

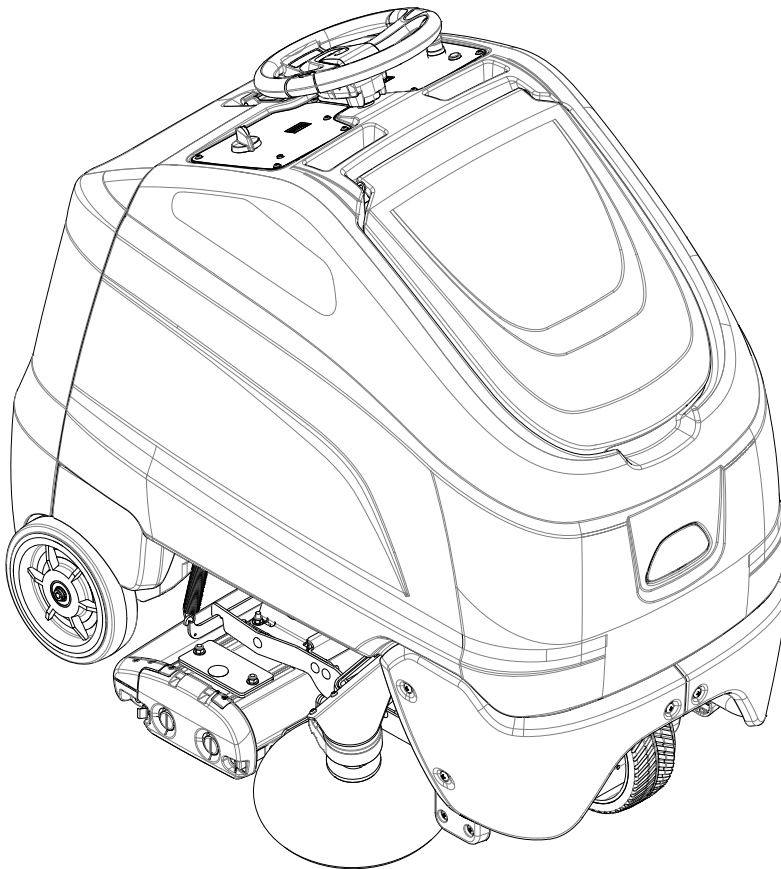
# KÄRCHER

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## Chariot 3 - CV 86/1 RS Bp

English

02



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your product**

[www.kaercher.com/welcome](http://www.kaercher.com/welcome)



86413740-F 01/10/20

## Machine Data Label

Model: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Dealer: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Sales Representative: \_\_\_\_\_

### Overview

The Chariot® CV86 is a battery powered, stand-on, wide area vacuum intended for commercial use. The Chariot® CV86 brushes and vacuums debris from the floor and stores it in the debris tray and vacuum bag.

#### MODELS:

1.012-596.0	CV86
1.012-597.0	CVC86
1.012-600.0	CVI8
1.012-601.0	CV86LI

## 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

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## How To Use This Manual

This manual contains the following sections:

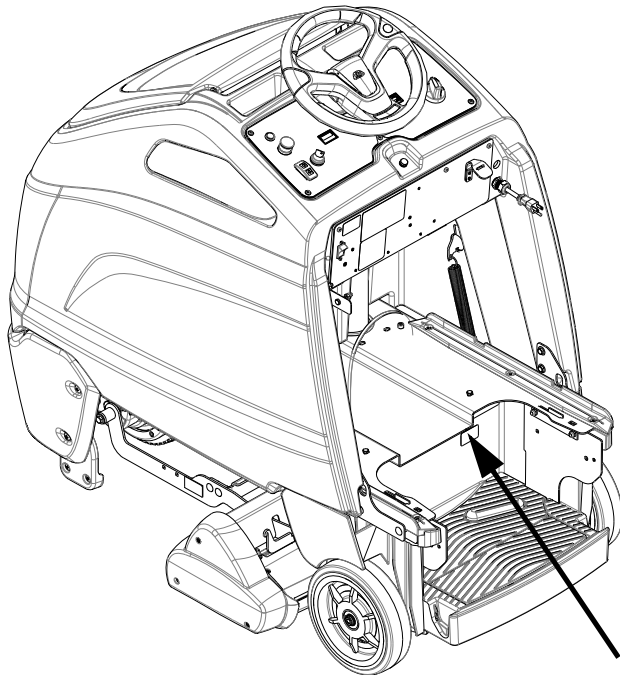
- How to Use This Manual
- Safety
- Operations
- Maintenance

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:

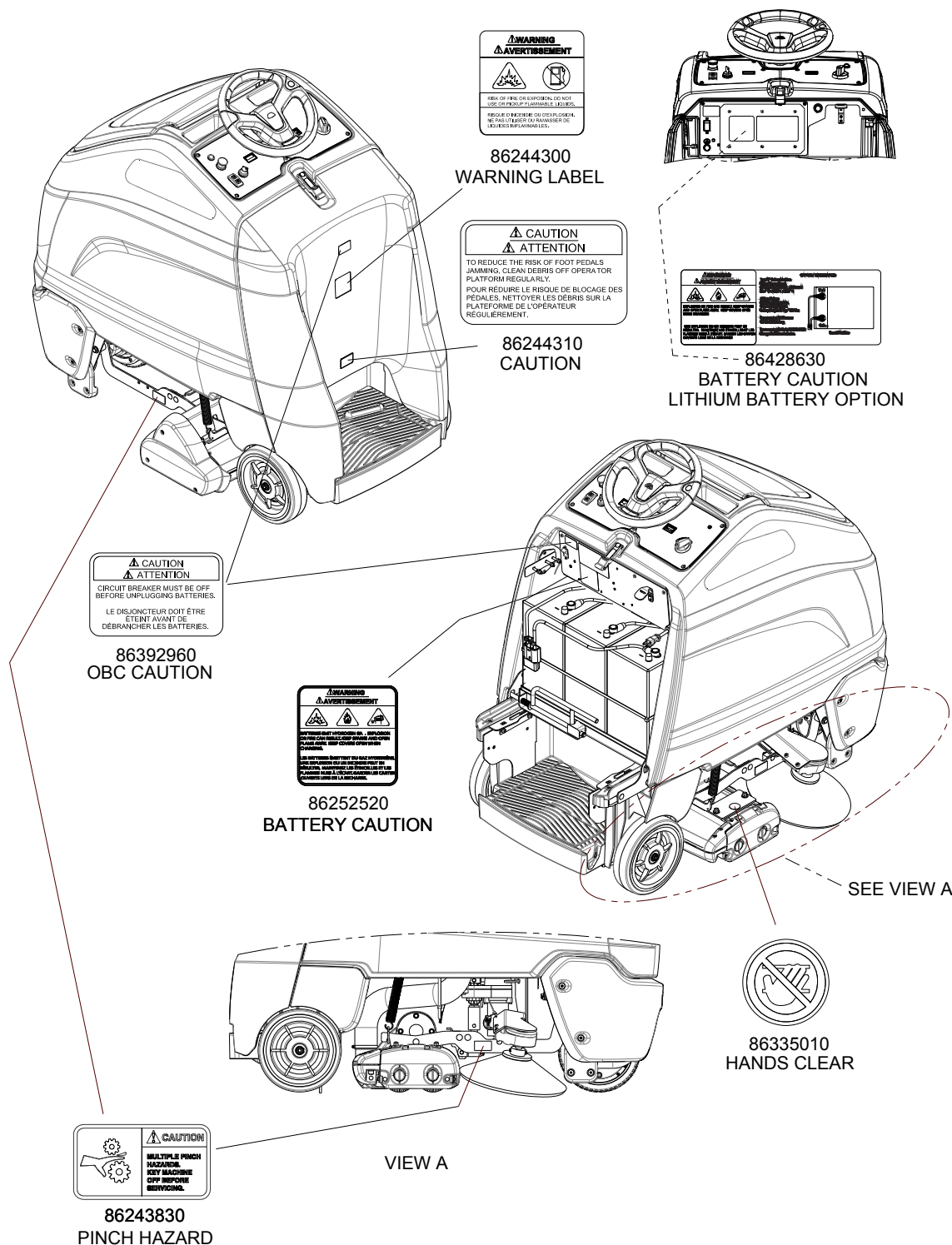
- Service Schedule
- Batteries
- Brush Deck
- Vacuum
- Drive Motor & Brake
- Troubleshooting

*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.

**EMPLACEMENT DE L'ÉTIQUETTE DE SÉCURITÉREMARQUE :** Ces dessins indiquent l'emplacement des étiquettes de sécurité sur la machine. Si, à tout moment, les étiquettes deviennent illisibles, contactez votre représentant autorisé pour un remplacement rapide.



## 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:

**Use only** indoors. Do not use outdoors or expose to rain.

**Use only** as described in this manual. Use only manufacturer's recommended components and attachments.

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.

**Disconnect** battery before cleaning or servicing.

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.

Lithium Battery Option: For use only with Discover Lithium battery 12-36-6700 and Delta Q QuiQ 1000 Charger.

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**, secure against unintentional movement.

**The machine shall only** be operated by instructed and authorized persons.

**When leaving unattended**, switch off or lock the main power switch to prevent unauthorized use.

**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.

## READ AND SAVE THESE INSTRUCTIONS

## MESURES DE SÉCURITÉ IMPORTANTES

**Lors de l'utilisation d'un appareil à batteries, il est nécessaire de respecter systématiquement des mesures de sécurité de base, comme suit:**

**PRENEZ NOTE DE TOUTES CES MESURES AVANT D'UTILISER CETTE MACHINE.**

### **⚠ AVERTISSEMENT:**

Pour réduire les risques d'incendie, de chocs électriques, ou de blessures:

N'utiliser cette machine qu'en intérieur. Ne jamais l'utiliser à l'extérieur ou dans la pluie.

Utiliser cet appareil conformément aux instructions du présent manuel uniquement. N'utiliser que les composants et les accessoires conseillés par le fabricant.

Lorsque la machine ne fonctionnant pas correctement, a fait l'objet d'une chute ou d'une détérioration, a été laissée à l'extérieur, est tombée dans l'eau, la retourner au centre de service agréé.

Ne pas opérer la machine lorsque les conduits de ventilation sont bloqués. Débarrasser les débris des conduits, car ils peuvent réduire l'écoulement d'air.

Cette machine n'est pas adaptée au ramassage de poussières dangereuses

Ne pas l'utiliser près de liquides, de poussières ou de vapeurs inflammables. Ne pas exposer au feu.

L'entretien et les réparations de la machine doivent être effectuées par un personnel qualifié.

Déconnecter les batteries avant de nettoyer la machine ou de la soumettre à un entretien.

Ne pas utiliser de bloc-batterie ni d'appareil visiblement endommagé. Si le compartiment de batterie est endommagé, ne pas toucher au contenu exposé.

Ne pas modifier ni tenter de réparer l'appareil ou le bloc-batterie.

Option pour batterie lithium-ion Pour utilisation avec batterie au lithium Discover 12-36-6700 et chargeur Delta Q QuiQ 1000 avec un algorithme au lithium.

Avant de se débarrasser de la machine, il est nécessaire de retirer les batteries et de les jeter correctement.

S'assurer que toutes les plaques d'avertissement ou de précaution sont lisibles et fixées correctement sur la machine.

