SC370 ***Service Manual***

SC370 43B/17B 50000627 / 50000638

Nilfisk

English

04/2023 (Rev.01) Form No. 55942489

Table of Contents

03 General Information

Machine General Description

The SC370 43B/17B is a walk-behind commercial floor scrubbing machine designed to wash and dry commercial floors. The machine is powered by on-board batteries. The machine is equipped with a disc scrubbing pad, a controlled solution system and a squeegee with blades behind the deck with vacuum suction. The machine also has an on-board solution tank and wastewater recovery tank. This machine is not to be used outdoors, on carpets, or on coarse floors.

Service Manual Purpose and Field of Application

This Service Manual is a technical resource intended to aid service personnel in maintaining and repairing the SC370 43B/17B to ensure optimum performance and long service life. Please read this manual carefully before performing any maintenance and repair procedure on the machine.

Other Reference Manuals

Document name	Document number	Document type
SC370 43B Instructions for Use	55942467	Instructions for Use
SC370 43B / 17B Parts List	55942486	Parts List
SC370 17B Instructions for Use	55942485	Instructions for Use

These manuals are available at:

- Local Advance or Local Nilfisk Retailer
- Nilfisk website: https:// www.nilfisk.com
- Advance website: www.advance-us.com
- Nilfisk website: www.nilfisk.com

Conventions

Front, rear, left or right are intended with reference to the operator's position.

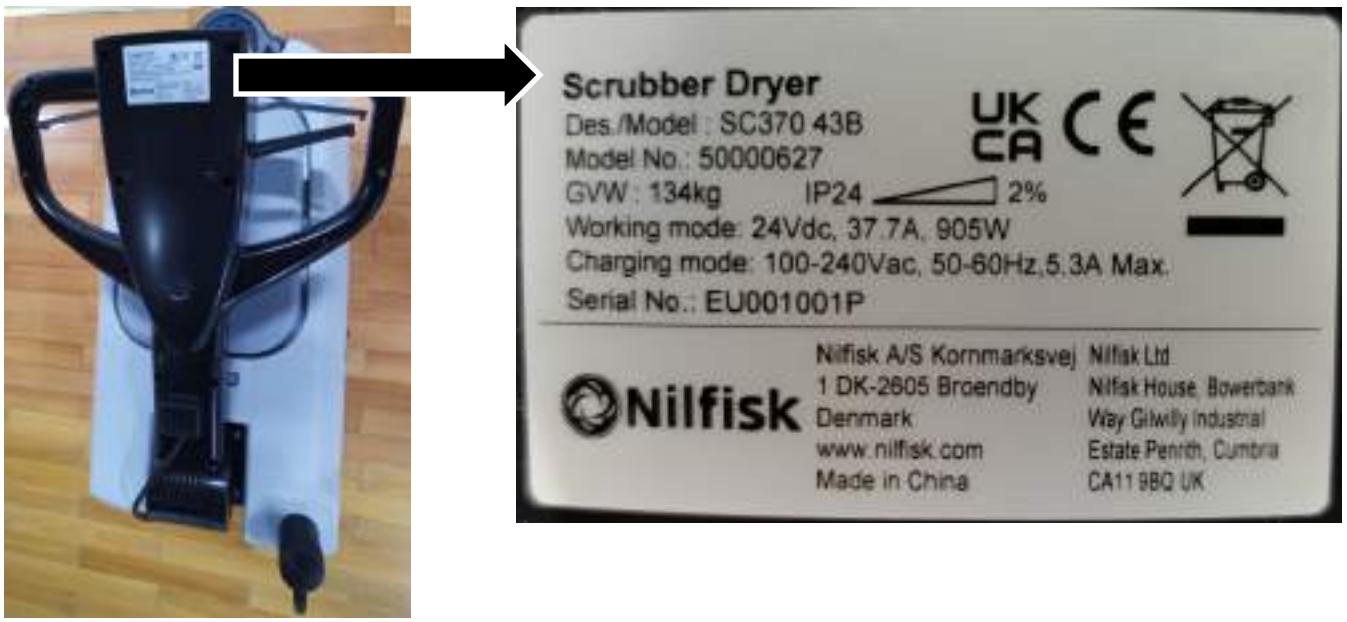
Service and Spare Parts

Service and repairs must be performed only by authorized personnel or Advance/Nilfisk Service Centers. The authorized personnel must be trained directly by the manufacturer and use original spare parts and accessories. Customers can order spare parts according to the Model No. specified on the label.

(Apply Retailer label here)

Serial Number Label

The Model No. and Serial No. are shown on the nameplate on the machine. This information is needed when ordering repair parts. Use the space below to write down the machine identification data.



MODEL NUMBER _____

SERIAL NUMBER _____

Safety

Symbols

It is important for you to read and understand this manual. The information it contains relates to protecting your safety and preventing problems. The symbols below are used to help you recognize this information.

Warning: ***Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.***

Caution: ***Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.***

Caution: ***When used without the Safety Alert Symbol, indicates a potential situation which, if not avoided, could result in property or machine damage.***

Note: ***Indicates an important informational message.***

General Safety Instructions

These safety instructions are included to warn you of potential bodily injury or property damage.

Caution! ***Read and understand all safety warnings and instructions. Failure to follow them may result in electric shock, fire, and/or serious injury.***

- ***To avoid personal injury, this machine should be used only by properly trained and authorized persons.***
- ***Do not operate the machine near toxic, dangerous, flammable and/or explosive materials. This machine is not suitable for collecting dangerous or hazardous materials.***
- ***In case of fire, use a powder fire extinguisher, not a water-based extinguisher.***

  While on ramps or inclines, avoid sudden stops when loaded. Avoid abrupt sharp turns.
- ***Disconnect the power source and/or batteries before servicing electrical components.***
- ***Never work under a machine without safety blocks or stands to support the machine.***
- ***Do not dispense flammable cleaning agents, operate the machine on or near these agents, or operate in areas where flammable liquids exist.***
- ***When using floor cleaning detergents, follow all safety and handling instructions of their respective manufacturer.***
- ***Battery charging may produce highly explosive hydrogen gas. Charge the batteries only in well-ventilated areas and away from ignition sources or open flames.***
- ***When operating this machine, ensure that third parties, particularly children, are not endangered.***
- ***Take precautions to prevent hair, jewelry, or loose clothing from being caught in moving parts.***

Property Damage Messages

- ***Storage and operation temperature must be above 0°C and humidity must be between 30% and 95%, non-condensing.***
- ***Before use, all doors and hoods should be properly latched.***
- ***This machine is not approved for use on public paths or roads.***
- ***This machine is only approved for use on hard surface.***
- ***Use brushes and pads supplied with the machine or those specified in the User Manual. Using other brushes or pads could reduce safety.***
- ***Do not wash the machine with direct or pressurized water jets, or with corrosive substances.***
- ***Do not allow the brush/pad to operate while the machine is stationary to avoid damaging the floor.***
- ***Use only factory authorized parts and accessories.***
- ***This machine must be properly disposed of in accordance with local laws and regulations.***

Machine Lifting

Caution! ***Never work under a machine without safety stands or blocks to support the machine.***

Transporting The Machine

Caution! ***Before transporting the machine on an open truck or trailer, make sure that:***

- ***All covers are closed***
- ***The recovery tank and solution tank are empty***
- ***Batteries (if equipped) are disconnected***
- ***The machine is securely fastened in place on the transport.***

Technical Data

Description	Units	Model
		SC370 43B / SC370 17B
Rated power	W	905 W
Solution tank capacity	L/Gal	25 L / 6.6 Gal.
Recovery tank capacity	L/Gal	25 L / 6.6 Gal.
Machine length	mm/Inches	1020 mm / 40.1 Inches
Machine width with squeegee	mm/Inches	570 mm / 22.4 Inches
Machine width without squeegee	mm/Inches	485 mm / 19.1 Inches
Machine height (without handle)	mm/Inches	647 mm / 25.5 Inches
Machine height (with vertical handle)	mm/Inches	1182 mm / 46.5 Inches
Working width	mm/Inches	432 mm / 17 Inches
Driving wheel diameter	mm/Inches	153 mm / 6 Inches
Rear wheel diameter	mm/Inches	89 mm / 3.5 Inches
Brush/pad diameter	mm/Inches	432 mm / 17 Inches
Brush/pad pressure (max)	Kg/Lbs.	19 Kg / 41.8 Lbs.
Solution flow (max) per setting	L/Gal per minute	(0.59/0.69/1.11/1.68) L (0.16/0.18/0.29/0.44) Gal.
Sound pressure level	dB (A)	67 ± 3 dB (A)
Sound pressure level in ECO mode or in silent mode	dB (A)	63 ± 3 dB (A)
Handle vibration level (max)	m/s^2	< 2.5 m/s^2
Climbing capacity (max)	% grade	2%
Min. aisle turn	cm/Inches	103 cm / 40.5 Inches
Vacuum motor power	W/H.P.	300 W / 0.4 H.P.
Vacuum capacity	mm/In of H_2O	900 mm / 33±3 In of H_2O
Vacuum capacity in ECO mode or in silent mode	mm/In of H_2O	650 mm / 25±3 In of H_2O
Brush motor power	W/H.P.	400 W / 0.54 H.P.
Brush speed in normal mode	RPM	140 RPM
Brush speed in ECO mode	RPM	100 RPM
IP protection class	IP	IP24
Battery compartment size (L x W x H)	mm/Inches	(265 x 350 x 230) mm / (10.4 x 13.8 x 9.1) Inches
Voltage	V	24 V DC
Batteries (*)	Ah	85Ah C20 / 67Ah C5
Battery run time (standard batteries) (*)	Hour	Up to 4 hours
On-Board charger (*)	V/A	24V 10A
Productivity (max)	m^2/h	1720 m^2/h (18,514 sq. ft./h)
Machine weight with empty tanks (without batteries)	Kg/Lbs.	58 Kg / 128 Lbs.
Gross vehicle weight (GVW)	Kg/Lbs.	134 Kg / 295 Lbs.
Shipping weight	Kg/Lbs.	137 Kg / 302 Lbs.
Packing dimensions (L x W x H)	mm/Inches	(1130 x 730 x 1040) mm / (44.5 x 28.7 x 41) Inches

(*): Optional

Maintenance Schedule

Warning! ***Maintenance procedures must be performed after the machine is turned off and the battery charger cable is disconnected. In addition, read carefully the instructions in the Safety chapter before performing any maintenance procedure.***

Scheduled Maintenance Table

Procedure	**Daily, after use**	**Weekly**	**Every 6 months**	**Annually**
Battery charging				
Squeegee cleaning				
Brush/pad-holder cleaning				
Tank cleaning				
Tank sealing strip inspection				
Float ball filter cleaning				
Squeegee blade check or replacement				
Solution filter cleaning				
WET battery fluid level check				
Fasteners tightness inspection			(1)	
Brush motor carbon brush check or replacement				(2)
Vacuum motor carbon brush check or replacement				(2)

1. Also perform this inspection after the initial 10 hours of new machine usage.
2. Must be done by Service Center authorized by our company.

Machine Structure

1. Handlebar
2. Safety switch lever
3. Handlebar adjusting lever
4. Recovery water drain hose
5. Recovery tank lid
6. Fresh water cover
7. Cover retention chain
8. Filling hose neck
9. Recovery tank
10. Solution tank
11. Brush deck bumper wheel
12. Brush/pad-holder deck
13. Brush/pad-holder
14. Solution level hose
15. Solenoid valve
16. Solution filter
17. Front wheels
18. Squeegee knob
19. Squeegee lifting handle
20. Squeegee assembly
21. Control panel
22. Accessory parts box (*)
23. Battery charge cable holder
24. Battery charge cable
25. Security cover of charging jack
26. Charging signal lights
27. Deck lifting/lowering pedal
    a) Pedal position when deck is lowered
    b) Pedal position when deck is lifted
28. Caster wheel
29. Squeegee vacuum hose
30. Outlet cover

(*): Optional

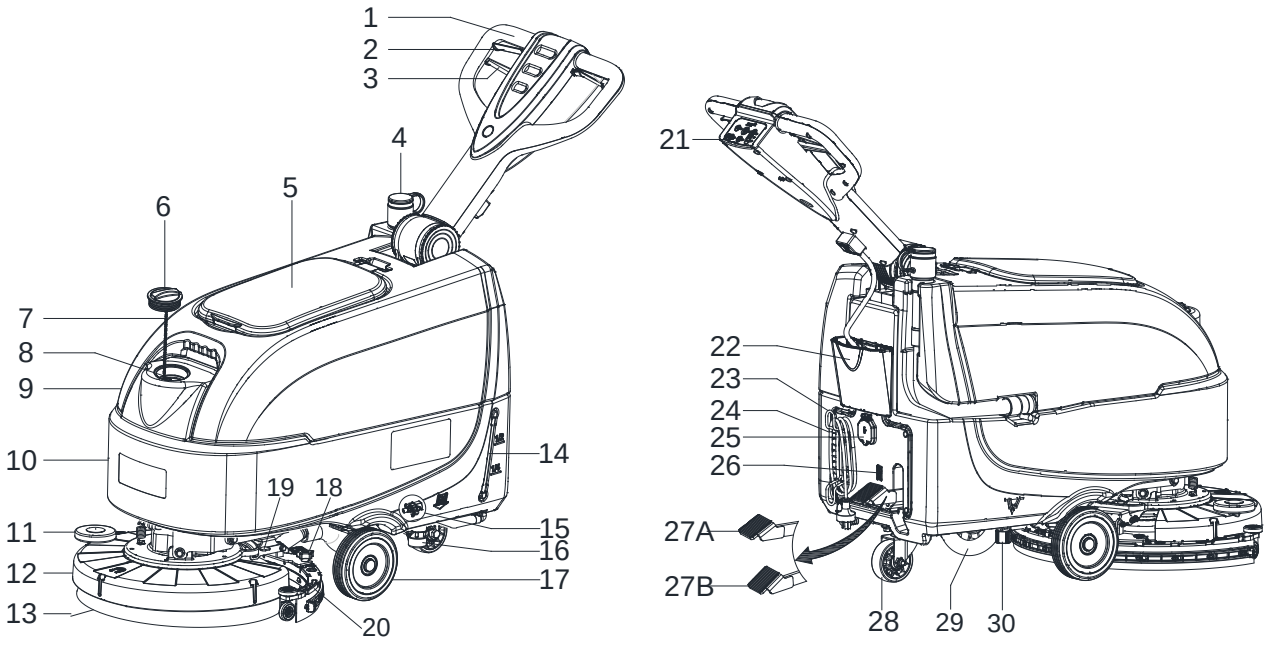


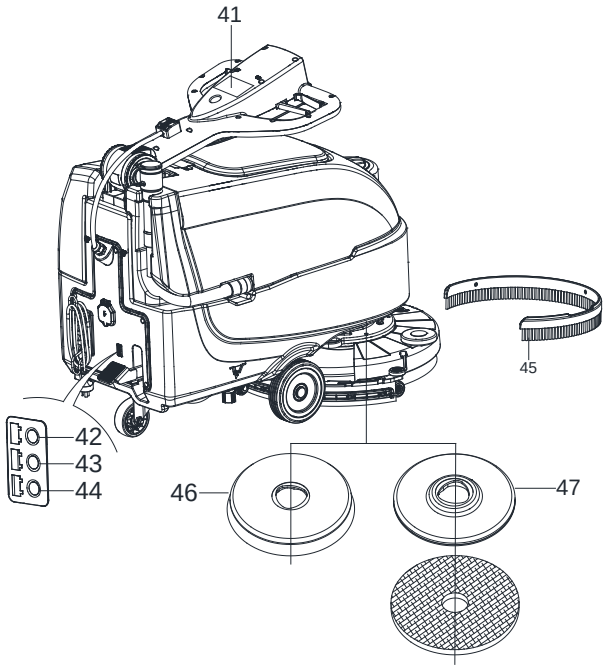
Figure 1

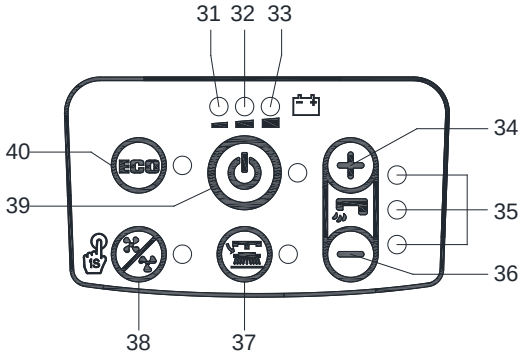
Machine Structure (continues)

Control Panel

31. Discharged battery warning light (red)
32. Semi-discharged battery warning light (yellow)
33. Charged battery warning light (green)
34. Flow increase switch
35. Solution flow indicator
36. Flow decrease switch
37. Brush/pad-holder release switch
38. Normal vacuum motor mode
39. One-button starting
40. ECO mode
41. Serial number plate/technical data
42. Charging red LED
43. Charging yellow LED
44. Charging green LED
45. Skirt (*)
46. Brush
47. Pad-holder (*)

(*): Optional



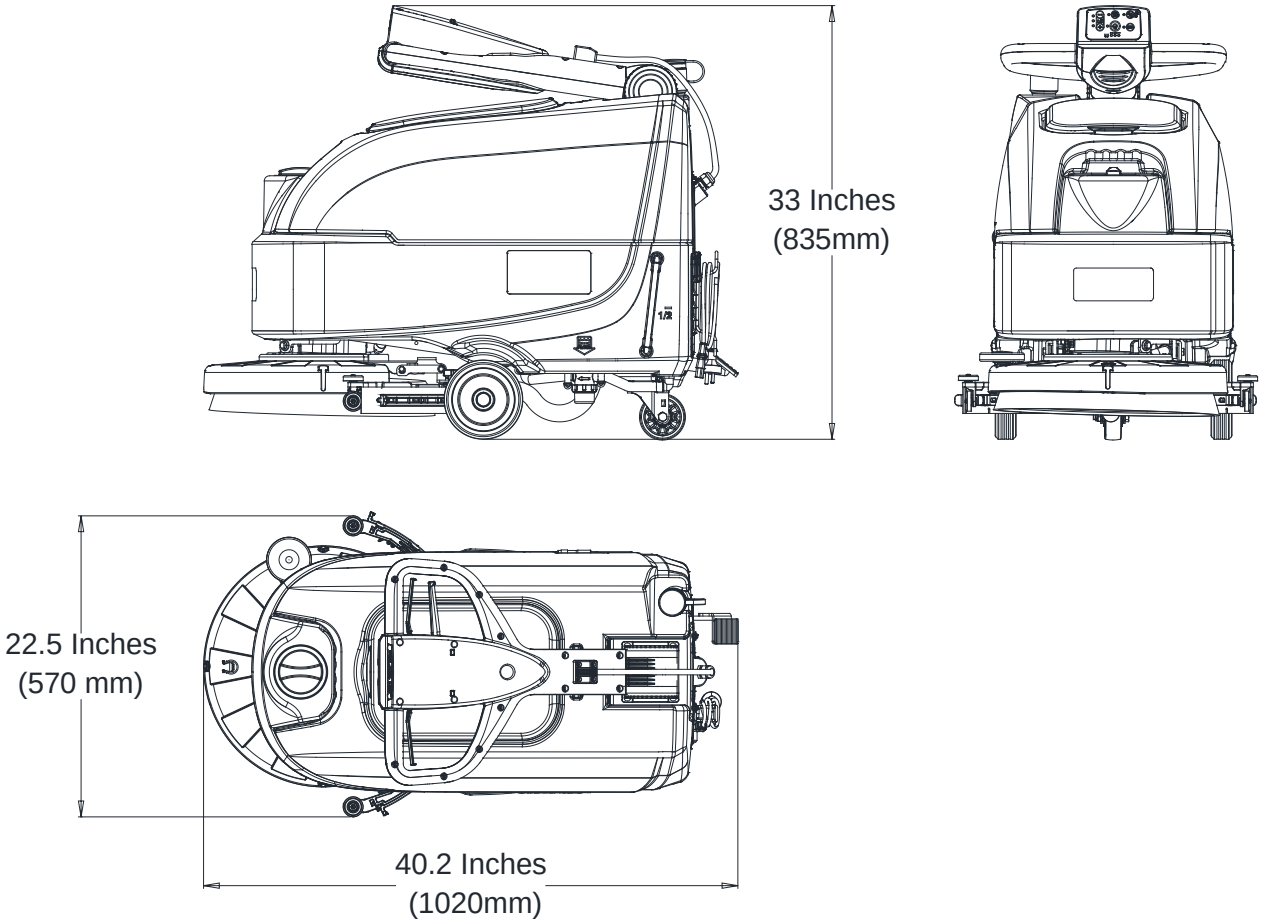


Service and Diagnostic Equipment

Besides a complete set of standard tools, the following instruments are necessary to perform quick check and repairs on machines:

- Digital Voltmeter (DVM)
- Amp clamp with possibility of making DC measurements
- Battery charge tester to check 12 V batteries
- Dynamometric wrench set
- A copy of the User Manual and Spare Parts List of the machine to be serviced

Dimensions



04 Control System

Functional Description

The machine utilizes a Dashboard (EB1) to turn on various machine functions and a Control board (EB2) to control outputs. When Dashboard (EB1) receives inputs from operator, it activates various components and functions accordingly.

