCK67125620	Cover,Decor		R
CCI1	MCK67065109	Cover,Inner		R
CCP1	MCK67105101	Cover,Spring		R
CCT1	MCK67064801	Cover,Top		R
CCV1	AFK73049601	Locker Assembly		R
CGK1	MDS61982205	Gasket		R
CHD1	MEG63078701	Holder,Fixing		R
CHS2	EAD61925506	Harness,Single		R
CHS3	EAD62086002	Harness,Single		R
CLA1	MCK66271101	Cover,Switch		R
CPA2	EBR74755261	PCB Assembly,Sensor		R
CPB1	EBR77901603	PCB Assembly,Display		R
CPU1	EBR77693901	PCB Assembly,USB		R
CSA1	EAB62588301	Speaker Assembly		R
CSP1	MHY61869605	Spring		R
CSP2	MHY61869606	Spring		R
CSW1	EBF61755002	Switch Assembly		R
CWA1	AJX73564902	Window Assembly		R
CWV1	MKC64259440	Window,Viewing		R
MGJ185	MGJ63841901	Plate,Cover		R
SC02	FAB31798901	Screw,Machine		R
TBF1	ABC73090101	Brush Assembly,Filter		R
TCO1	MCK67065401	Cover,Dust		R
TFA1	ADV74225701	Frame Assembly,Filter		R
TFE1	MDJ62305402	Filter,Exhaust		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
TFF1	MDQ63216601	Frame,Filter		R
TGA1	MDS61976904	Gasket		R
THC1	MEB62614101	Handle,Carrier		R
TLC1	4026FI3706E	Locker		R
TPC1	MGJ63261601	Plate,Cover		R
TSC1	4970FI3224F	Spring,Coil		R
TTD1	MJM62444801	Tank,Dust		R

■ VR8600RB (VR6560LV.AKRQGSF)

Location	Child	Description	Substitute	SVC Code
AAB1	ABC73130001	Brush Assembly		R
AAB2	ABC73129901	Brush Assembly		R
AAC1	MCK67105002	Cover,Body		R
AAS2	MJB63369701	Stopper		R
AAS2	MJB63349701	Stopper		R
ABB1	MAM62784102	Base,Body		R
ACB1	EAY62789230	Charger,Battery		R
ACF1	MCK67124801	Cover,Front		R
ACS1	ACJ73310201	Connector Assembly		R
ACS2	ACJ73310101	Connector Assembly		R
AFB1	MDQ62897101	Frame,Brush		R
AHR1	MEG63058901	Holder,Cord		R
AHS1	EAD60813303	Harness,Single		R
APC1	EAD62086117	Power Cord Assembly		R
APG1	MGJ63301201	Plate,Guide		R
APP1	EBR74309201	PCB Assembly,Power		R
ARC1	AKB73616014	Remote Controller Assembly		R
ASC1	MHY62904801	Spring,Coil		R
ATC1	MJP62031202	Terminal,Contact		R
BAA1	AEC73617801	Guide Assembly,Air		R
BAC1	MCD61842801	Connector,Pin		R
BAW1	EBF61755102	Switch Assembly		R
BBA1	ABA74252601	Bracket Assembly		R
BBA2	ABA74250201	Bracket Assembly		R
BBB1	MAM62783901	Base,Body		R
BBN1	AAN74050401	Base Assembly,Nozzle		R
BBU1	MBD62183801	Bumper,Body		R
BCB1	MCK67050601	Cover,Button		R
BCD1	MCK67144602	Cover,Decor		R
BCD2	MCK67046702	Cover,Decor		R
BCS1	MCK67065301	Cover,Sensor		R
BCS2	MCK67104901	Cover,Sensor		R
BFC1	MDQ63196401	Frame,Caster		R
BFF1	MDQ63236701	Frame,Filter		R
BGA1	MEA62910001	Guide,Air		R
BGT1	MDS65130101	Gasket		R
BHS1	EAD60810503	Harness,Single		R
BHS2	EAD60809905	Harness,Single		R
BHS3	EBD62665202	Sensor Assembly		R
BHS4	EAD60811503	Harness,Single		R
BHS5	EAD60842112	Harness,Single		R
BHS6	EAD60810403	Harness,Single		R
BHS7	EAD62085802	Harness,Single		R
BHS8	EAD60810205	Harness,Single		R
BHS9	EAD62085902	Harness,Single		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
BMD1	EAU61804301	Motor Assembly,DC		R
BMD2	EAU63063602	Motor Assembly,DC,Fan		R
BPM1	EBR79946701	PCB Assembly,Main		R
BPS1	EBR74309101	PCB Assembly,Sub		R
BPS2	EBR74309801	PCB Assembly,Sub		R
BRB1	AHJ72909401	Roller Assembly		R
BRB2	AHJ73249901	Roller Assembly		R
BRL1	EAC62218205	Rechargeable Battery,Lithium Ion		R
BSB1	MHJ61848501	Shaft		R
BSC2	4970FI3224T	Spring,Coil		R
BSC3	4970FI3224W	Spring,Coil		R
BSG1	AHR73109804	Shaft Assembly,Agitator		R
BSN1	EBD60662502	Sensor Assembly		R
BSN2	EBD60661401	Sensor Assembly		R
BSS1	EBR74308901	PCB Assembly,Sub		R
BWA1	AJW73110501	Wheel Assembly		R
BWA2	AJW73110401	Wheel Assembly		R
BWH1	MKB62122701	Wheel		R
BWL1	MKC64259601	Window,LED		R
BWW1	MCK67066101	Cover,Wheel		R
BWW2	MCK67047001	Cover,Wheel		R
CCC1	MCK67046201	Cover,Connector		R
CCD1	MCK67125620	Cover,Decor		R
CCI1	MCK67065109	Cover,Inner		R
CCP1	MCK67105101	Cover,Spring		R
CCT1	MCK67064801	Cover,Top		R
CCV1	AFK73049601	Locker Assembly		R
CGK1	MDS61982205	Gasket		R
CHD1	MEG63078701	Holder,Fixing		R
CHS2	EAD61925506	Harness,Single		R
CHS3	EAD62086002	Harness,Single		R
CLA1	MCK66271101	Cover,Switch		R
CPA2	EBR74755261	PCB Assembly,Sensor		R
CPB1	EBR77901603	PCB Assembly,Display		R
CPU1	EBR77693901	PCB Assembly,USB		R
CSA1	EAB62588301	Speaker Assembly		R
CSP1	MHY61869605	Spring		R
CSP2	MHY61869606	Spring		R
CSW1	EBF61755002	Switch Assembly		R
CWA1	AJX73564902	Window Assembly		R
CWV1	MKC64259440	Window,Viewing		R
MGJ185	MGJ63841901	Plate,Cover		R
SC02	FAB31798901	Screw,Machine		R
TBF1	ABC73090101	Brush Assembly,Filter		R
TCO1	MCK67065401	Cover,Dust		R
TFA1	ADV74225701	Frame Assembly,Filter		R

Deal Drawing of the Structure and List of Parts

Location	Child	Description	Substitute	SVC Code
TFE1	MDJ62305402	Filter,Exhaust		R
TFF1	MDQ63216601	Frame,Filter		R
TGA1	MDS61976904	Gasket		R
THC1	MEB62614101	Handle,Carrier		R
TLC1	4026FI3706E	Locker		R
TPC1	MGJ63261601	Plate,Cover		R
TSC1	4970FI3224F	Spring,Coil		R
TTD1	MJM62444801	Tank,Dust		R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