Durant la manoeuvre de la machine, prendre garde aux personnes environnantes et notamment aux enfants.

Avant l'utilisation de la machine, veiller à positionner tous les couvercles et portes comme indiqué dans les instructions.

Lorsque la machine est laissée sans surveillance, s'assurer qu'elle ne se déplace pas de manière accidentelle.

Cette machine ne doit être manoeuvrée que par un personnel expérimenté et qualifié.

Lorsque la machine est laissée sans surveillance, la mettre hors tension ou verrouiller l'interrupteur principal afin d'empêcher un emploi non autorisé.

Cette machine a été conçue pour être utilisée avec des brosses spécifiées par le fabricant.

L'utilisation d'autres brosses peut affecter sa sûreté.

N'employez pas sur des surfaces ayant un gradient de plus de 10% (6 degrés).

Ne pas utiliser l'appareil si le filtre ou le sac à poussière n'est pas en place.

## CONSERVER CES INSTRUCTIONS

## Safety

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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.**



Les symboles ci-dessous sont utilisés à travers ce manuel comme illustré dans leurs descriptions:

## DEGRÉS DE RISQUES EN CAS DE DANGER

Il existe trois degrés de risques identifiés par les termes signalétiques -AVERTISSEMENT et ATTENTION et POUR VOTRE SÉCURITÉ. Le degré de risque est défini de la manière suivante:

### **AVERTISSEMENT:**

**AVERTISSEMENT** - Dangers ou méthodes dangereuses qui POURRAIENT provoquer de graves blessures ou entraîner la mort.

### **ATTENTION:**

**ATTENTION** - Dangers ou méthodes dangereuses qui pourraient provoquer des blessures légères ou une détérioration du produit ou des biens immobiliers.

**POUR VOTRE SÉCURITÉ:** ce signe permet d'identifier les mesures de précaution à prendre pour assurer un bon fonctionnement du matériel.

Rendre compte immédiatement d'une défaillance ou d'une détérioration de la machine. Ne pas utiliser la machine si celle-ci ne fonctionne pas correctement. Lire soigneusement les informations ci-dessous signalant certains dangers potentiels pour l'opérateur de la machine. L'opérateur doit être absolument au courant de ces dangers potentiels. Localiser tous les dispositifs de sécurité sur la machine. Il est conseillé de prendre les mesures nécessaires pour former le personnel opérateur.

#### **POUR VOTRE SÉCURITÉ:**

**NE PAS MANOEUVRER LA MACHINE:**

Lorsqu'on n'est pas expérimenté ou qualifié.

Lorsque le guide d'utilisation n'est pas été lu ou compris.

Dans des zones inflammables ou explosives.

Dans des zones où des objets peuvent tomber.

#### **LORS DE L'ENTRETIEN DE LA MACHINE:**

Éviter les parties amovibles. Ne pas porter de vêtements amples, tels que des vestes, des chemises ou des vêtements avec manches lors de l'utilisation de la machine. Utiliser les pièces détachées Kärcher North America homologuées.

### **AVERTISSEMENT:**

**Les batteries émettent le gaz d'hydrogène. L'explosion ou le feu peut résulter. Étincelles de subsistance et flamme nue loin. Compartiment de batterie de subsistance ouvert en chargeant. Étincelles et flammes de subsistance loin des batteries. Ne fumez pas autour des batteries.**

### **AVERTISSEMENT:**

**Déconnecter les batteries avant de travailler sur la machine. La machine ne doit être confiée qu'à un personnel qualifié. Porter systématiquement des lunettes et des vêtements de protection lors d'une intervention sur les batteries ou aux alentours. Éviter tout contact de la peau avec l'acide contenu dans les batteries.**

### **AVERTISSEMENT:**

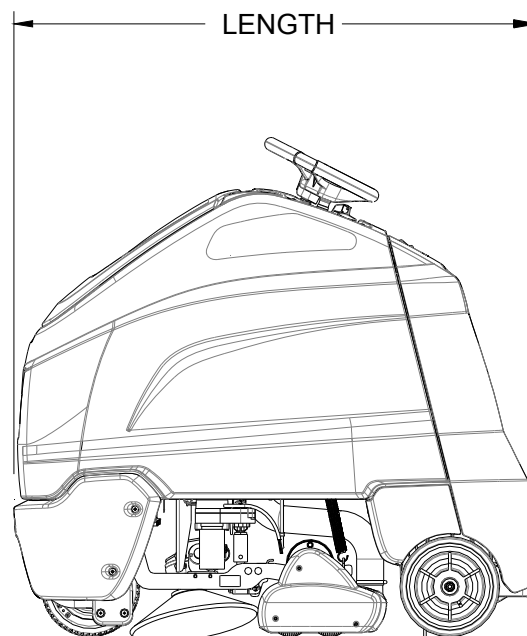
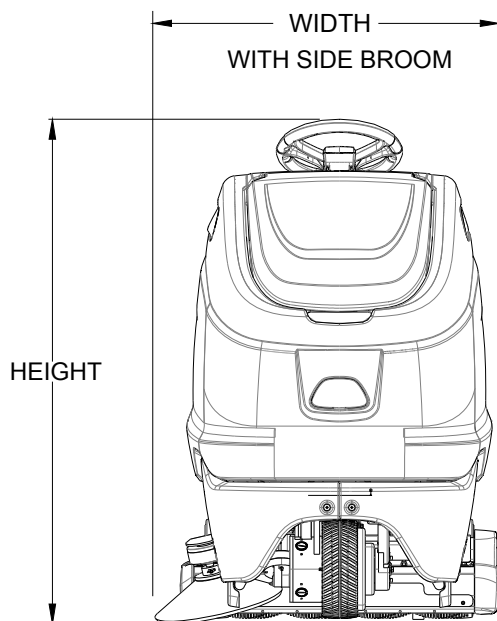
**Ne jamais placer d'objets métalliques sur le dessus des batteries.**

## Operations

### Technical Specifications

ITEM	DIMENSION/CAPACITY
Nominal Power	1600 W
Rated Voltage	36 Volts DC
Rated Amperage	43 Amps
Batteries	3 X 12 Volt 205-234 @ 20 hr. rate
Battery Compartment Dimensions	21in. X 16in. X 17in. (533mm X 406mm X 432mm)
Battery, Lithium	38.4 Volts
Battery, Lithium - Dimensions	(375mm x 347.5 x 471.5 mm)
Propel Motor	0.75HP (560W)
Brush Motor	0.5 HP (373W)
Side Broom Motor	0.06HP (45W)
Bag Capacity	1006 in <sup>3</sup> (16.5L)
Hopper Capacity	43.6 in <sup>3</sup> (0.71L)
Brushes	Two 28in (71cm) by 4in (10cm) dia.
Side Broom	13 inch (33cm)
Max Brush Speed	970 RPM
Max Side Broom speed	90 RPM
Vacuum Motor	0.94 HP (700W)
Max Flow Rate of vac motor	120 cfm (56.6 L/sec)
Vac bag full shut-off	14-16 inH <sub>2</sub> O (3.5 - 4.0 kPa)
Max suction vac motor	58.2 inH <sub>2</sub> O (14.5 kPa)
Weight (GVW) Gross weight with batteries and operator	958 Lb. (435 Kg)
Weight Empty no batteries or operator	361 Lb. (164Kg)
Tires	10in. (254mm) Solid grey non-marking
Foundation Pressure	61psi (420kPa)
Max Speed	3.65 MPH 5.88 Km/h
Frame construction	Powder coated Steel
Brake	Electrical Brake (engaged when operator steps of or E-Stop activated)
Minimum Aisle	U-Turn 66.92 in. (1700 mm)
Max rated climb and Descent	10% (6 degrees)
Sound Pressure at operators ear (IEC 60704-1)	71.1 dBA Uncertainty 2.8dBA Hard Floor Norm Clean
Sound Power (IEC 60704-1)	84.9 dBA Uncertainty 2.8dBA Hard Floor Norm Clean
Sound Pressure at operators ear (IEC 60704-1)	65.8 dBA Uncertainty 2.5 dBA Carpet Daytime Clean
Sound Power (IEC 60704-1)	84.7 dBA Uncertainty 2.5 dBA Carpet Daytime Clean
Vibration Hands (ISO 5349)	0.77 m/sec <sup>2</sup> Uncertainty .5 m/sec <sup>2</sup>
Vibration Feet (ISO 5349)	0.08 m/sec <sup>2</sup> Uncertainty .5 m/sec <sup>2</sup>

ITEM	MEASURE
Height	50.0 inches (1270 mm)
Length	52.1 inches (1323 mm)
Width without deck	30.6 inches (777 mm)
Width of deck	31.9 inches (811mm)
Width with side broom	34.2 inches (869 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.

**⚠ ATTENTION:**

Cet appareil n'est pas prévu à l'usage des personnes (enfants y compris) avec des possibilités physiques, sensorielles ou mentales réduites, ou le manque d'expérience et de connaissance, à moins qu'ils aient été donnés la surveillance ou l'instruction au sujet de l'utilisation de l'appareil par une personne chargée de leur sûreté. Des enfants devraient être dirigés pour s'assurer qu'ils ne jouent pas avec l'appareil.

### How This Machine Works

The Chariot® CV86 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.

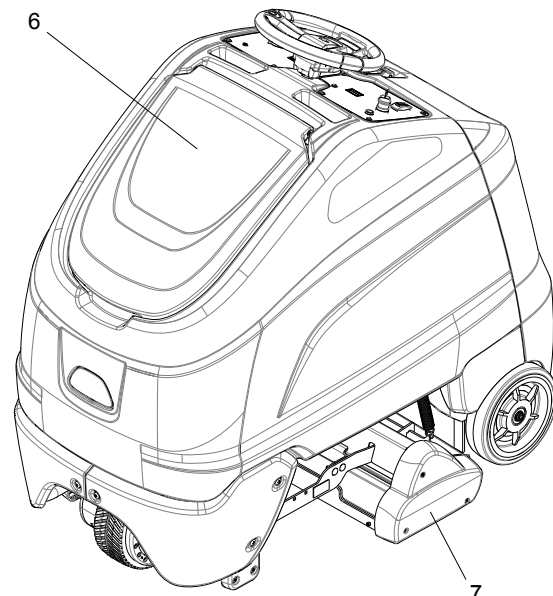
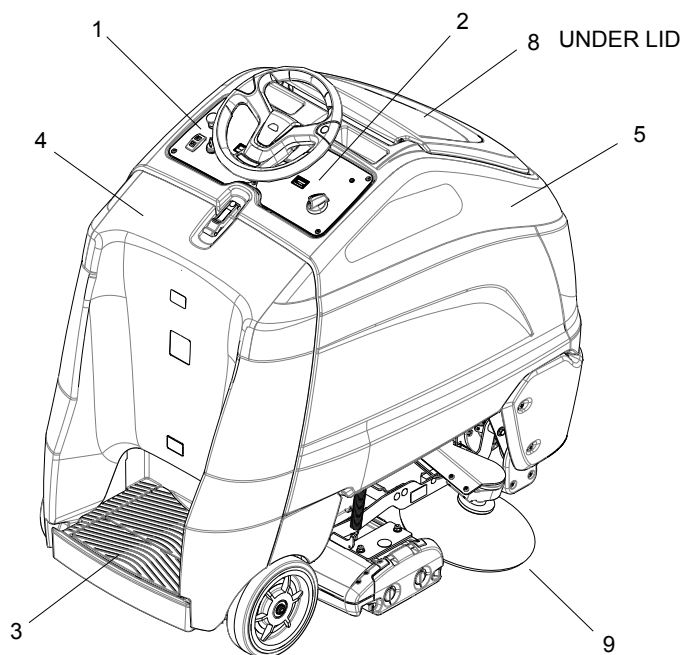
The machine's primary systems are the brush system, vacuum system, and operator control system.