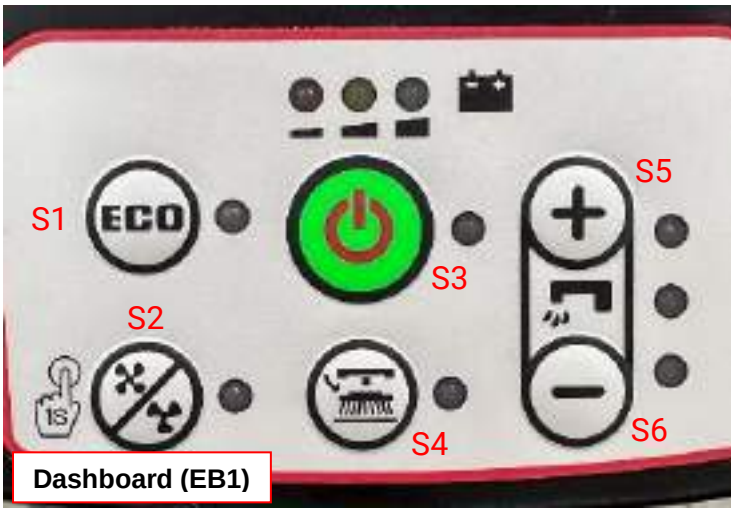
Press the one-button start (S3) on Dashboard (EB1) to turn on/off the machine. And press the vacuum button (S2) on Dashboard (EB1) to turn on/off the vacuum motor (M2). Press the vacuum button (S2) for 1 second to switch between normal mode and silent mode. The control signal is transmitted to Control board (EB2) via port J1-6 (vacuum PWM) to control the on/off/vacuum level of vacuum output.

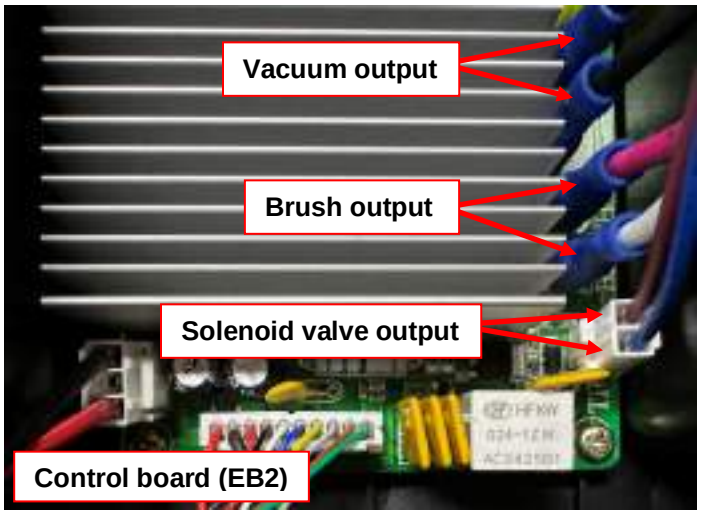
When the machine is turned on, the brush motor (M1) and solenoid valve (EV1) are on standby. When the safety switch is pressed, the control signal is transmitted to Control board (EB2) via port J1-5 (brush PWM) and J1-7 (Water) to activate the output of brush motor and solenoid valve. Press the flow increase switch (S5) and flow decrease switch (S6) on Dashboard (EB1) to select the solution flow level.

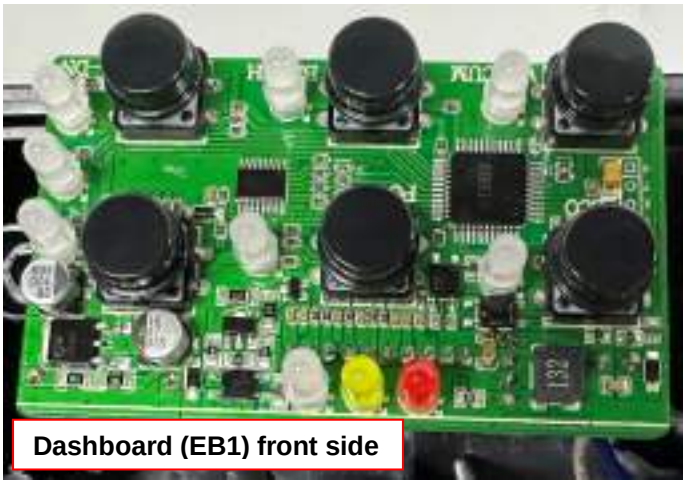
Press the ECO mode button (S1) on Dashboard (EB1) to make the brush motor (M1) and vacuum motor (M2) work in ECO mode by lowering their voltage via PWM regulation. The control signal is transmitted to Control board (EB2) via port J1-5 (Brush PWM) and J1-6 (Vacuum PWM) to control the output of brush motor and vacuum motor. And press the brush release button (S4) on Dashboard (EB1) to control the Control board (EB2) to release the brush via brush motor.

The Control board (EB2) provides +24V and B- power for Dashboard (EB1). And the Dashboard (EB1) controls the main relay on Control board (EB2). When the battery polarity is connected reversely, the Control board (EB2) can't provide +24V for Dashboard (EB1), and will cut off the B+ power from main relay to the load.

The Dashboard (EB1) also shows battery capacity and error messages through the battery capacity LED indicators and one-button start LED indicator.

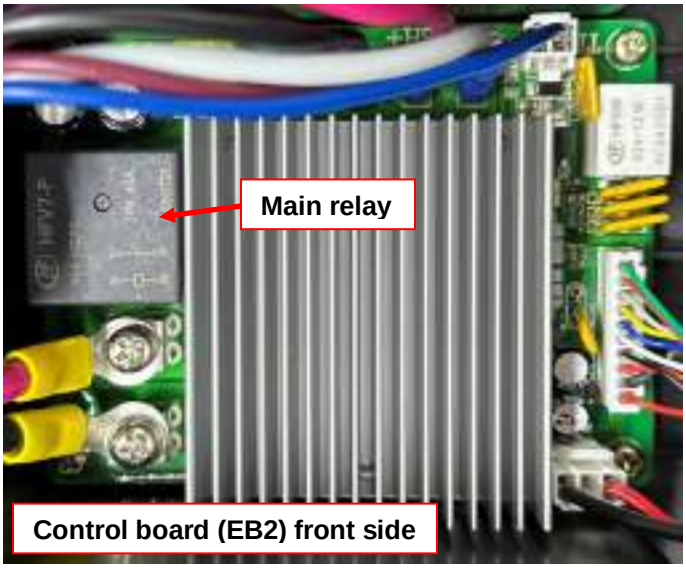




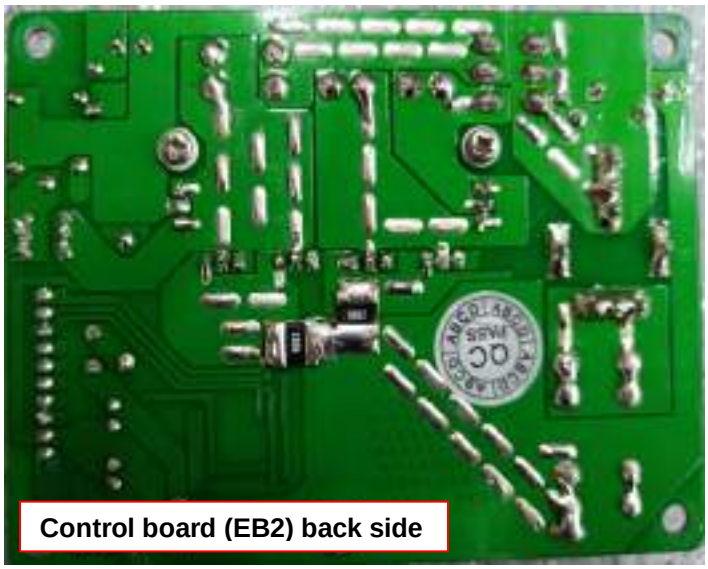


Dashboard (EB1) front side

Dashboard (EB1) back side

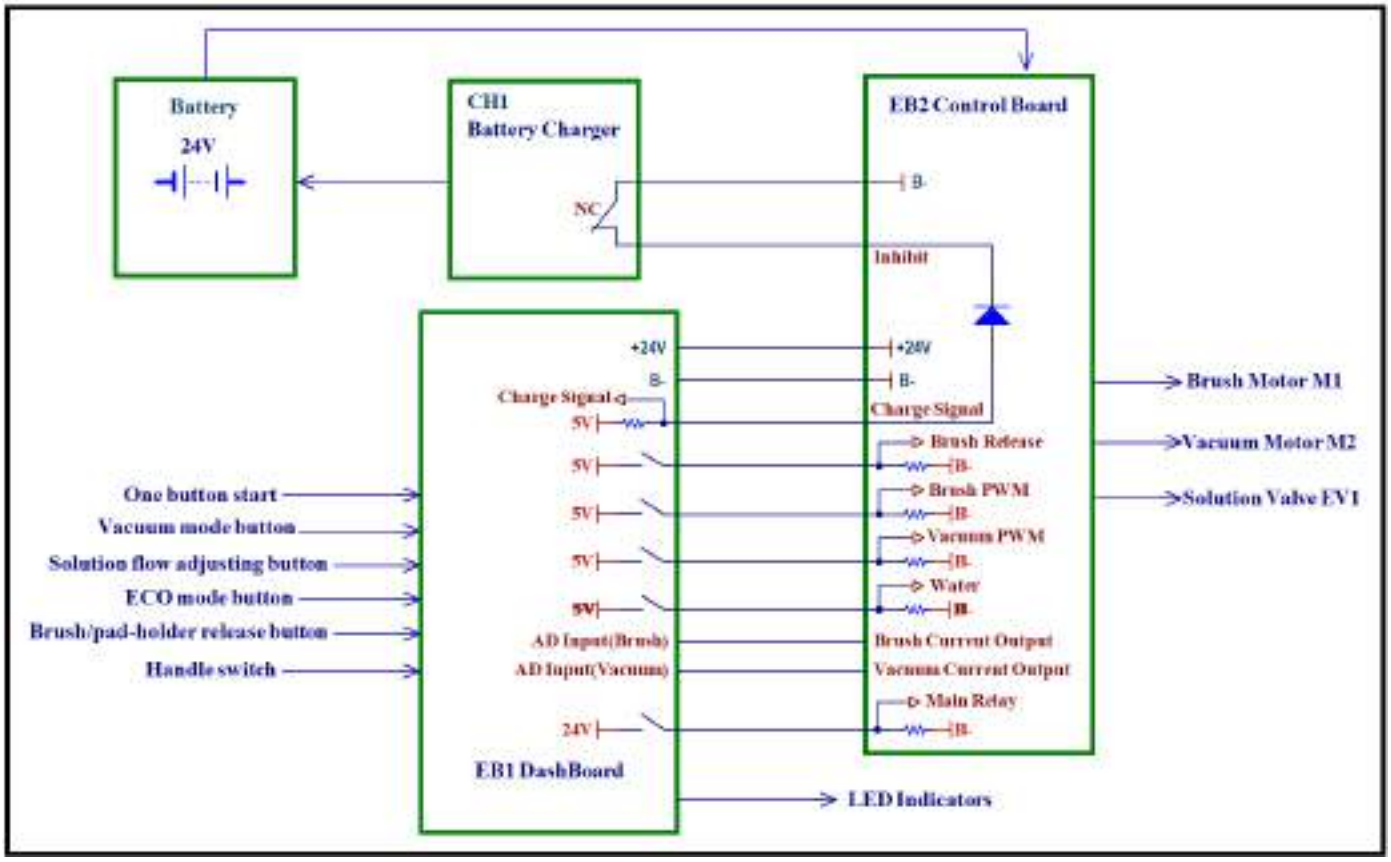


Control board (EB2) front side



Control board (EB2) back side

Block Diagram



Component Locations

- Safety switch lever
- Handlebar adjusting lever
- Battery capacity LED
- One-button start
- Flow adjustment button
- Dashboard (EB1)
- Control board (EB2)

Figure 1

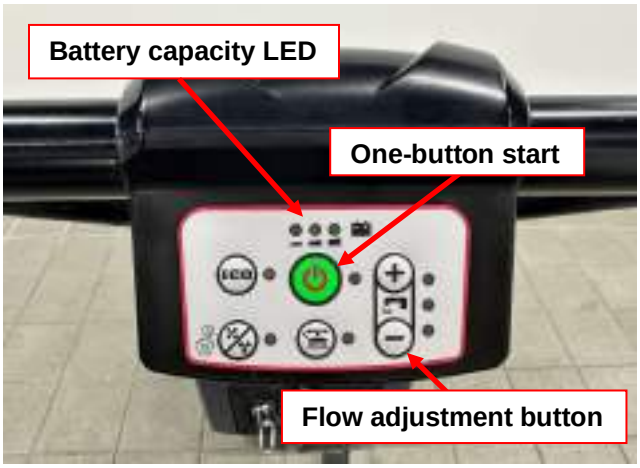


Figure 2

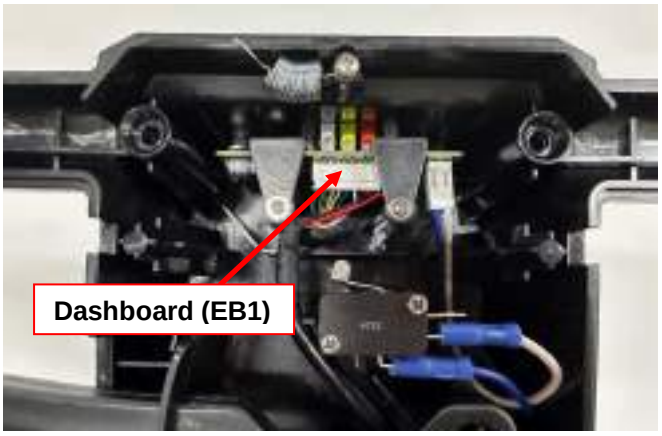


Figure 3

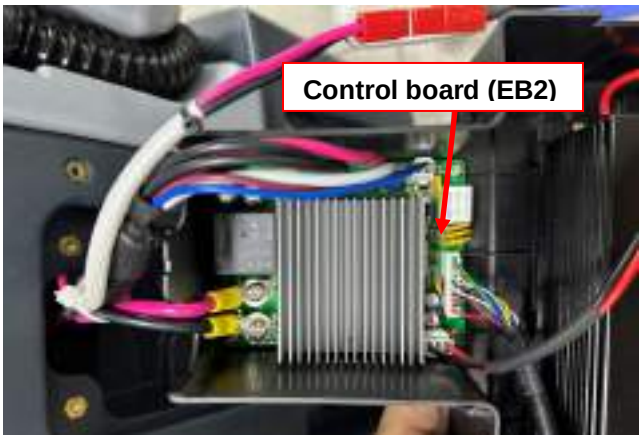


Figure 4

Troubleshooting

Trouble	Possible causes	Remedy
One-button start LED indicator flashes	Brush motor overload	Check brush motor or replace it
	Vacuum motor overload	Check vacuum motor or replace it
	Debris or wires/cords entangled in the brush hub, slowing its rotation	Remove the brush and remove any debris/wires/cords
3 battery capacity LED indicators flash simultaneously	Battery voltage too high, >29.5V	Use batteries of 24V

Control Panel Removal and Installation

Dashboard (EB1)

Removal

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the recovery tank is empty.
4. Remove the recovery tank assembly (Figure 5).
5. Disconnect the battery connector connected to the machine (Figure 6).
6. Use cross screwdriver to remove 16 screws on the rear cover of the handlebar (Figure 7).
7. Remove the cover of the handlebar (Figure 8).

Figure 5

Figure 6

Figure 7

Figure 8

8. Remove the safety switch lever assembly (Figure 9).
9. Remove 2 screws on the PCB fixing plate (Figure 10).
10. Take out the Dashboard (Figure 11).
11. Disconnect all harnesses and terminals connected to the Dashboard (Figure 12).

Installation

Assemble components in reverse order of disassembly.

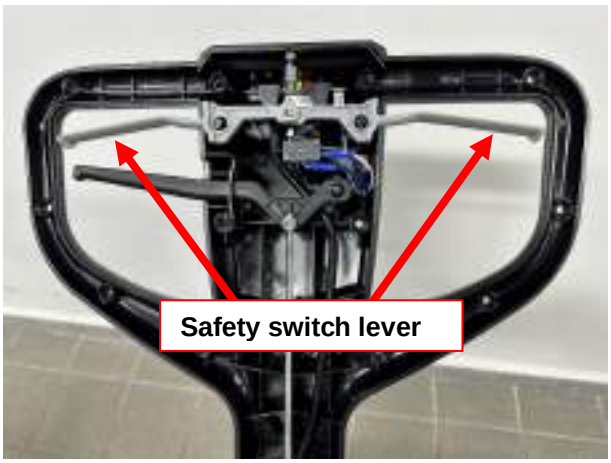


Figure 9

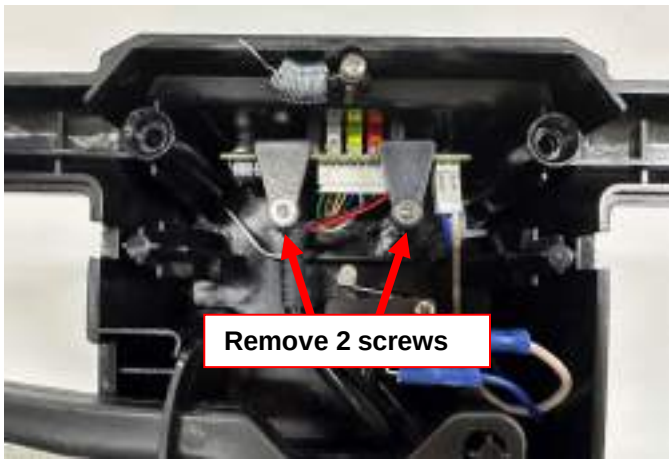


Figure 10

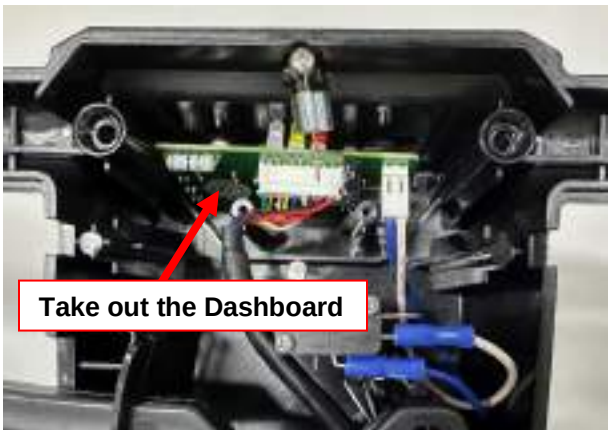


Figure 11

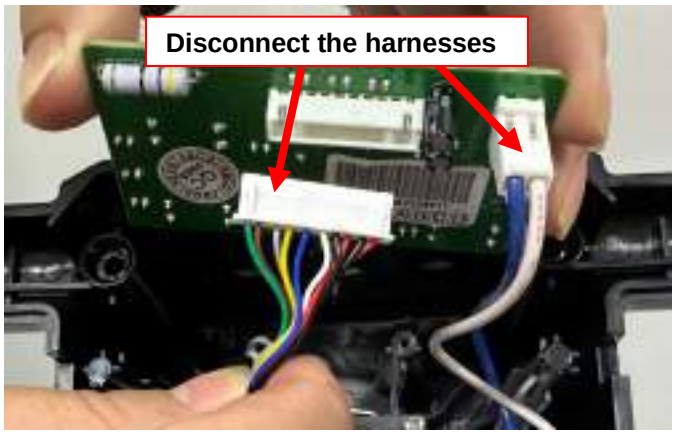


Figure 12

Control Board (EB2)

Removal

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the recovery tank is empty.
4. Remove the recovery tank assembly.
5. Disconnect the battery connector connected to the machine (Figure 6).
6. Remove 7 screws, take out the distribution box (Figure 13).
7. Remove 2 screws, then remove the cover of distribution box (Figure 14).
8. Disconnect all harnesses connected to the Control board (Figure 15).
9. Remove 4 screws fixing the Control board and take it out (Figure 16).

