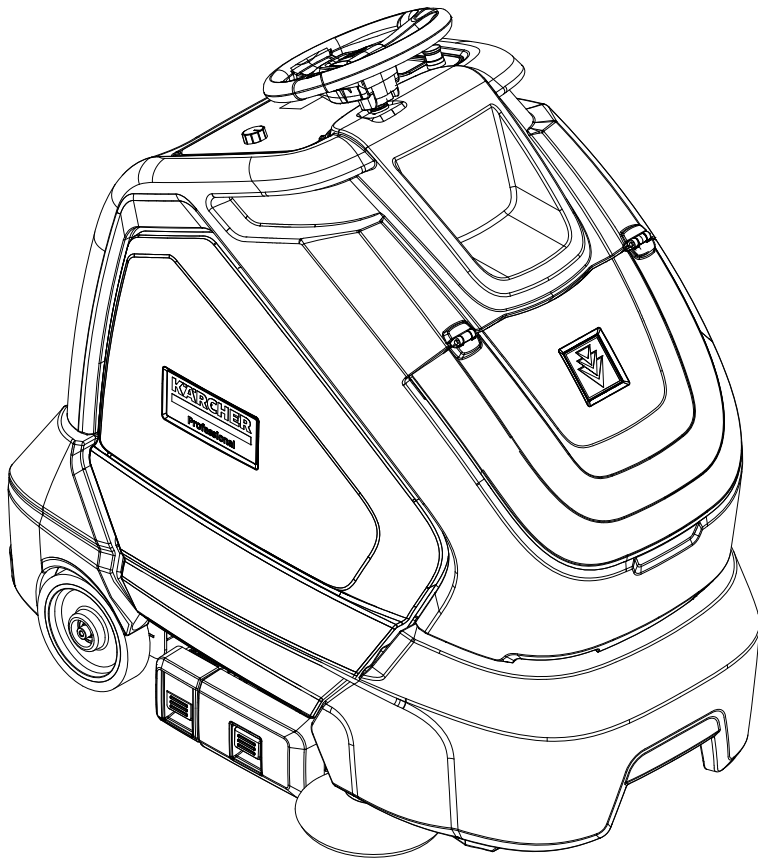


KÄRCHER

makes a difference

Chariot CV 60/1 RS

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Français	121



**Register
your product**

www.kaercher.com/welcome



86447160-C 08/04/23

Machine Data Label

Model:	_____
Date of Purchase:	_____
Serial Number:	_____
Dealer:	_____
Address:	_____
Phone Number:	_____
Sales Representative:	_____

Overview

The Chariot® CV60/1 RS is a battery powered, stand-on, wide area vacuum intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses. The Chariot® CV60/1 RS brushes and vacuums debris from the floor and stores it in the debris tray and vacuum bag.

MODELS:

- 1.012-101.0 CV 60/1 RS OBC AGM
- 1.012-103.0 CV 60/1 RS OBC Li
- 1.012-105.0 CV 60/1 RS OBC AKW

Warranty Registration

Thank you for purchasing a Kärcher North America product. Warranty registration is quick and easy. Your registration will allow us to serve you better over the lifetime of the product.

To register your product go to :
<http://warranty.karcherna.com>

For customer assistance:
1-800-444-7654

KÄRCHER

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How To Use This Manual

This manual contains the following sections:

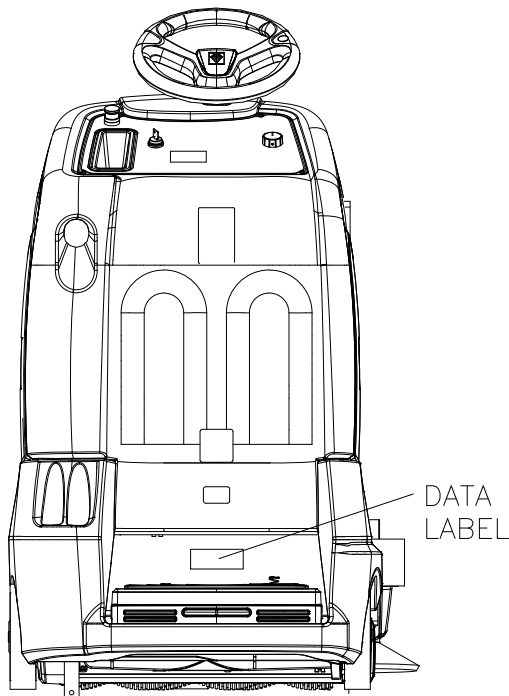
- How to Use This Manual
- Safety
- Operations
- Maintenance

The HOW TO USE THIS MANUAL section will tell you how to find important information for ordering correct repair parts.

Parts may be ordered from authorized dealers. When placing an order for parts, the machine model and machine serial number are important. Refer to the MACHINE DATA box which is filled out during the installation of your machine. The MACHINE DATA box is located on the inside of the front cover of this manual.

Model:	_____
Date of Purchase:	_____
Serial Number:	_____
Dealer:	_____
Address:	_____
Phone Number:	_____
Sales Representative:	_____

The model and serial number of your machine are located on the back of the machine.



The SAFETY section contains important information regarding hazardous or unsafe practices of the machine. Levels of hazards are identified that could result in product damage, personal injury, or severe injury resulting in death.

The OPERATIONS section is to familiarize the operator with the operation and function of the machine.

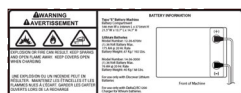
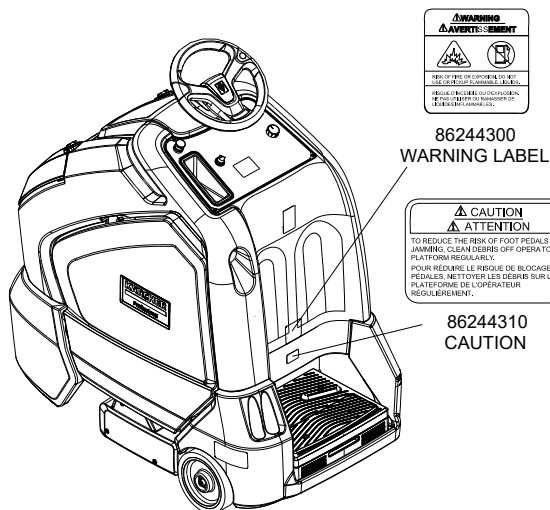
The MAINTENANCE section contains preventive maintenance to keep the machine and its components in good working condition. They are listed in this general order:

- Batteries
- Service Schedule
- Brush Deck
- Vacuum Filters
- Drive Motor & Brake
- Troubleshooting
- Error Codes

NOTE: The manual part number is located on the lower right corner of the front cover.

Safety Label Locations

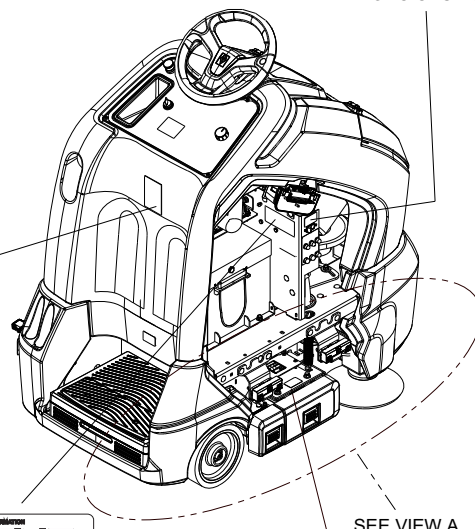
These drawings indicate the location of safety labels on the machine. If at any time the labels become illegible, promptly replace them.



86447260
BATTERY INFORMATION



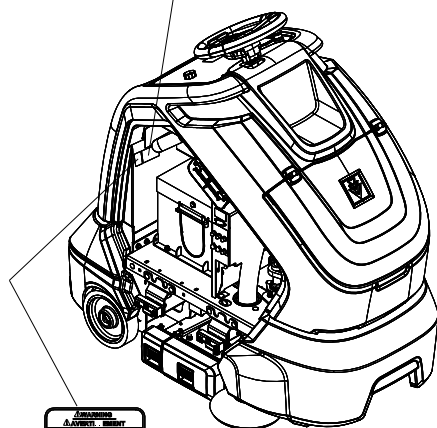
86444500
QR Code



86447270
BATTERY INFORMATION



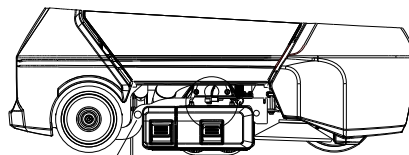
86402490
PINCH HAZARD



86252520
BATTERY CAUTION



86335010
HANDS CLEAR



IMPORTANT SAFETY INSTRUCTIONS

**When using this machine, basic precaution must always be followed, including the following:
READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.**

⚠ WARNING: To reduce the risk of fire, electric shock, or injury:

The operation of this machine is strictly reserved to trained and qualified operators. Operators shall be adequately instructed on the use of these machines. Read the instruction manual before using the machine. Use only as described in this manual.

Use only manufacturer's recommended components and attachments.

When charging, connect to a properly grounded outlet. See Grounding Instructions.

Use only indoors. Do not use outdoors or expose to rain. This machine is for dry use only.

If the machine is not working properly, has been dropped, damaged, left outdoors, or dropped into water, return it to an authorized service center.

Do not operate the machine with any openings blocked. Keep openings free of debris that may reduce airflow.

This machine is not suitable for picking up hazardous dust. Do not operate this machine near flammable fluids, dust or vapors. Do not expose to fire.

Maintenance and repairs must be done by qualified personnel.

Machine shall be disconnected from its power source during cleaning or maintenance and when replacing parts or converting the machine to another function. For battery powered machines, safely disconnect at least the non frame connected pole of the battery or by an equivalent method (disconnecting device).

Do not use a visibly damaged battery pack or appliance. If the battery housing is damaged, do not touch exposed contents. Do not modify or attempt to repair the appliance or the battery pack.

Before the machine is discarded, the batteries must be removed and properly disposed of.

Make sure all warning and caution labels are legible and properly attached to the machine.

During operation, attention shall be paid to other persons, especially children.

Before use, all covers and doors shall be put in the positions specified in the instructions.

When leaving unattended, switch off or lock the main power switch to prevent unauthorized use by removing the key of the main switch or the ignition key. Machines left unattended shall be secured against unintentional movement.

This appliance has been designed for use with the brushes specified by the manufacturer. The fitting of other brushes may affect its safety.

Do not use on surfaces having a gradient of over 10% (6 degrees).

Do not use without dust bag/or filter in place.

⚠ CAUTION: This machine shall be stored indoors only

READ AND SAVE THESE INSTRUCTIONS

The following symbols are used throughout this guide as indicated in their descriptions:

HAZARD INTENSITY LEVEL

There are three levels of hazard intensity identified by signal words **-WARNING** and **CAUTION** and **FOR SAFETY**. The level of hazard intensity is determined by the following definitions:

WARNING:

WARNING - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

CAUTION:

CAUTION - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

FOR SAFETY: To Identify actions which must be followed for safe operation of equipment.

Report machine damage or faulty operation immediately. Do not use the machine if it is not in proper operating condition. Following is information that signals some potentially dangerous conditions to the operator or the equipment. Read this information carefully. Know when these conditions can exist. Locate all safety devices on the machine. Please take the necessary steps to train the machine operating personnel.

FOR SAFETY:

DO NOT OPERATE MACHINE:

Unless Trained and Authorized.

Unless Operation Guide is Read and understood.

In Flammable or Explosive areas.

In areas with possible falling objects.

WHEN SERVICING MACHINE:

Avoid moving parts. Do not wear loose clothing; jackets, shirts, or sleeves when working on the machine. Use Kärcher North America approved replacement parts.

WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep battery compartment open during charging. Keep sparks and flames away from the batteries. Do not smoke around batteries.

WARNING:

Disconnect batteries before working on machine. Only qualified personnel should work inside machine. Always wear eye protection and protective clothing when working on or near batteries. Avoid skin contact with the acid contained in the batteries.

WARNING:

Never allow metal to lie across battery tops.

Safety

Grounding Instructions

THIS PRODUCT IS FOR COMMERCIAL USE ONLY.

Electrical:

In the USA this machine operates on a standard 15 amp 120V, 60 hz, A.C. power circuit. The amp, hertz, and voltage are listed on the data label found on each machine. Using voltages above or below those indicated on the data label will cause serious damage to the motors.

Extension Cords:

If an extension cord is used, the wire size must be at least one size larger than the power cord on the machine, and must be limited to 50 feet (15.5m) in length.

Grounding Instructions:

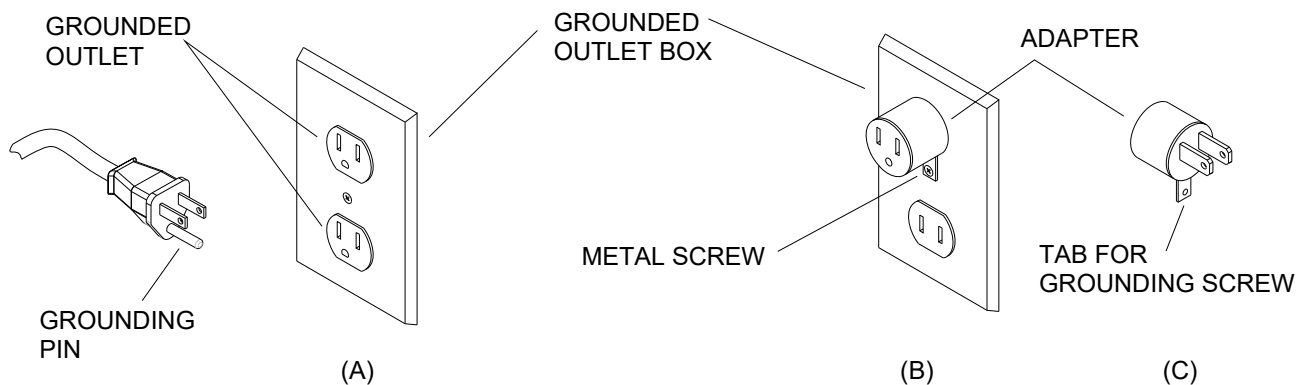
This appliance must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This appliance is equipped with a cord having an equipment-grounding conductor and grounding plug. The plug must be inserted into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

120 Volt Models:

This appliance is for use on a nominal 120-volt circuit, and has a grounded plug that looks like the plug in "Fig. A". A temporary adapter that looks like the adapter in "Fig. C" may be used to connect this plug to a 2-pole receptacle as shown in "Fig. B", if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet (Fig. A) can be installed by a qualified electrician. The green colored rigid ear, lug, or wire extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by a metal screw.

! WARNING:

Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the appliance - if it will not fit the outlet, have a proper outlet installed by a qualified electrician.



How This Machine Works

The Chariot® CV60/1 RS is a battery powered, self-propelled, vacuum intended for commercial use. The appliance vacuums debris and dirt from the floor and collects it in the debris tray and disposable bag.

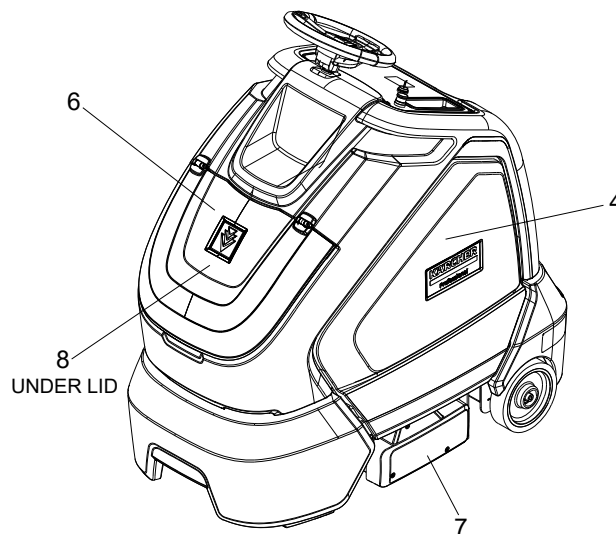
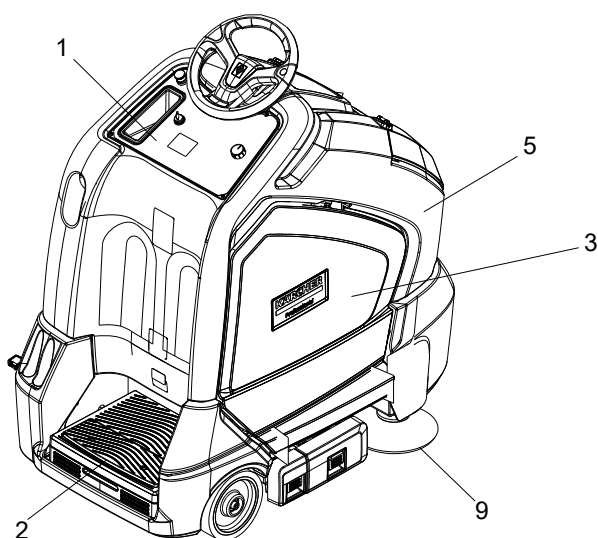
The machine's primary systems are the brush system, vacuum system, and operator control system.

The function of the brush system is to brush the floor. The brush system consists of two cylindrical type brushes, brush motor, brush deck, side broom, side broom motor and controls. The front brush turns clockwise when viewed from the right side of the machine. The rear brush turns counterclockwise. Both brushes work to agitate the floor and to route the debris up into the brush deck. The side broom rotates counterclockwise as viewed by the operator. The side broom sweeps debris into the path of the brush deck.