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.

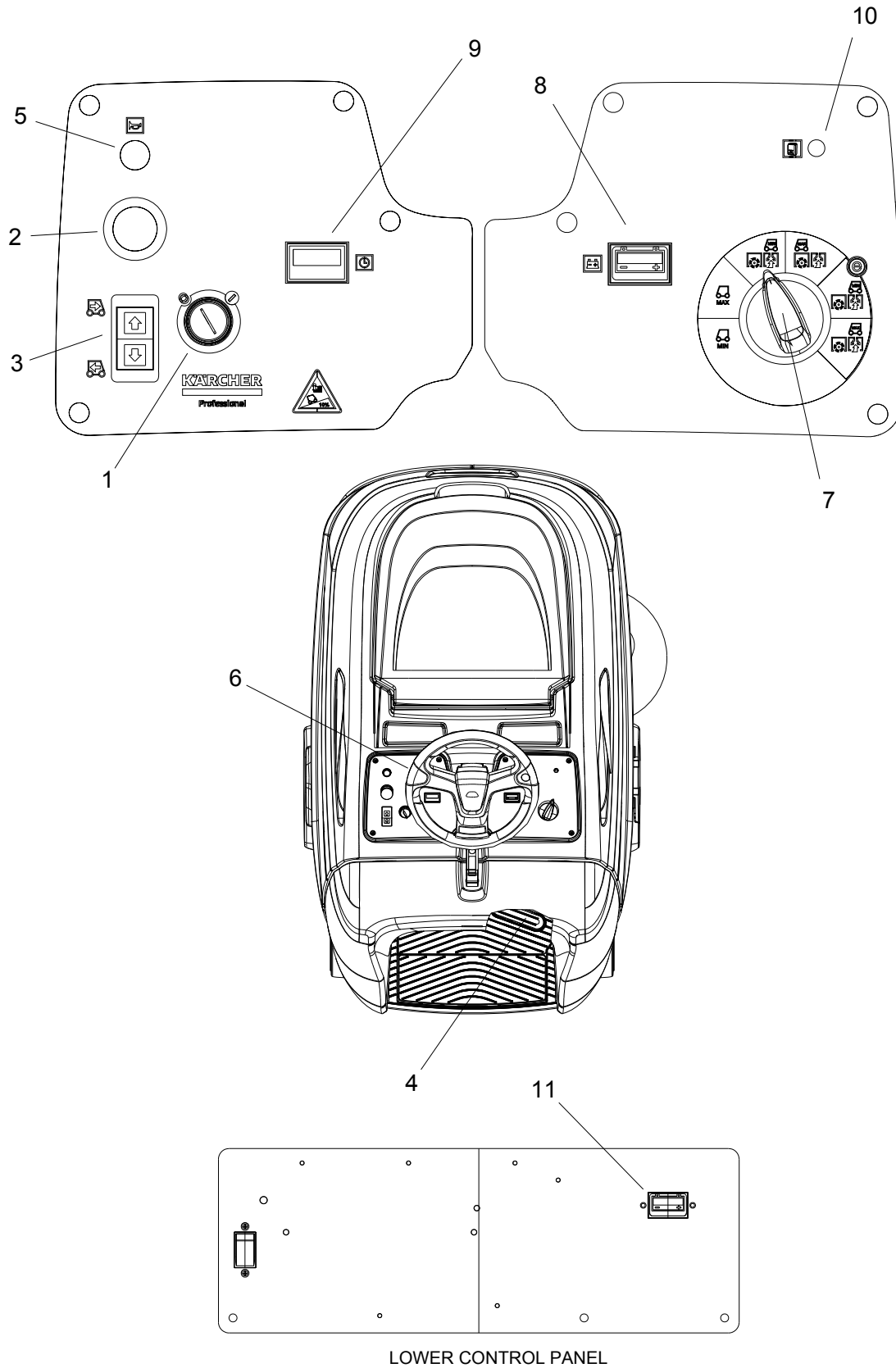
The function of the operator control system is to control the direction and speed of the machine. The directional control system consists of the direction control drive reset switch, throttle pedal, emergency stop switch, steering wheel, propel controller, and drive wheel. The directional control drive 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 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 - Drive  | 6. Cover Lid  |
| 2. Control Panel - Vacuum | 7. Brush Deck |
| 3. Pedal Platform         | 8. Vacuum Bag |
| 4. Rear Cover             | 9. Side Broom |
| 5. Cover                  |               |



## **Controls**

- 1. Key Switch**
- 2. Emergency Stop Switch**
- 3. Directional Control / Drive Reset Switch**
- 4. Throttle Pedal**
- 5. Horn Button**
- 6. Steering Wheel**
- 7. Function Mode Switch**
- 8. Battery Discharge Indicator**
- 9. Hour Meter**
- 10. Vacuum System Status Indicator**
- 11. Error Indicator (lithium only)**

### **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 battery symbol will flash 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 lit arrow on the switch indicates direction of travel.

To travel forward, press the top of the switch.

To travel in reverse, press the bottom of the switch.

### 4. Throttle Pedal

Controls the speed of the vehicle within the speed control setting selected. 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.

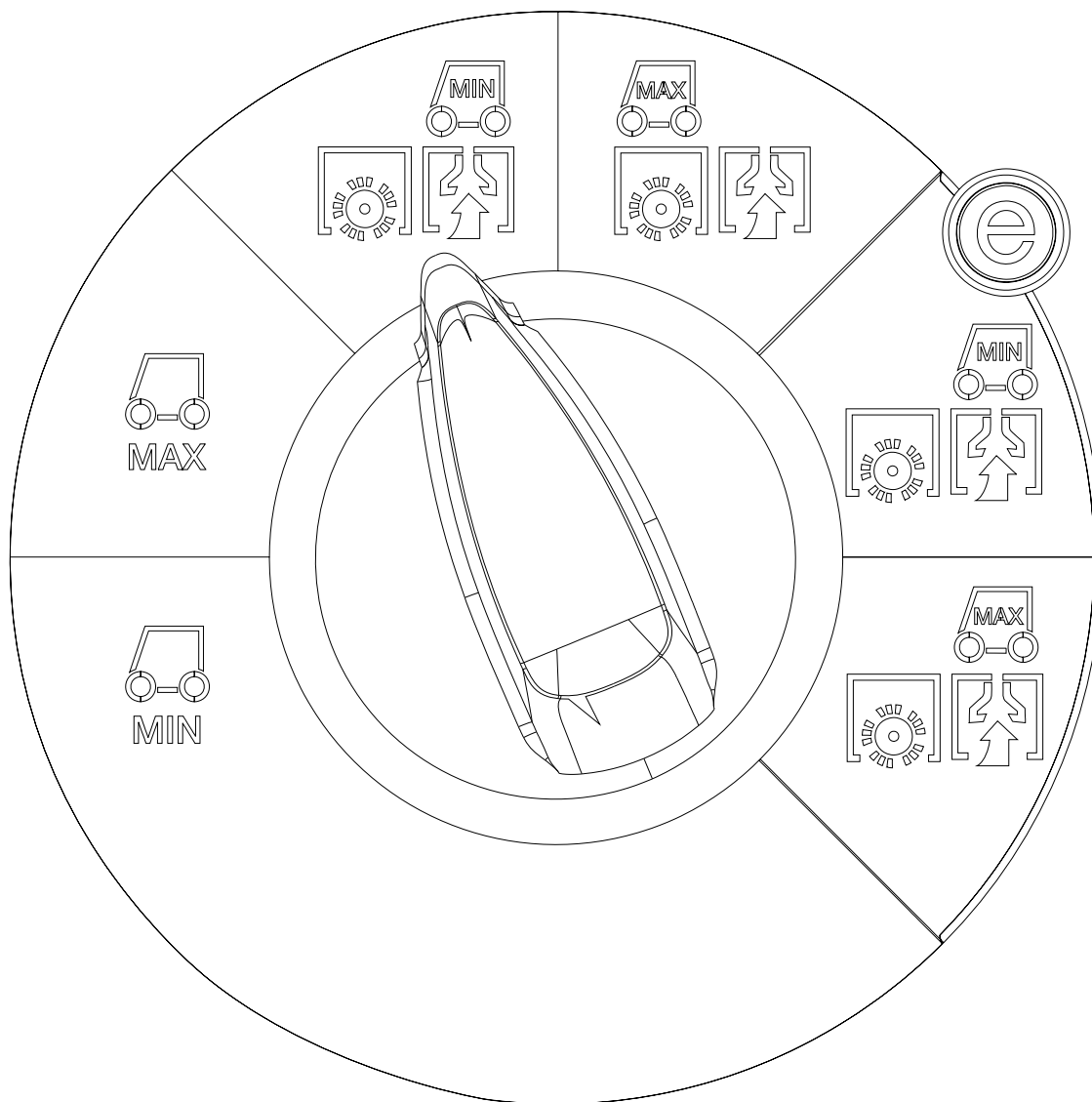
### 5. Horn Button

The horn is activated by pressing the horn button.

### 6. Steering Wheel

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

### 7. Function Mode Switch







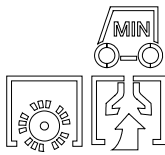
**Slow Transport**

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



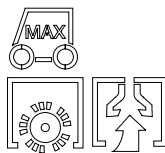
**Fast Transport**

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



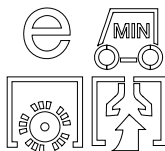
**Deep vacuuming**

This mode is used for deep 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.



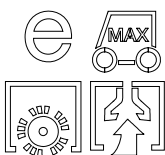
**Light vacuuming**

This mode is used for light vacuuming. In this mode the machine will propel at fast 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 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.



**Daytime Light Vacuuming**

This mode is used for daytime light vacuuming. In this mode the machine will propel at fast 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.

### **8. Battery Charge Level Indicator**

Indicates the charge level of the batteries.

The meter display is divided into 10 bars. Bars illuminated on the far right indicate full charge. Bars flashing near the left side indicate the batteries should be recharged. Further operation of the machine could damage the machine or the batteries.

When the machine is left overnight with less than a full charge, the display may initially indicate a full charge. It will also indicate a full charge if the batteries are disconnected, then reconnected. After a few minutes of operation the meter will give the correct charge level.

### **9. Hour Meter**

Records the number of hours the brushes have been run. This information is useful in determining when to service the machine.

### **10. Vacuum Bag Status Light**

If vacuum operating conditions are good, light is green.

If vacuum operating conditions are poor, light flashes red for 1 minute, then turns solid red and vacuum operations are stopped.

### **11. Error Indicator (Lithium Only)**

Indicates any errors that the machine may experience when the machine is equipped with lithium batteries.