Installation

Assemble components in reverse order of disassembly.

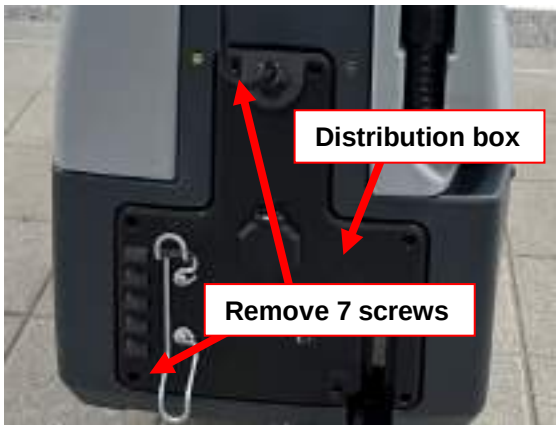


Figure 13

Figure 14

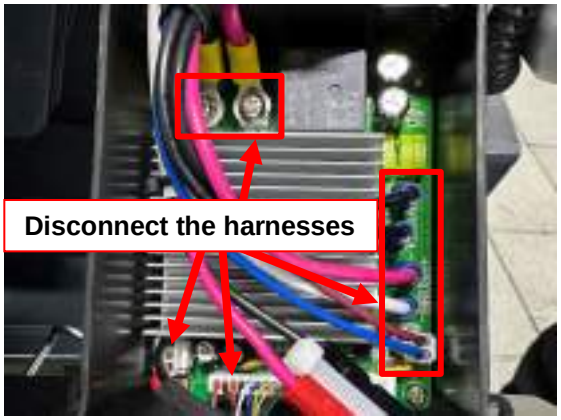


Figure 15

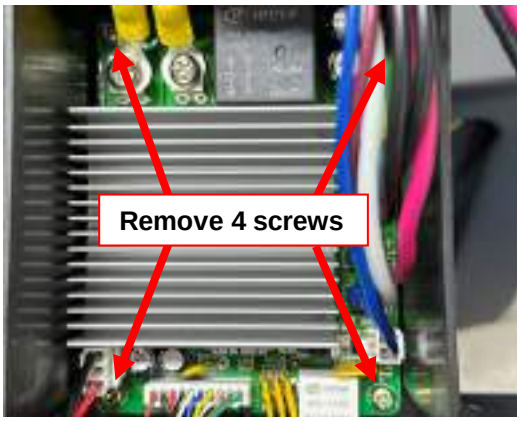


Figure 16

Specifications

Sample Shop Voltage Measurement

The following tables contain some “real world” shop voltage measurements to help you recognize what “normal” looks like.

- Unless otherwise noted, all voltage readings are referenced to GND.
- Some pin numbers are listed out of sequence when measurements require pin-to-pin voltage references instead of GND.
- Values of “≈24V” represent full battery voltage, regardless of the circuit path.

Please refer to Figure 1 and Figure 2 for connectors location on Dashboard (EB1) and Control board (EB2).

Figure 1. Connectors on Dashboard (EB1)

Dashboard (EB1) J1 Connector				
Pin#	**Color**	**Function**	**Condition**	**Value**
1	RED	+24V		24V
2	BLACK	GND		0V
3	RED	Charge Signal	When charging	4.9V
			Not charging	0.5V
4	BLACK	Brush Release	Brush release on	5.8V
			Brush release off	0V
5	White	Brush PWM	Brush motor in normal mode	5.0V
			Brush motor in ECO mode	3.9V
			Brush motor off	0V
6	Blue	Vacuum PWM	Vacuum motor in normal mode	5.0V
			Vacuum motor in ECO mode	4.0V
			Vacuum motor off	0V
7	Yellow	Water (Solution flow adjustment)	Solenoid valve on	3.3V
			Solenoid valve off	0V
8	Gray	AD Input (Brush)	Brush motor in normal mode	0.7V
			Brush motor in ECO mode	0.5V
			Brush motor off	0
9	Brown	AD Input (Vacuum)	Vacuum motor in normal mode	1.7V
			Vacuum motor in ECO mode	1.2V
			Vacuum motor off	0V
10	Green	Main Relay	Machine on	≈20V
			Machine off	0V

Dashboard (EB1) J2 Connector				
Pin#	**Color**	**Function**	**Condition**	**Value**
1	WHITE	Start (Safety switch signal)	Safety switch pressed	0.1V
			Safety switch released	≈4.6V
2	BLUE	GND		0V

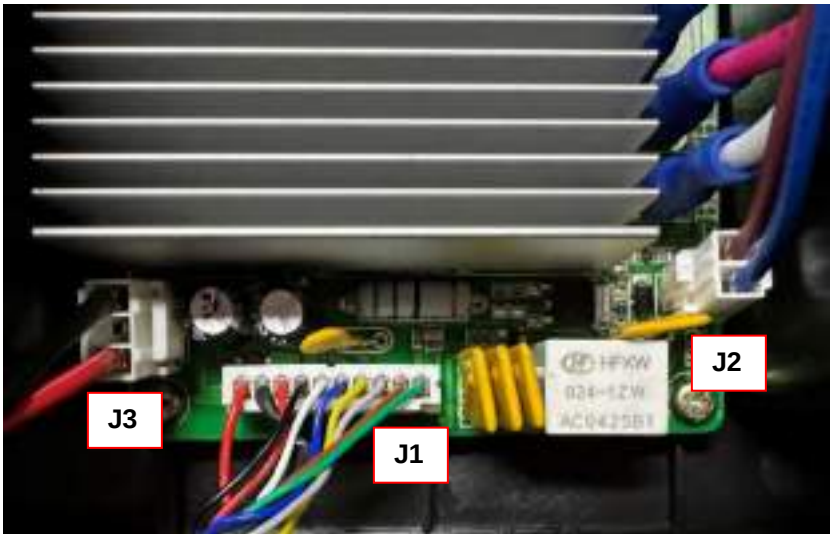


Figure 2. Connectors on Control Board (EB2)

Control Board (EB2) J1 Connector				
Pin#	**Color**	**Function**	**Condition**	**Value**
1	RED	+24V		24V
2	BLACK	GND		0V
3	RED	Charge Signal	When charging	4.9V
			Not charging	0.5V
4	BLACK	Brush Release	Brush release on	5.8V
			Brush release off	0V
5	White	Brush PWM	Brush motor in normal mode	5.0V
			Brush motor in ECO mode	3.9V
			Brush motor off	0V
6	Blue	Vacuum PWM	Vacuum motor in normal mode	5.0V
			Vacuum motor in ECO mode	4.0V
			Vacuum motor off	0V
7	Yellow	Water (Solution flow adjustment)	Solenoid valve on	3.3V
			Solenoid valve off	0V
8	Gray	Brush Current Output	Brush motor in normal mode	0.7V
			Brush motor in ECO mode	0.5V
			Brush motor off	0
9	Brown	Vacuum Current Output	Vacuum motor in normal mode	1.7V
			Vacuum motor in ECO mode	1.2V
			Vacuum motor off	0V
10	Green	Main Relay	Machine on	≈20V
			Machine off	0V

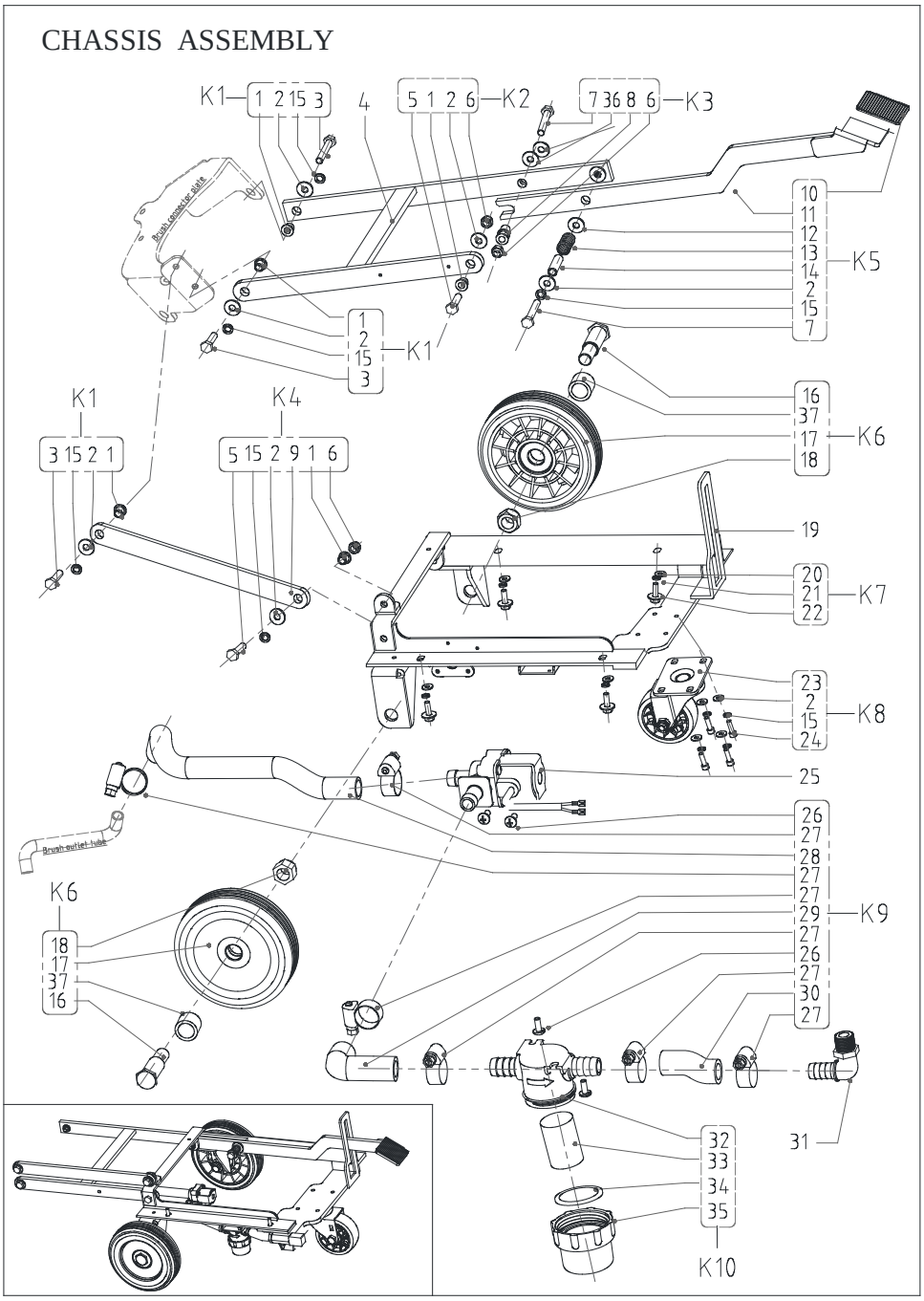
Control Board (EB2) J2 Connector				
Pin#	**Color**	**Function**	**Condition**	**Value**
1	BLUE	Solution + output	Solenoid valve on, Ref Pin1 to Pin2	≈24V
2	BROWN	Solution - output	Solenoid valve off, Ref Pin1 to Pin2	0V

Control Board (EB2) J3 Connector				
Pin#	**Color**	**Function**	**Condition**	**Value**
1	RED	Inhibit (charge signal)	When charging	≈4.6V
			Not charging	0V
2	N/A	N/A	N/A	N/A
3	BLACK	GND		0V

10 Chassis System

Chassis (main parts)

The chassis is installed in the solution tank.



Item	Description
1	BUSHING
2	WASHER
3	SCREW M8X25mm
4	BRUSH LIFTING SUPPORT
5	SCREW M8X30mm
6	NUT M8
7	SCREW M8X50mm
8	STEPS BUSHING
9	FRONT PEDAL BRUSH
10	PEDAL LEVER GASKET
11	BRUSH AND SQUEE LIFTING
12	WASHER
13	RESET SPRING
14	BUSHING
15	WASHER
16	WHEEL SHAFT
17	WHEEL 6 INCH
18	NUT M16
19	CHASSIS
20	SPRING WASHER
21	WASHER
22	SCREW M6X20mm
23	3.5 INCH CASTER
24	SCREW M8x20mm
25	24V DC SOLENOID VALVE
26	SCREW M4X10mm
27	CLAMP 3/8"
28	HOSE Ø 20mm L400mm
29	HOSE WITH SPRING L130mm
30	OULET HOSE Ø20MM
31	ELBOW 90 PLASTIC
32	FILTER BASE
33	FILTER NET
34	O-RING
35	FILTER COVER
36	PA WASHER
37	BUSHING

24 Electrical System

Functional Description

The batteries (2 x 12V) are connected in series and supply power to the machine through connector C1.
The battery charger (CH1) is connected to the machine by two connectors C2 and J3 (2-way signal connection).

The red and black cables (pin 1 and 3 of connector J3) are normally connected inside the battery charger CH1 when the battery charger is not connected to the mains. When the battery charger is plugged into the mains, the connection between pin 1 and 3 of connector J3 is broken, which will cause all machine functions to be disabled.

Fuses F1&F2 (20A) are connected in series between brush motor (M1) and Control board (EB2), as the brush motor overcurrent protection; Fuse F3 (20A) is connected in series between vacuum motor (M2) and Control board, as the vacuum motor overcurrent protection; Circuit breaker F4 (3A) is resettable and is connected in series between solenoid valve (EV1) and Control board, as the solenoid valve overcurrent protection. All of them are located in the Control board.

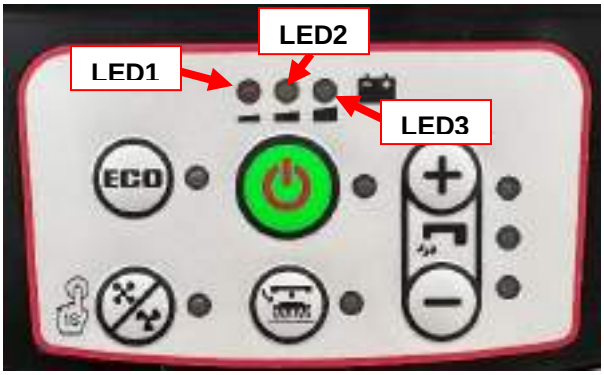
To prolong battery life, the machine has low voltage cut-off function. When battery is of low voltage, the battery capacity LED (red) flashes to alert the operator to charge the machine (the machine will power off automatically in 10 seconds if not charged). Brush motor and vacuum motor can't work normally until the battery is fully charged or charged for more than 2 hours.

Different battery type settings are of different low voltage cut-off threshold. See corresponding voltage values in the table below. The battery charger can't identify what type of battery the machine is using via the Control board (EB2), so if the battery type is changed, the charger battery type must be set accordingly via the dipswitch (SW1) inside the charger. See relevant procedures in section "Maintenance and Adjustment" (on page 26).

Battery Type	WET	AGM/GEL	DIS-EV
LVC Voltage (V)	20.4	21.6	22.8
Reset Voltage (V)	24.5		

The battery capacity is indicated by the battery capacity LED indicators, and the corresponding voltage value of each battery capacity LED is shown in the following table:

Battery type			LED status	Description
WET	GEL/AGM	DIS-EV		
>22.0V	>22.2V	>23.2V	Green LED3 on	Battery capacity is enough, machine can work normally.
20.4~22.0V	21.6~22.2V	22.8~23.2V	Yellow LED2 on	Battery capacity is not enough, machine can work normally.
<20.4V	<21.6V	<22.8V	Red LED1 flashes	Battery capacity runs out, machine will power off automatically in 10s.



Component Locations

- Charger (CH1)
- Battery connector (C1)
- Battery (BAT)
- Charger AC plug
- Handle switch
- Brush motor fuses (F1&F2)
- Vacuum motor fuse (F3)
- Solenoid valve circuit breaker (F4)
- Brush release circuit breaker