The function of the vacuum system is to vacuum fine dirt and debris into the vacuum bag, and large debris into the debris tray. The vacuum system consists of the

debris tray, vacuum motor, vacuum filter and vacuum bag. The debris tray captures the dirt off the floor as the machine moves forward. The vacuum motor provides suction to draw the fine dirt into the vacuum bag, and the debris tray stores large debris. The function of the operator control system is to control the direction and speed of the machine. The directional control system consists of the direction control drive reset switch, maximum speed knob, throttle pedal, emergency stop switch, steering wheel, propel controller, and drive wheel. The directional control drive reset switch signals forward or reverse direction and makes sure the operator is on platform before machine will propel. The controller interprets signals from the maximum speed knob and the throttle pedal to command the drive wheel to propel or slow the machine. The steering wheel points the drive wheel in the direction desired by the operator. The brake automatically engages when the operator steps off the platform, turns the key off, or engages the emergency stop switch.

NOTE: Impact to machine may cause damage.



Components

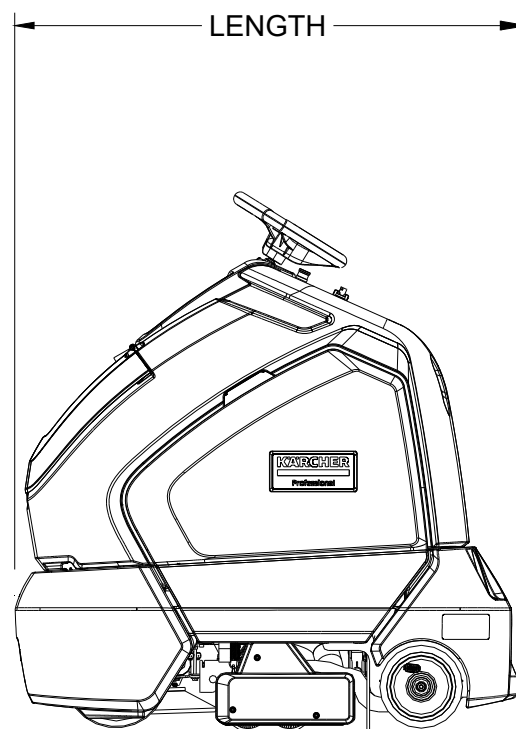
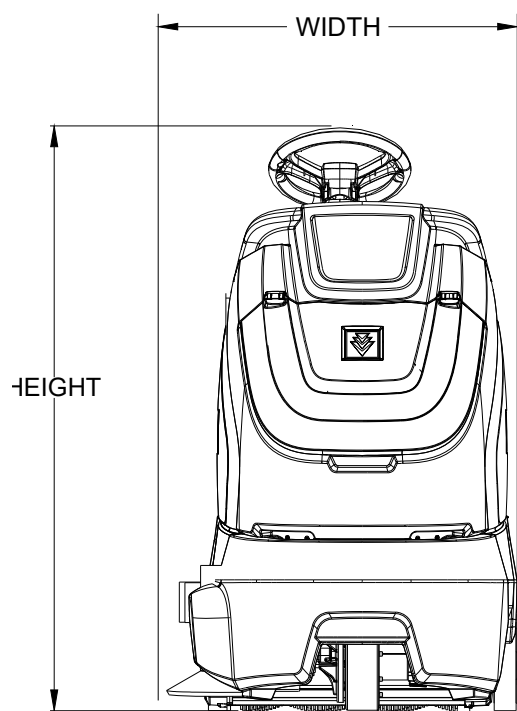
- | | |
|--------------------|---------------|
| 1. Control Panel | 6. Cover Lid |
| 2. Pedal Platform | 7. Brush Deck |
| 3. Side Door Right | 8. Vacuum Bag |
| 4. Side Door Left | 9. Side Broom |
| 5. Main Cover | |

Operations

Technical Specifications

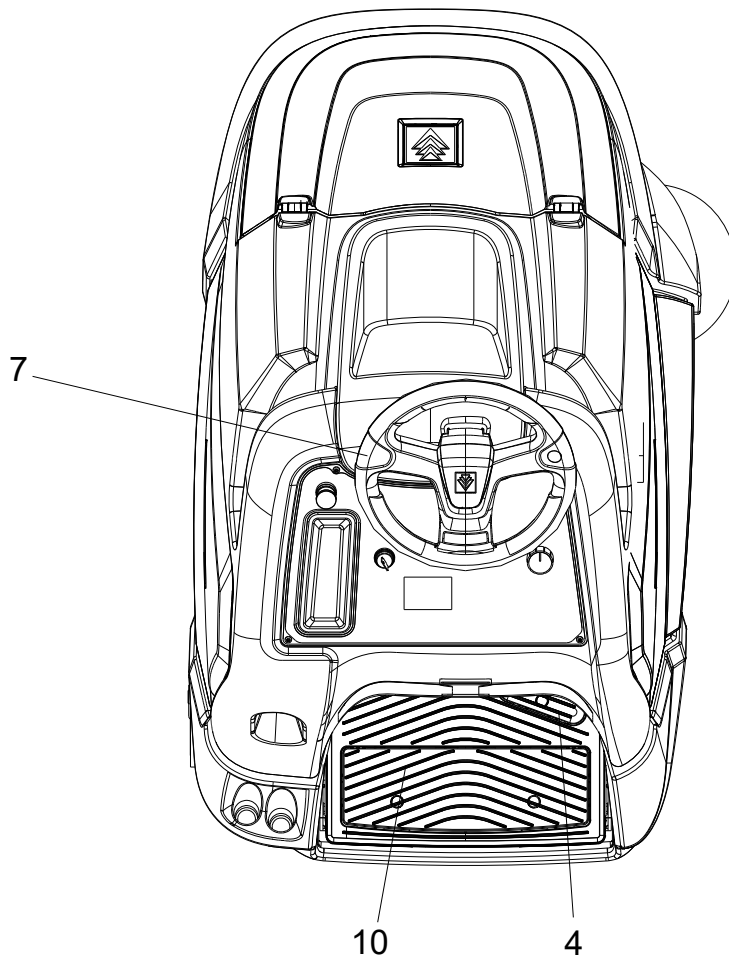
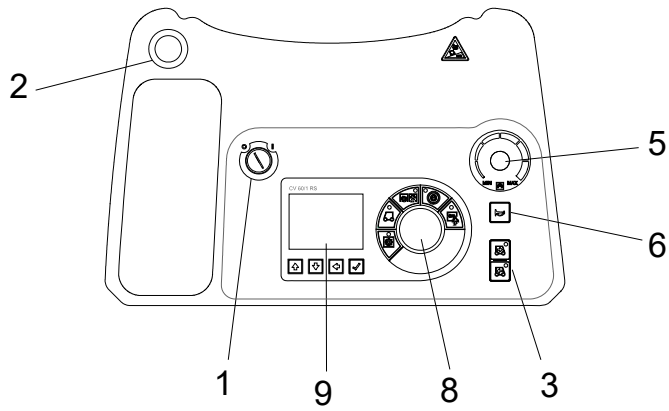
ITEM	DIMENSION/CAPACITY
Nominal Power	1620 W
Rated Voltage	36 Volts DC
Rated Amperage	45 Amps
Batteries	3 X 12 Volt
Battery, Lithium	38.4 Volts
Battery Compartment Dimensions	23 x 14.5 x 12.38" (584 x 370 x 315mm)
Battery, AGM - Dimensions	21.3 x 12.9 x 10.8" (541 x 323 x 274mm)
Battery, Lithium - Dimensions	13.0 x 13.3 x 10.1" (330 x 338 x 257mm)
Propel Motor	2.0HP (149W)
Brush Motor	0.5 HP (373W)
Side Broom Motor	0.06HP (45W)
Bag Capacity	1060 in ³ (17.5L)
Hopper Capacity	77in ³ (1.26L)
Brushes	Two 20in (51cm) by 4in (10cm) dia
Side Broom	9in (23cm)
Max Brush Speed	1026 RPM
Max Side Broom speed	90 RPM
Vacuum Motor	0.63 HP (470W)
Max Flow Rate of vac motor	72 cfm (33.98 lpm)
Vac bag full shut-off	14-16 inH ₂ O (3.5 - 4.0 kPa)
Max suction vac motor	47.3 in H ₂ O (11.7kPa)
Weight (GVW) Gross weight with batteries and operator	848 Lb. (385Kg), Lithium - 658lb (298kg)
Weight Empty (no batteries or operator)	412 Lb. (187Kg), Lithium - 399lb (181kg)
Tires	Front - 10in. (254mm) Solid grey non-marking Rear - 8in (203mm) grey non-marking
Foundation Pressure	AGM - 238psi (1641kPa) Lithium - 182psi (1256kPa)
Max Speed	3.34mph (5.57km/h)
Frame construction	Powder coated Steel
Brake	3.5 ft.lb (4.75Nm) electrical brake (engaged when operator steps off platform or e-stop activated)
Minimum Aisle U-Turn	50in (1270mm)
Max rated climb and Descent	10% (6 degrees)
Sound Pressure at operators ear (IEC 60704-1)	68.4dBA Uncertainty 2.5dBA Hard Floor Norm Clean
Sound Power (IEC 60704-1)	81.8dBA Uncertainty 2.5dBA Hard Floor Norm Clean
Sound Pressure at operators ear (IEC 60704-1)	67.7dBA Uncertainty 2.6 dBA Carpet Daytime Clean
Sound Power (IEC 60704-1)	81.8dBA Uncertainty 2.6 dBA Carpet Daytime Clean
Vibration Hands (ISO 5349)	$a_h \leq 2.5m/s^2$
Vibration Feet (ISO 5349)	$a_w \leq 0.5m/s^2$

ITEM	MEASURE
Height	52 in (1321mm)
Length	49 in (1245 mm)
Width	28.3 in (719 mm)



⚠ CAUTION:

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.



Controls

1. **Key Switch**
2. **Emergency Stop Switch**
3. **Directional Control / Drive Reset Switch**
4. **Throttle Pedal**
5. **Maximum Speed Knob**
6. **Horn Button**
7. **Steering Wheel**
8. **Function Mode Switch**
9. **Display Screen**
10. **Operator Presence Pedal**

1. Key Switch

Controls the power for machine functions.

To turn the machine power on, rotate key clockwise.

To turn the machine off, rotate key counterclockwise.

When the key is turned on the display will come on while the system runs self-diagnostics and returns the brush deck and side broom to their raised positions, if necessary. The controller will not respond to other commands until this routine is complete.

2. Emergency Stop Switch

This safety feature is designed to cut all power to the machine at any time and apply the brake.

To shut the machine power off, push the Emergency Stop Switch. This will also engage the brake and cause the machine to stop immediately. Excessive emergency stop usage can cause premature brake wear; use only when necessary.

To release the emergency stop switch, rotate the switch clockwise.

3. Directional Control / Drive Reset Switch

This safety feature is designed to ensure safe engagement of propel drive. Each time the machine power is turned on, or each time an operator steps on to the platform, the Drive Reset Switch must be pushed before machine will propel.

Controls the direction of travel of the vehicle. The light next to the icon on the switch indicates direction of travel.

To travel forward, press the top button.

To travel in reverse, press the bottom button.

4. Throttle Pedal

Controls the speed of the vehicle within the speed control setting selected, and the maximum speed knob.

Pressing the pedal causes the machine to travel in the direction selected by the Directional Control Switch.

To increase speed, increase pressure on the pedal.

To decrease speed, decrease pressure on the pedal.

5. Maximum Speed Knob

Controls the maximum speed the machine will travel when the throttle pedal is pressed.

To increase speed turn the knob clockwise.

To decrease speed turn the knob counter clockwise.

Operations

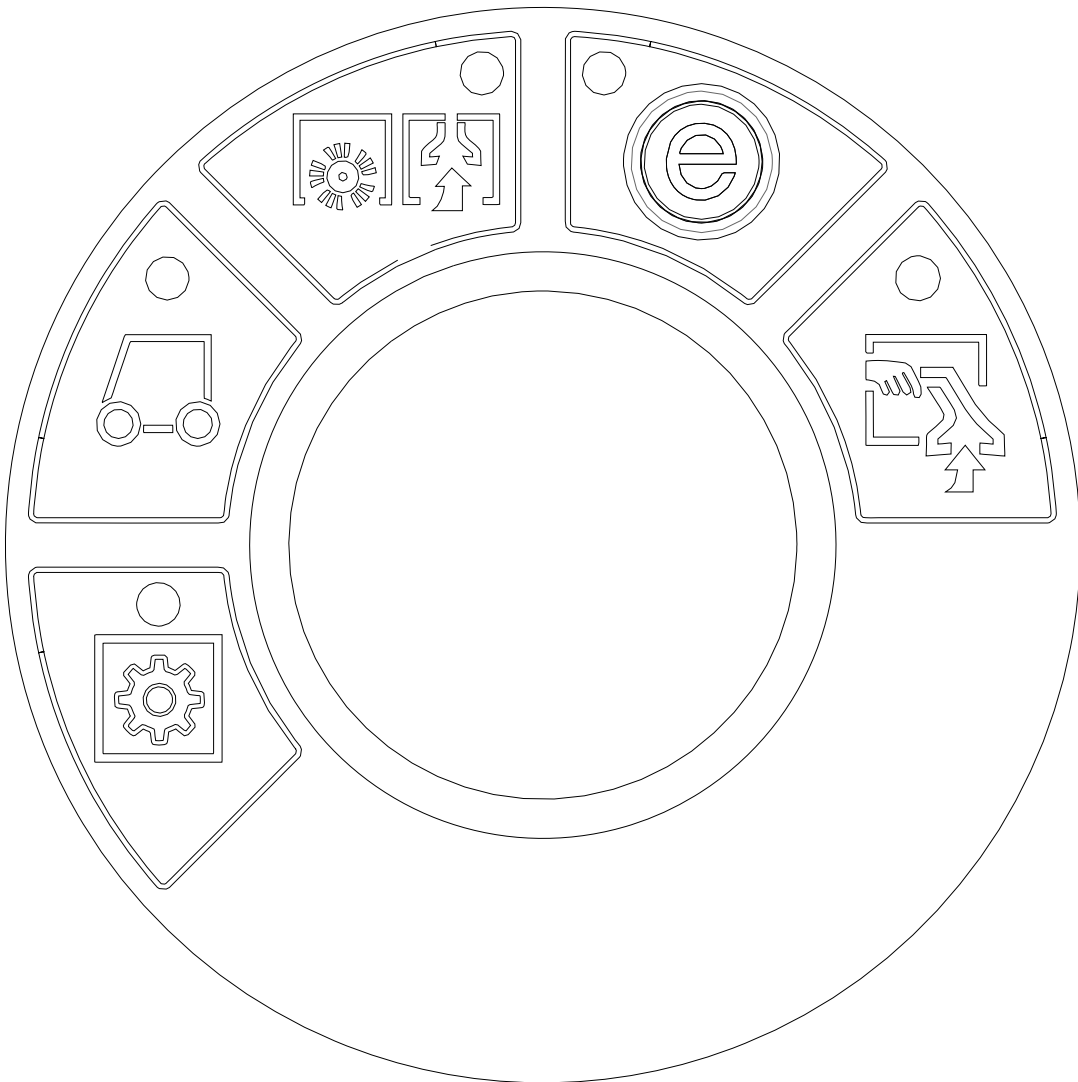
6. Horn Button

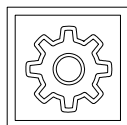
The horn is activated by pressing the horn button.

7. Steering Wheel

The steering wheel turns the front wheel causing the machine to change direction.

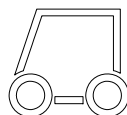
8. Function Mode Switch





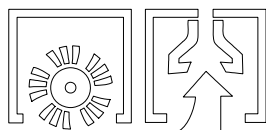
Maintenance and Settings

This mode is used to control machine settings



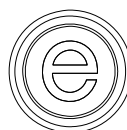
Transport

This mode is used for machine transport. In this mode the machine will propel at the speed that the maximum speed knob is set to. The 'floating' brush deck and side broom are in the up position. The brushes, side broom, and vacuum are off.



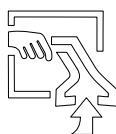
Vacuuming

This mode is used for vacuuming. In this mode the machine will propel at a cleaning speed. The 'floating' brush deck and side broom are in the down position. The brushes will agitate, the side broom will bring debris into the path of the deck. The vacuum will draw the dirt and debris into the debris tray and the vacuum bag.



Daytime Light Vacuuming

This mode is used for daytime vacuuming. In this mode the machine will propel at a slow speed. The 'floating' brush deck and side broom are in the down position. The brushes will agitate, the side broom will bring debris into the path of the deck. The vacuum will draw the dirt and debris into the debris tray and the vacuum bag. The brushes, side broom, and vacuum will operate at reduced power.



Optional Accessory Wand

If equipped with this option. This mode is used for the accessory hose wand and attachment only. The brush deck and side broom will both be up and off. In this mode the machine will not propel. The vacuum motor will run and supply suction to the accessory wand.