## 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.
3. Press the Drive Reset Directional Control Switch to set the intended direction for travel.
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.

## Operations

### Normal Vacuuming

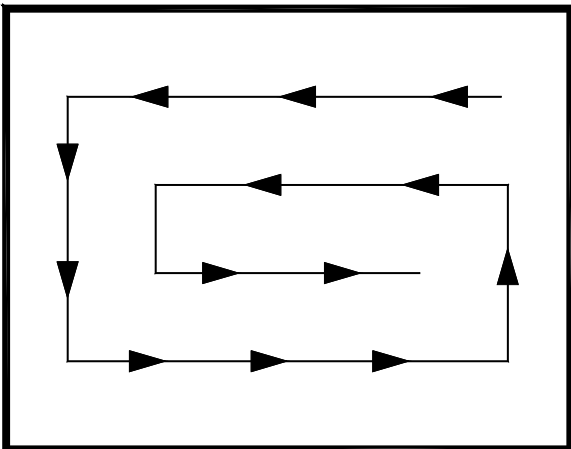
Plan the vacuuming pattern in advance. The longest track is around the perimeter of the area to be cleaned. For efficient operation, the runs should be the longest possible without turning or stopping.

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.**

#### **⚠ ATTENTION:**

**Lorsque vous utilisez la machine en présence de gens, portez une attention particulière aux mouvements inattendus. Soyez plus prudent, surtout en présence d'enfants.**

1. Stand on the operator platform. Throttle pedal must not be depressed.
2. Turn key switch to turn machine power on.
3. Check position of Directional Control Switch to ensure that machine is set to travel in direction intended.
4. Rotate the Function Control Switch to one of the four vacuum settings. Vacuum motor will turn on within a few seconds.
5. Depress the throttle pedal to drive machine and turn on brushes and side broom.

## 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.

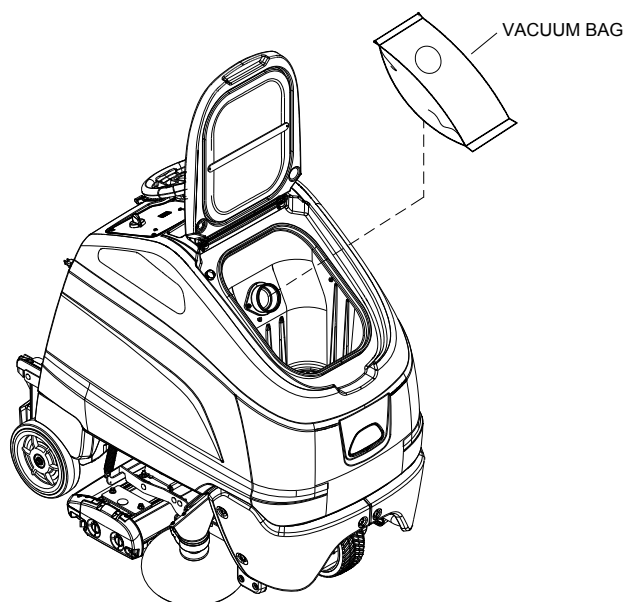
*FOR SAFETY: Before leaving or servicing machine: stop on level surface, turn off machine and remove key.*

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

## Changing Vacuum Bag

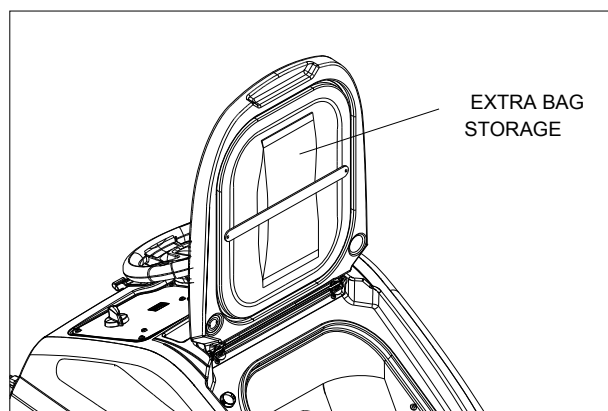
A convenient bag storage strap is located on the underside of the lid.

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



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 from the storage strap on the cover lid.



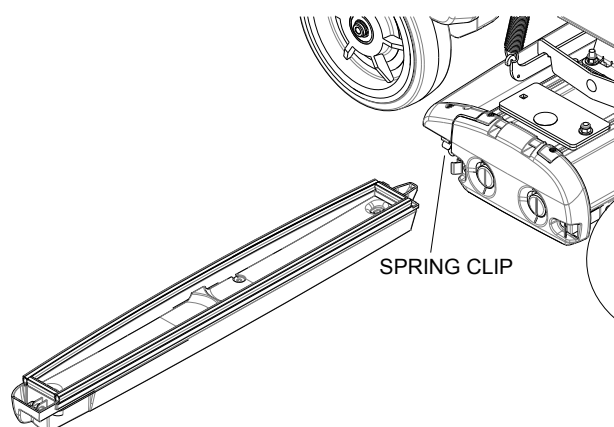
8. Place a new vacuum bag in the vacuum box and push the lip over the nozzle.
9. Close lid.

## Debris Tray Removal

1. Release the debris tray spring clip.
2. Slide the debris tray away from machine.

## Debris Tray Installation

1. Slide the debris tray into the debris tray mount notch.
2. Secure with debris tray spring clip.

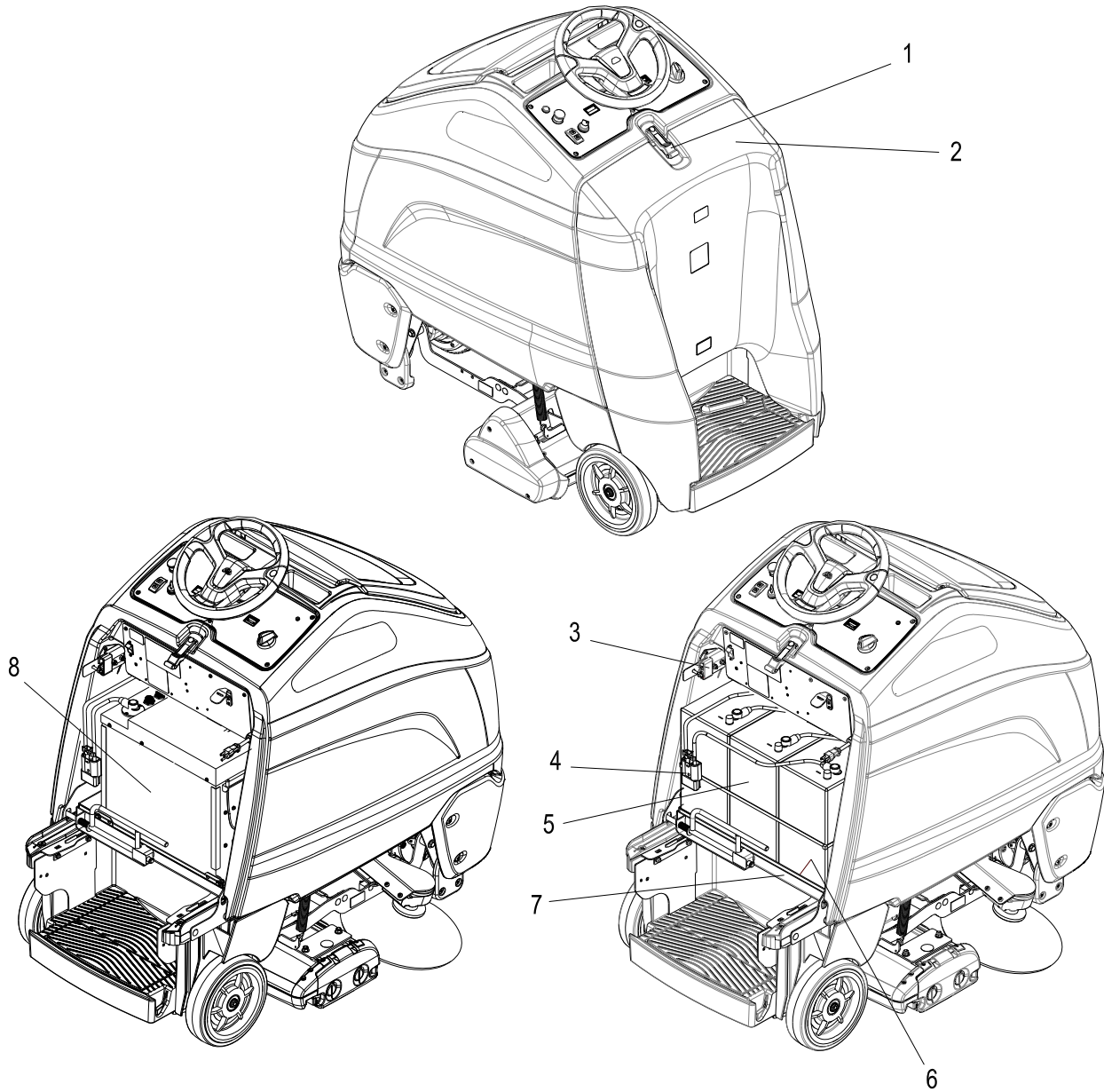




**Service Schedule**

<b>MAINTENANCE</b>	<b>BEFORE EACH WORK PERIOD</b>	<b>AFTER EACH WORK PERIOD</b>	<b>50 HRS</b>	<b>100 HRS</b>	<b>200 HRS</b>
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 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, intake, and microfilters.				*	
Check brake.					*
Check all motors for carbon brush wear.					*
Check motor commutators.					*
Check steering chain tensioner.					*
Check brush deck ATV 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.					*

## Batteries



1. Rear Cover Latch
2. Rear Cover
3. Battery Connector-Machine
4. Battery Connector-Battery
5. Batteries
6. Battery Tray Liner
7. Battery Tray
8. Batteries - Lithium Option



## Batteries (Wet Cell 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.**

### **⚠ ATTENTION:**

**Lors de l'entretien de la machine, évitez tout contact avec l'acide de batterie.**

### **⚠ WARNING:**

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

### **⚠ AVERTISSEMENT:**

**Les batteries émettent du gaz hydrogène. Une explosion ou un incendie peut en résulter. Maintenez les étincelles et les flammes nues à l'écart. Gardez les carters ouverts lors du chargement.**

### **⚠ WARNING:**

**Wear eye protection and protective clothing when working with batteries.**

### **⚠ AVERTISSEMENT:**

**Portez des lunettes de protection et des vêtements de protection lorsque vous travaillez avec des batteries.**

### **⚠ WARNING:**

**Charge batteries in a well ventilated area.**

### **⚠ AVERTISSEMENT:**

**Chargez les batteries dans un endroit bien ventilé.**

## Battery Maintenance

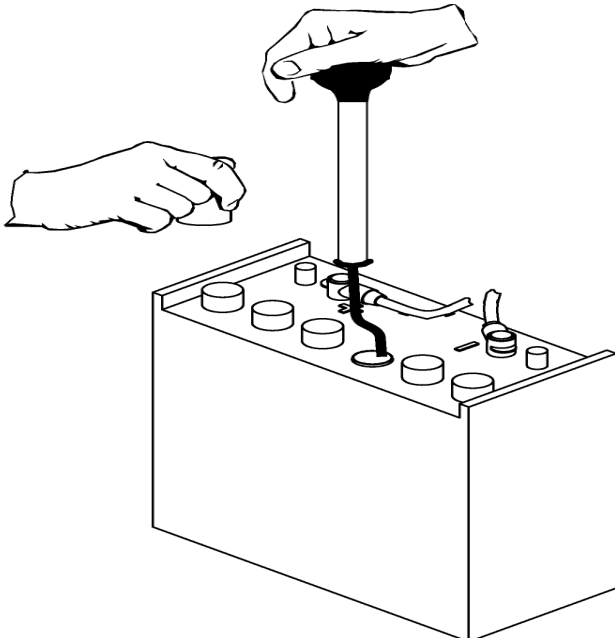
1. When cleaning the batteries, use a solution of baking soda and water. Do not allow the cleaning fluid to enter the battery cells, electrolyte will be neutralized.
2. Maintain the proper electrolyte level in each battery cell. If a cell should accidentally overflow, clean immediately.
3. Wipe off the 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.