Figure 1

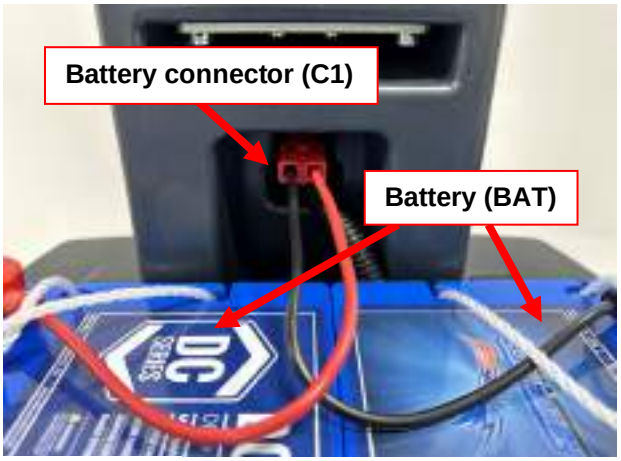


Figure 2

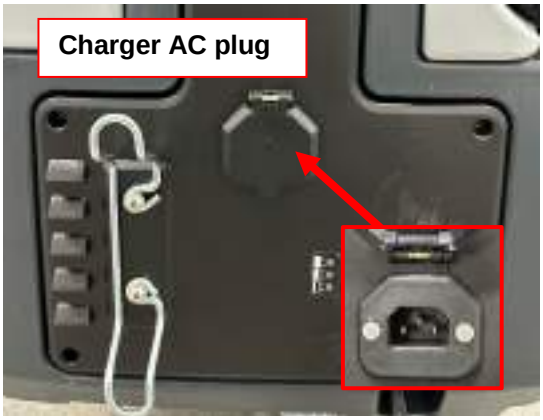


Figure 3

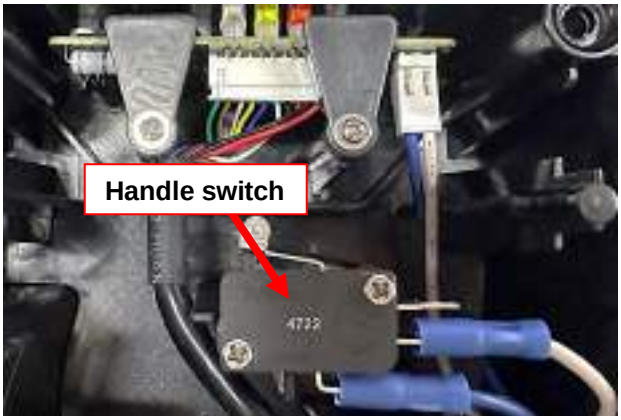


Figure 4

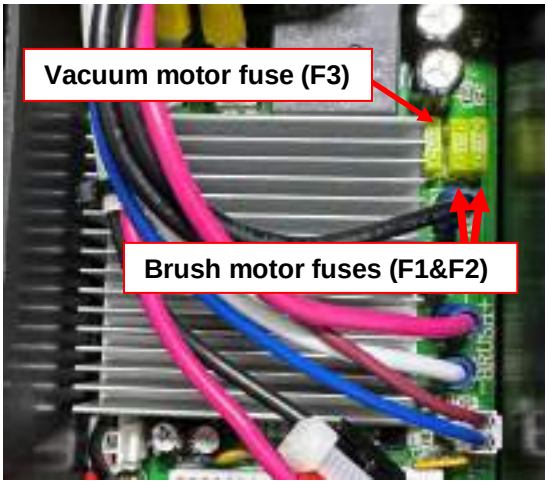


Figure 5

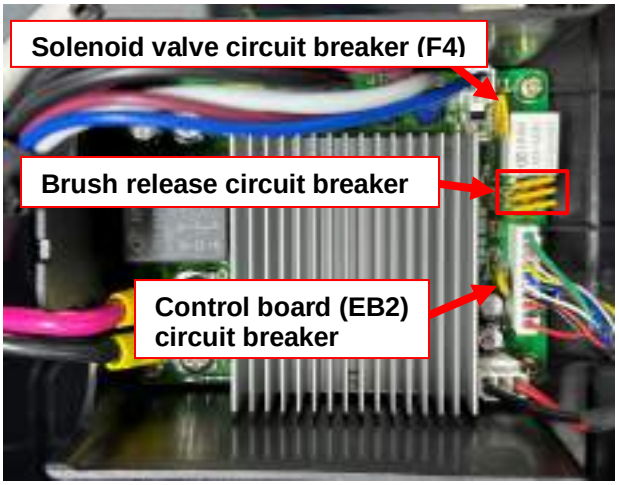


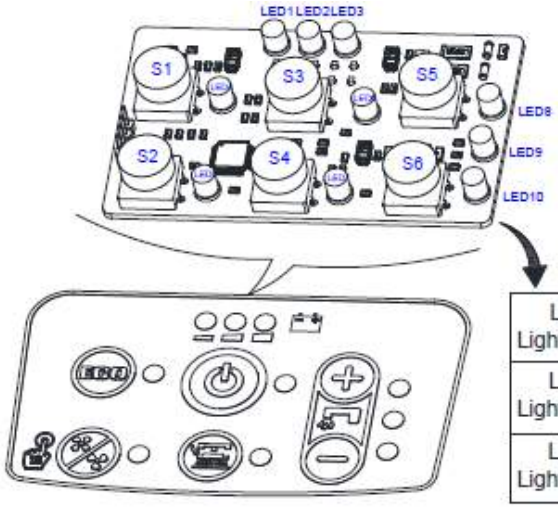
Figure 6

Maintenance and Adjustment

Machine Battery Type Setting

According to the battery type (WET/GEL/AGM/DIS), set the machine as follows:

1. When one-button start (S3) is switched off, press flow increase switch and flow decrease switch (S5 and S6) at the same time. 0.5 seconds later, LED1, LED2 and LED3 will all light up and the machine enters the battery type setting mode.
2. Then press flow increase switch or flow decrease switch to select battery type among “WET”, “GEL/AGM” and “DIS-EV”. If “WET” battery type is selected, LED1 (red) is on. For “DIS-EV”, LED2 (yellow) is on. And for “GEL/AGM”, LED3 (green) is on.
3. Press one-button start to exit battery type setting mode, and turn off the machine to update the battery type. When it’s turned on again, the machine battery type is updated accordingly, and the corresponding LED will flash twice.

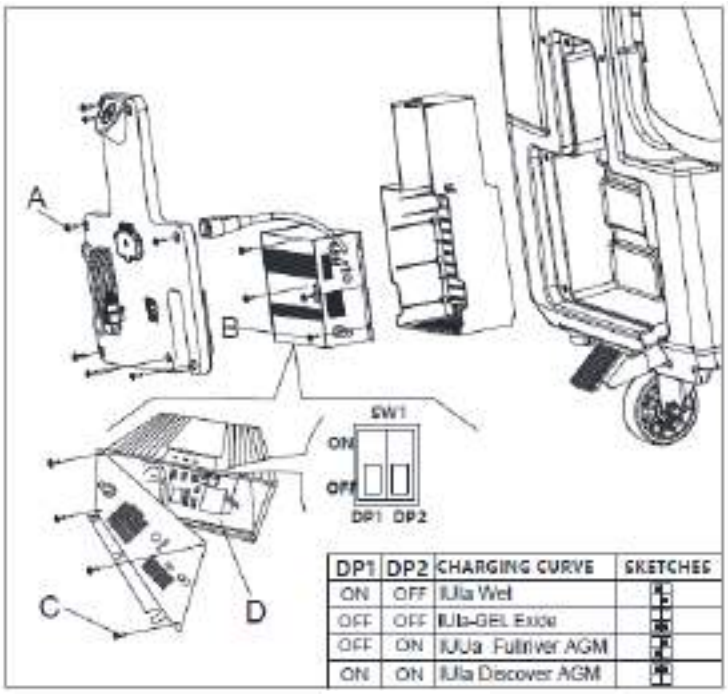


LED1 Light is Red	WET BATTERIES
LED2 Light is Yellow	DISCOVER EV AGM BATTERIES
LED3 Light is Green	GENERAL GEL/AGM BATTERIES

Figure 5

Charger Battery Type Setting

1. Remove all the screws (A,B,C, Figure 6).
2. Open the charger and find SW1 (D, Figure 6).
3. Set DP1 and DP2 according to the table in Figure 6.
4. Install the screws (A,B,C, Figure 6) after the setting.



DP1	DP2	CHARGING CURVE	SKETCHES
ON	OFF	IUIa Wet	
OFF	OFF	IUIa-GEL Exide	
OFF	ON	IUUa Fullriver AGM	
ON	ON	IUIa Discover AGM	

Figure 6

Troubleshooting

Trouble	Possible causes	Remedy
Can't turn on the machine	The battery connector (C1) is not connected	Connect
	The charger to control board terminal (J3) is not connected	Connect
	Dashboard (EB1) is faulty	Replace
	Control board (EB2) is faulty	Replace
	Wiring is loose or damaged	Repair/replace

Removal and Installation

Charger

Removal

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the recovery tank is empty.
4. Remove the recovery tank assembly.
5. Disconnect the battery connector connected to the machine (Figure 7).
6. Remove 7 screws, take out the distribution box (Figure 8).

Figure 7

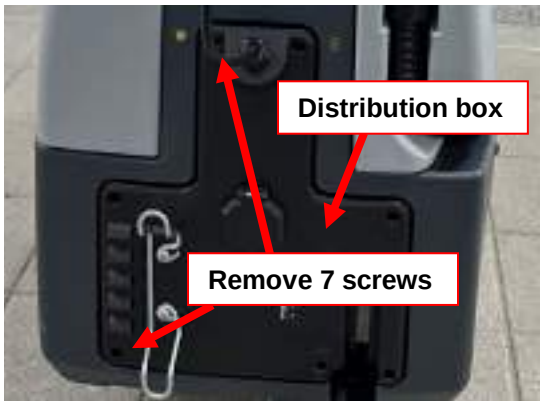


Figure 8

7. Remove 2 screws, then remove the cover of distribution box (Figure 9).
8. Remove 2 screws, then remove the AC plug cover (Figure 10).
9. Pull out the charger AC plug (Figure 11).
10. Disconnect the charger output connector (Figure 12).
11. Remove 5 screws fixing the charger and take out the charger (Figure 13)

Installation

Assemble components in reverse order of disassembly

Figure 9

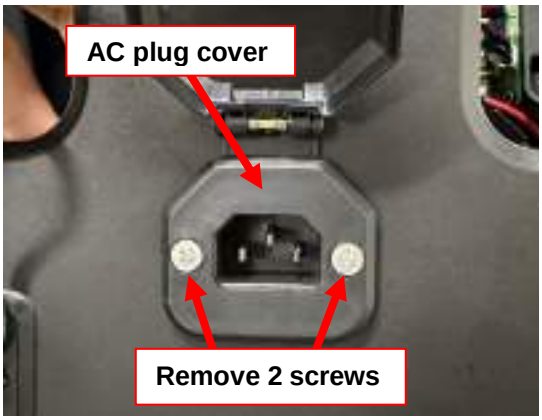


Figure 10

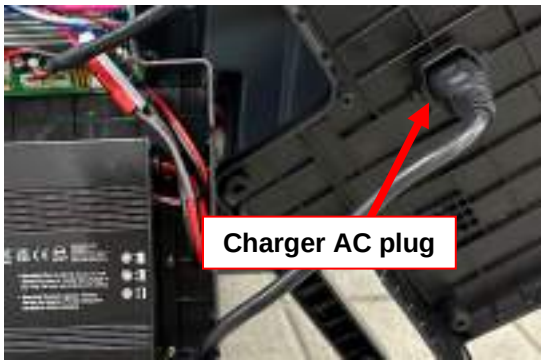


Figure 11

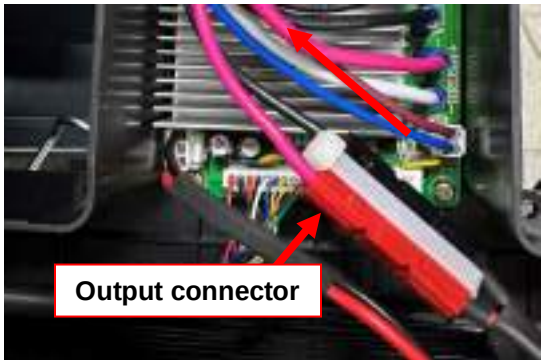


Figure 12

Figure 13

Battery

Installation

1. Empty the recovery tank with drain hose.
2. Remove the recovery tank assembly (A, Figure 14).
3. The machine is equipped with battery cables suitable for installing 2X12V batteries. Carefully put the batteries into the compartment and install them as shown in the diagram near the batteries.
4. Route and connect the battery cables (connect the battery cable to battery negative terminal last and disconnect it first), then carefully tighten the nut on each battery terminal.
5. Place the protection cap on each terminal, then connect the battery connector (B, Figure 14).
6. Carefully put back the recovery tank assembly (A, Figure 14).

Removal

Disassemble components in reverse order of assembly.

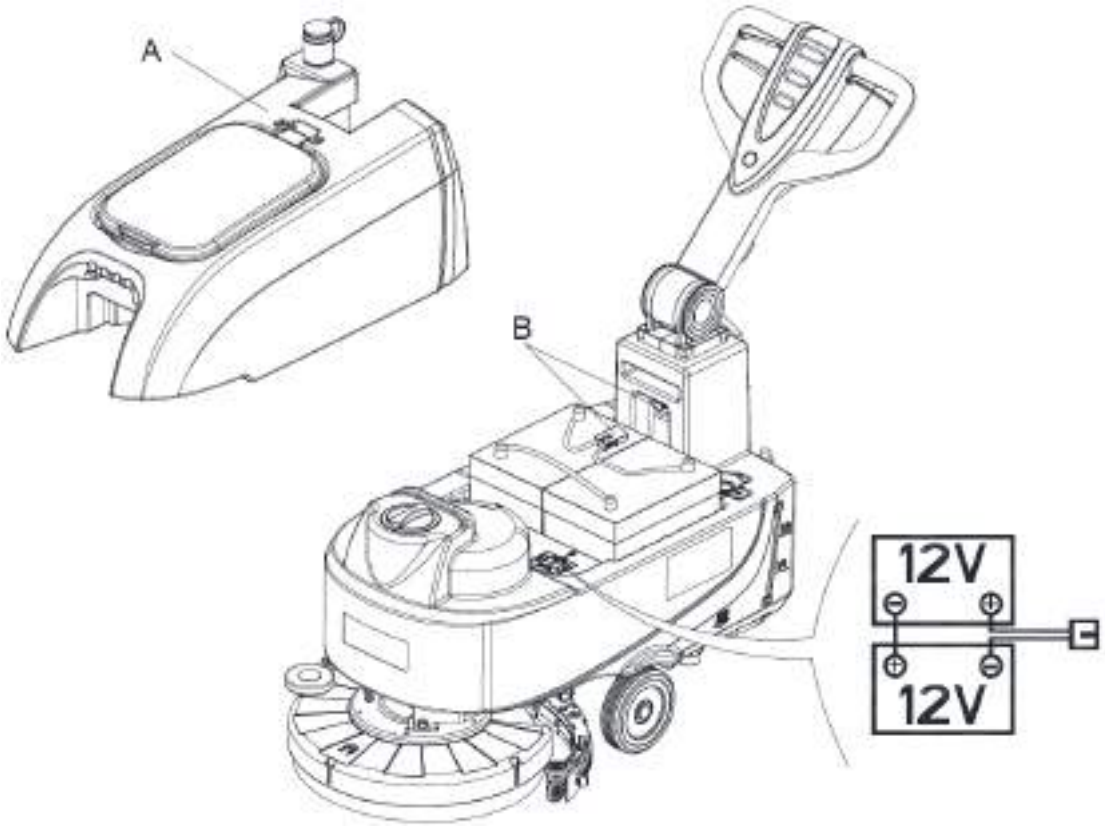
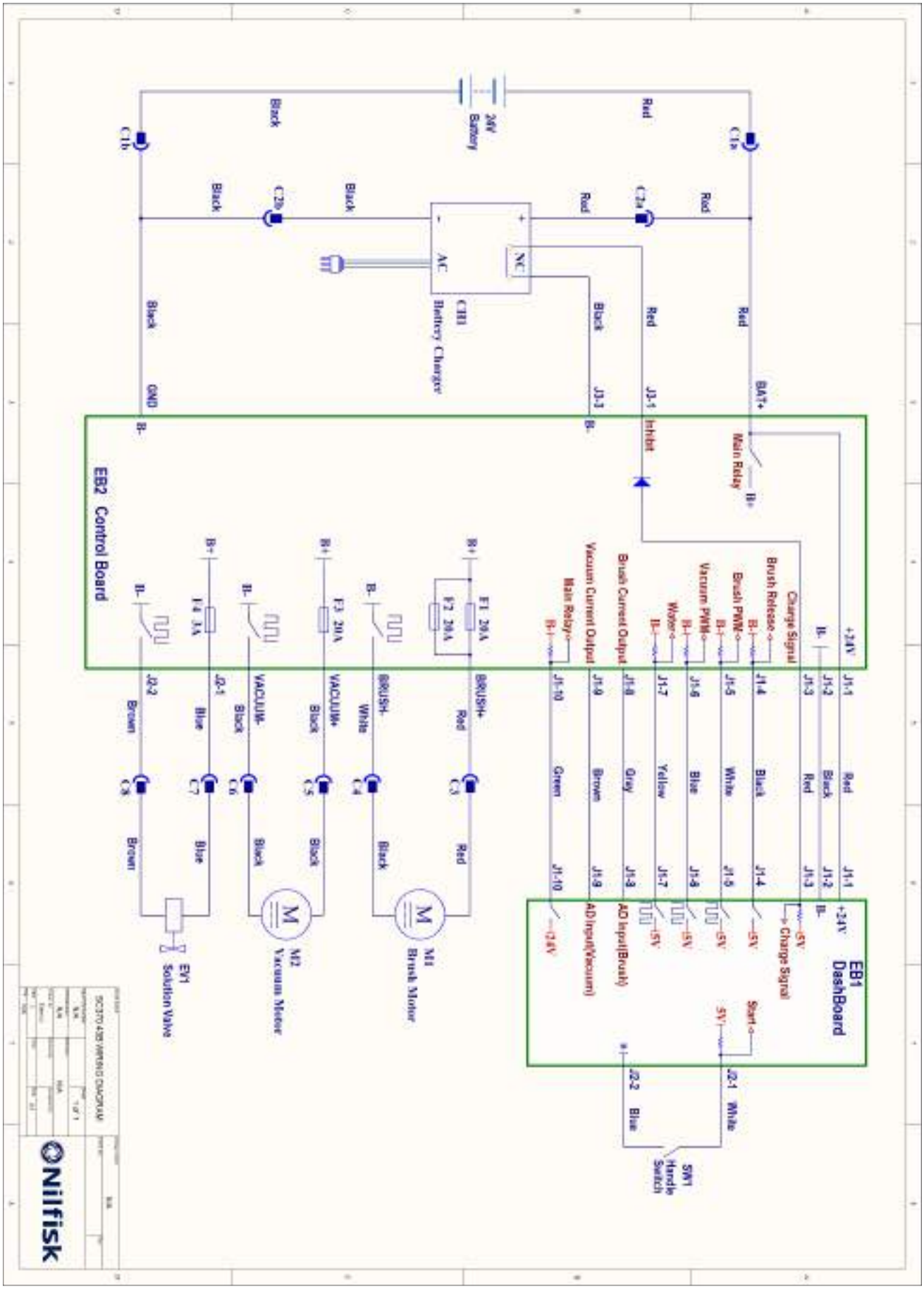


Figure 14

Specifications

Description	Unit	Value
Battery Voltage	V	24
Battery Charger Voltage	V	24

Electrical Wiring Diagram



30 Solution System

Functional Description

The solution system supplies water to the brush when cleaning the floor. The solution tank is also the main machine body. The solution flows from the tank to the filter and solenoid valve (EV1) and then to the brush deck.

Press the one-button start on Dashboard (EB1) to turn on the machine, and the solenoid valve is on standby. When the safety switch is pressed, the control signal is transmitted to Control board (EB2) via port J1-7 (Water) to control the output of solenoid valve. When the safety switch is released, the output is off. Press the flow increase switch and flow decrease switch on Dashboard (EB1) to select the solution flow level.