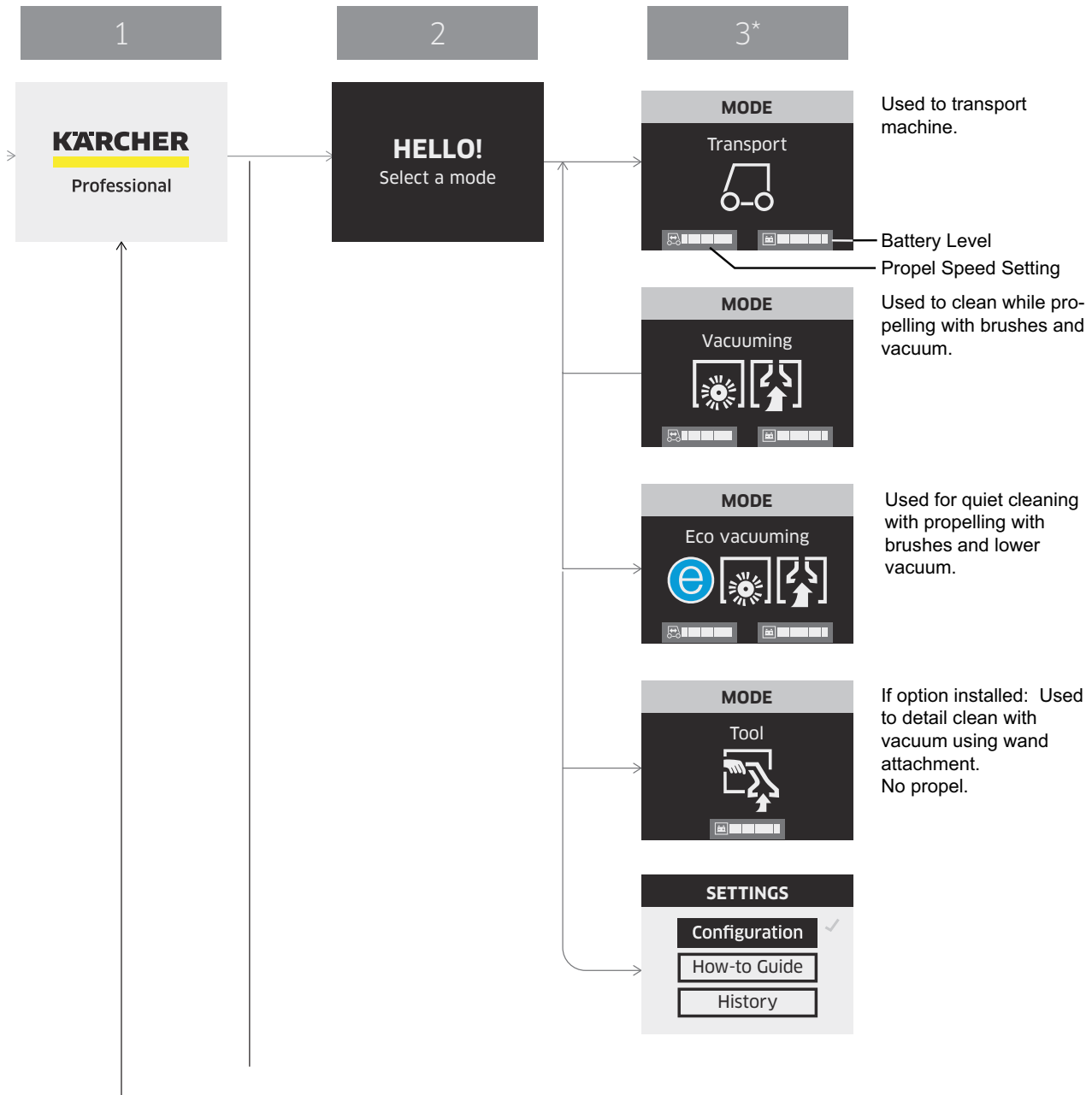
9. Display Screen

Displays information about the machine and ability to make adjustments to machine attributes.

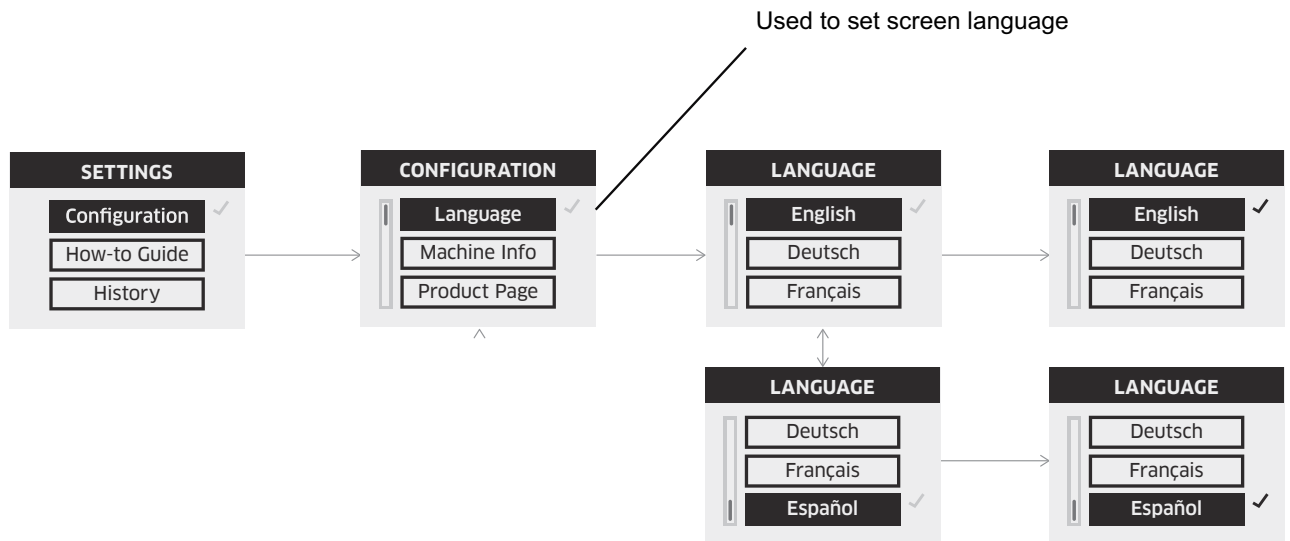
10. Operator Presence Pedal

Ensures that the operator is on the platform.

Select Mode Screens



Settings: Configuration: Language



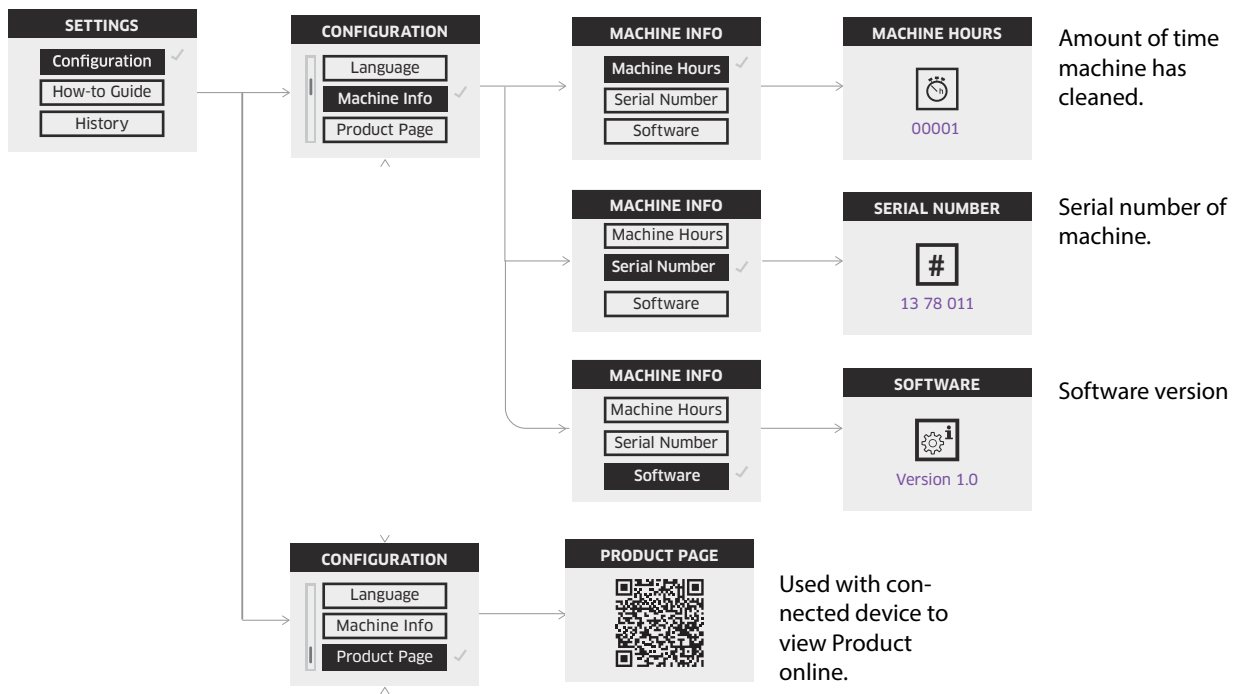
Settings: Configuration: Machine Info and Product page

The Deluxe machine includes a "Machine info" section in the settings menu. This can be used to help trouble shoot the machine. Navigate "Machine info" using the following path:

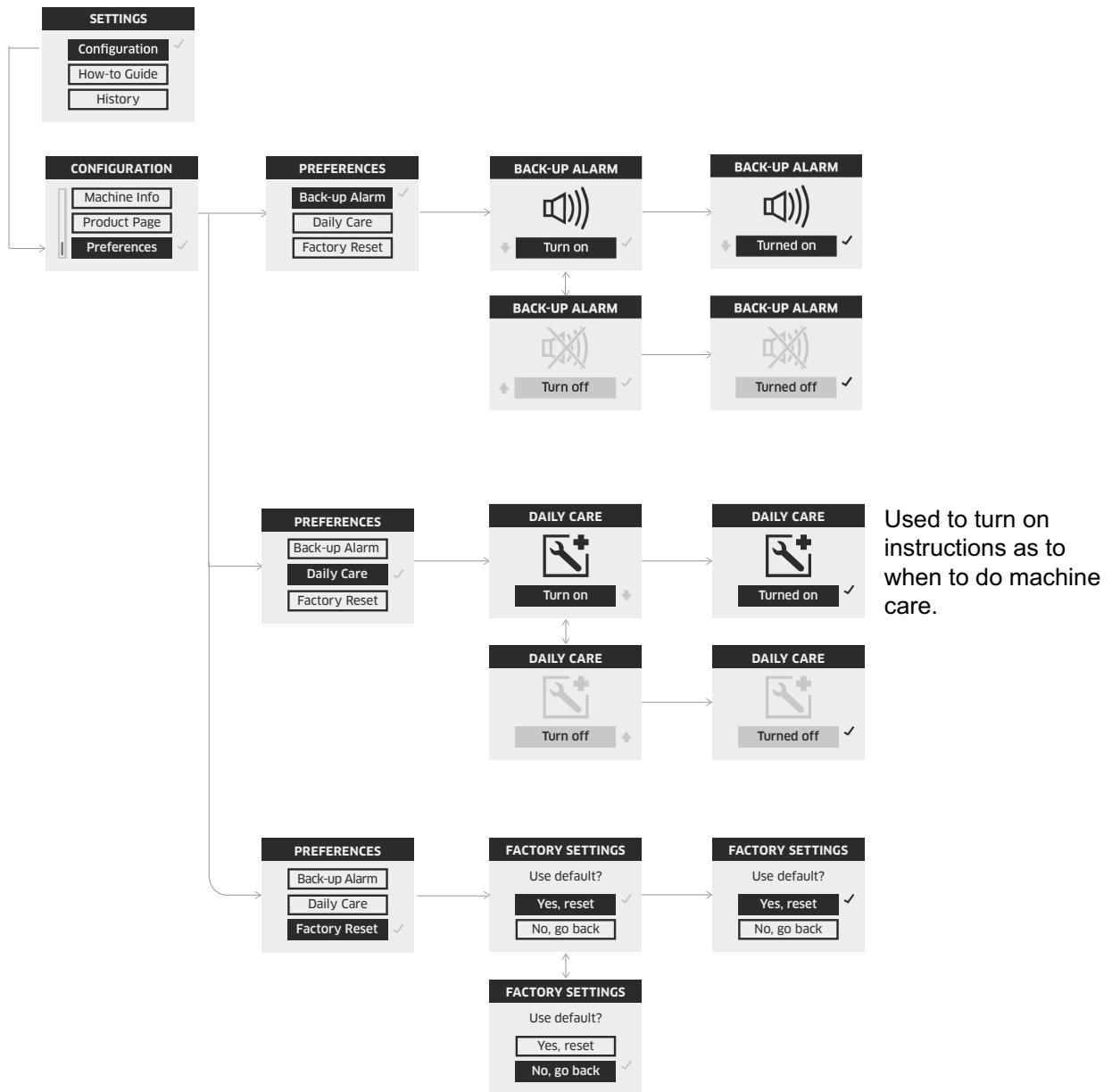
Setting button>Configuration>Machine info

The following is a list of items that can be found in the "Machine info" section.

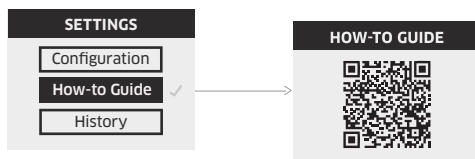
- Machine Hours
- Serial Number
- Software



Settings: Configuration: Preferences



Settings: How-to Guide



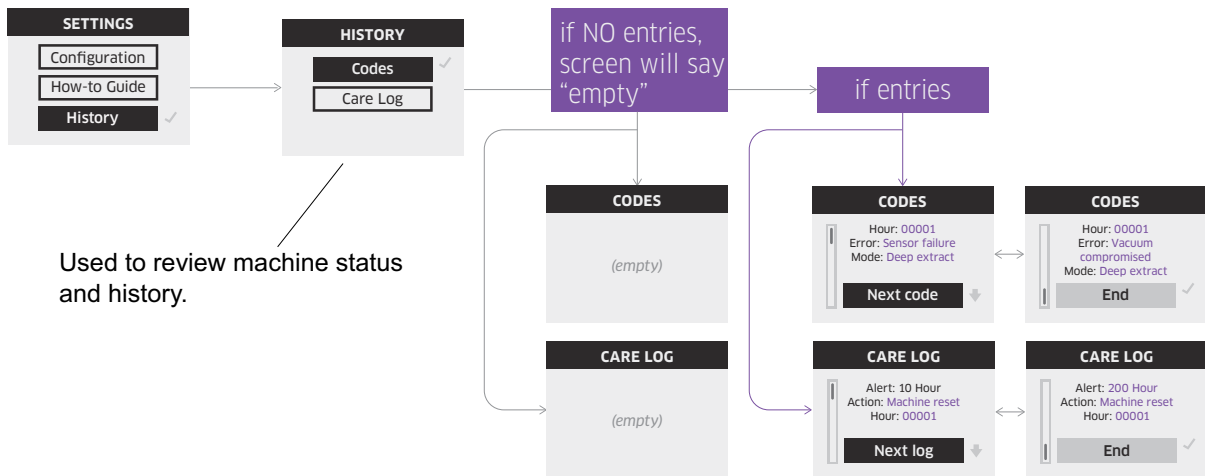
Used with connected device to access machine instructions.

Reset the Machine

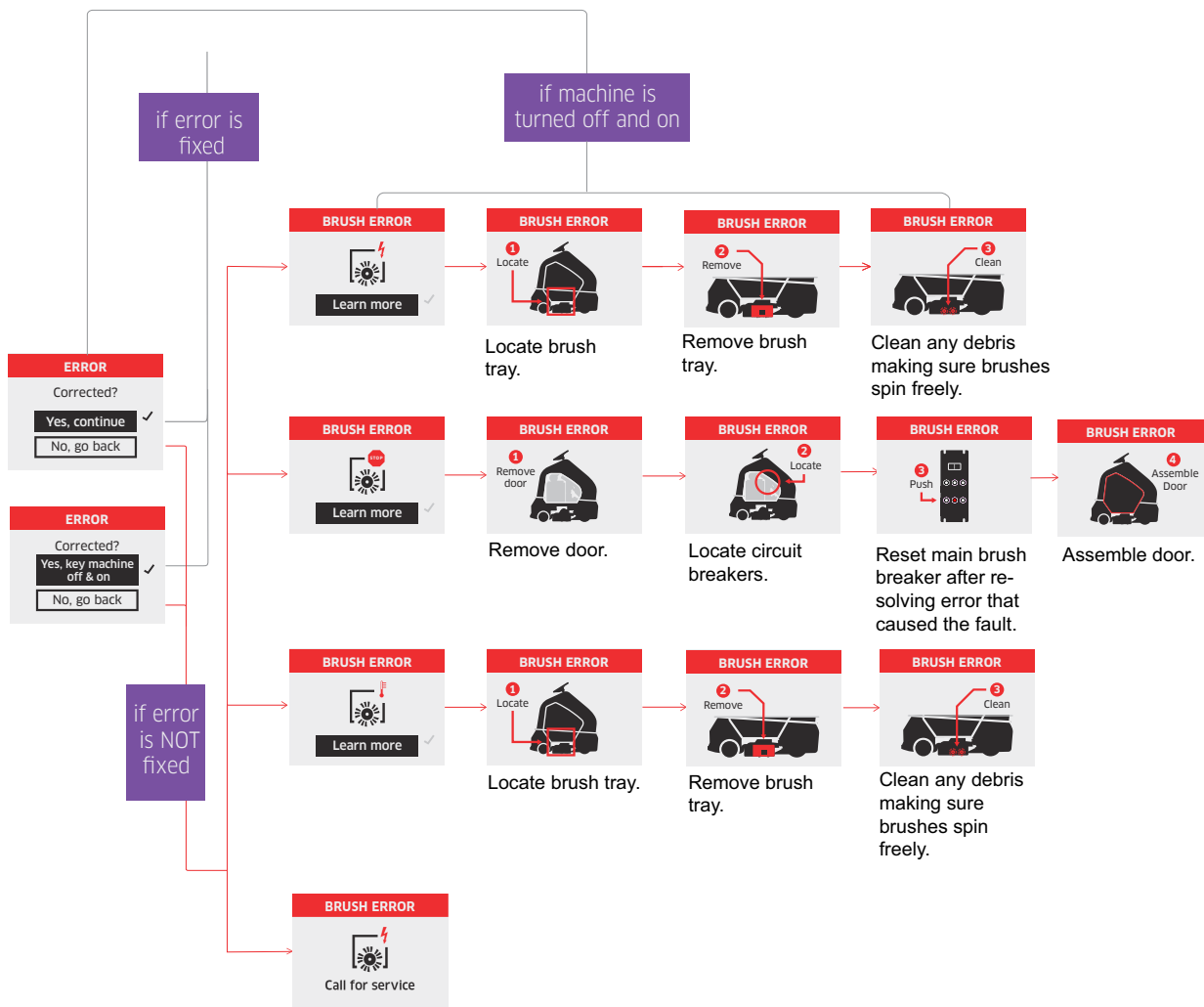
Reset machine by turning on the main breaker for 5 seconds then turning back on. The horn will beep if the machine was successfully reset. This should take care of most issues.