## Maintenance

### 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.

<b>SPECIFIC GRAVITY @ 80° F (27° C)</b>	<b>BATTERY CONDITION</b>
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.

#### **⚠ ATTENTION:**

Lors de l'entretien de la machine, évitez tout contact avec l'acide de batterie.

#### **⚠ WARNING:**

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

#### **⚠ AVERTISSEMENT:**

Les batteries émettent du gaz hydrogène. Une explosion ou un incendie peut en résulter. Maintenez les étincelles et les flammes nues à l'écart. Gardez les carters ouverts lors du chargement.

#### **⚠ WARNING:**

Wear eye protection and protective clothing when working with batteries.

#### **⚠ AVERTISSEMENT:**

Portez toujours des lunettes et des vêtements de protection pour travailler sur les batteries.

#### **⚠ WARNING:**

Charge batteries in a well ventilated area.

#### **⚠ AVERTISSEMENT:**

Chargez les batteries dans un endroit bien ventilé.

## External Charger

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 rear cover, turn off breaker, unplug batteries from machine, unlatch and pull out the battery tray to expose batteries.

### **⚠ WARNING:**

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

### **⚠ AVERTISSEMENT:**

**Les batteries émettent du gaz hydrogène. Une explosion ou un incendie peut en résulter. Maintenez les étincelles et les flammes nues à l'écart. Gardez les carters ouverts lors du chargement.**

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. Slide in and latch the battery tray, plug the batteries into the machine, turn on the breaker, and close the rear cover.

## On Board Charger

1. Stop the machine in a clean, well ventilated area next to an AC outlet.
2. Turn "OFF" machine.
3. Open rear cover 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**

### **⚠ AVERTISSEMENT:**

**Les batteries émettent du gaz hydrogène. Une explosion ou un incendie peut en résulter. Maintenez les étincelles et les flammes nues à l'écart. Gardez les carters ouverts lors du chargement.**

4. (Wet Cell Only) Unlatch and pull out the battery tray to expose batteries.
5. (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.
6. (Wet Cell Only) Install the battery caps, and leave them in place while charging.
7. Release the charger cord. Connect the charger AC plug to a wall outlet. The charger gauge should indicate that the batteries are charging. Leave rear cover open slightly to allow venting.
8. When the batteries are fully charged, disconnect the charger from the AC wall outlet and secure the charger cord.
9. (Wet Cell Only) Check the electrolyte level. It should be up to the indicator ring. If necessary, add distilled water. Install the battery caps.
10. (Wet Cell Only) Slide in and latch the battery tray.
11. Turn on the breaker, and close the rear cover.

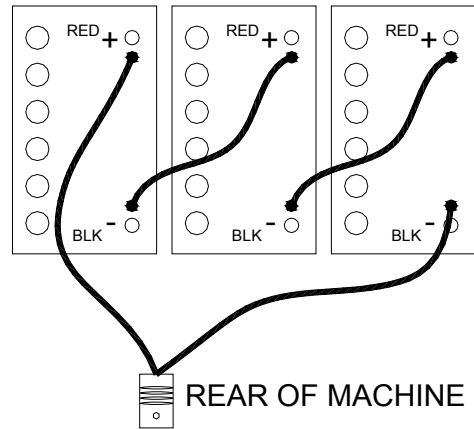
## Maintenance

### 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 the rear cover.
2. Turn off breaker and disconnect battery pack from machine.
3. Unlatch battery tray from machine and pull out to expose batteries.
4. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from batteries.
5. Disconnect main positive lead and secure cable terminals away from batteries.
6. Loosen both terminals on each jumper cable and remove one at a time.
7. Prepare a suitable site to place the batteries.
8. 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.

### **⚠ AVERTISSEMENT:**

Fixez le dispositif de levage de batterie approprié et levez les batteries de la machine. Les batteries constituent un danger potentiel pour l'environnement. Consultez le fournisseur de votre batterie pour connaître les méthodes d'élimination sûres.

### Onboard Charger (Optional)

**⚠ CAUTION:**

Circuit Breaker must be off before unplugging batteries or connecting the charger AC plug to a wall outlet.

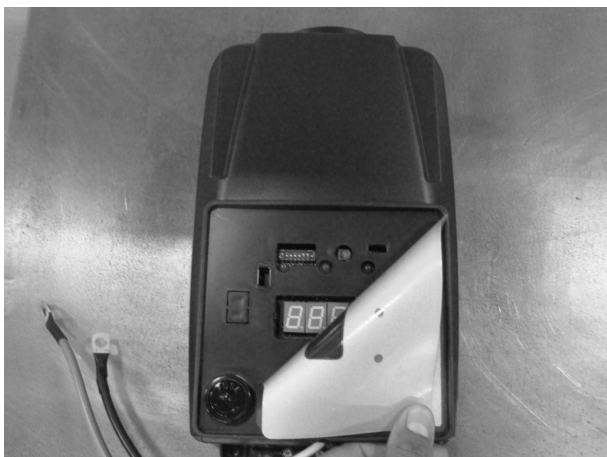
**⚠ ATTENTION:**

Le disjoncteur doit être coupé avant de débrancher les batteries ou de connecter la fiche CA du chargeur à une prise murale.

4. Replace charger label and lower charger back into cover. Tighten four nuts to secure charger to mounting bracket.

### Battery Charger Programming

*For machines equipped with optional on-board charger. When replacing batteries, charger programming changes may be required. If replacing batteries with same type, (e.g. maintenance free batteries with maintenance free) no programming is required. If replacing batteries with different type (e.g. maintenance free with wet cell), programming changes are required. Failure to make programming changes may lead to reduced battery life.*



1. Remove four nuts from charger mounting bracket. Lift charger out of cover.
2. Peel back label on charger to access DIP switches.
3. Change switches to correct battery type.

	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
LEAD ACID	OFF	ON	ON	ON	OFF	ON	ON	OFF
DISCOVER AGM	ON	OFF	OFF	OFF	OFF	ON	ON	OFF

## **Maintenance**

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### **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.**

### **! AVERTISSEMENT:**

**Les batteries au lithium présentent un risque chimique si elles sont mal utilisées, manipulées incorrectement.**

#### **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	12-36-6700
Continuous Charge Current	150A
Continuous Discharge Current	150A
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.

### **⚠ ATTENTION:**

Ne pas installer de batteries en série. Sélectionner le modèle de batterie AES approprié pour la tension du système.

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

## Fuse

Fuse provides back-up over-current protection.

## Fuse Replacement

A blown fuse requires service from a qualified technician. Contact your Discover supplier for more information.

## Maintenance

### Handling

#### **⚠ WARNING:**

Read Safety Section before installing the battery.

#### **⚠ AVERTISSEMENT:**

Lire les directives de sécurité avant d'installer la batterie.

- 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.

#### **⚠ AVERTISSEMENT:**

Lire les directives de sécurité avant d'installer la batterie.

### Tools

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

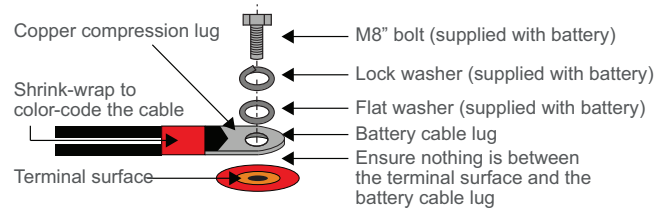
### Securing Battery

- 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

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.

### **⚠ ATTENTION:**

Toujours s'assurer que les chargeurs de courbe respectent l'exigence de charge de la batterie. ne jamais charger une batterie visiblement endommagée; ne jamais charger une batterie gelée.

1. Connect the charger leads to the battery.
2. Make sure that the charger lead, both at the charger and the battery side, connections are tight.
3. Turn the charger on.
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

### **⚠ ATTENTION:**

**TOUS LES CHARGEURS NE SONT PAS APTE À CHARGER DES BATTERIES AU LITHIUM.**

Durant la conception du système, **CONFIRMER** que le chargeur que vous avez choisi n'est pas capable d'une hausse de tension dépassant les **COTES DE BORNE MAXIMALES** de la batterie.

## Discharging

- Turn on battery.
- Turn on load

*NOTE: Do not discharge battery below recommended minimum operating voltages.*

*NOTE: Do not discharge battery at rates greater than recommended operating currents.*

## 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.

## Protection & Faults

- BMS (battery management system) generates faults when maximum operating limits are reached.
- BMS sounds a buzzer when fault limits are triggered.
- BMS monitors the following information for faults and warning:
  - Cell module voltage
  - Battery current
  - Battery temperature

## Faults & Corrective Actions

In the event of a fault the BMS (battery management system) will sound an audible buzzer warning and the system will shut off after a 120 second delay.

FAULT LEVELS	
Parameter	Trigger Point
High Temperature	60°C / 140°F
High Voltage	3.7 V in any cell module
Low Voltage	2.5 V in any cell module
Over Current	150 A

CORRECTIVE ACTIONS	
<b>High Temperature</b>	Stop discharge or charge Leave the battery to cool
<b>Low Temperature</b>	Stop discharge or charge
<b>High Voltage</b>	If charging, stop charge
<b>Low Voltage</b>	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
<b>Over Current</b>	Reduce current
<b>Low SOC</b>	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

Battery Won't Turn On:

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

<b>Symptom</b>	Was the battery left on or stored for extended periods of time?
<b>Description</b>	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.
<b>Action</b>	Do not use. Replace and recycle.

## Changing Battery

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 the rear cover.
2. Disconnect battery from machine.
3. Unlatch battery tray from machine and pull out to expose battery.
4. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from battery.
5. Disconnect main positive lead and secure cable terminals away from battery.
6. Prepare a suitable site to place the battery.