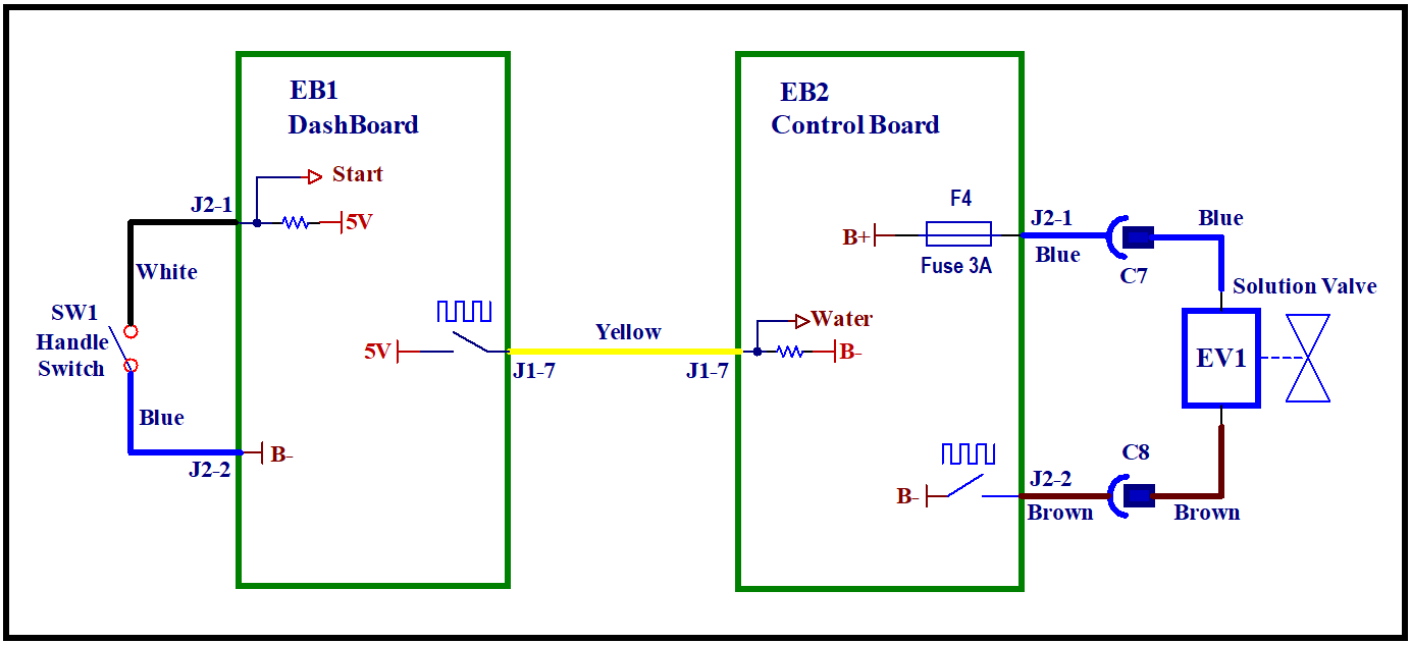
The solution flow is controlled by the on and off time of the solenoid valve. The solenoid valve output and corresponding LED status are shown in the following table (The LEDs are referring to the solution flow LED indicators. And 1 means LED on, 0 means LED off):

Status	Time on (s)	Time off (s)	LED1	LED2	LED3
0	0	Stay off	0	0	0
1	3	3	1	0	0
2	4	2	1	1	0
3	Stay on	0	1	1	1

Solenoid valve (EV1) can only work when all the following inputs/conditions are met:

- One-button start on
- One of the two handle switches is pressed
- Battery level not in condition with flashing segment

Wiring Diagram



Component Locations

- Solenoid valve (EV1)
- Solution level hose
- C7&C8 connectors
- Solenoid valve circuit breaker (F4)

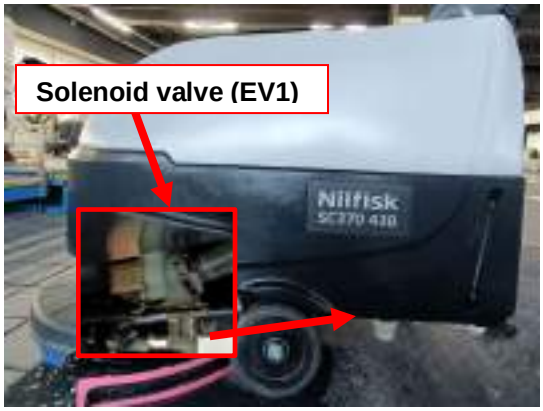


Figure 1

Figure 2

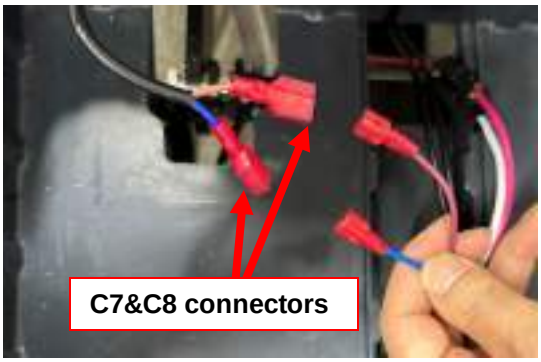


Figure 3

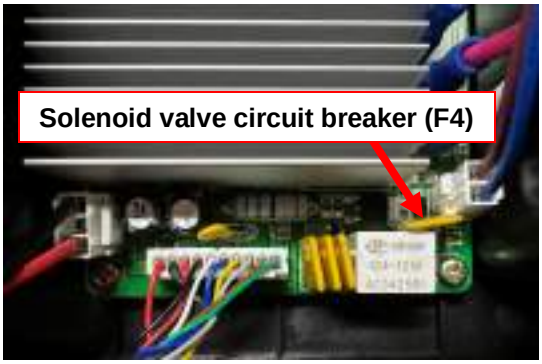


Figure 4

Maintenance and Adjustment

Solution Filter Cleaning

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Empty the solution tank (Advice).
4. Remove the cover (D, Figure 5), then remove the filter strainer (E). Clean and install them on the support (F).

NOTE
The filter strainer (E) must be correctly positioned on the housing (H) of the support (F).

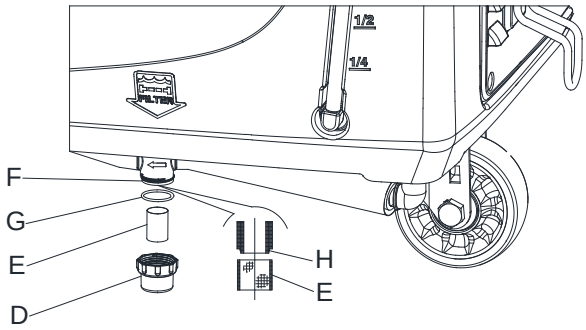


Figure 5

Troubleshooting

Trouble	Possible causes	Remedy
Small amount of solution or no solution reaches the brush	Solution filter is clogged/full of dirt	Clean
	Solenoid valve faulty or electrical connection broken	Replace the solenoid valve or repair the electrical connection
	There is dust/debris in the tank obstructing the solution	Clean
	Solution tank is empty	Fill up solution tank with water
	Wiring damaged	Repair
	Control board (EB2) is faulty	Replace
	Dashboard (EB1) is faulty	Replace
The solution reaches the brush also when the machine is off	The solenoid valve is faulty (leaking)	Replace or remove it to clean

Removal and Installation

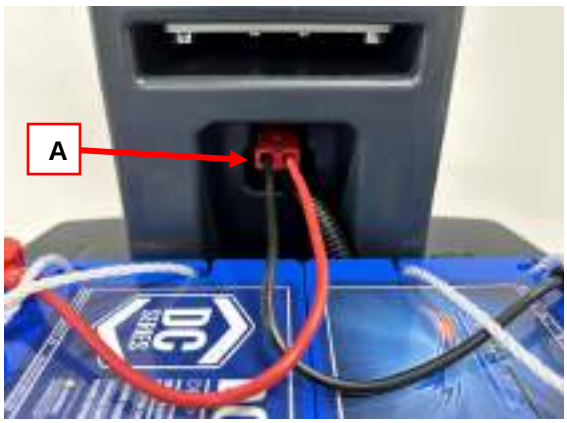
Solenoid Valve (EV1)

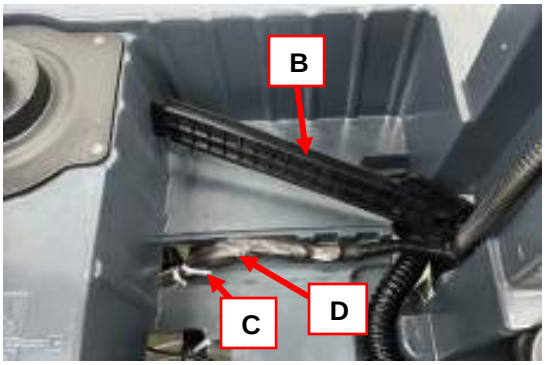
Removal

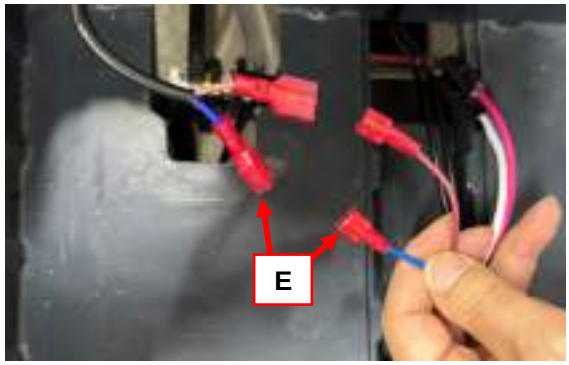
1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the solution tank and recovery tank is empty.
4. Remove the recovery tank assembly.
5. Disconnect the battery connector (A) and move the batteries.
6. Remove the cable cover plate (B) and cut the wiring retaining clamp (C).
7. Cut the heat-shrink tubing (D) then disconnect the electrical connections (E) of the solenoid valve.
8. Carefully put the machine down.
9. Loosen the clamps (F) and disconnect the hoses (G) from the solenoid valve (H).
10. Remove 2 screws (I) and take out the solenoid valve (H).

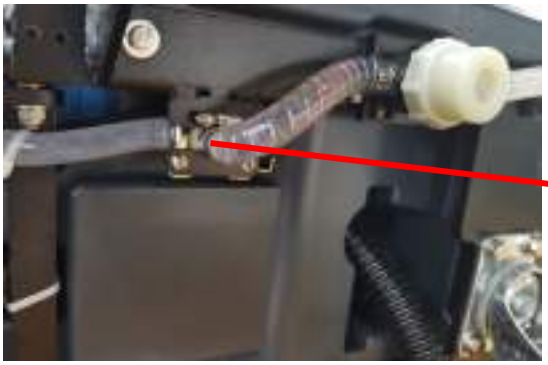
Installation

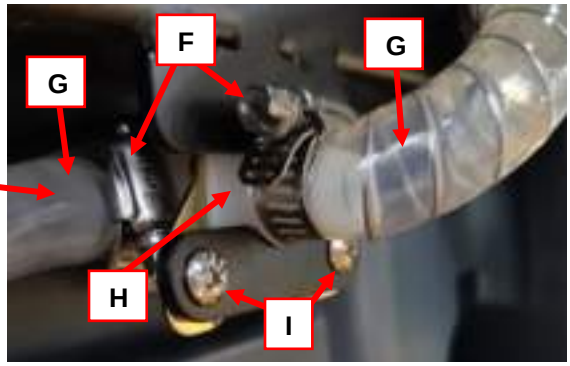
Assemble components in reverse order of disassembly.











Specifications

Description	Unit	Value
Solution tank capacity	L/Gal.	25 L / 6.6 Gal.
Solution flow (max) per setting	L/min	0.59/0.69/1.11/1.68
Solenoid valve coil resistance @25℃	Ω	≈110

34 Scrub System

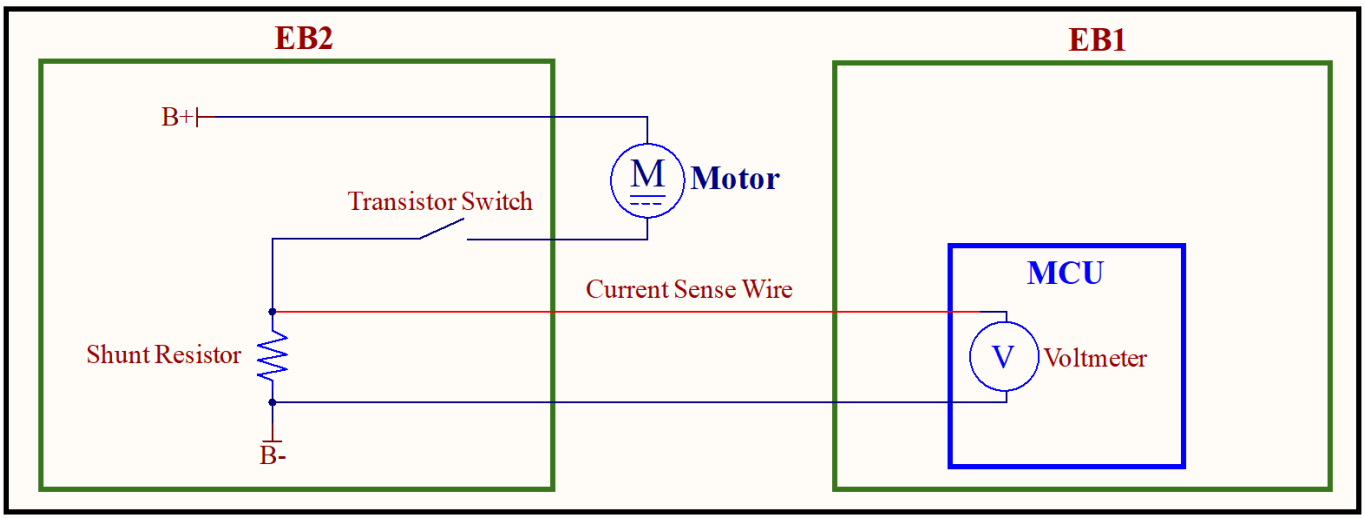
Functional Description

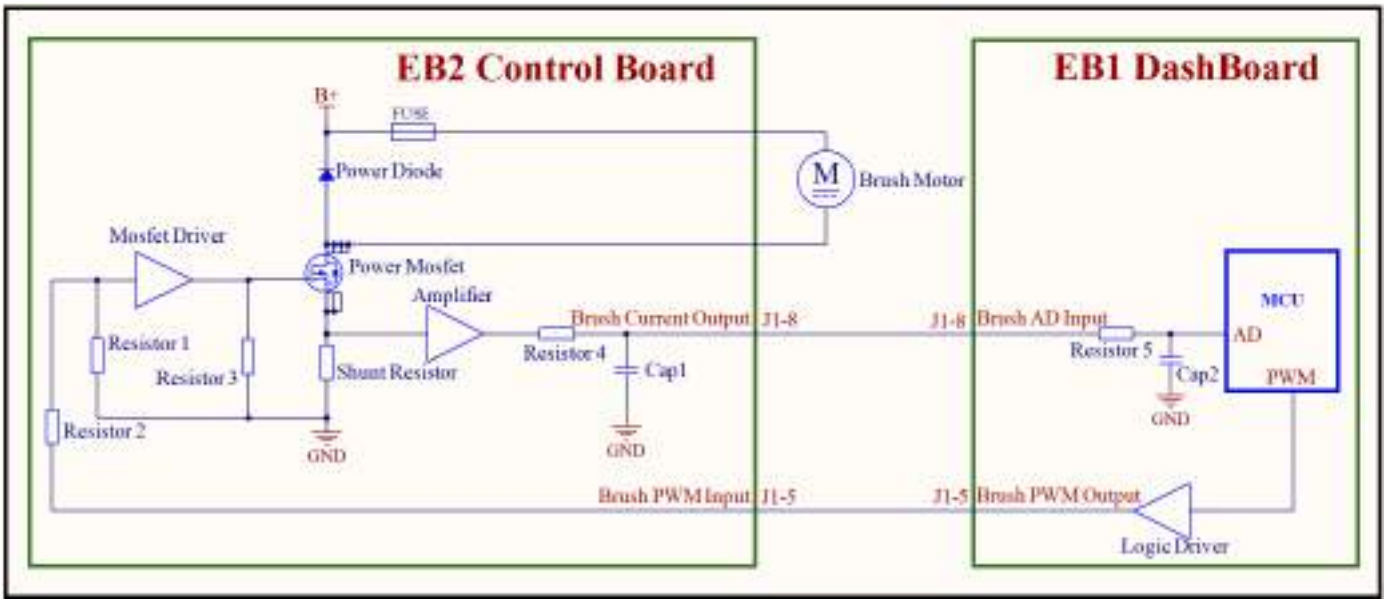
The rotating brush system cleans the surface of the floor. The main component of the brush system is the deck where brush or pad holder with pad whichever is suitable for the type of surface to be cleaned is installed.

Press the one-button start on Dashboard (EB1) to turn on the machine, and the brush motor (M1) is on standby. When the safety switch is pressed, the control signal is transmitted to Control board (EB2) via port J1-5 (brush PWM) to activate the output of brush motor. When the safety switch is released, the output is off.

The machine uses a current sense circuit to detect the current. Here is how the MCU knows how much current is flowing through the motor. When the transistor (switch) closes to cause the motor to run, the current flows through a shunt resistor, inside the EB2 control board, with a known resistance value before reaching battery negative. The EB1 Dashboard has an internal “voltmeter” that measures the voltage drop across the shunt resistor. With the knowledge of the resistance value and the voltage drop, the MCU mathematically calculates the amperage going through the resistor based on Ohm’s law. Think of the “current” wire as though it were the red voltmeter lead, reaching out to measure the voltage just upstream of the shunt resistor compared to battery negative.

If the current exceeds the set value (25A) for 3 seconds, the MCU outputs control signal (low level) to logic driver and transmit it to the gate of power MOSFET controlled by MOSFET driver on Control board (EB2) via port J1-5 to stop the brush motor. When the current is greater than 30A, the output is turned off after 60 milliseconds. And the one-button start LED indicator flashes in the meantime, indicating the circuit is overcurrent.





Brush motor current and the corresponding voltage at port J1-8:

Brush Motor Current (A)	Volts at J1-8 (V) (Battery voltage=26V)
0	0
5	0.39
10	0.84
15	1.26
20	1.72
25	2.15

If the brush motor is overloaded and the protection function of software is disabled, the fuses (F1&F2) will stop the brush to prevent continuous overload. To start scrubbing again after the brush stops due to overload, turn off the machine, replace the fuses (F1&F2) in the Control board (EB2) and then turn on the machine.

To work properly, the brush motor (M1) needs the following inputs/conditions:

- One-button start on
- One of the two handle switches is pressed
- Battery level not in condition with flashing segment

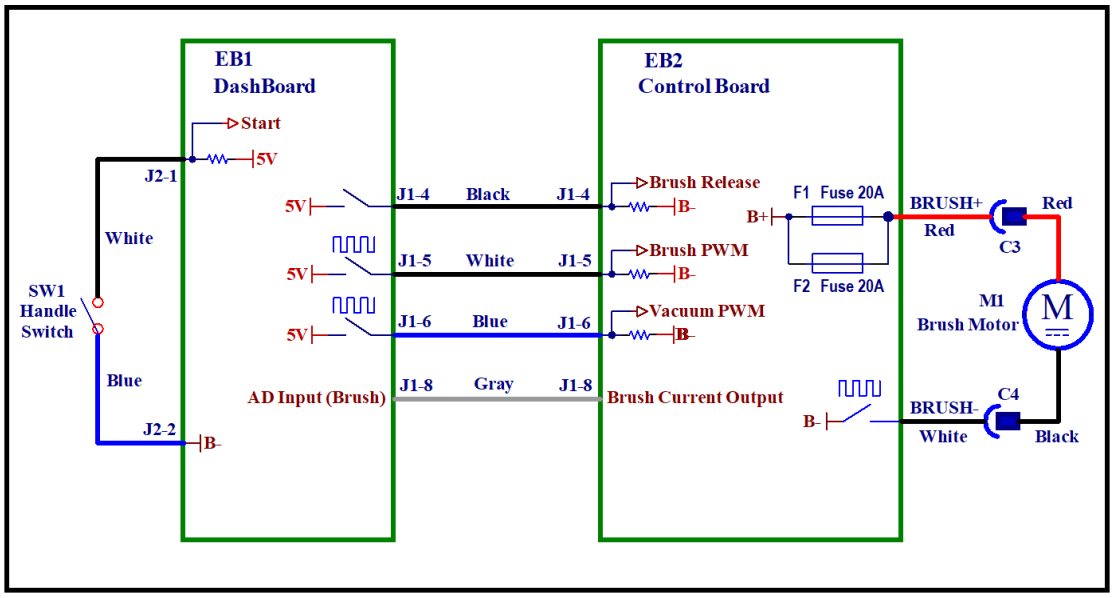
Brush Release Function

To release the brush from its hub, the brush motor starts up and then stops immediately. After the brush motor starts up for several seconds, the wires on both sides of the brush motor will be connected to the positive terminal of power supply at the same time, generating reverse current to stop the motor abruptly. The brush's inertia thus causes it to disengage from the hub.

ECO Mode

When the ECO mode button is pressed, the control signal is transmitted to Control board (EB2) via port J1-5 (Brush PWM) and J1-6 (Vacuum PWM) to control the output of brush motor (M1) and vacuum motor (M2). And the brush and vacuum output MOSFET of Control board (EB2) will lower the voltage of brush motor and vacuum motor to about 18.5V via PWM regulation, reducing the current draw of brush motor and vacuum motor to reduce power consumption and thus achieve energy saving.