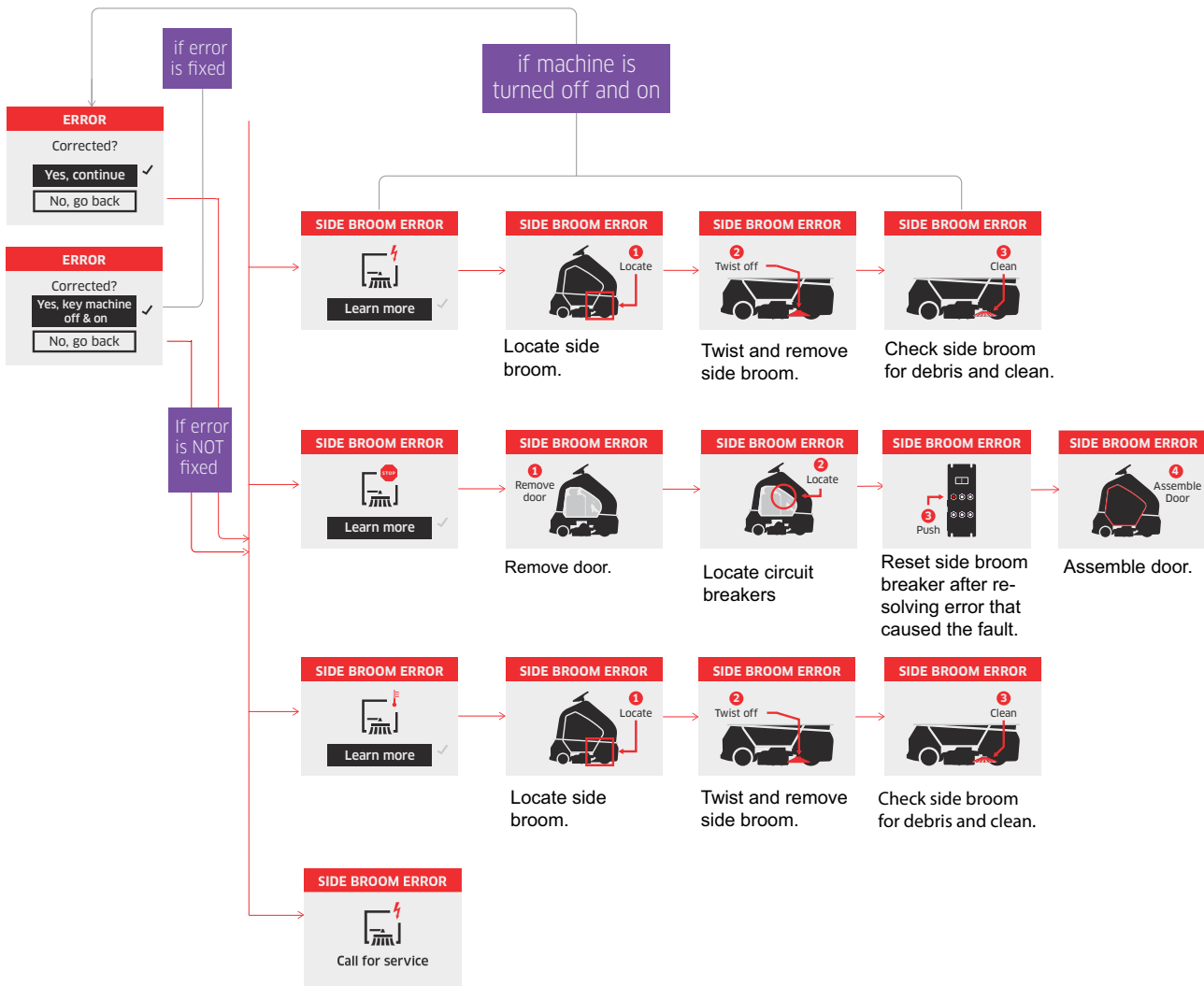
Settings: History



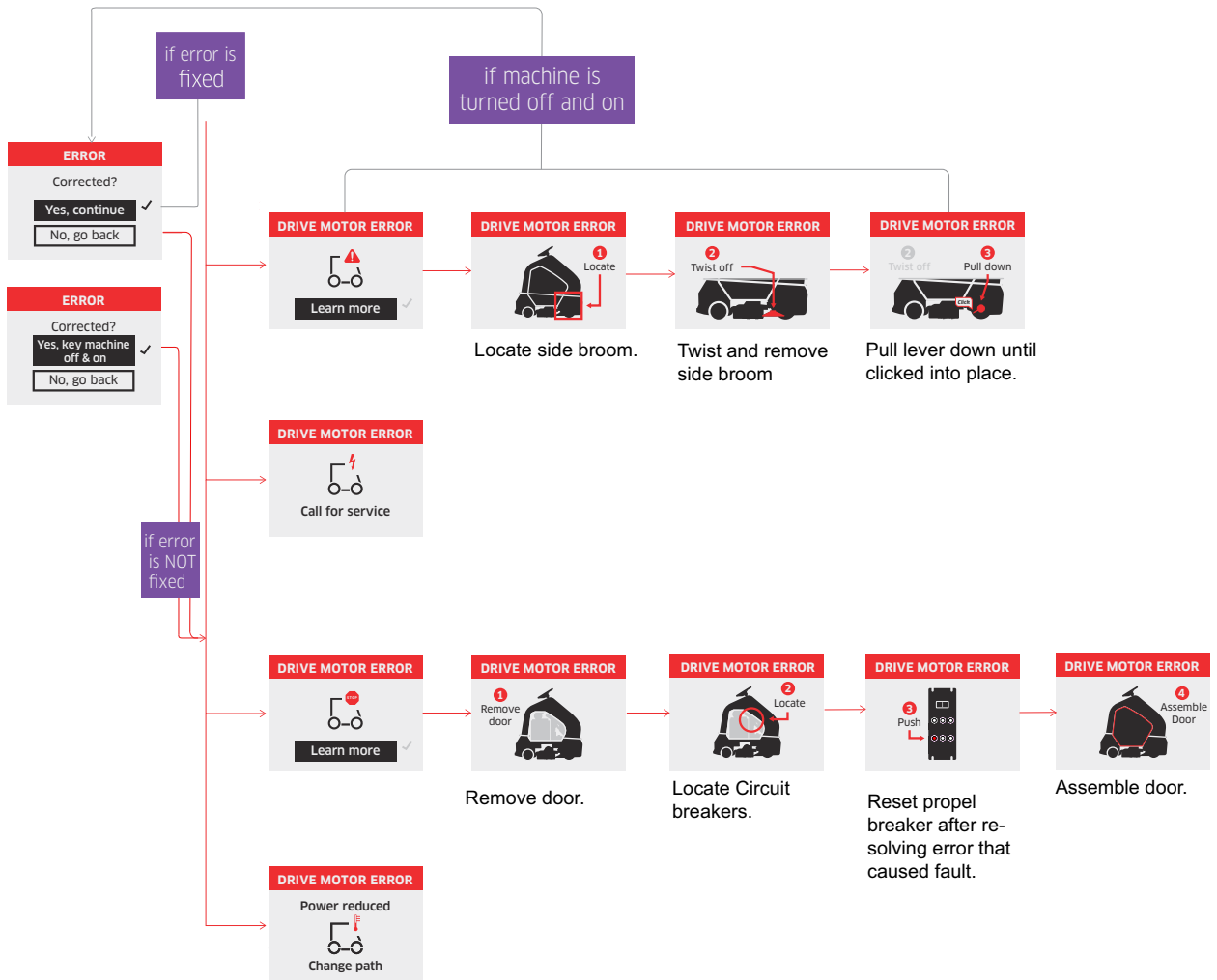
Error Codes - Brushes



Error Codes - Side Broom

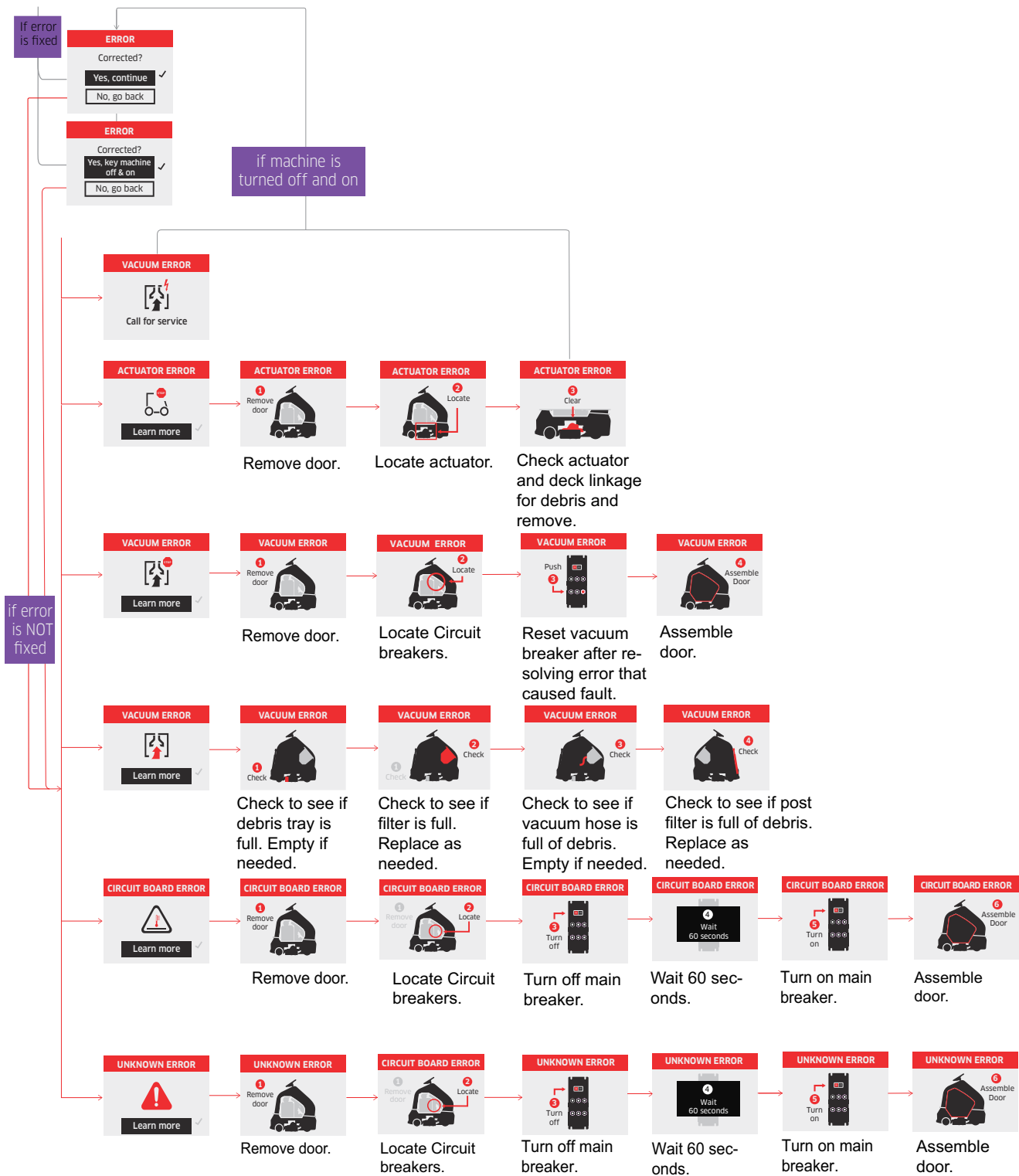


Error Codes - Drive Motor

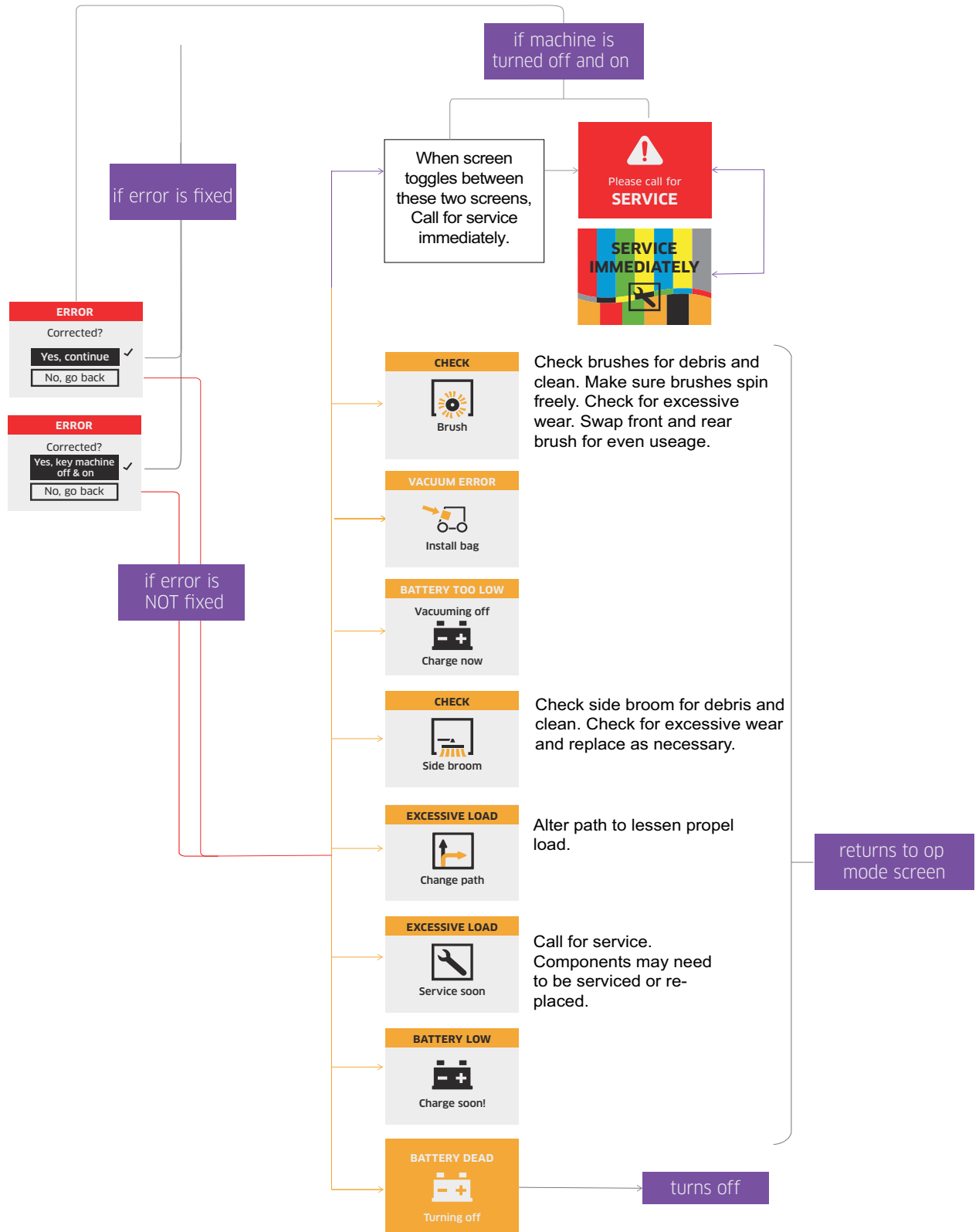


If propel motor is being over worked, the power will be cut back. Resolve cause of extra load and full power will be restored automatically after cool down period.