### **⚠ 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.**

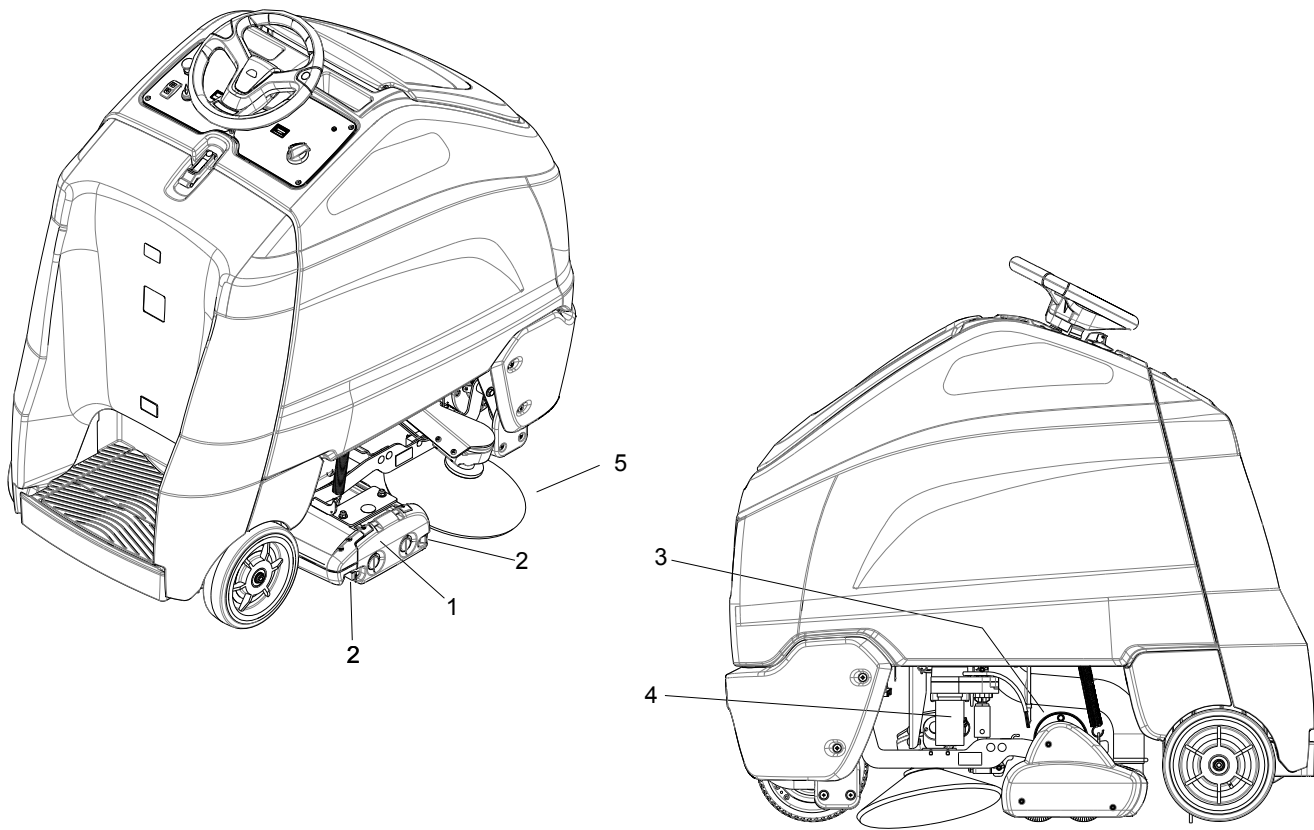
### **⚠ AVERTISSEMENT:**

**Fixez le dispositif de levage de batterie approprié et levez les batteries de la machine. Les batteries constituent un danger potentiel pour l'environnement. Consultez le fournisseur de votre batterie pour connaître les méthodes d'élimination sûres.**

## 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.





### Brush Deck

1. Brush Deck
2. Brush Release Clips
3. Brush Motor
4. Brush Deck Lift Actuator
5. Side Broom

## Brush Removal & Bearing Cleaning

*NOTE: The brushes should wear evenly side to side. Brushes should be replaced as a set when bristle length wears to height of yellow PerformAlert™ bristles.*

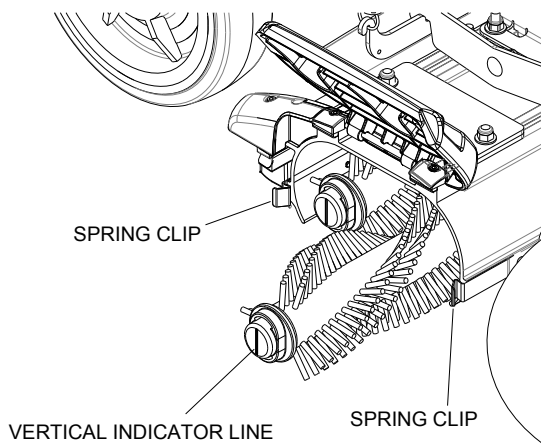
The brushes are removed from the right side of the machine.

1. Release door spring clips and rotate the brush door up.
2. Slide the brushes out the side opening.
3. Remove bearing cap from end of brush.
4. Clean bearings and cap.



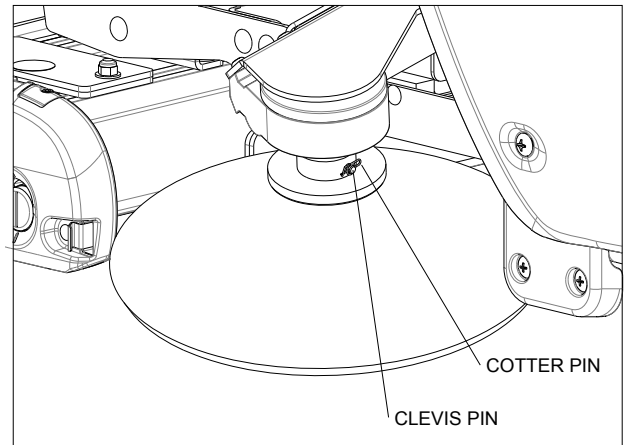
## Brush Installation

1. Slide brush through door opening and onto drive shaft. Make sure it is fully seated and is driven by the deck system.
2. Rotate the brush caps until the indicator lines on the ends are vertical.
3. Lower the brush door and ensure both spring clips engage.



## Side Broom Removal

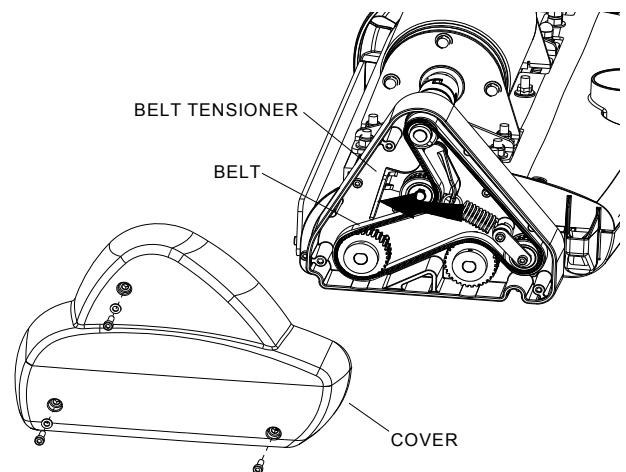
1. Remove cotter and clevis pins from side broom assembly.
2. Slide side broom from assembly.
3. Reverse process to assemble.



## Belt Replacement

1. Remove three (3) cover screws and cover.
2. Push belt tensioner to the left as shown to release belt tension. Remove belt and discard.
3. Thread new belt through pulley's and tensioner.
4. Re-install cover.

*NOTE: Belt must be installed with lettering facing out. If installed incorrectly this may cause excessive noise*



## **Maintenance**

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### **Remove Brush Deck**

1. Lower brush deck.
2. Turn off machine.
3. Disconnect brush motor power cable.
4. Disconnect vacuum hose from debris tray.
5. Unhook spring lift plate from linkage arms.
6. Remove clevis pin and hardware that connect the crossbar deck bracket to the deck actuator.
7. Remove both halves of the bumper.
8. Remove (2) screws & hardware that fasten linkage arms to front support brackets.
9. Slide deck and linkage arms out left side of the machine.
10. Reverse process to reassemble.

### **Replace Brush Deck Motor**

1. Remove brush deck from machine (see above).
2. Remove (2) shaft cover nuts holding shaft cover in place and remove shaft cover.
3. Remove (4) nuts to free motor mounting bracket from deck.
4. Remove motor with attached coupler hub.
5. Remove (6) motor mount bracket face screws.
6. Remove mounting brackets from motor.
7. Remove coupler hub (1 set screw) from old motor for reuse.
8. Reverse process to reassemble with new motor.

### **Brush Deck Actuator Removal/ Replacement**

***FOR SAFETY: Before leaving or servicing machine, stop on a level surface. Turn off machine.***

1. Lower brush deck.
2. Turn off machine.
3. Remove actuator cable from the P clamps holding it in place.
4. Disconnect actuator cable.
5. Remove clevis pin and hardware that connect the deck actuator to the crossbar deck bracket.
6. Remove clevis pin and hardware that connect the deck actuator to the actuator mount bracket.
7. Remove actuator.
8. Remove (2) screws that hold the bracket to the actuator barrel. Separate bracket and remove from barrel.
9. Reverse process to reassemble with new actuator. Actuator will need to be adjusted (see Deck Actuator Adjustment).

## Deck Actuator Adjustment

The actuator will need to be adjusted when replaced.

### To adjust the actuator:

1. While holding the actuator barrel to prevent it from spinning, apply power to the actuator such that it is fully extended. Positive power to white wire, and negative/ground to black. Limit switch within actuator will prevent overtravel.
2. Turn barrel out one or more full turns to assure that when it is retracted it will not bind against itself.
3. While holding actuator barrel to prevent it from spinning, apply power to the actuator such that it is fully retracted. Positive power to the black wire, and negative/ground to white wire. Limit switch within actuator will prevent overtravel.
4. With actuator fully retracted, turn barrel in until it touches the base of the threaded shaft.
5. At the bottomed out position, turn the barrel out one full turn.
6. Connect actuator to lift linkage. If holes in barrel do not align with linkage brackets, turn barrel out only enough for proper alignment.
7. Raise and lower brush deck. Ensure actuator barrel does not bottom out.