Wiring Diagram



Component Locations

- Brush motor (M1)
- Brush deck
- C3&C4 connectors
- Brush motor fuses (20A) (F1&F2)
- Brush release relay
- Brush release fuse

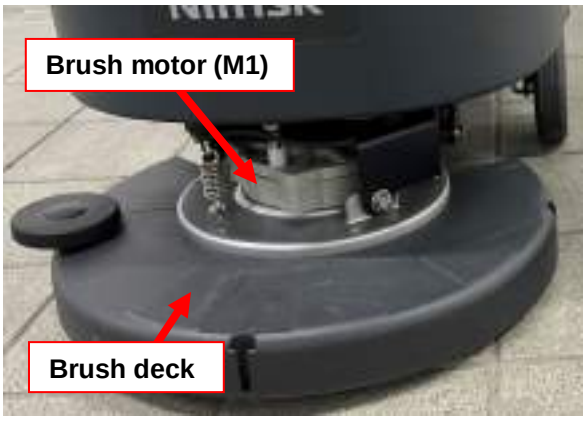


Figure 1

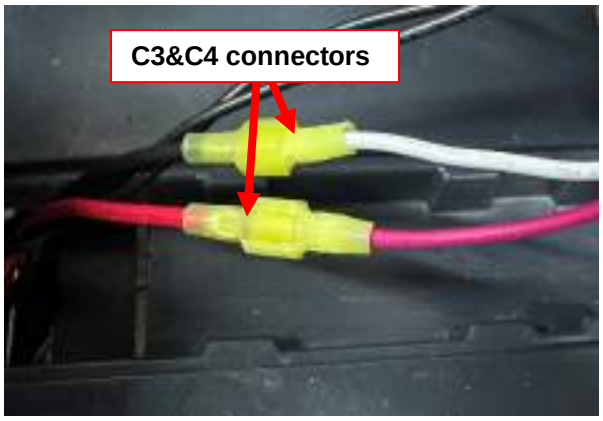


Figure 2

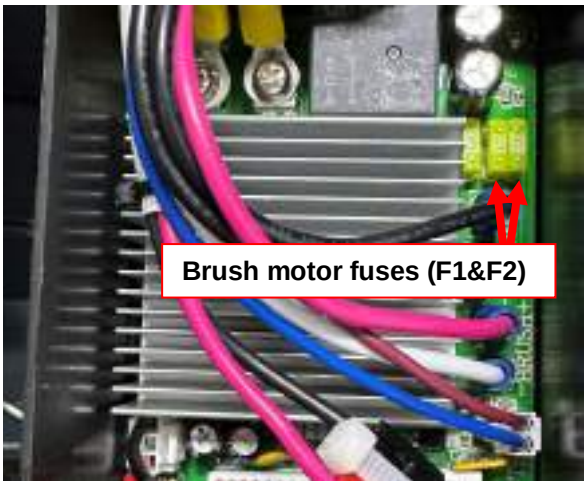


Figure 3

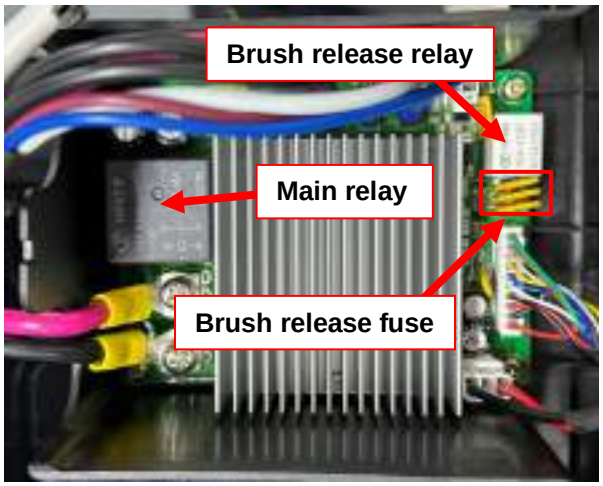


Figure 4

Troubleshooting

Trouble	Possible causes	Remedy
Brush does not clean properly	The brush is excessively worn	Replace
Brush can't rotate	There are ropes or debris restraining the brush rotation	Remove the brush and clean it
	Wiring damaged	Repair or replace
	Brush motor carbon brushes are worn	Replace
	Brush motor fuses (F1&F2) have blown	Replace
	Brush motor damaged	Repair or replace
	Control board (EB2) is faulty	Replace
Brush release function does not work	Control board (EB2) is faulty	Replace
	Wiring damaged	Repair or replace

Brush Motor Amperage Check

Warning! This procedure must be performed by qualified personnel only.

1. Apply the amp clamp (A, Figure 5) to one of the brush motor wires (B, Figure 5).
2. Lift the brush deck by pressing the deck lifting pedal.
3. Press one-button start to turn on the machine.
4. Start brush rotation by pressing the handle switch and check if the current draw of brush motor is between 1A and 4A at 24V.
5. If the amperage is higher than 4A, perform following procedures to detect and correct the abnormal amperage:
   - Check and clean the brush hub if there is debris wrapped around it.
   - Remove brush motor and check the condition of all its components, repair or replace them if necessary.
6. If above-mentioned procedures can't lead to correct amperage, the brush motor must be replaced.

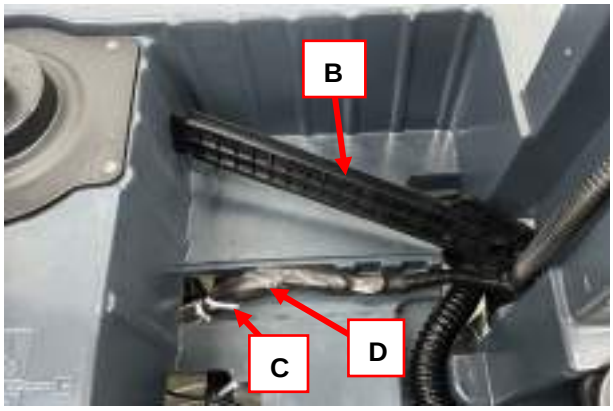
Figure 5

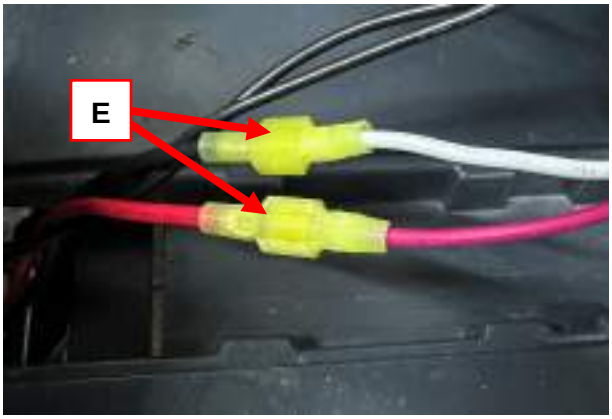
Removal and Installation

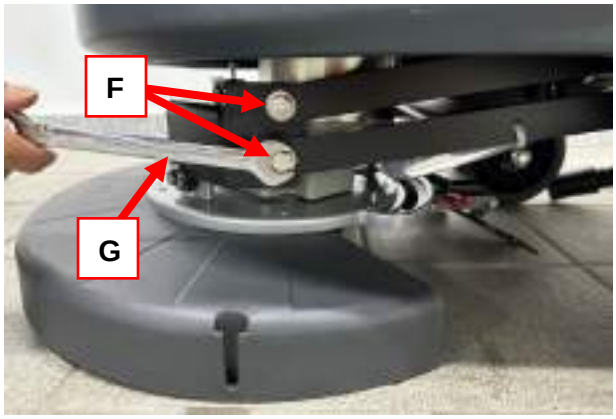
Brush Motor (M1)

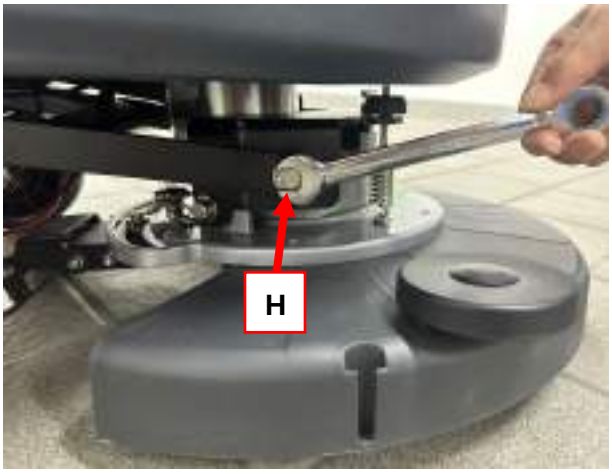
Removal

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the recovery tank is empty.
4. Remove the recovery tank assembly.
5. Disconnect the battery connector (A) and move the batteries.
6. Remove the cable cover plate (B) and cut the wiring retaining clamp (C).
7. Cut the heat-shrink tubing (D) then disconnect the electrical connections (E) of the brush motor.
8. Remove 2 bolts (F) with the wrench (G), and then remove bolt (H).
9. Loosen the clamp (I) and take out the brush deck.





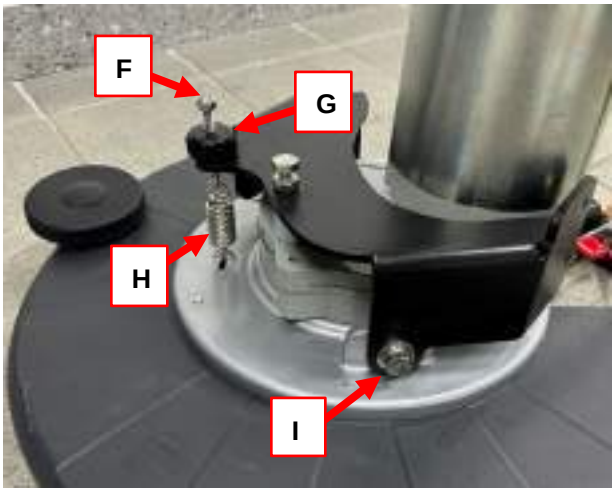


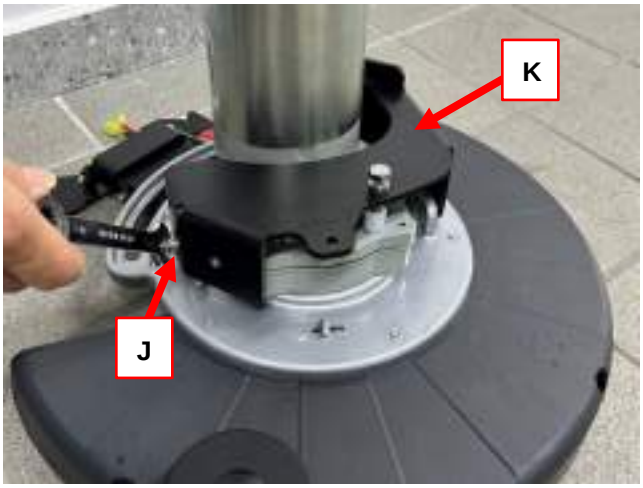


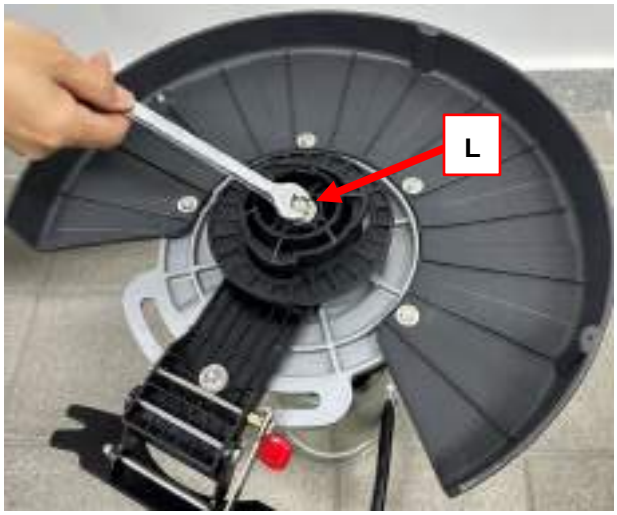
10. Remove nut (F) and knob nut (G), and then remove spring (H).
11. Remove bolt (I) and bolt (J), and then remove bracket (K).
12. Remove bolt (L) and then remove brush hub (M).
13. Remove 4 bolts, and spring washers (N), and then take out the brush motor (O).

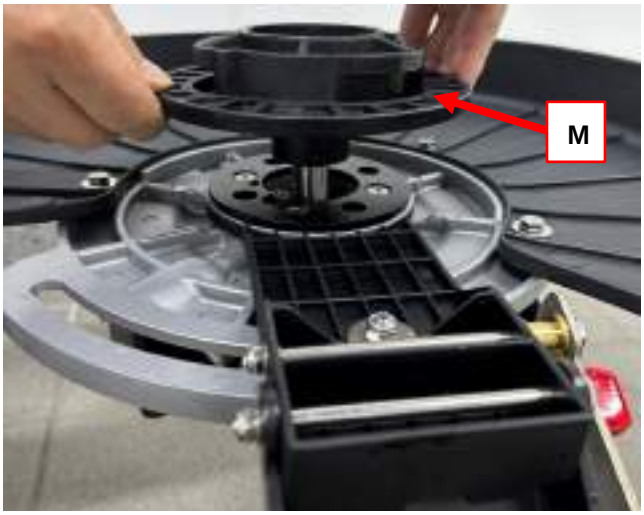
Installation

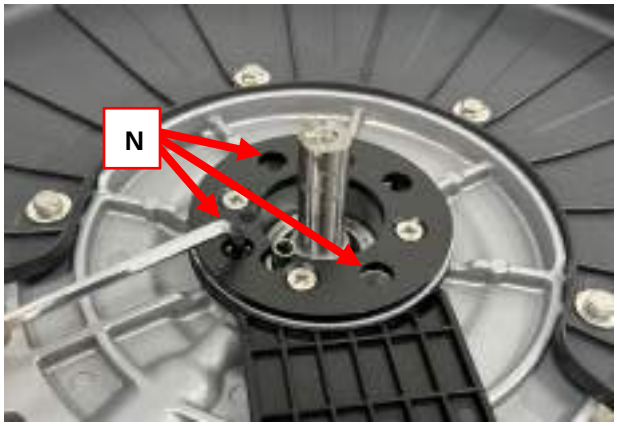
Assemble components in reverse order of disassembly.

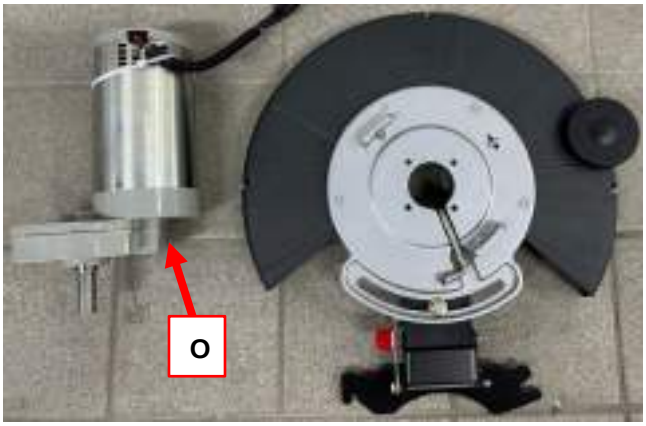












Brush Motor Carbon Brushes

Removal

1. Disconnect the electrical connections of the brush motor and remove the brush deck.
2. Remove 2 screws (A) and the protection strip (B) on brush motor (C).
3. For each of the motor's four carbon brushes, disengage spring (D) and remove the carbon brush (E) from its seat, then detach the carbon brush by disengaging its electrical connection (F).
4. Check the condition of the four carbon brushes (E). Replace them when their contact with the motor armature is insufficient or their contact surface is not intact due to wear, or the thrust spring is broken, etc. If the residual length of the carbon brushes reaches the minimum (7mm), they must be replaced in any case.

   All carbon brushes of the motor need to be replaced at the same time.

Installation

Assemble components in reverse order of disassembly.

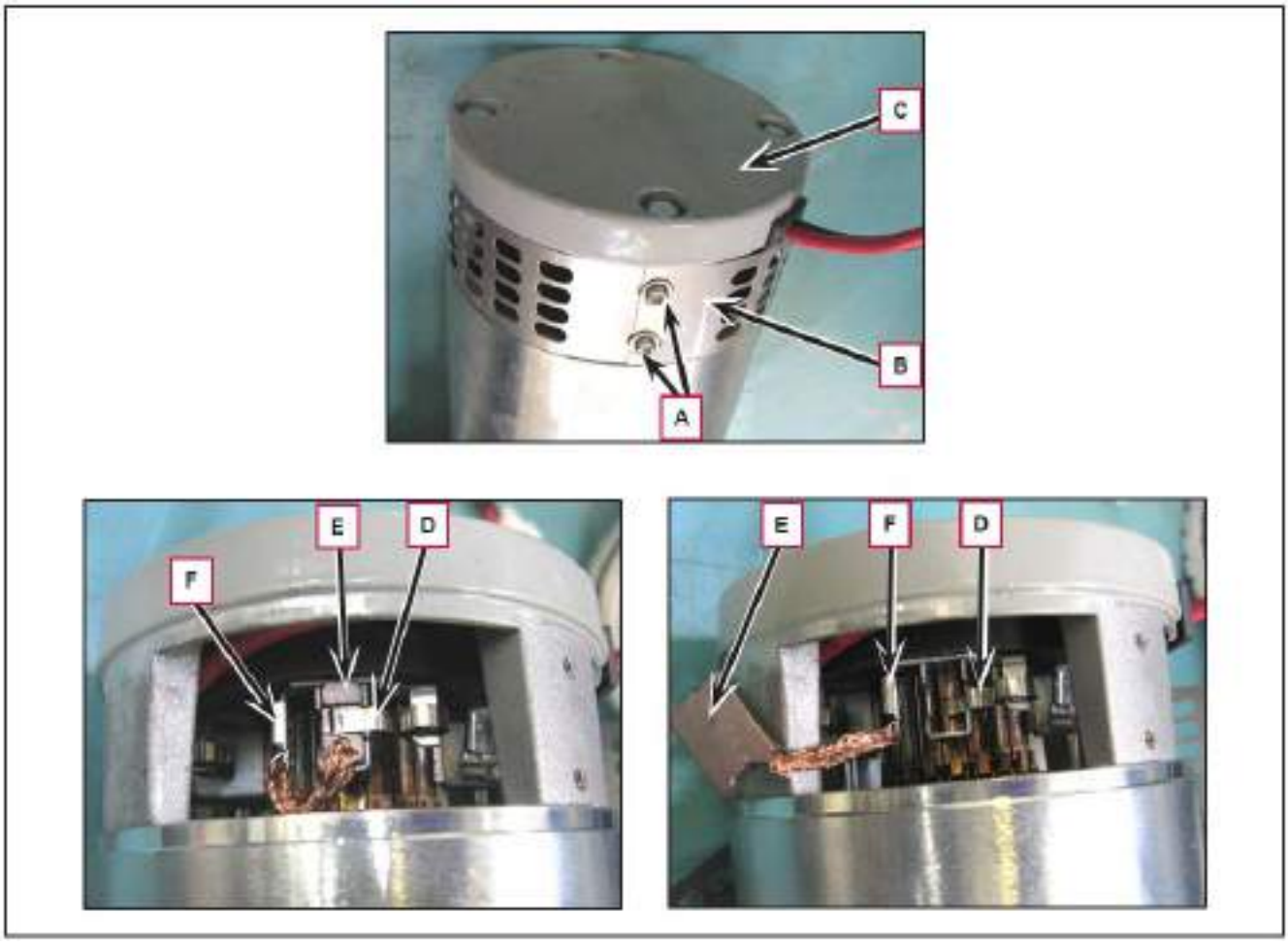


Figure 6

Specifications

Description	Unit	Value
Cleaning width	Inches / mm	17 / 432
Brush motor power	W	400
Brush motor rated voltage	V DC	24
Brush rotation speed (normal mode)	RPM	140
Brush rotation speed (ECO mode)	RPM	100
Brush motor normal no-load current	A	1.6
Insulation class	IP	IP24

38 Squeegee System

Functional Description

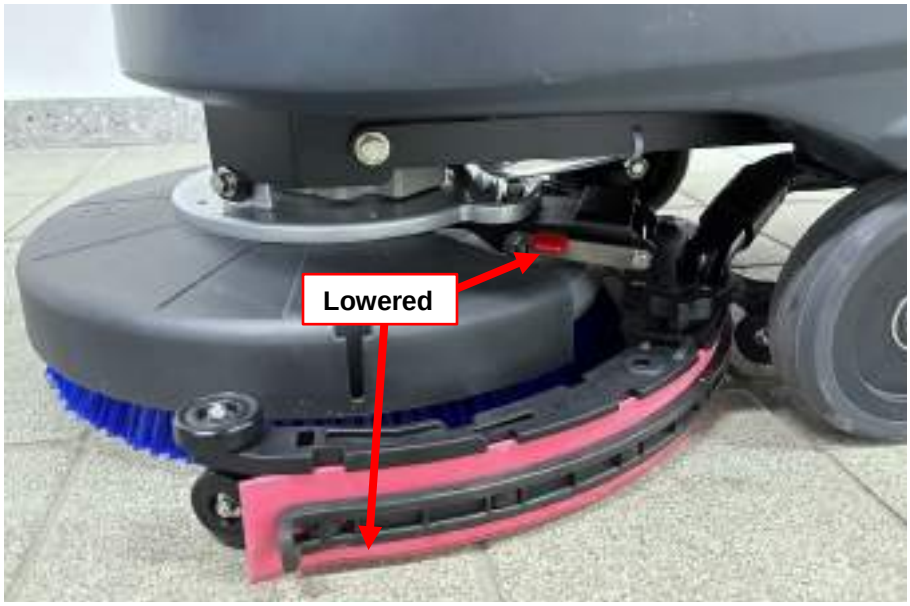
The squeegee system cleans the liquid off the floor, which is then collected by the recovery system.