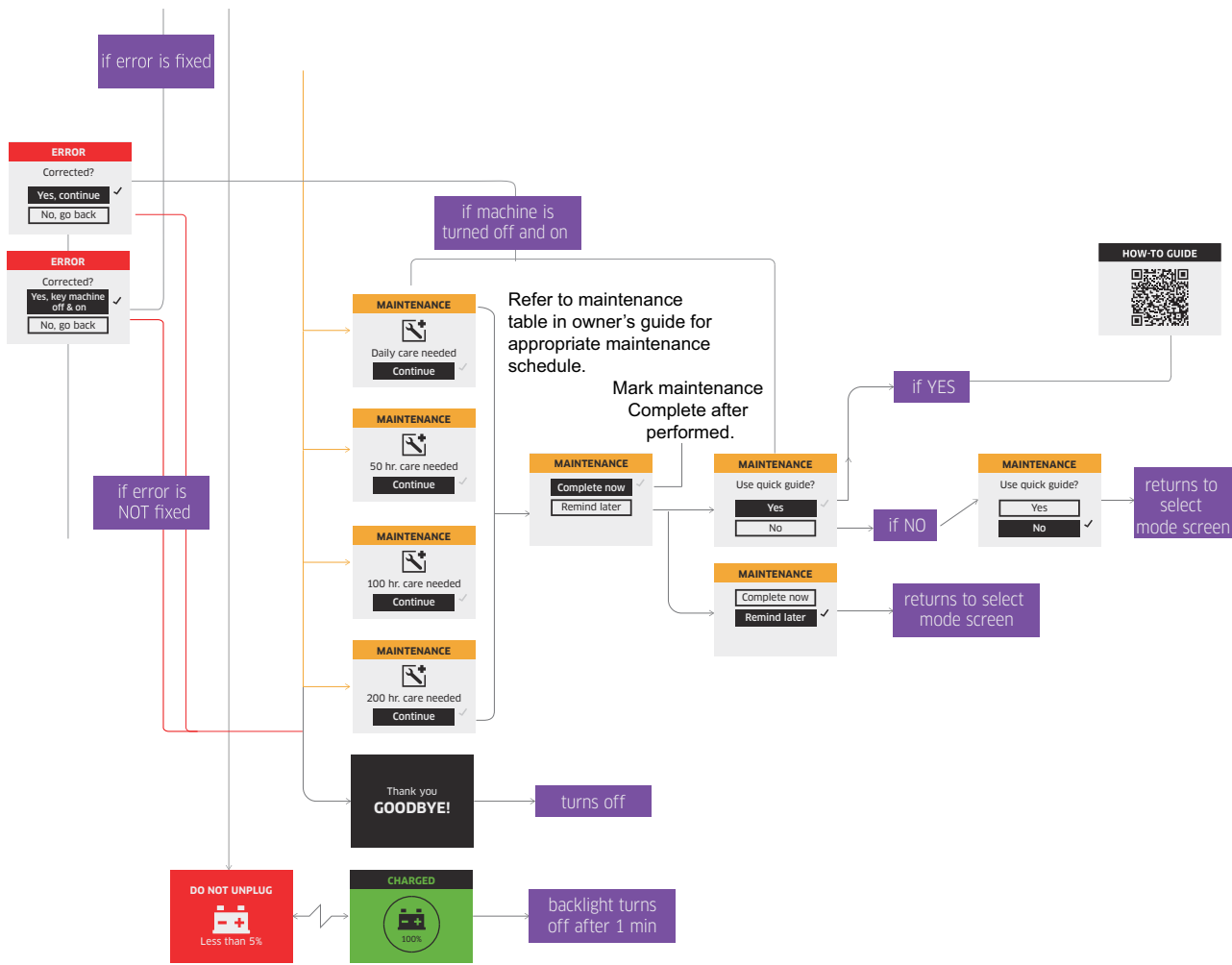
Error Codes - Vacuum, Actuator & Circuit Board



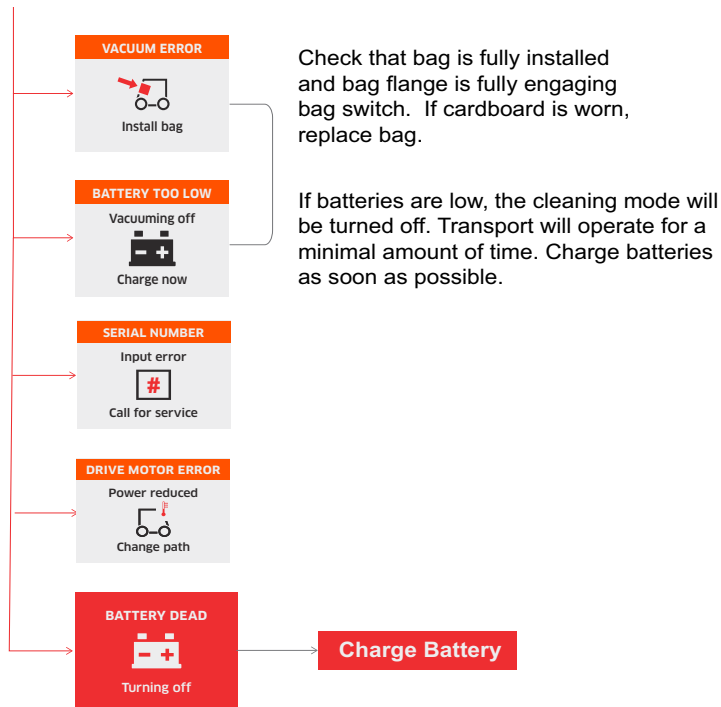
Error Codes - Dead Battery & Misc



Error Codes - Maintenance



Display Warning Codes



Operations

Machine Operation

Pre-Run Machine Inspection

Do a pre-run inspection to find possible problems that could cause poor performance or lost time from breakdown. Follow the same procedure each time to avoid missing steps.

NOTE: Perform Pre-run Machine Check before operating machine. See Service Schedule in Maintenance Section.

Starting Machine

FOR SAFETY: Before starting machine, make sure that all safety devices are in place and operating properly.

1. The operator should be on the pedal platform. The throttle pedal must be in the neutral position.
2. Turn the machine power on by turning key switch clockwise to the "ON" position. Press the transport mode button.
3. Press the Drive Reset Directional Control Switch to set the intended direction for travel. Set the maximum speed knob to desired speed.
4. Press lightly on the throttle pedal with right foot.

Emergency Stop Procedures

1. Push in emergency stop button. This will engage the brake and cause the machine to stop immediately.

Normal Vacuuming

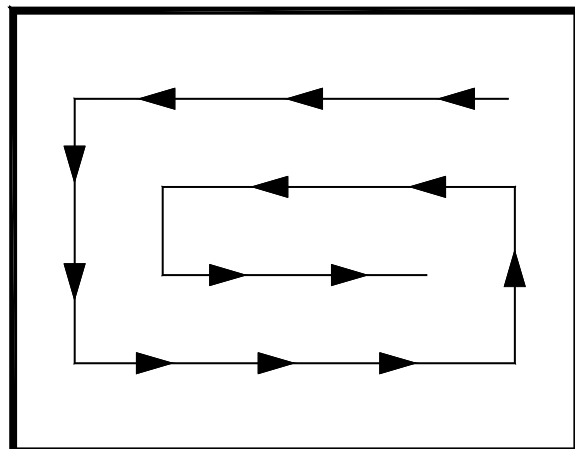
Plan the vacuuming pattern in advance. The longest track is around the perimeter of the area to be cleaned. For efficient operation, the runs should be the longest possible without turning or stopping.

In order to achieve the best possible results, the area which is to be cleaned should be picked up before vacuuming. Large debris, strings and wire must be removed to prevent being caught in brushes.

NOTE: Check and empty debris tray as needed during operation.

If machine is allowed to stand in neutral with the vacuum deck down for more than 2 seconds, the brush motor stops. If either forward or reverse travel is selected, the brush motor will continue once movement of machine begins. Overlap the brush path and avoid transporting over previously cleaned areas.

Recommended Path



To Begin Vacuuming

⚠ CAUTION:

When operating the machine around people, pay close attention for unexpected movement. Use extra caution around children.

1. Stand on the operator platform. Throttle pedal must not be depressed.
2. Turn key switch to turn machine power on. Press vacuum mode button.
3. Press the Directional Control Switch to ensure that machine is set to travel in direction intended.
4. Set the maximum speed knob to desired speed.
5. Depress the throttle pedal to drive machine and turn on brushes and side broom.
5. Remove vacuum bag from vacuum box and dispose of properly.
6. Clean vacuum box and remove any debris.
7. Retrieve a new clean vacuum bag.
8. Place a new vacuum bag in the vacuum box and push the lip over the nozzle.
9. Push the cardboard flange under the retaining tabs and make sure the bag switch is being fully engaged
10. Close lid.

To Stop Vacuuming

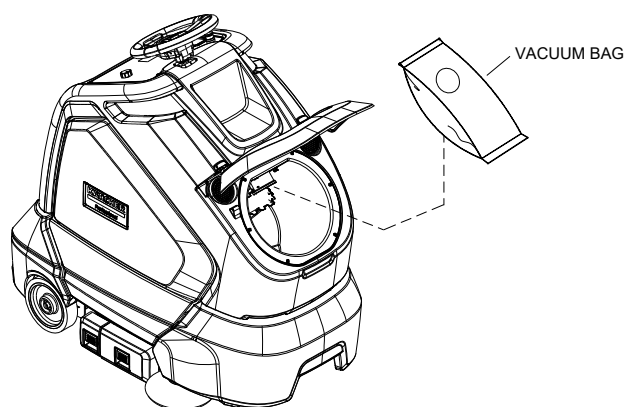
1. Remove foot from throttle pedal allowing pedal to return to neutral.
2. Turn machine power off or switch to transport only mode.

FOR SAFETY: Before leaving or servicing machine: stop on level surface, turn off machine and remove key.

FOR SAFETY: When using machine, go slow on inclines.

Changing Vacuum Bag

1. Park machine on level area.
2. Turn the machine power off.
3. Open cover lid.
4. Remove vacuum bag lip from nozzle.



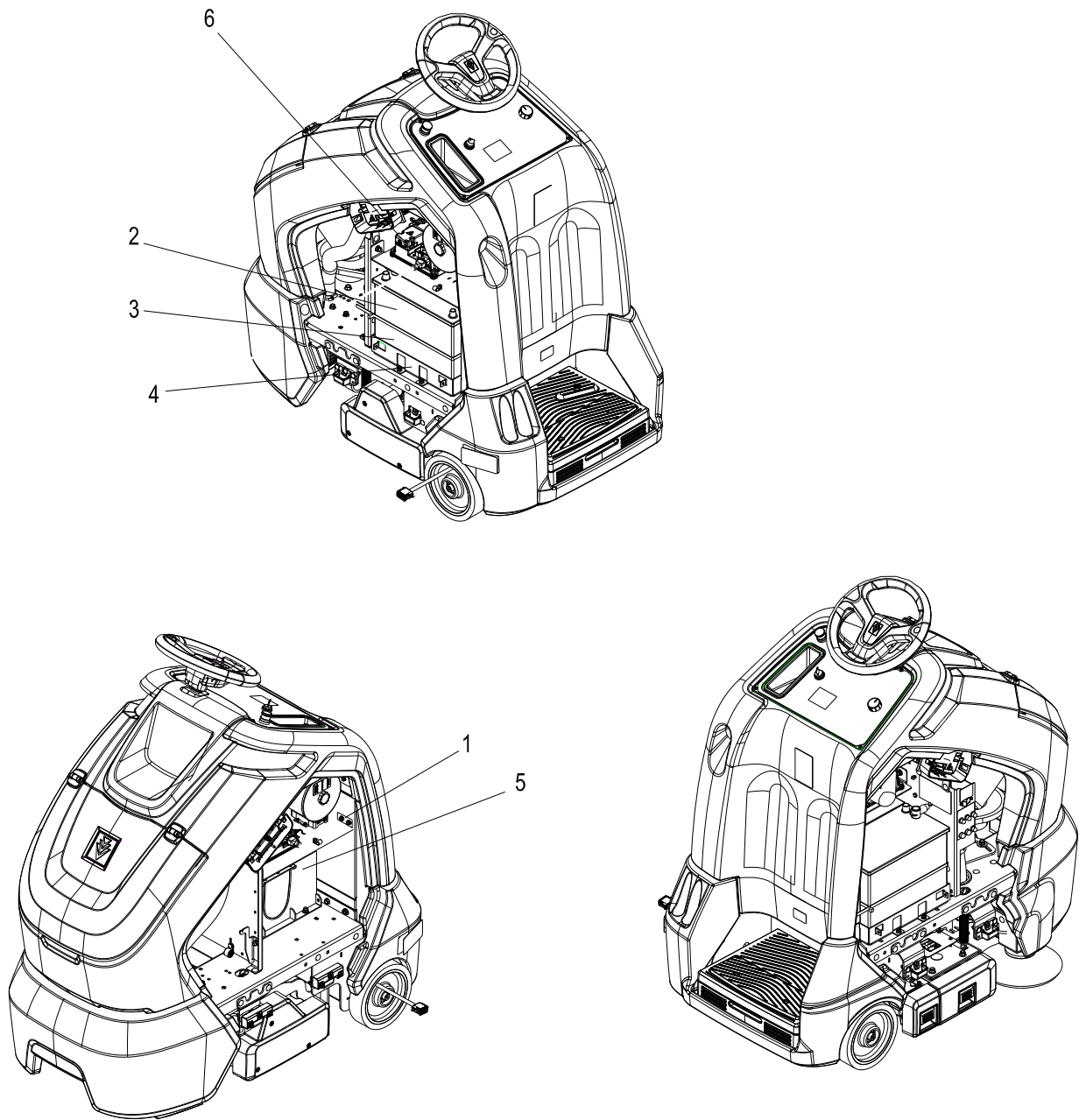
Maintenance

Service Schedule

MAINTENANCE	BEFORE EACH WORK PERIOD	AFTER EACH WORK PERIOD	50 HRS	100 HRS	200 HRS
Check water level of batteries after charging; add distilled water if necessary (Wet cell only)	*				
Check that the vacuum box lid seals tightly	*				
Check for damaged or worn tires.	*				
Check brushes for proper installation.	*				
Check vacuum hose connections.	*				
Check hoses for debris buildup.	*				
Check pedal(s), brake and steering for proper operation	*				
Clean brush tray		*			
Clean inside brush housing		*			
Clean brushes and check wear.		*			
Remove bearing cap from end of brush. Clean bearing and cap.		*			
Empty debris tray		*			
Check vacuum bag fullness and change if necessary.		*			
Charge batteries.		*			
Clean off top of batteries.			*		
Check battery cells with hydrometer. (Wet cell only)			*		
Check battery connections are tight.			*		
Clean battery cases and compartment.				*	
Inspect and replace all filters including exhaust, and intake.				*	
Check brake.					*
Check all motors for carbon brush wear.					*
Check motor commutators.					*
Check steering chain tensioner.					*
Check brush deck guard rods for excessive wear.					*
Check wiring and other electrical components for frays, heat discoloration, cracked or hardened insulation, broken or loose connections, and other defects.					*

Failure to perform scheduled service can result in machine damage and loss of machine function.

Batteries



1. Battery Connector-Battery (Flooded Only)
2. Batteries
3. Battery Tray Liner (Flooded Only)
4. Battery Tray
5. Batteries - Lithium Option
6. Charger Wall Plug And Cords

Maintenance

Batteries (Wet Cell Or Flooded Only)

The batteries provide the power to operate the machine. The batteries require regular maintenance to keep them operating at peak efficiency.

The machine batteries will hold their charge for long periods of time, but they can only be charged a certain number of times. To get the greatest life from the batteries, charge them when their charge level reaches 25% of a full charge. Use a hydrometer to check the charge level.

Do not allow the batteries to remain in a discharged condition for any length of time. Never expose a discharged battery to temperatures below freezing. Discharged batteries will freeze causing cracked cases. Do not operate the machine if the batteries are in poor condition or if they have a charge level below 25% (specific gravity below 1.155).

Keep all metallic objects off the top of the batteries, as they may cause a short circuit. Replace worn or damaged cables and terminals.

Check the electrolyte level in each battery cell before and after charging the batteries. Never add acid to the batteries, use distilled water. Do not allow water level to fall below the battery plates. Portions of plates exposed to air will be destroyed. Do not overfill. Keep plugs firmly in place at all times.

⚠ CAUTION:

When servicing machine, avoid contact with battery acid.

⚠ WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

⚠ WARNING:

Wear eye protection and protective clothing when working with batteries.

⚠ WARNING:

Charge batteries in a well ventilated area.

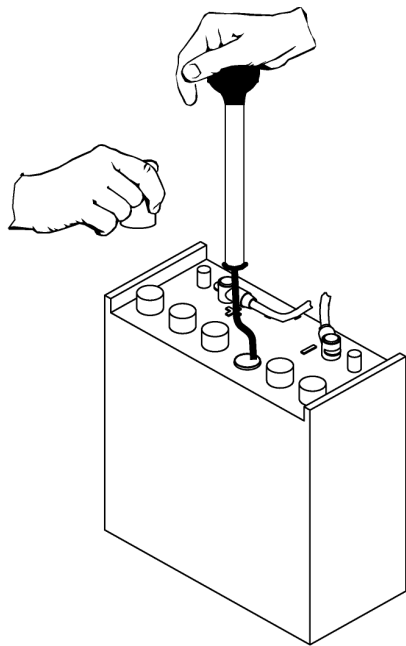
Battery Maintenance

1. When cleaning the batteries, use a solution of baking soda and water. Do not allow the cleaning fluid to enter the battery cells, electrolyte will be neutralized.
2. Maintain the proper electrolyte level in each battery cell. If a cell should accidentally overflow, clean immediately.
3. Wipe off the top of the batteries at least once a week.
4. Test battery condition with a hydrometer at least once a week.
5. Ensure that all connections are tight and all corrosion is removed.

Every 4 to 6 months, remove the batteries from the machine and clean the battery cases and battery compartment.

Checking Battery Specific Gravity

Use a hydrometer to check the battery specific gravity.



NOTE: Do not take readings immediately after adding distilled water, if the water and acid are not thoroughly mixed, the reading may not be accurate.

Check the hydrometer readings against this chart.

SPECIFIC GRAVITY @ 80° F (27° C)	BATTERY CONDITION
1.265	100% CHARGED
1.225	75% CHARGED
1.190	50% CHARGED
1.155	25% CHARGED
1.120	DISCHARGED

NOTE: If the readings are taken when the battery electrolyte is any temperature other than 80°F (27°C), the reading must be temperature corrected. To find the corrected specific gravity reading when the temperature of the battery electrolyte is other than 80°F (27°C): Add (+) to the specific gravity reading 0.004 (4 points), for each 10°F (6°C) above 80° (27°C). Subtract (-) from the specific reading 0.004 (4 points), for each 10°F (6°C) below 80°F (27°C).

Charging Batteries

⚠ CAUTION:

When servicing machine, avoid contact with battery acid.

⚠ WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

⚠ WARNING:

Wear eye protection and protective clothing when working with batteries.

⚠ WARNING:

Charge batteries in a well ventilated area.

Maintenance

External Charger (Wet Cell Or Flooded Only)

Use a 36 volt, 20 amp maximum output DC charger which will automatically shut off when the batteries are fully charged.

1. Stop the machine in a clean, well ventilated area next to the charger.
2. Turn "OFF" machine.

FOR SAFETY: Before leaving or servicing machine; stop on level surface, turn off machine and remove key.

3. Open doors, turn off breaker.

! WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

4. (Wet Cell Only) Check the electrolyte level in each battery cell. Before charging, add just enough distilled water to cover the plates. If the water level is too high before charging, normal expansion rate of the electrolyte may cause an overflow resulting in a loss of battery acid balance and damage to the machine.
5. (Wet Cell Only) Install the battery caps, and leave them in place while charging.

FOR SAFETY: When charging, connect the charger to the batteries before connecting the charger to the AC wall outlet. Never connect the charger to the AC wall outlet first. Hazardous sparks may result.

6. Plug the charger connector into the battery connector. Connect the charger AC plug to a wall outlet. The charger gauge should indicate that the batteries are charging.
7. When the batteries are fully charged, disconnect the charger from the AC wall outlet, then disconnect the charger from the batteries.
8. (Wet Cell Only) Check the electrolyte level. It should be up to the indicator ring. If necessary, add distilled water. Install the battery caps.
9. Turn on the breaker, and close doors.

On Board Charger

1. Stop the machine in a clean, well ventilated area next to an AC outlet.
2. Turn "OFF" machine.
3. Open doors and turn off breaker.

! WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging

4. Release the charger cord. Connect the charger AC plug to a wall outlet. The charger gauge should indicate that the batteries are charging. Leave doors open slightly to allow venting.
5. When the batteries are fully charged, disconnect the charger from the AC wall outlet and secure the charger cord.
6. Turn on the breaker, and close doors.

Changing Batteries

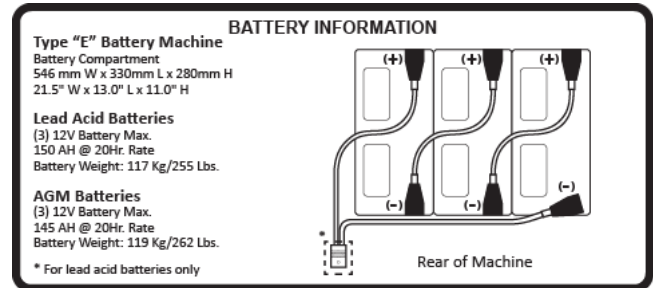
Stop the machine in a clean area next to the charger.
Turn off machine.

FOR SAFETY: Before leaving or servicing the machine; stop on level surface, turn off machine and remove key.

1. Remove doors.
2. Turn off breaker.
3. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from batteries.
4. Disconnect main positive lead and secure cable terminals away from batteries.
5. Loosen both terminals on each jumper cable and remove one at a time.
6. Prepare a suitable site to place the batteries.
7. Remove batteries from machine.

⚠ WARNING:

Attach suitable battery lifting device and lift batteries from the machine. Batteries are a potential environmental hazard. Consult your battery supplier for safe disposal methods.



Maintenance

Lithium Battery (Optional)



This product must be recycled and is made of recycled products.

Chemical Risk

!WARNING:

Lithium batteries are chemical risk if mis-operated, mishandled or abused.

Do:

- Do protect terminals from short circuit before, during, and after installation
- Do wear electrically insulated gloves
- Do use electrically insulated tools
- Do wear eye protection
- Do wear safety toe boots / shoes
- Do handle battery carefully
- Do secure battery safely
- Do always assume battery terminals are energized

Do Not:

- Do not lift or carry the battery during usage or operation
- Do not operate or store battery outside of operating limits
- Do not short circuit battery
- Do not puncture battery
- Do not expose battery to flames, or incinerate
- Do not open battery case or disassemble battery
- Do not wear rings, watches, bracelets or necklaces when handling or working near battery
- Do not drop or crush battery
- Do not lift battery by the terminal cables
- Do not vibrate battery
- Do not expose battery to water or other fluids
- Do not expose battery to direct sunlight
- Do not dispose of battery
- Do not connect with other types of batteries
- Do not expose battery to high temperatures
- Do not install with other battery types or brands

Transportation

If the battery is not installed in equipment, it must be transported in the original package or equivalent.

Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC. 10/11/ Rev.5). For transport, the batteries belong to category UN3480, Class 9, Packaging Group II.

Operating Limits

The battery should not be operated outside these operating limits:

Operating Limits	14-36-3000
Continuous Charge Current	76A
Continuous Discharge Current	76A
Charge Voltage	40.8 V
Operating Voltage (Min / Max)	33.6 V / 43.8 V
Charge Temperature (Min / Max)	0°C / 45°C (32°F / 113°F)
Discharge Temperature (Min / Max)	-20°C / 50°C (-4°F / 122°F)
Storage Temperature (Min / Max)	-20°C / 45°C (-4°F / 113°F)

CAUTION:

Do not install batteries in series. Select the appropriate AES battery model for the voltage of your system.

NOTE: Intentional bypassing of BMS to operate battery outside maximum and minimum limits voids warranty.

Maintenance

Handling - Lithium Battery

! WARNING:

Read Safety Section before installing the battery.

- Battery should be off.
- Battery cables should be disconnected.
- Battery terminals should be protected.
- Battery handle should be used to lift battery.
- Battery should be handled by two people or mechanical lift equipment.
- Do not lift or carry the battery during usage or operation.

Installation - Single Battery

! WARNING:

Read Safety Section before installing the battery.

Tools

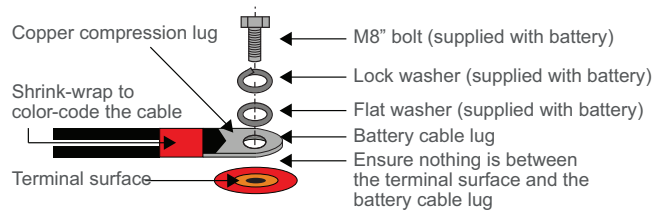
- Insulated tools sized to match nuts, bolts and cables in use
- Voltmeter
- Post cleaner and wire brush
- Personal protective equipment

Securing Battery

- Battery can be strapped in place with non-conductive nylon straps
- Battery may have hold down brackets at the base of the battery

Installation

- Check that battery is switched off
- If battery circuit has disconnect, open disconnect to isolate battery
- Clean cable connections. Broken, frayed, brittle, kinked or cut cables should be replaced
- Install and secure new battery. Be careful not to ground the terminals to any metal mounting, fixture, or body part
- Connect battery cables. Connect ground cable last to avoid sparks
- Recommended terminal torque is 9.0 Nm (6.64 ft-lb)
- Close circuit disconnect (if open)
- Turn battery switch on



NOTE: All cable ends must be connected to battery terminals without any washers between terminal bushings and cable ends.

Terminal burnout is caused by:

- Discharge currents exceeding allowable limits
- Improper cable installation
- Improper cable sizing
- Improper terminal torque

NOTE: Without exception, product experiencing terminal burnout will not be warranted.

Operation

NOTE: Review operating limits.

On-Off

- To turn the battery on press and hold switch for 2-3 seconds
- To turn the battery off press and hold switch for 2-3 seconds



Charging - Lithium

Before operating the charger make sure to read and understand the instructions that come with the charger. Never attempt to charge a battery without first reviewing and understanding the instructions for the charger being used

⚠ CAUTION:

Always make sure the chargers charging curve meets the battery's charging requirement; never charge a visibly damaged battery; never charge a frozen battery.

1. Open doors.
2. Turn off main breaker.
3. Plug in charger to wall.
4. Turn the battery on (if required).

⚠ CAUTION:

NOT ALL CHARGERS ARE CAPABLE OF CHARGING LITHIUM BATTERIES!
During system design CONFIRM that your chosen charger is not capable of transient spikes that exceed the published MAXIMUM TERMINAL RATINGS of the battery

Storage

Systems should be stored out of direct sunlight under the following temperature conditions:

Minimum Storage Temperature	-20°C / -4°F
Maximum Storage Temperature	45°C / 113°F

System should be put into storage at 80% SOC and checked monthly to ensure the system SOC (state of charge) does not fall below 20%/ At 2-% SOC the battery will self discharge in approximately 2 months.

Maintenance

CORRECTIVE ACTIONS	
High Temperature	Stop discharge or charge Leave the battery to cool
Low Temperature	Stop discharge or charge
High Voltage	If charging, stop charge
Low Voltage	Do not discharge the battery. Any discharge current detected will force the battery into Low Voltage Fault The user can charge the battery in Low Voltage Recovery If no charge current is detected within 2 minutes, the BMS will turn off the battery
Over Current	Reduce current
Low SOC	Stop discharge Charge the battery

Service & Maintenance

Batteries should be carefully inspected on a regular basis in order to detect and correct potential problems before they can do harm. This routine should be started when the batteries are first received.

Inspection

- Look for cracks in the case
- Check the battery, terminals and connections to make sure they are clean, free of dirt, fluids and corrosion
- All battery cables and their connections should be tight, intact, and NOT broken or frayed
- Replace any damaged batteries
- Replace any damaged cables
- Check torque on terminal bolts

Troubleshooting - Lithium Battery

Battery Won't Turn On:

Symptom	Does the battery turn on for a short time, then turn itself off?
Description	The battery is likely in a low voltage or low SOC.
Action	Connect to charger and turn on the battery.

Symptom	Was the battery left on or stored for extended periods of time?
Description	The battery will turn itself off at 5% SOC. If left sitting at a low SOC, the battery may have discharged itself completely and cannot be used.
Action	Do not use. Replace and recycle.

Changing Battery - Lithium

Stop the machine in a clean area. Turn off machine.

FOR SAFETY: Before leaving or servicing the machine; stop on level surface, turn off machine and remove key.

1. Remove doors.
2. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from battery.
3. Disconnect main positive lead and secure cable terminals away from battery.
4. Prepare a suitable site to place the battery.

Recycling and Disposal

Batteries must not be mixed with domestic or industrial waste. Discover's Advanced Energy Systems are recyclable and must be processed through a recognized recycling agency or dealer. Please contact Discover® or your servicing dealer for details.



! WARNING:

Attach suitable battery lifting device and lift battery from the machine. Batteries are a potential environmental hazard. Consult your battery supplier for safe disposal methods.

! WARNING
! AVERTISSEMENT





EXPLOSION OR FIRE CAN RESULT. KEEP SPARKS AND OPEN FLAME AWAY. KEEP COVERS OPEN WHEN CHARGING

UNE EXPLOSION OU UN INCENDIE PEUT EN RÉSULTER. MAINTENEZ LES ÉTINCELLES ET LES FLAMMES NUÉS À L'ÉCART. GARDER LES CARTER OUVERTS LORS DE LA RECHARGE

BATTERY INFORMATION

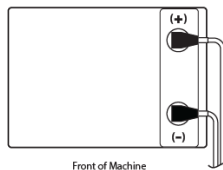
Type "E" Battery Machine
Battery Compartment
546 mm W x 348mm L x 373mm H
21.5" W x 13.7" L x 14.7" H

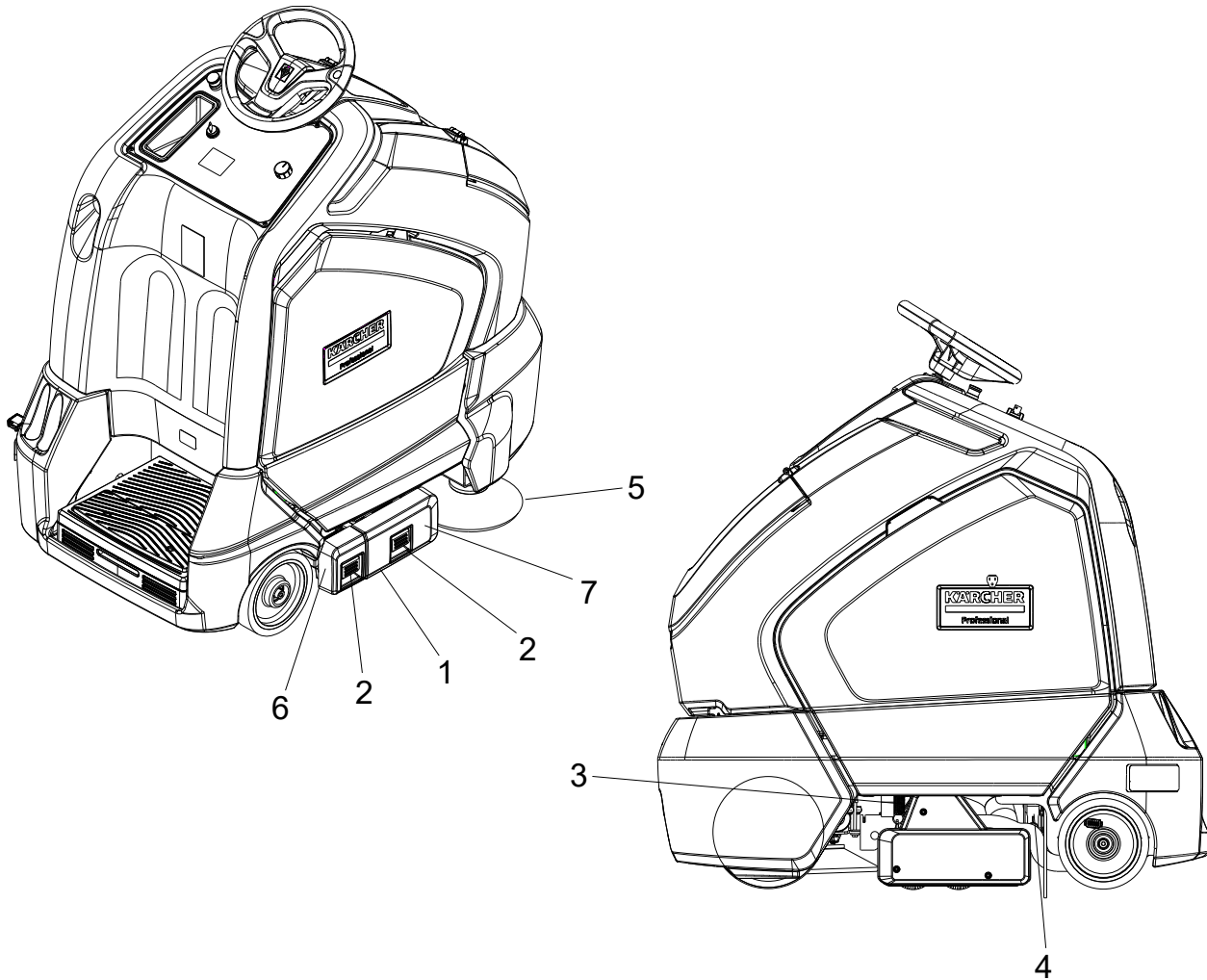
Lithium Batteries
Model Number: 12-36-6700v
(1) 36 Volt Battery Max.
175 AH @ 20 Hr. Rate
Battery Weight: 67 Kg / 152 Lbs.

Model Number: 14-36-3000
(1) 36 Volt Battery Max.
76 AH @ 20 Hr. Rate
Battery Weight: 40 Kg / 88 Lbs.

For use only with Discover Lithium Batteries.

For use only with DeltaQ RC1200 Charger for lithium batteries.





Brush Deck

1. Brush Deck
2. Release Levers
3. Brush Motor
4. Brush Deck Lift Actuator
5. Side Broom
6. Debris Tray
7. Brush Tray

Brush Removal & Bearing Cleaning

The brushes are removed from the right side of the machine.

1. Remove the main door from the right side of the machine.
2. Pull the yellow door lever to release the brush tray latch.
3. Slide the brush tray out the side of the machine.
4. Remove brush from tray. Note which one is the front/rear and be sure to switch them regularly to assist with even wear.

NOTE: The brushes should wear evenly side to side. Brushes should be replaced as a set, before bristle length wears to yellow indicator.

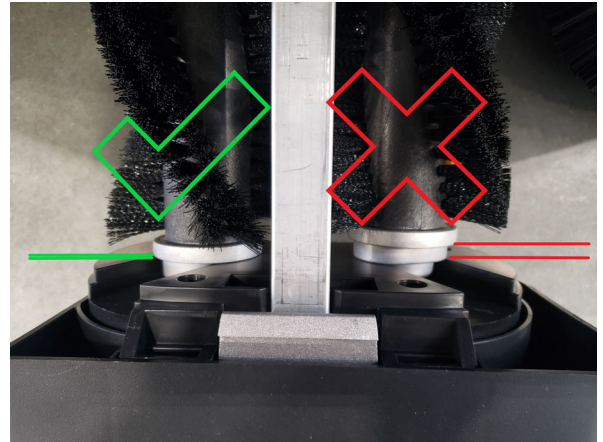
5. Clean the brushes, removing any built-up lint and any hair or string caught in the brush.
6. Remove bearing cap from end of brush.
7. Clean bearings and cap.



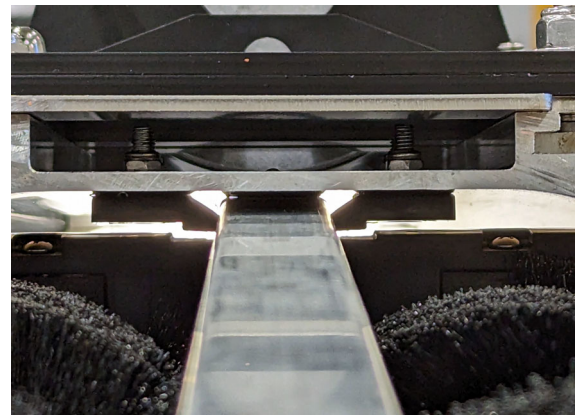
8. Clean the contacts on the inside roof of the brush housing. Be careful not to bend or damage them.
9. Clean the top rail surface of the brush tray cartridge. Inspect for excessive wear and replace as needed.

Brush Installation

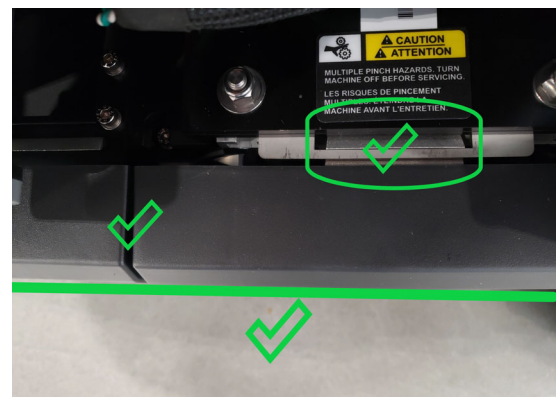
1. Place the brushes in the tray by inserting the drive end through the tray end plate about 1/2" then slide the idler end down into place.
2. Make sure the flat sides of the brush end idler ends are rotated to align with the slots in the tray retaining plate and that the round end of the idler drops into the hole in the tray retaining plate.



3. Slide brush tray into opening making sure the top rail is between the two top rail hangers that are inside the deck housing. Slide the tray full in making sure the brushes are over the drive shafts. You may need to rotate the bushes slightly to align the drive lugs with the receivers on the brush.