## **WARNING:**

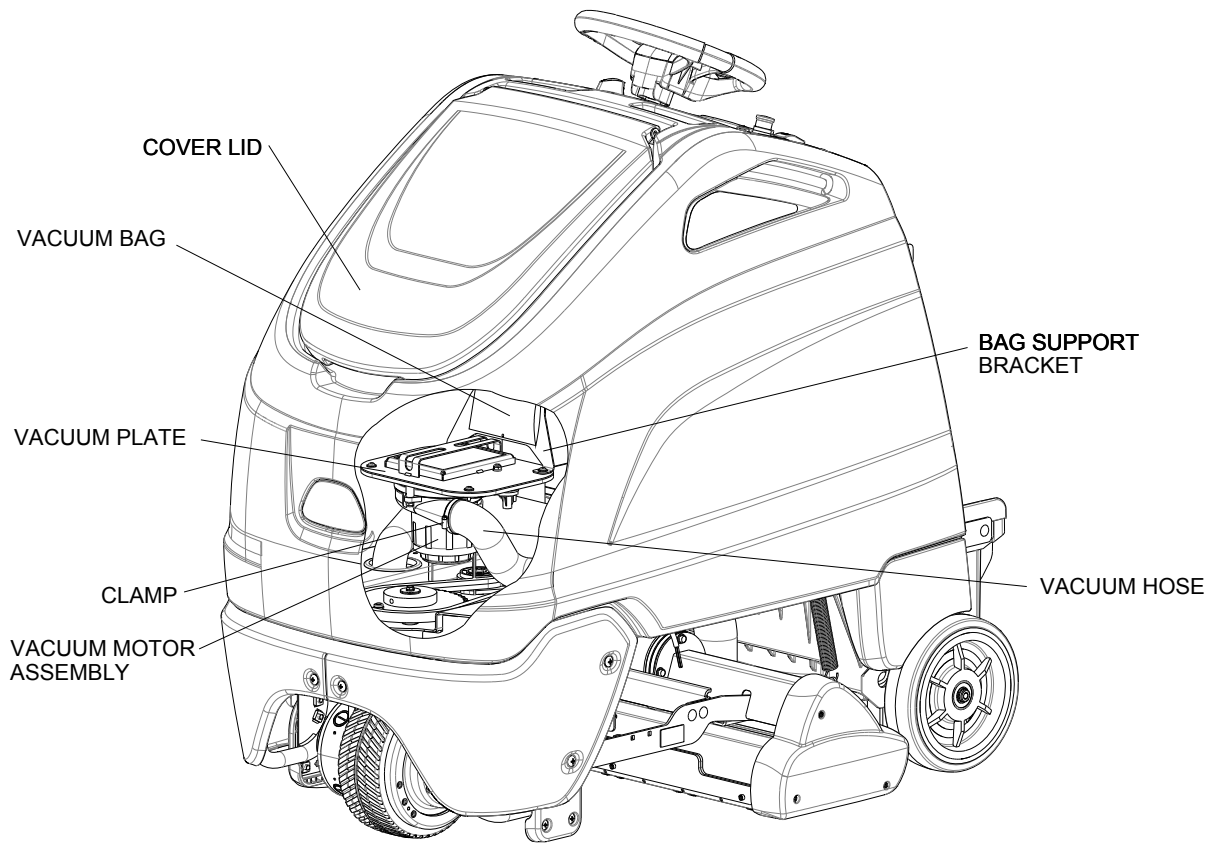
**Do not use a pressure washer to clean around the brush motors. Use tap pressure only.**

## **AVERTISSEMENT:**

**N'utilisez pas de nettoyeur haute pression pour nettoyer autour des moteurs des brosses. Utilisez seulement la pression du robinet.**

## Brush Motor Carbon Brush Replacement

1. Scribe alignment marks on motor barrel to motor caps. Remove two bolts.
2. Remove end cap opposite motor shaft from motor.  
*NOTE: Do not lose the three wave washers contained in the motor cap. Note the order of the washers.*
3. Release brush from spring tension. Remove screw connecting brush wire lead to brush holder. Clean brush holder to ensure free movement.
4. Retract spring and install new brush. Install connector screw and lead.
5. When all new brushes are installed, retract each brush until the spring pushing against the side of the brush holds it in place.
6. Carefully place end cap onto bearing on motor shaft.  
*NOTE: Use care to ensure washer alignment.*
7. With end cap in partially installed position, push brushes into contact with motor commutator.  
*NOTE: Failure to ensure all brushes are released will result in motor failure.*
8. Reinstall end caps and realign to scribe marks on motor barrel. Reinstall the two bolts, maintaining alignment between motor barrel and cap.



### **⚠ 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.

### **⚠ AVERTISSEMENT:**

Déconnecter les batteries avant de travailler sur la machine. La machine ne doit être confiée qu'à un personnel qualifié. Porter systématiquement des lunettes et des vêtements de protection lors d'une intervention sur les batteries ou aux alentours. Éviter tout contact de la peau avec l'acide contenu dans les batteries.

### **To Remove Vacuum Motor**

1. Turn off machine.
2. Raise cover lid.
3. Remove vacuum bag.
4. Remove (4) screws and hardware holding vacuum plate and bag support bracket cover. Remove (2) nuts holding vacuum motor to vacuum plate. Remove vacuum plate.

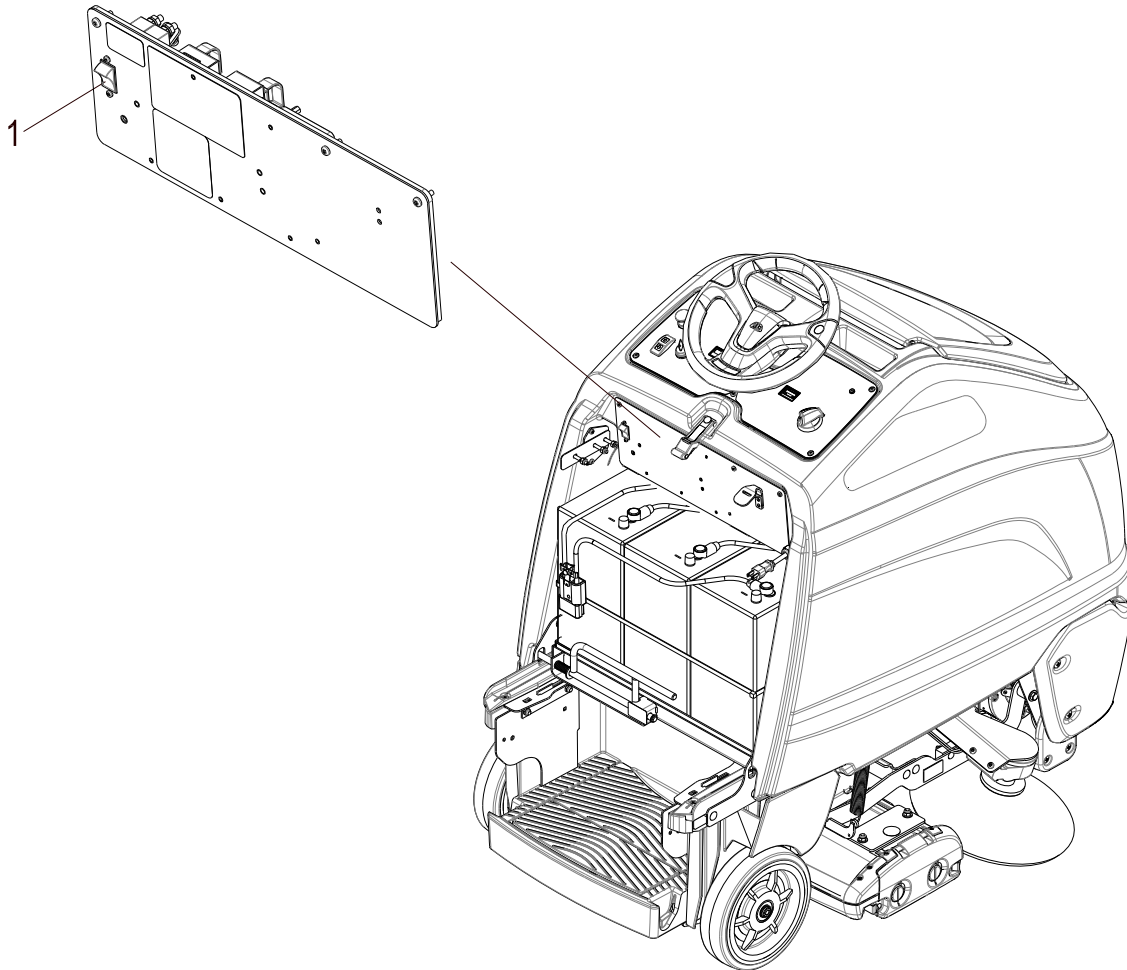
5. Loosen hose clamp, then disconnect hose from assembly.
6. Disconnect vacuum motor cables.
7. Remove vacuum motor assembly from machine.
8. Reverse process to assemble.

### **Vacuum Motor Carbon Brush Replacement**

1. Remove vacuum motor.
2. Remove (2) screws on top of motor case and lift case to reveal coils.
3. Remove (4) brush clamp screws.
4. Remove brushes.
5. Reverse process to assemble with new brushes.



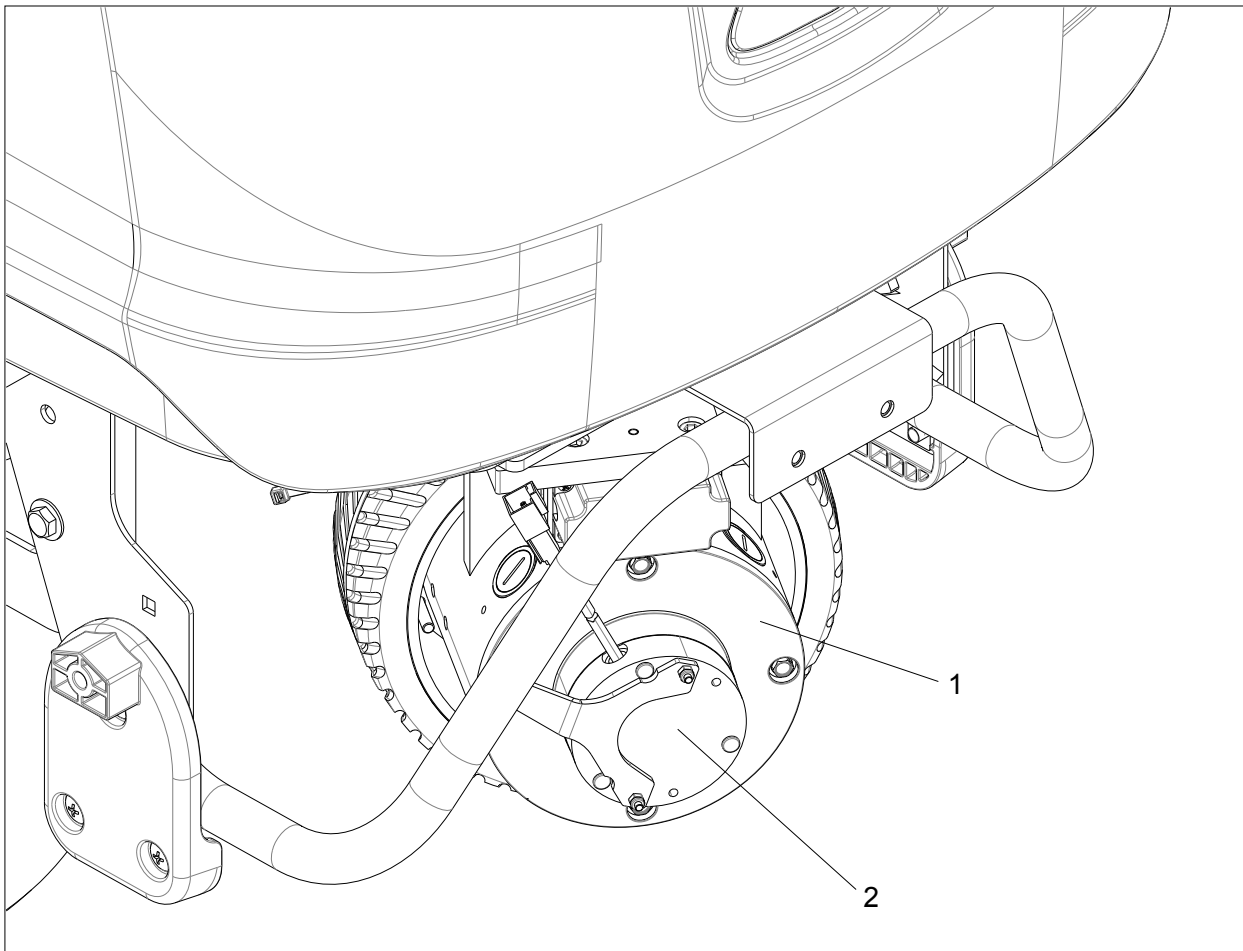
## Circuit Protection



### 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.



**Drive Motor**

- 1. Drive Motor
- 2. Brake

## Electric Brake Engagement

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

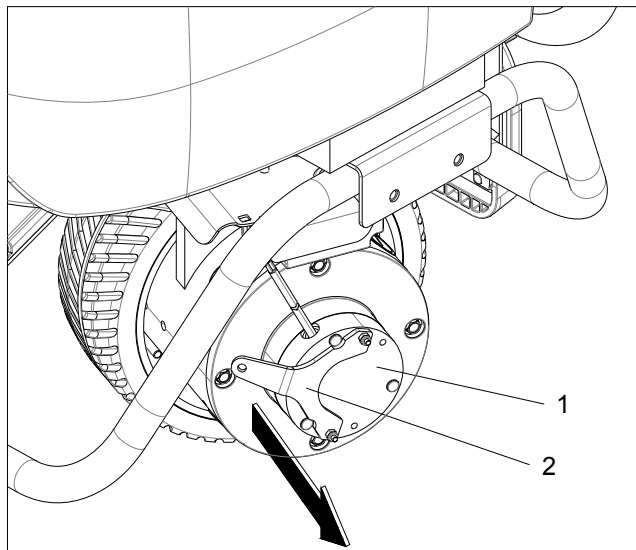
## Electric Brake Engagement

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. Pull lever away from brake housing.
2. Insert material to hold brake lever away from brake housing.