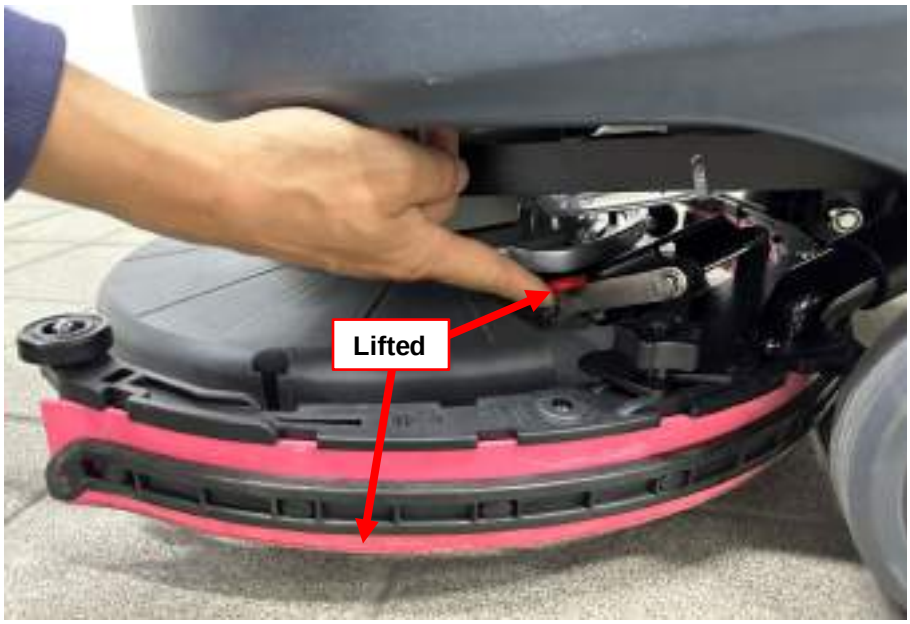
The squeegee is mounted on the squeegee bracket and the weight of the squeegee kit presses it down on the floor.

In case of fixed obstacles on the floor, the brush deck and squeegee can be lifted by pressing the pedal on the machine to pass through the obstacles.

The front blade has an opening in the bottom edge so the squeegee can collect the water on the floor. The design and the central duct make it easy for the squeegee to clear the water. The bottom edge of the rear blade is smooth.

The squeegee can be lifted and lowered by the operator manually. By lifting the squeegee the machine can scrub without picking up the water.





Component Locations

- Brush deck bumper wheel
- Squeegee bumper wheel
- Squeegee bracket
- Squeegee lifting handle
- Squeegee knob
- Squeegee blades

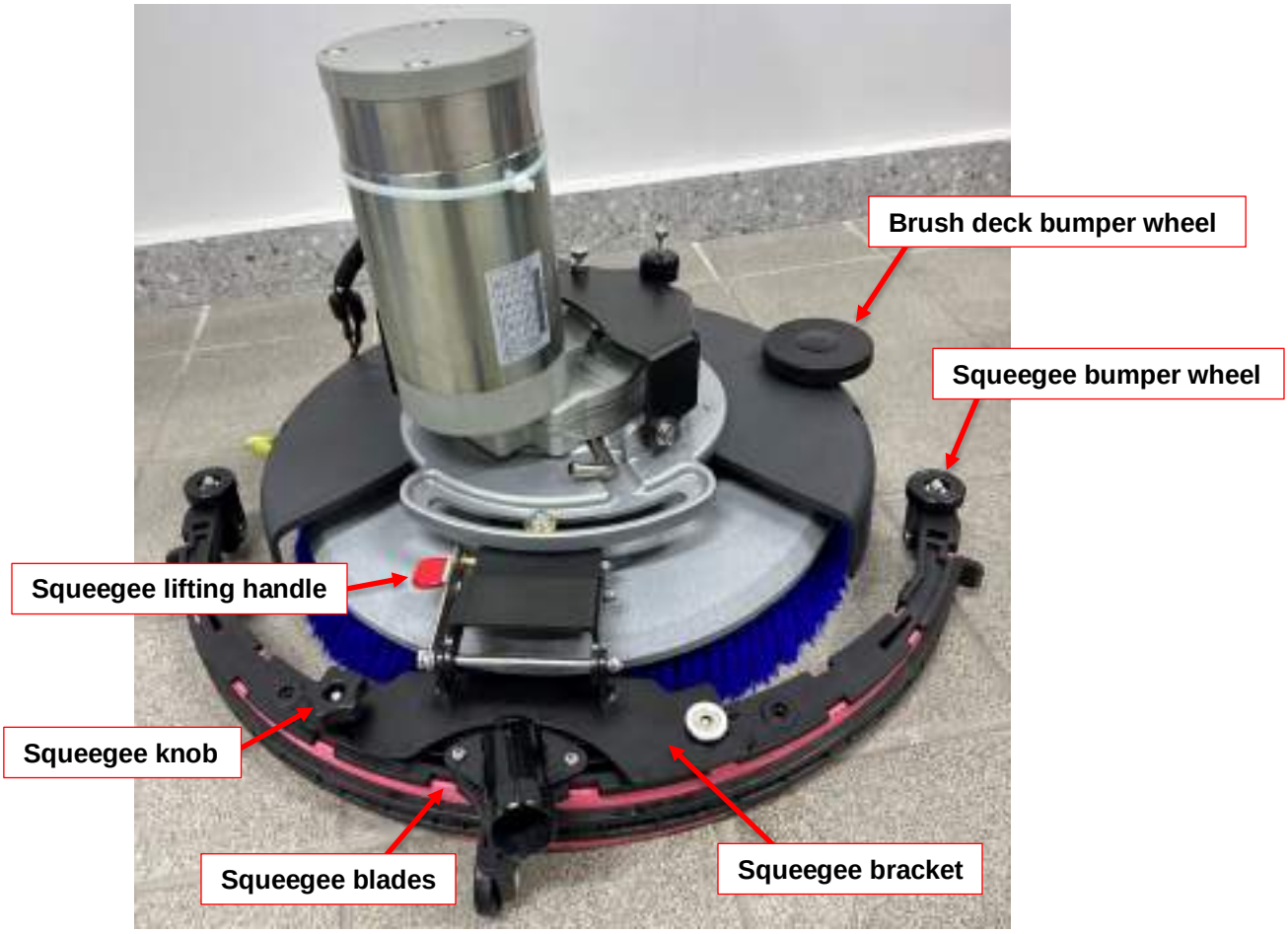


Figure 1

Maintenance and Adjustment

Squeegee cleaning

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Lower the brush/pad-holder deck and the squeegee by lifting the pedal.
4. Disconnect the vacuum hose (B) from the squeegee connector (C).
5. Loosen the knob (D) and remove the squeegee (E).
6. Clean the rubber or the plastic squeegee (E). Clean the compartments (I) and the hole (H) especially. Check the front blade (F) and the rear blade (G) for integrity, cuts and tears; if necessary replace them (see the procedure in the following paragraph).
7. Assemble the squeegee in reverse order of disassembly.

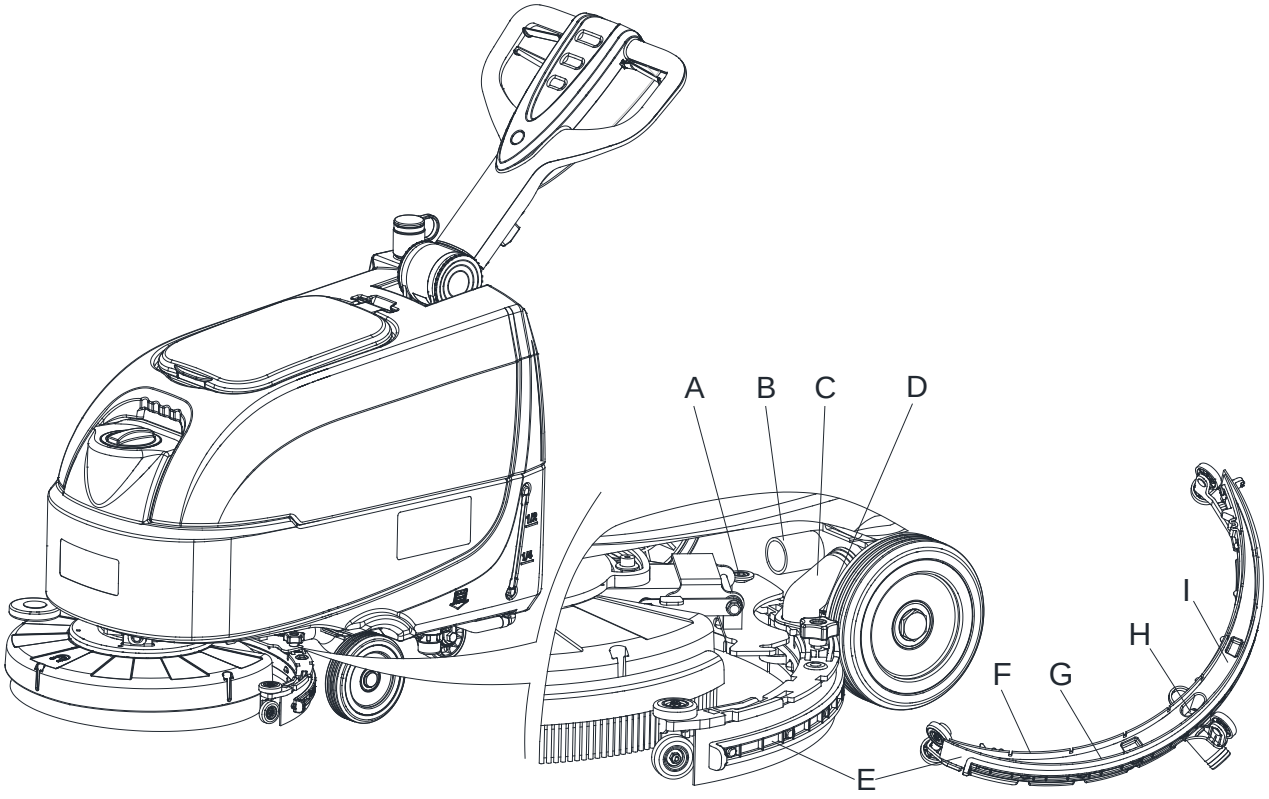


Figure 2

Squeegee blade check and replacement

1. Clean the squeegee as shown in the previous paragraph.
2. Check the condition of the front (A, Figure 3) and rear (C) blades, ensuring there are no cuts and tears; if necessary, replace them as shown below. Check that the front corner (F) of the rear blade is not worn; otherwise, turn the blade to replace the worn corner with one of the three remaining intact corners. If the other corners are worn too, replace the blade according to the following procedure:

- Use the tab (G) to release and remove the elastic strap (D) from the fasteners (H), then turn or replace the rear blade (C).
- Install the rear blade in the reverse order of removal. Fasten the elastic strap (D) to the fasteners (H) starting from one side. To make the fastening procedure easier, secure the fasteners one at a time, by locking the strap before the fastener with one hand and pulling it with the other hand.
- Remove the fastening strap (B) by disengaging it from the fasteners (J).
- Replace (or overturn) the front blade (A), then reinstall the fastening strap (B).

3. Install the squeegee (E, Figure 2) and fasten the knob (D, Figure 2).
4. Connect the vacuum hose (B, Figure 2) to the squeegee connector (C, Figure 2).

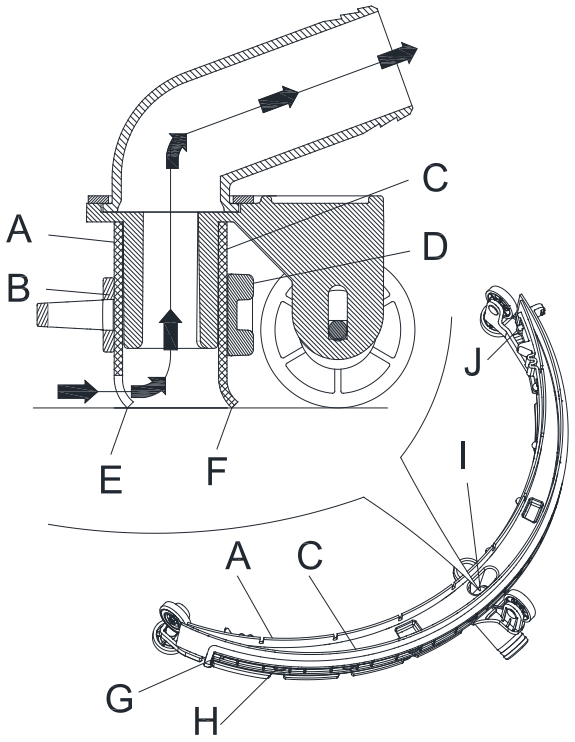


Figure 3

Troubleshooting

Trouble	Possible causes	Remedy
The recovery water vacuuming is insufficient or there is no vacuuming	The squeegee is dirty or the squeegee blades are worn or damaged	Clean or repair/replace
The squeegee leaves water marks on the floor	There is debris under the squeegee blades	Remove
	The squeegee blades are worn, chipped or torn	Replace

Removal and Installation

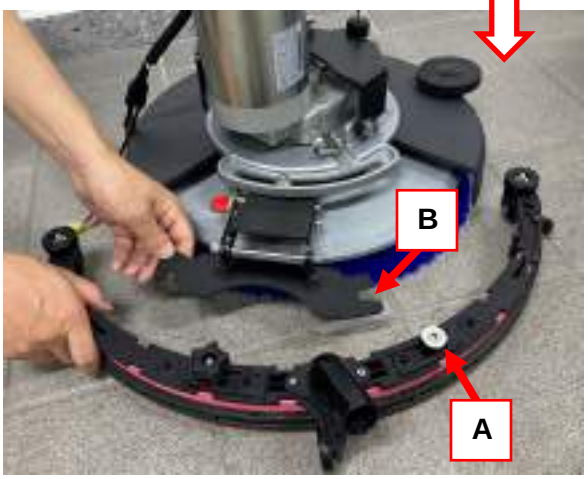
Squeegee assembly

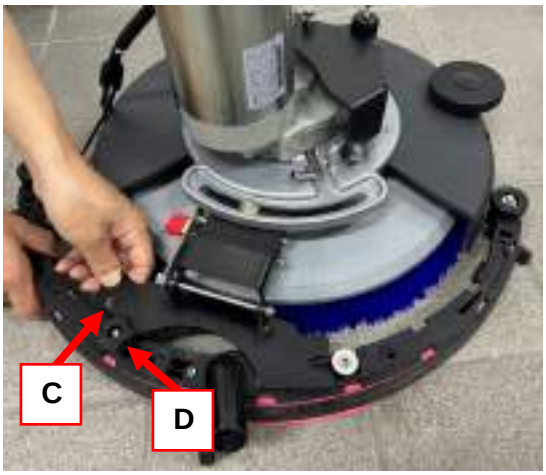
Installation

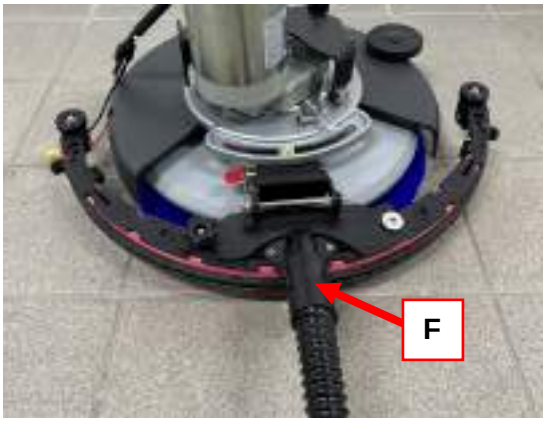
1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Lower the brush/pad-holder deck by lifting the pedal.
4. Place squeegee in the place between brush deck and front wheel.
5. Fix stud (A) to the opening (B), then fix another screw (D) to the opening (C) and fasten the knob.
6. Connect the vacuum hose (F) to the connector (E).

Removal

Disassemble components in reverse order of assembly.