4. Ensure the brush tray latch is fully engaged. The debris tray and brush tray will be aligned when fully latched.



5. Reinstall the main right door of the machine.

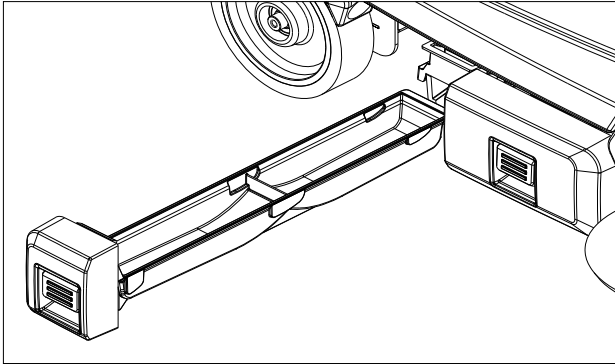
Maintenance

Debris Tray Removal

1. Release the debris tray lever.
2. Slide the debris tray away from machine.

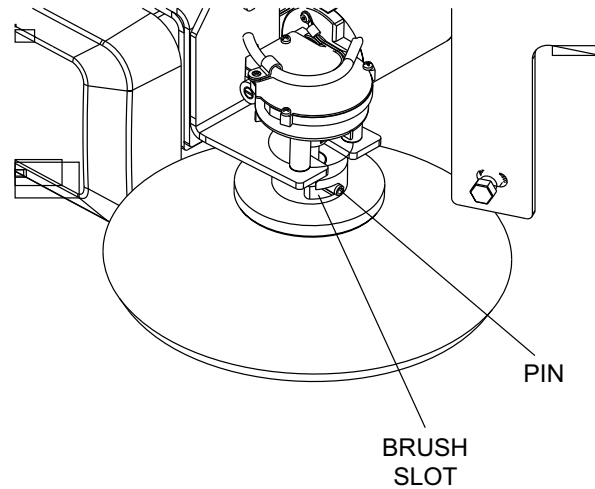
Debris Tray Installation

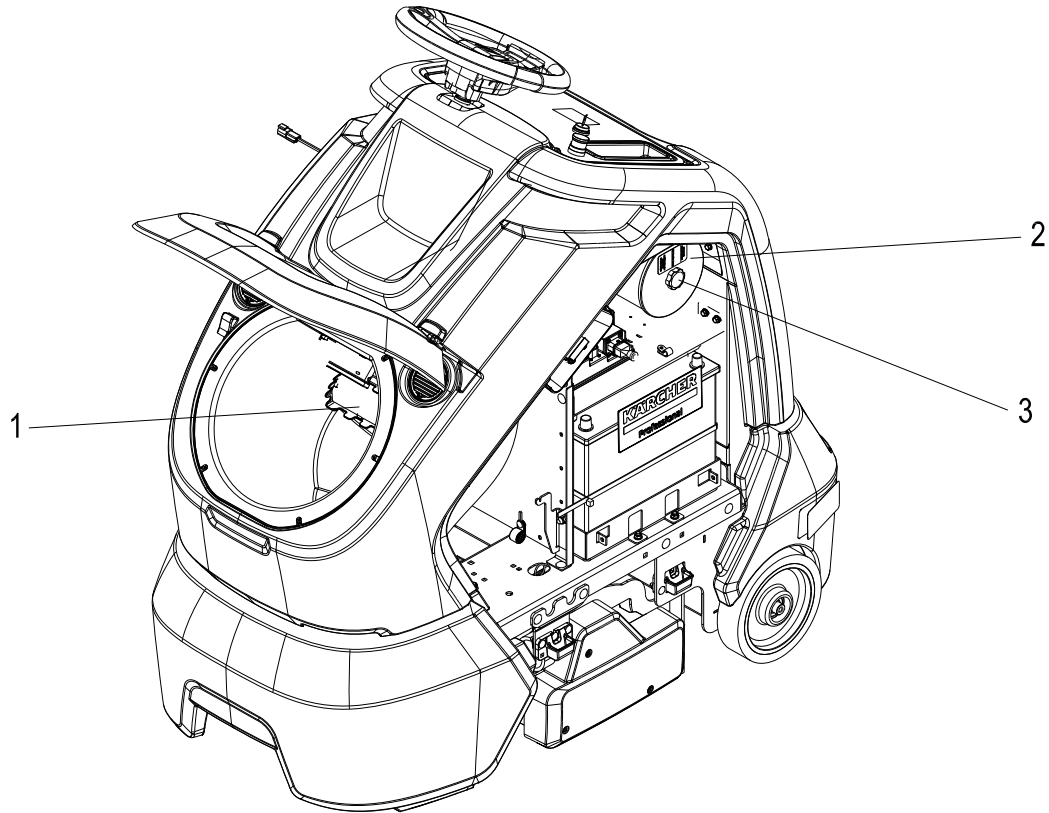
1. Slide the debris tray into the debris tray mount notch.
2. Verify latch is fully engaged.



Side Broom Removal

1. Rotate the side broom to align pin with vertical slot.
2. Slide side broom down from assembly.
3. Reverse process to assemble.



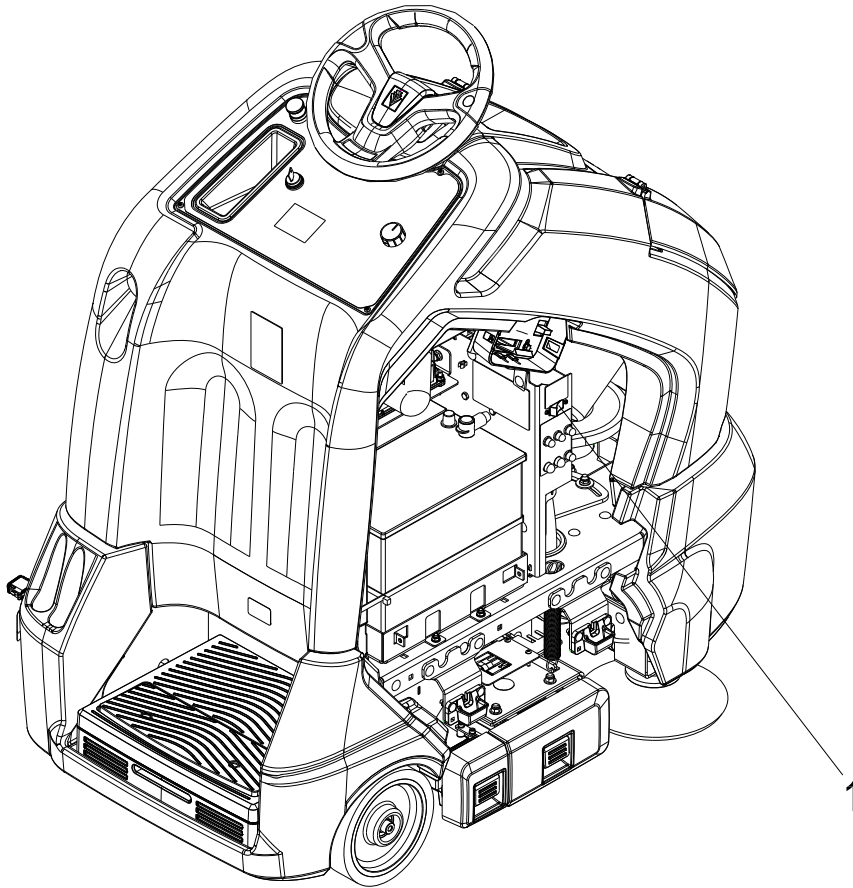


Vacuum Filters

1. Vacuum Pre Filter
2. Vacuum Post Filter
3. Knob

Changing the Bag, Pre Filter or Post Filter

1. Lift lid to replace bag or pre filter.
2. Release bag from debris snout.
3. Place new bag over debris snout and ensure card board flange is engaging bag presence switch.
4. To replace pre filter simply remove old and insert new under clips.
5. To replace post filter, remove left door, remove filter knob and slide filter of post mount. Reverse to install.

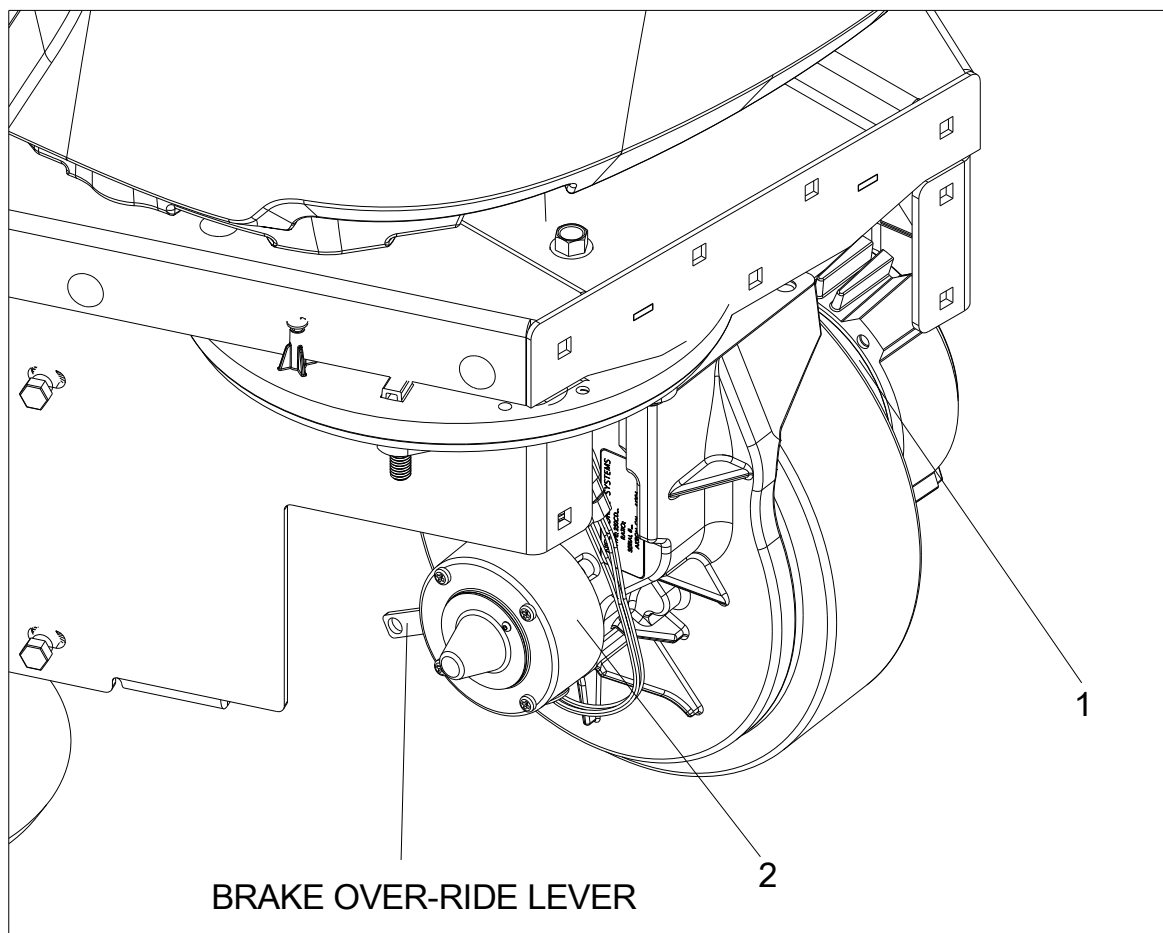


Circuit Protection

Circuit Breakers

1. MAIN CIRCUIT BREAKER

Interrupts the flow of power from batteries in the event of an electrical overload. When the circuit breaker is tripped, it can be reset by pressing the toggle switch. If the circuit breaker continues to trip, the cause of the electrical overload must be corrected. Call for service.



Drive Motor

1. Drive Motor
2. Brake

Maintenance

Electric Brake Engagement

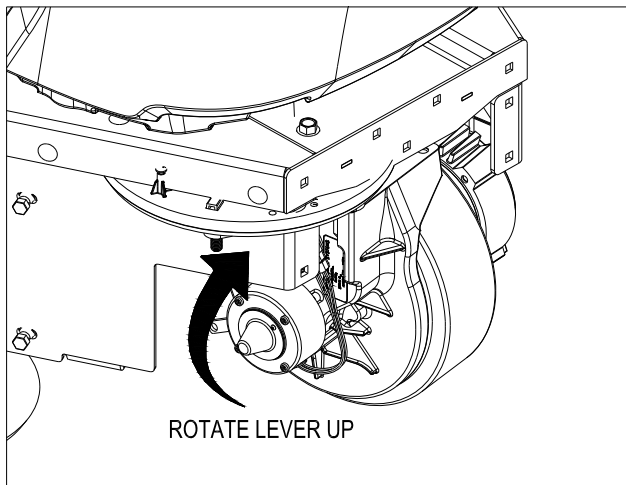
FOR SAFETY: Before leaving or servicing machine, stop on a level surface, turn off machine and remove key.

This machine is equipped with an electric brake.

The brake automatically engages and keeps the machine from moving whenever the operator steps off the platform or when emergency stop is engaged.

The brake has a mechanical over-ride that can be engaged so machine can be pushed or towed (slowly).

To disengage brake:



1. Rotate lever up.

⚠ WARNING:

Do not operate machine with brake disengaged.

Transporting

Pushing Machine

The machine may be pushed for short distances at speeds not to exceed 5 mph. Be careful to avoid damaging machine. The machine may be pushed by hand from the rear.

NOTE: To avoid damage caused by regenerative voltage, disconnect traction motor before towing or pushing machine.

Trailer Loading/Unloading

Brush deck must be in the up position before loading.

Park machine in a corner of the trailer with padding between machine and the walls. Once loaded, lower brush deck, turn off machine, and ensure brake is engaged. Block the tires to prevent the machine from rolling.

Place a strap wrapping around the machine pulling it into the corner with padding between the machine and the strap.

Reverse process to unload.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
No power to machine	Battery disconnected	Check all battery cable connections; replace or tighten as necessary.
	Emergency shut-off activated	Reset
	Faulty key switch	Replace switch
	Battery cables corroded	Clean connections
	On board charger plugged in	Unplug and stow cord
	Main circuit breaker tripped	Reset circuit breaker
Little or no propel	Low battery charge	Charge batteries
	Tripped circuit breaker	Reset circuit breaker and check brushes
	Controller overheated	Allow cool down period
	Loose motor connection	Check wires and connections from controller to motor, replace or tighten as necessary.
	Faulty throttle circuit or potentiometer	Check wires and connections from throttle to controller and potentiometer resistance, replace or tighten as necessary.
Faulty platform circuit or switch	Check wires, connections and switch, replace or tighten as necessary.	
Machine does not change speeds	Faulty speed control circuit or switch	Check wires, connections and switch, replace or tighten as necessary.
Vacuum motor does not run, or runs slowly	Faulty vacuum circuit or switch	Check wires connections and motor, replace or tighten as necessary.
	Worn vacuum motor brushes	Replace brushes, check commutator
	Full vacuum bag	Replace vacuum bag
	Clog in vacuum system	Check for and remove debris
	Low battery charge	Charge battery
Poor vacuum performance	Debris caught in system	Remove debris
	Low battery charge	Charge batteries
Brush motors do not run, or run slowly	Low battery charge	Charge battery
	Worn brush motor brushes	Replace brushes, check commutator
	Faulty brush circuit or motor	Check wires, connections and motor, replace or tighten as necessary.
Poor brushing performance	Debris caught in brushes	Remove debris
	Worn brushes	Replace brushes
	Low battery charge	Charge batteries
Brush deck goes down, then raises	Faulty actuator circuit or actuator	Check wire connections and actuator, replace or tighten as necessary.
Debris tray needs to be emptied too frequently	Excessive amounts of large or heavy material on floor.	Remove debris tray insert
	New carpet	Remove debris tray insert

Maintenance

Error Codes Table

Code	Description of Code	Corrective Actions – If the problem persists, call for service
01	Brush Motor Overheat	Disconnect power with the main breaker, remove the brush tray and clean the brushes. Allow the motor to cool down for 1 hour before continuing operation.
02	Brush Motor Overcurrent	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
03	Brush Motor Short	Turn the main breaker off and wait 10 seconds before turning it back on.
04	Brush Motor Low FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
05	Brush Motor High FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
06	Brush Motor Internal Motor Controller Error	Turn the main breaker off and wait 10 seconds before turning it back on.
07	Brush Motor Unknown Motor Controller Error	Turn the main breaker off and wait 10 seconds before turning it back on.
08	Brush Motor External Temperature Sensor Error	Turn the main breaker off and wait 10 seconds before turning it back on.
0A	Side Broom Motor Overcurrent	Disconnect power with the main breaker, remove the side broom and clean.
0B	Side Broom Motor Open Circuit	Locate the side broom circuit breaker and reset.
0C	Side Broom Motor Short	Turn the main breaker off and wait 10 seconds before turning it back on.
0D	Side Broom Motor Low FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
0E	Side Broom Motor High FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
0F	Side Broom Motor Internal Motor Controller Error	Turn the main breaker off and wait 10 seconds before turning it back on.
10	Side Broom Motor Unknown Motor Controller Error	Turn the main breaker off and wait 10 seconds before turning it back on.
12	Brake Manually Released	Position the machine on a 0% grade, or chalk the wheels. Locate the break release lever and pull down.
13	Drive Motor Short	Turn the main breaker off and wait 10 seconds before turning it back on.
14	Drive Motor Low FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
15	Drive Motor High FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
16	Drive Motor Internal Motor Controller Error	Disconnect power with the main breaker, remove the brush tray and clean the brushes. Allow the motor to cool down for 1 hour before continuing operation.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
17	Drive Motor Unknown Motor Controller Error	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
18	Brake Detect Error	Turn the main breaker off and wait 10 seconds before turning it back on.
19	Drive Motor External Temperature Sensor Error	Turn the main breaker off and wait 10 seconds before turning it back on.
1A	Drive Motor Open Circuit	Locate the traction motor circuit breaker and reset..
1B	Drive Motor Overheat	Allow the traction motor cool down for 1 hour before continuing operation
1C	Vacuum Motor Short	Turn the main breaker off and wait 10 seconds before turning it back on.
1D	Vacuum Motor Low FET Error	Turn the main breaker off and wait 10 seconds before turning it back on.
1E	Vacuum Motor High FET Error	Disconnect power with the main breaker, remove the side broom and clean.
1F	Vacuum Motor Internal Motor Controller Error	Locate the side broom circuit breaker and reset.
20	Vacuum Motor Unknown Motor Controller Error	Turn the main breaker off and wait 10 seconds before turning it back on.
21	Vacuum Motor Overcurrent Error	Turn the main breaker off and wait 10 seconds before turning it back on.
22	Vacuum Motor Open Circuit	Locate the vacuum motor circuit breaker and reset.
23	Clogged Hose, Hopper, or Bag	Change the vacuum bag. Inspect the vacuum hose and hopper and clear any clogs.
24	Actuator Overcurrent	Turn the main breaker off and wait 10 seconds before turning it back on.
25	Traction Motor DMC Over Temperature	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
26	Brush Motor DMC Over Temperature	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
27	Side Broom Motor DMC Over Temperature	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
28	Vacuum Motor DMC Over Temperature	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.