Specifications

Description	Unit	Value
Machine width with squeegee	mm/Inches	570 / 22.4

40 Recovery System

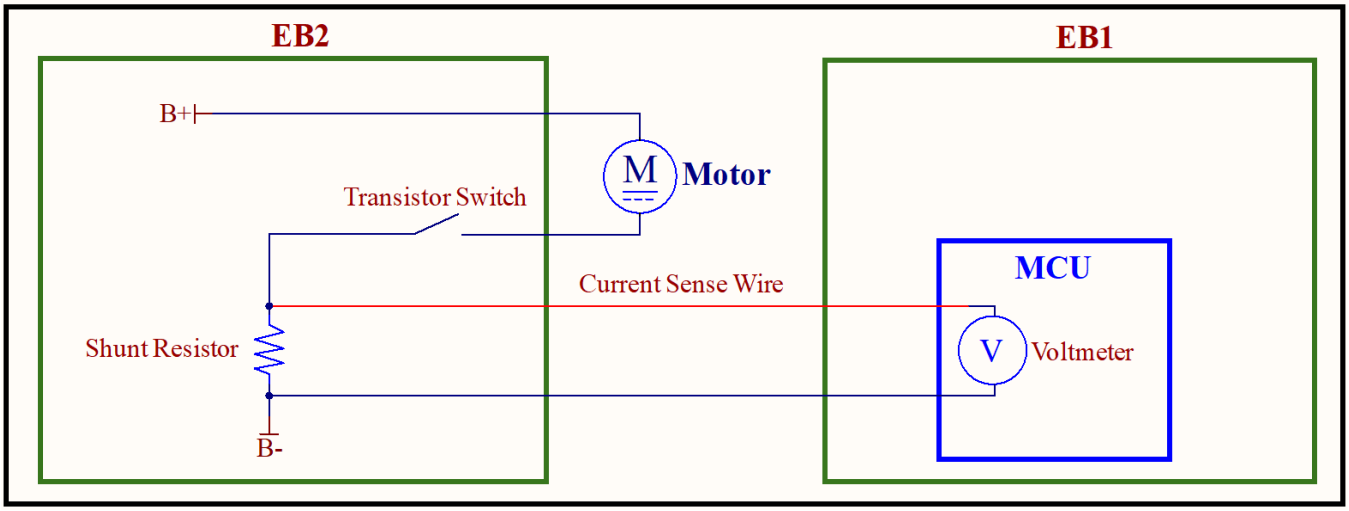
Functional Description

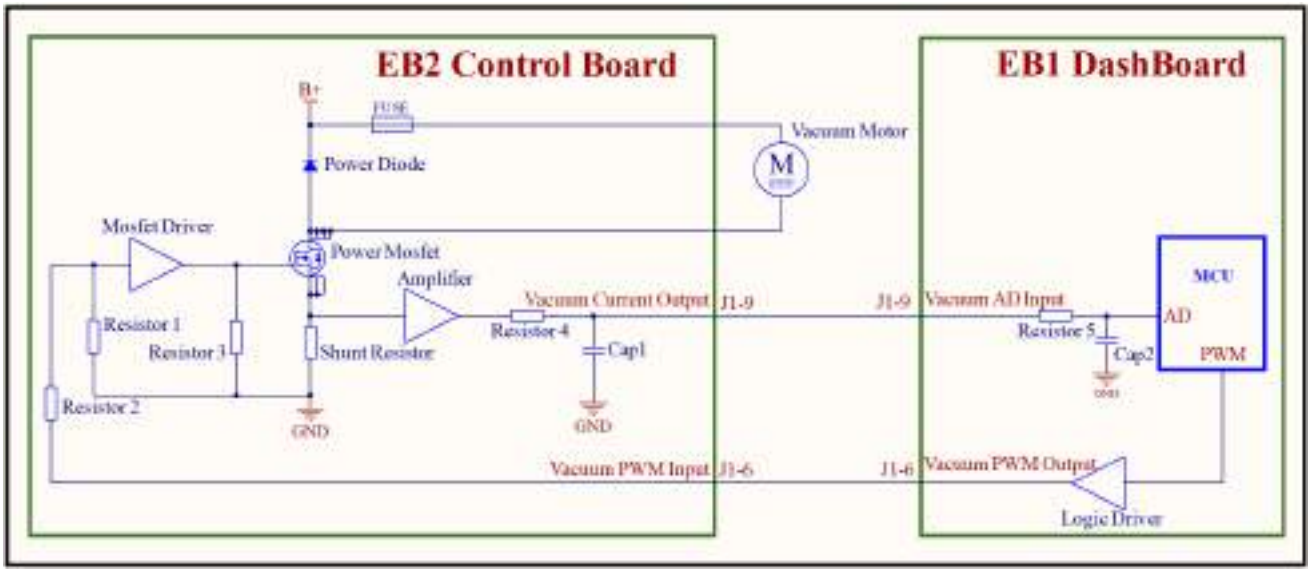
The recovery system removes dirty water from the floor and pipes it to the recovery tank. When the machine is running, the dirty water on the floor is collected by the squeegee blades, and piped through the vacuum hose and into the tank by the airflow created by vacuum motor (M2). The dirty water is piped into the recovery tank, while the airflow continues to flow to the vacuum fan.

Press the one-button start on Dashboard (EB1) to turn on the machine. And press the vacuum button on Dashboard (EB1) to turn on/off the vacuum motor (M2). Press the vacuum button for 1 second to switch between normal mode (vacuum LED is on) and silent mode (vacuum LED flashes). The control signal is transmitted to Control board (EB2) via port J1-6 (vacuum PWM) to control the on/off/vacuum level of vacuum output.

The machine uses a current sense circuit to detect the current. Here is how the MCU knows how much current is flowing through the motor. When the transistor (switch) closes to cause the motor to run, the current flows through a shunt resistor, inside the EB2 control board, with a known resistance value before reaching battery negative. The EB1 Dashboard has an internal “voltmeter” that measures the voltage drop across the shunt resistor. With the knowledge of the resistance value and the voltage drop, the MCU mathematically calculates the amperage going through the resistor based on Ohm’s law. Think of the “current” wire as though it were the red voltmeter lead, reaching out to measure the voltage just upstream of the shunt resistor compared to battery negative.

If the current exceeds the set value (20A) for 3 seconds, the MCU outputs control signal (low level) to logic driver and transmit it to the gate of power MOSFET controlled by MOSFET driver on Control board (EB2) via port J1-6 to stop the vacuum motor. When the current is greater than 30A, the output is turned off after 60 milliseconds. And the one-button start LED indicator flashes in the meantime, indicating the circuit is overcurrent.





Vacuum motor current and the corresponding voltage at port J1-9:

Vacuum Motor Current (A)	Volts at J1-9 (V) (Battery voltage=26V)
0	0
5	0.46
10	0.96
15	1.52
20	2.07
25	2.54

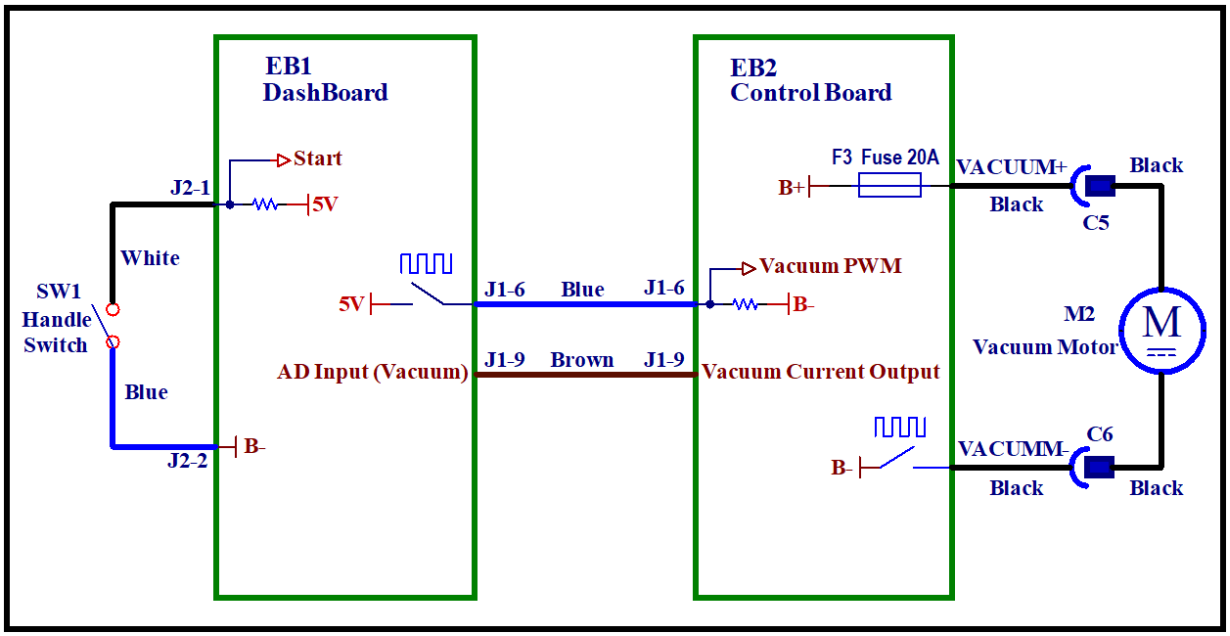
The automatic float in the vacuum grid can prevent the vacuum motor (M2) from collecting any liquids.

When the recovery tank is full it can be emptied through the drain hose.

To work properly, the vacuum motor (M2) needs the following inputs/conditions:

- Vacuum function on
- Battery level not in condition with flashing segment

Wiring Diagram



Component Locations

- Vacuum motor (M2)
- C5&C6 connectors
- Squeegee vacuum hose
- Recovery water drain hose
- Vacuum motor fuse (20A) (F3)
- Vacuum motor connecting terminals

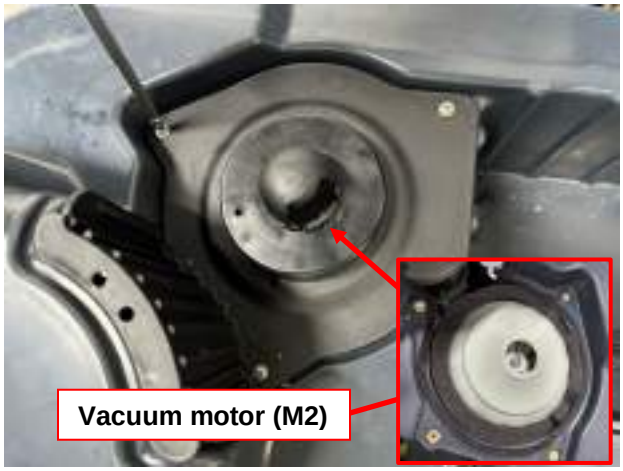


Figure 1

Figure 2

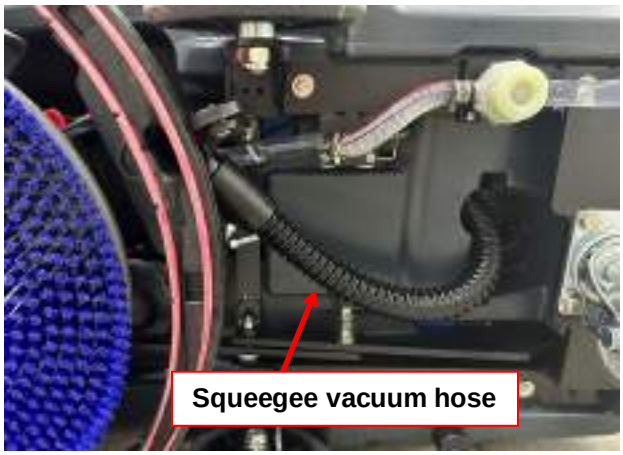


Figure 3

Figure 4

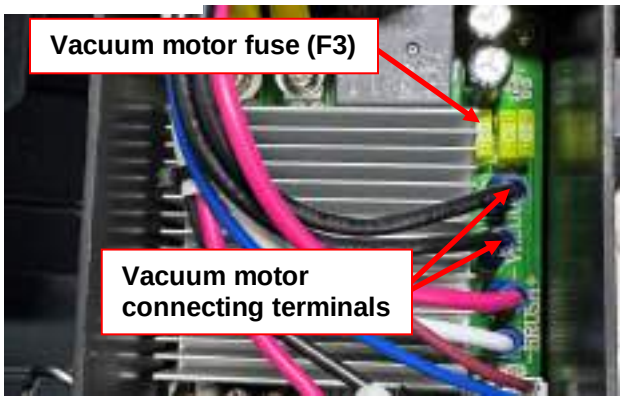


Figure 5

Maintenance and Adjustment

1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Turn the recovery tank lid (A) to 90 degrees position where it can be taken off from the recovery tank, and then take down the float ball filter (B) from the recovery tank lid.
4. Clean the recovery tank lid (A), recovery tank (C), solution tank (D) and float ball filter (B). Empty the recovery tank with the drain hose.
5. Install the float ball filter (B) and recovery tank lid (A).
6. Inspect the integrity of the tank sealing strip.

NOTE
The tank sealing strip (E) helps to produce the vacuum inside the tank when the vacuum motor works. The tank must be sealed to effectively collect water from the ground to the recovery tank.

7. Check whether the contact surface of sealing strip (E) is integral and the sealing is sufficient. If necessary, take the sealing strip of the tank out of the groove (F) and replace it. Assemble the new sealing strip as shown in Figure 6, the joint should be back in the middle area.
8. Close the recovery tank lid (A).

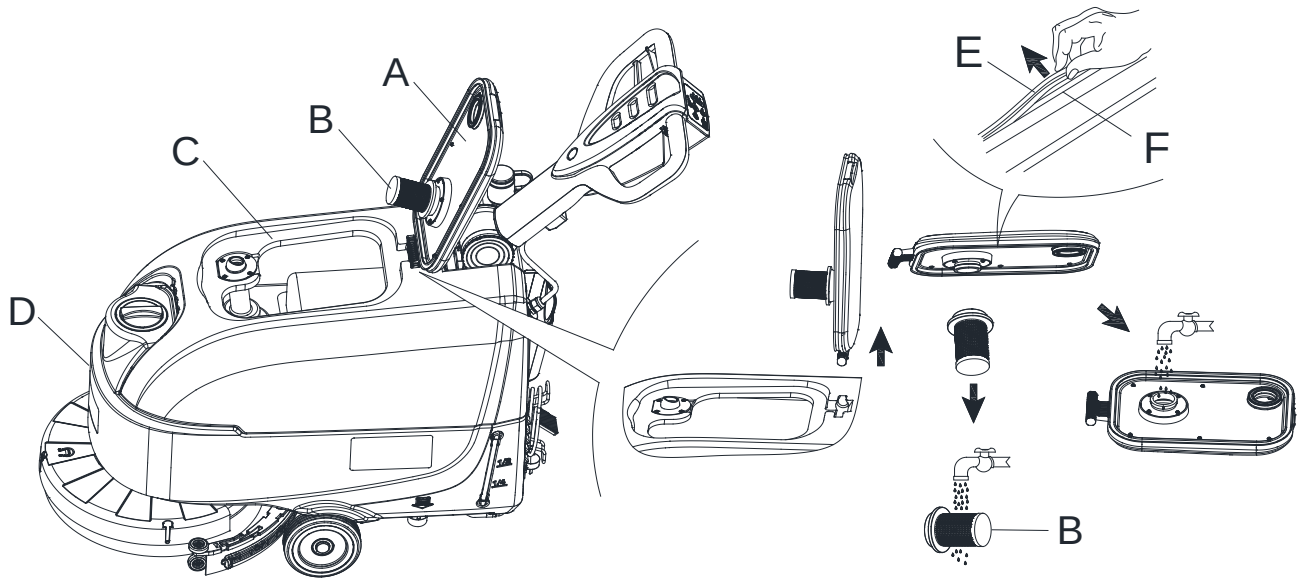


Figure 6

Troubleshooting

Trouble	Possible causes	Remedy
Can't turn on the vacuum motor	The fuse (F3) has blown	Replace
	Vacuum motor damaged	Repair or replace
	Wiring damaged	Repair or replace
	Control board (EB2) is faulty	Replace
The recovery water vacuuming is insufficient or there is no vacuuming	The recovery tank is full	Drain the recovery tank
	The vacuum hose is disconnected from the squeegee	Connect it
	The vacuum grid is dirty or the float is blocked	Clean the grid/reactivate the float
	The tank cover is not correctly positioned	Adjust
	The tank cover gasket is not in good condition	Clean/replace
	The vacuum gaskets are damaged or do not match perfectly	Repair/replace
	The vacuum hose is broken	Replace
	The recovery tank is broken	Repair/replace

Vacuum Motor Current Draw Test

Warning! This procedure must be performed by qualified personnel only.

1. Apply the amp clamp (A, Figure 7) to one of the vacuum motor wires (B, Figure 7).
2. Press one-button start to turn on the machine.
3. Check if the current draw of vacuum motor is between 12A and 16A at 24V.
4. If the amperage is higher than 16A, perform following procedures to detect and correct the abnormal amperage:
   - Check and clean the vacuum hose if there is debris or dirt inside.
   - Remove vacuum motor and check the condition of all its components, repair or replace them if necessary.

If above-mentioned procedures can't lead to correct amperage, the vacuum motor must be replaced.

Figure 7

Removal and Installation

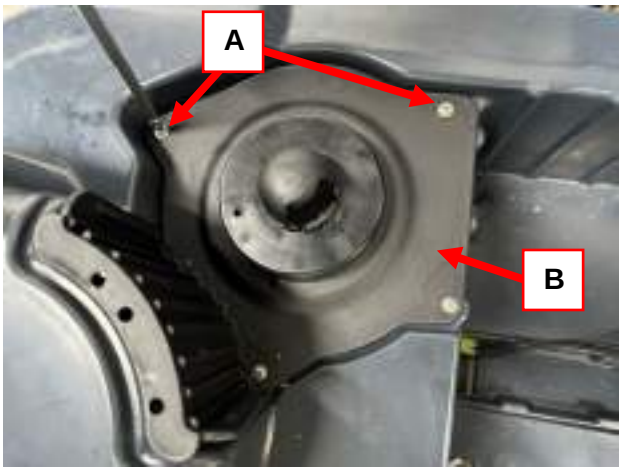
Vacuum Motor (M2)

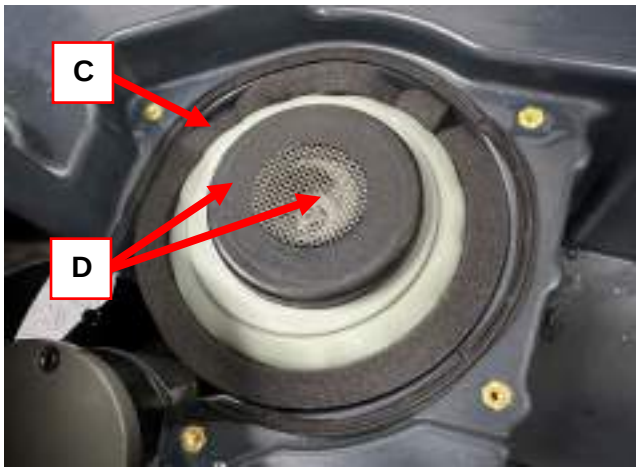
Removal

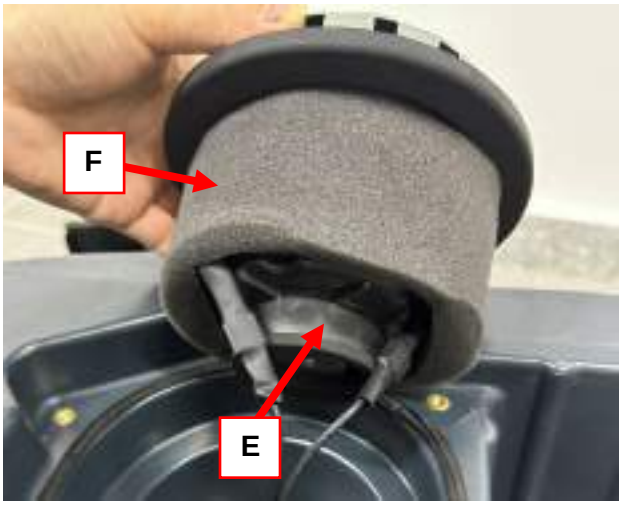
1. Push the machine to a level floor.
2. Ensure that the machine is off.
3. Ensure the recovery tank is empty.
4. Remove the recovery tank assembly.
5. Disconnect the battery connector connected to the machine.
6. Remove 4 screws (A) and the vacuum motor retention plate (B).
7. Remove foam (C) and shock absorber and grid (D).
8. Take out the vacuum motor (E) along with the foam (F).
9. Disconnect the electrical connections (G) of the vacuum motor.
10. Remove the vacuum motor (E), and if necessary replace parts (C), (D) and (F).

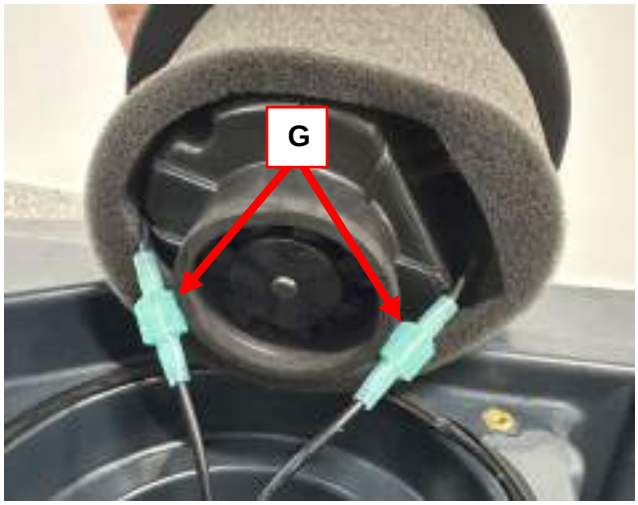
Installation

Assemble components in reverse order of disassembly.









Specifications

Description	Unit	Value
Recovery tank capacity	L/Gal.	25 / 6.6
Vacuum motor technical data	W	300
	V DC	24
Vacuum capacity (normal mode)	In of H_2O (mm of H_2O)	33 (900)
Vacuum capacity (ECO mode)	In of H_2O (mm of H_2O)	25 (650)
Vacuum motor current (normal mode)	A	≈14.8@24V
Vacuum motor current (ECO mode)	A	≈12.5@18.6V