Maintenance

Error Codes Table, cont.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
29	Traction Motor DMC Temperature Error (FET)	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
2A	Brush Motor DMC Temperature Error (FET)	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
2B	Side Broom Motor DMC Temperature Error (FET)	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
2C	Vacuum Motor DMC Temperature Error (FET)	Disconnect power with the main breaker. Remove the side broom and clean. Remove the brush tray and clean the brushes. Allow the controllers to cool down for 1 hour before continuing operation.
2D	Serial Number Error - Missing Serial Number	Turn the main breaker off and wait 10 seconds before turning it back on.
2E	Lithium Battery CAN Communication Error - Battery CAN Module Unplugged, Installed Backwards, or damaged.	Turn the main breaker off and wait 10 seconds before turning it back on. Locate the Lynk module inside the left hand door. Ensure that the green light is on and it is connected on either end.
2F	Received too many Errors in a Short Amount of Time.	Turn the main breaker off and wait 10 seconds before turning it back on.
30	Contactors Error (Welded) - Damaged Contactors	Turn the main breaker off and wait 10 seconds before turning it back on.
31	Contactors Error (Open) - Damaged Contactors	Turn the main breaker off and wait 10 seconds before turning it back on.
32	Brush Motor Open Circuit	Locate the brush motor circuit breaker and reset.
33	Brush Motor High Voltage Protect Error	Locate the brush motor circuit breaker and reset.
34	Side Broom Motor High Voltage Protect Error	Turn the main breaker off and wait 10 seconds before turning it back on.
35	Drive Motor High Voltage Protect Error	Ensure that the grade is appropriate for the machine. Turn the main breaker off and wait 10 seconds before turning it back on.
36	Vacuum Motor High Voltage Protect Error	Turn the main breaker off and wait 10 seconds before turning it back on.
37	CAN1 Failure	Turn the main breaker off and wait 10 seconds before turning it back on.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
38	Operator presence invalid state	Turn the main breaker off and wait 10 seconds before turning it back on.
39	Pre-charge Error	Turn the main breaker off and wait 10 seconds before turning it back on.
3A	DMC1 CAN connection failure	Turn the main breaker off and wait 10 seconds before turning it back on.
3B	DMC2 CAN connection failure	Turn the main breaker off and wait 10 seconds before turning it back on.
3C	HMI CAN connection failure	Turn the main breaker off and wait 10 seconds before turning it back on.
3D	Both DMC CAN connection failure	Turn the main breaker off and wait 10 seconds before turning it back on.
3E	Lithium battery - Battery General BMS Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
3F	Lithium battery - Battery High Voltage Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
40	Lithium battery - Battery Low Voltage Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
41	Lithium battery - Battery High Temperature Discharge Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
42	Lithium battery - Battery Low Temperature Discharge Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
43	Lithium battery - Battery High Temperature Charge Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
44	Lithium battery - Battery Low Temperature Charge Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
45	Lithium battery - Battery High Discharge Current Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
46	Lithium battery - Battery High Charge Current Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
47	Lithium battery - Battery Missing Battery Alarm (Active battery count does not equal configured number)	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
48	Lithium battery - Battery Internal BMS Alarm	Turn the main breaker and battery off and wait 10 seconds before turning them back on.
4A	Charger - H002	Unplug charger wait 10 seconds before plugging it back in.
4B	Charger - H003	Unplug charger wait 10 seconds before plugging it back in.
4C	Charger - H004	Unplug charger wait 10 seconds before plugging it back in.
4D	Charger - F001	Unplug charger wait 10 seconds before plugging it back in.
4E	Charger - F002	Unplug charger wait 10 seconds before plugging it back in.
4F	Charger - F003	Unplug charger wait 10 seconds before plugging it back in.

Maintenance

Error Codes Table, cont.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
50	Charger - F004	Unplug charger wait 10 seconds before plugging it back in.
51	Charger - F005	Unplug charger wait 10 seconds before plugging it back in.
52	Charger - F006	Unplug charger wait 10 seconds before plugging it back in.
53	Charger - F007	Unplug charger wait 10 seconds before plugging it back in.
54	Charger - F009	Unplug charger wait 10 seconds before plugging it back in.
55	Charger - F013	Unplug charger wait 10 seconds before plugging it back in.
56	Charger - F013	Unplug charger wait 10 seconds before plugging it back in.
57	Charger - E002	Unplug charger wait 10 seconds before plugging it back in.
58	Charger - E003	Unplug charger wait 10 seconds before plugging it back in.
59	Charger - E004	Unplug charger wait 10 seconds before plugging it back in.
5A	Charger - E005	Unplug charger wait 10 seconds before plugging it back in.
5B	Charger - E006	Unplug charger wait 10 seconds before plugging it back in.
5C	Charger - E007	Unplug charger wait 10 seconds before plugging it back in.
5D	Charger - E008	Unplug charger wait 10 seconds before plugging it back in.
5E	Charger - E009	Unplug charger wait 10 seconds before plugging it back in.
5F	Charger - E010	Unplug charger wait 10 seconds before plugging it back in.
60	Charger - E011	Unplug charger wait 10 seconds before plugging it back in.
61	Charger - E012	Unplug charger wait 10 seconds before plugging it back in.
62	Charger - E013	Unplug charger wait 10 seconds before plugging it back in.
63	Charger - E014	Unplug charger wait 10 seconds before plugging it back in.
64	Charger - E015	Unplug charger wait 10 seconds before plugging it back in.
65	Charger - E016	Unplug charger wait 10 seconds before plugging it back in.
A0	Charger - E017	Unplug charger wait 10 seconds before plugging it back in.
A1	Charger - E018	Unplug charger wait 10 seconds before plugging it back in.
A2	Charger - E019	Unplug charger wait 10 seconds before plugging it back in.
A3	Charger - E020	Unplug charger wait 10 seconds before plugging it back in.
A4	Charger - E021	Unplug charger wait 10 seconds before plugging it back in.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
A5	Charger - E022	Unplug charger wait 10 seconds before plugging it back in.
A6	Charger - E023	Unplug charger wait 10 seconds before plugging it back in.
A7	Charger - E024	Unplug charger wait 10 seconds before plugging it back in.
A8	Charger - E025	Unplug charger wait 10 seconds before plugging it back in.
A9	Charger - E026	Unplug charger wait 10 seconds before plugging it back in.
AA	Charger - E027	Unplug charger wait 10 seconds before plugging it back in.
AB	Charger - E028	Unplug charger wait 10 seconds before plugging it back in.
AC	Charger - E029	Unplug charger wait 10 seconds before plugging it back in.
AD	Charger - E030	Unplug charger wait 10 seconds before plugging it back in.
AE	Charger - E031	Unplug charger wait 10 seconds before plugging it back in.
AF	Charger - E032	Unplug charger wait 10 seconds before plugging it back in.
B0	Charger - E033	Unplug charger wait 10 seconds before plugging it back in.
B1	Charger - E034	Unplug charger wait 10 seconds before plugging it back in.
B2	Charger - E035	Unplug charger wait 10 seconds before plugging it back in.
B3	Charger - E036	Unplug charger wait 10 seconds before plugging it back in.
B4	Charger - E037	Unplug charger wait 10 seconds before plugging it back in.
B5	Charger - E038	Unplug charger wait 10 seconds before plugging it back in.
B6	Charger - E039	Unplug charger wait 10 seconds before plugging it back in.
B7	Charger - E040	Unplug charger wait 10 seconds before plugging it back in.
B8	Charger - E041	Unplug charger wait 10 seconds before plugging it back in.
B9	Charger - E042	Unplug charger wait 10 seconds before plugging it back in.
BA	Charger - E043	Unplug charger wait 10 seconds before plugging it back in.
BB	Charger - E044	Unplug charger wait 10 seconds before plugging it back in.
BC	Charger - E045	Unplug charger wait 10 seconds before plugging it back in.
BD	Charger - E046	Unplug charger wait 10 seconds before plugging it back in.
BE	Charger - E048	Unplug charger wait 10 seconds before plugging it back in.
BF	Charger - E049	Unplug charger wait 10 seconds before plugging it back in.

Maintenance

Error Codes Table, cont.

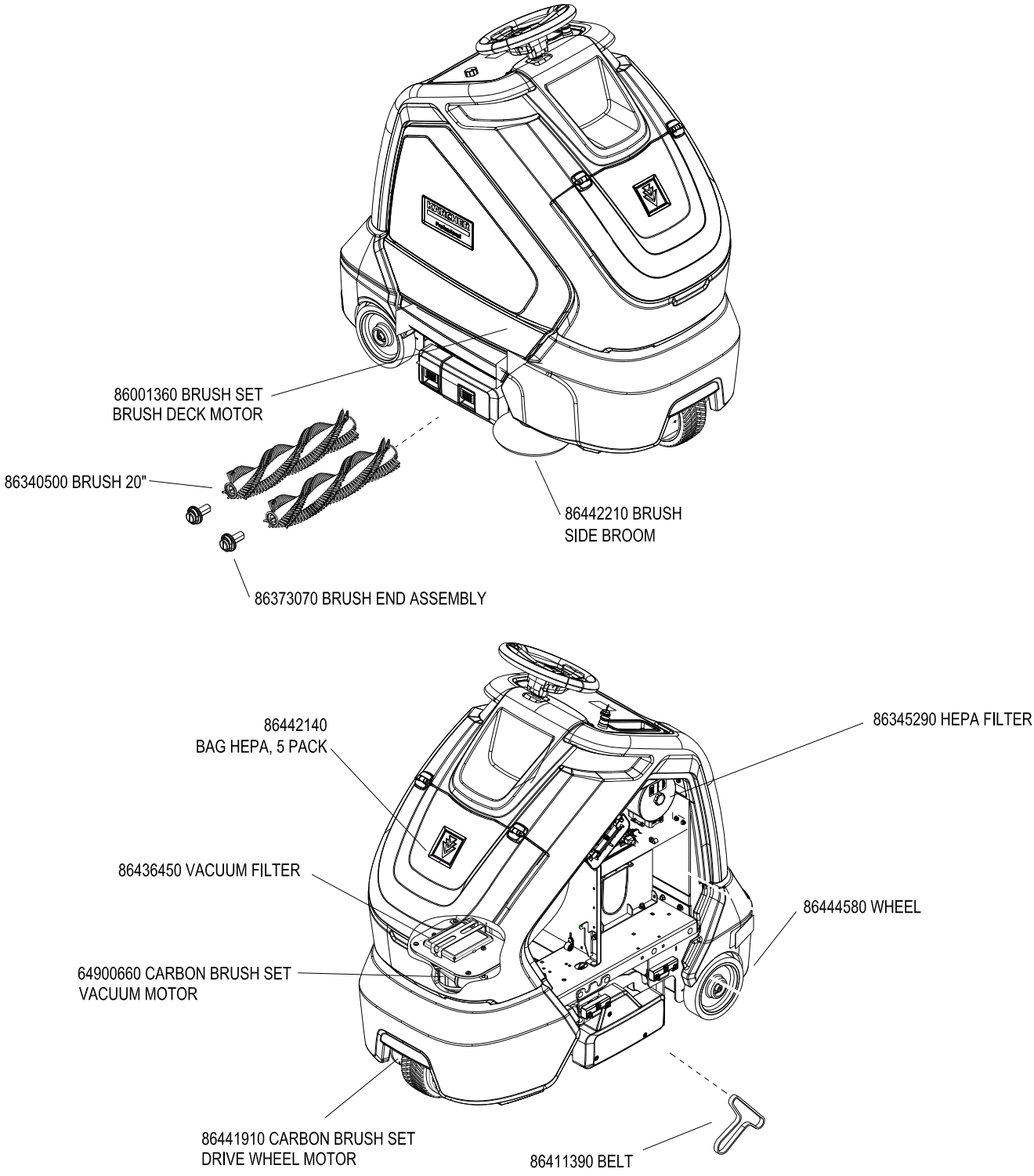
Code	Description of Code	Corrective Actions – If the problem persists, call for service
C0	Charger - E050	Unplug charger wait 10 seconds before plugging it back in.
C1	Charger - E051	Unplug charger wait 10 seconds before plugging it back in.
C2	Charger - E052	Unplug charger wait 10 seconds before plugging it back in.
C3	Charger - E053	Unplug charger wait 10 seconds before plugging it back in.
C4	Charger - E054	Unplug charger wait 10 seconds before plugging it back in.
C5	Charger - E055	Unplug charger wait 10 seconds before plugging it back in.
C6	Charger - E056	Unplug charger wait 10 seconds before plugging it back in.
C7	Charger - E059	Unplug charger wait 10 seconds before plugging it back in.
C8	Charger - E060	Unplug charger wait 10 seconds before plugging it back in.
C9	Charger - E061	Unplug charger wait 10 seconds before plugging it back in.
CA	Charger - E062	Unplug charger wait 10 seconds before plugging it back in.
CB	Charger - E063	Unplug charger wait 10 seconds before plugging it back in.
CC	Charger - E064	Unplug charger wait 10 seconds before plugging it back in.
CD	Charger - E065	Unplug charger wait 10 seconds before plugging it back in.
CE	Charger - E066	Unplug charger wait 10 seconds before plugging it back in.
CF	Charger - E067	Unplug charger wait 10 seconds before plugging it back in.
D0	Charger - E068	Unplug charger wait 10 seconds before plugging it back in.
D1	Charger - E080	Unplug charger wait 10 seconds before plugging it back in.
D2	Charger - E084	Unplug charger wait 10 seconds before plugging it back in.
D3	Charger - E085	Unplug charger wait 10 seconds before plugging it back in.
80	The battery is dead and will need to be charged. The machine will no longer transport.	Key the machine off. To push the machine to a charging location, locate break lever on the right hand side of the traction motor and lift. Charge the battery. For lithium only, ensure that the blue battery light located in the left hand door is solid while charging. If the light is blinking or off continue to press the button until it remains solid.
81	The vacuum bag is missing install a bag to allow cleaning. Transport mode is still allowed.	Install a vacuum bag. Or make sure the vacuum bag is seated correctly

Code	Description of Code	Corrective Actions – If the problem persists, call for service
82	The battery is dead and will need to be charged. Transport mode is still allowed.	Transport the machine to a charging location, key the machine off and charge the battery. For lithium only, ensure that the blue battery light located in the left hand door is solid while charging. If the light is blinking or off continue to press the button until it remains solid.
83	Side Broom Motor PWM is being limited by unspecified source. All modes are still allowed.	Disconnect power with the main breaker, remove the side broom and clean
84	Side Broom Motor Limited. The controller is driving but a power-limiting condition is active. All modes are still allowed.	Disconnect power with the main breaker, remove the side broom and clean
85	Side Broom Motor Temperature High. PWM limiting within range of High Motor Temperature. All modes are still allowed.	Disconnect power with the main breaker, remove the side broom and clean
86	Side Broom Motor ANIN Limit. Motor temperature is above software limit. Throttle input range is being affected. All modes are still allowed.	Disconnect power with the main breaker, remove the side broom and clean.
87	Brush Motor PWM is being limited by unspecified source. All modes are still allowed.	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
88	Brush Motor Limited. The controller is driving but a power-limiting condition is active. All modes are still allowed.	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
89	Brush Motor Temperature High. PWM limiting within range of High Motor Temperature. All modes are still allowed.	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
8A	Brush Motor ANIN Limit. Motor temperature is above software limit. Throttle input range is being affected. All modes are still allowed.	Disconnect power with the main breaker, remove the brush tray and clean the brushes.
8B	Traction Motor PWM is being limited by unspecified source. All modes are still allowed.	Ensure the grade is appropriate.

Maintenance

Error Codes Table, cont.

Code	Description of Code	Corrective Actions – If the problem persists, call for service
8C	Traction Motor Reverse Limited. The controller is driving in reverse, but a power-limiting condition is active. All modes are still allowed.	Ensure the grade is appropriate.
8D	Traction Motor Forward Limited. The controller is driving forward, but a power-limiting condition is active. All modes are still allowed.	Ensure the grade is appropriate
8E	Traction Motor Temperature High. PWM limiting within range of High Motor Temperature. All modes are still allowed.	Ensure the grade is appropriate.
8F	Traction Motor ANIN Limit. Motor temperature is above software limit. Throttle input range is being affected. All modes are still allowed.	Ensure the grade is appropriate.
90	Vacuum Motor PWM is being limited by unspecified source. All modes are still allowed.	Service soon.
91	Vacuum Motor Limited. The controller is driving but a power-limiting condition is active. All modes are still allowed.	Service soon.
92	The battery is low and will need to be charged soon. All modes are still allowed.	Charge the battery soon.
93	The batteries are charging, and the machine is locked out.	Ensure the key is off when charging.
94	Traction motor PWM is being limited by the active current limit	Ensure the grade is appropriate.
95	The throttle was not in the neutral position during startup.	Ensure the grade is appropriate.





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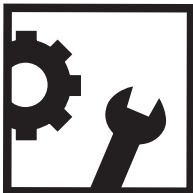


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