### **⚠ WARNING:**

Do not operate machine with brake disengaged.

### **⚠ AVERTISSEMENT:**

N'actionnez pas la machine avec le frein désengagé.

## Drive Motor Carbon Brush Replacement

### **⚠ WARNING:**

Do not use a pressure washer to clean around the motors. Use tap pressure only.

### **⚠ AVERTISSEMENT:**

N'utilisez pas de nettoyeur haute pression pour nettoyer autour des moteurs des brosses. Utilisez seulement la pression du robinet.

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

1. Disconnect batteries from machine.
2. Remove right bumper.
3. Remove brush caps from motor housing.
4. Remove brushes.
5. Reverse process to reassemble with new brushes.

## Maintenance

### 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.

#### Machine Tie-Downs

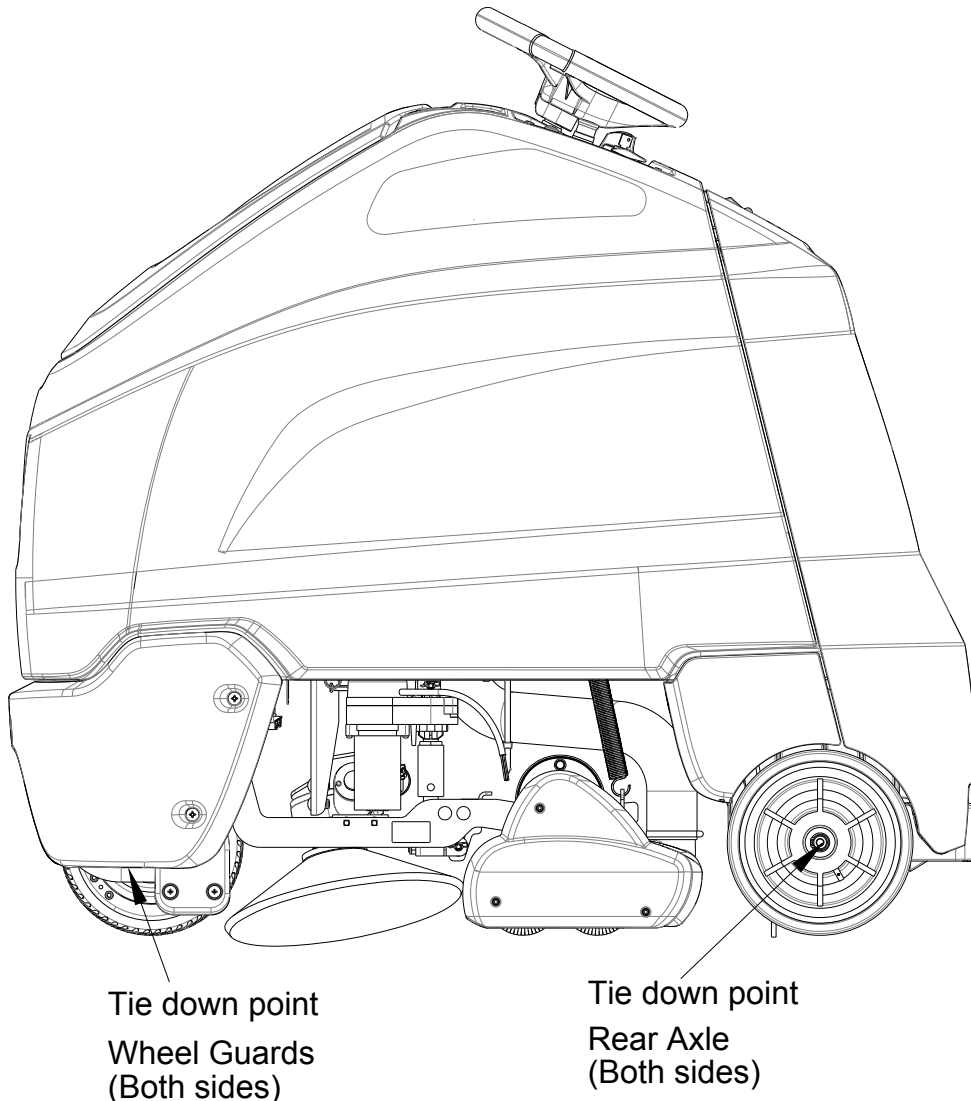
There are four tie down points, two on the front wheel guards, and two on the rear axle located on either side of the foot box.

### Trailer Loading/Unloading

Brush deck must be in the up position before loading.

Once loaded, lower brush deck, turn off machine, and ensure brake is engaged. Block the tires to prevent the machine from rolling and tie down machine using indicated anchor points.

Reverse process to unload.



**Troubleshooting**

<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
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 brush
	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 drive reset circuit or switch	Check wires, connections and switch, 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.
Forward speed only Reverse speed only	Faulty forward/reverse switch	Replace Switch
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	Full vacuum bag	Replace vacuum bag
	Clog in vacuum system	Check for and remove debris
	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.


## **Maintenance**

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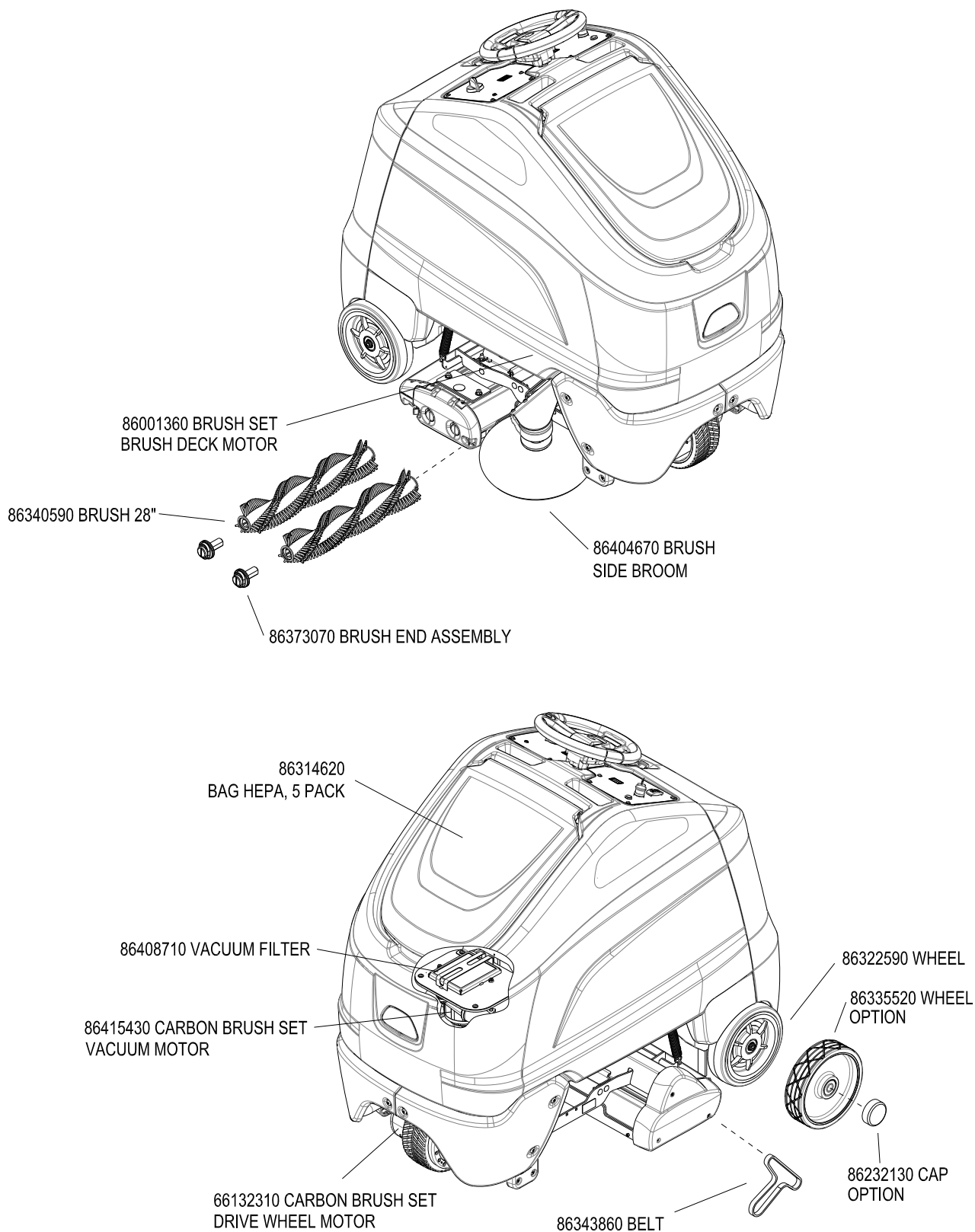
### **Troubleshooting**

<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
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

**Controller Fault Codes**

ERROR CODE DELUXE	PROBLEM	SOLUTION
	TRACTION MOTOR AND CONTROLLER ERROR	THE BATTERY NEEDS CHARGING OR THERE IS A BAD CONNECTION FROM THE BATTERY TO THE TRACTION CONTROLLER. CHARGE BATTERY OR CALL FOR SERVICE AND HAVE TECHNICIAN CHECK WIRING.
	TRACTION MOTOR DISCONNECTED	THE TRACTION MOTOR HAS A BAD CONNECTION. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK WIRING.
	TRACTION MOTOR SHORT CIRCUIT	THE TRACTION MOTOR HAS A SHORT CIRCUIT TO THE BATTERY. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK FOR SHORT CIRCUIT.
	AUX FAULT or DECK ACTUATOR OVERCURRENT	CALL FOR SERVICE AND HAVE TECHNICIAN CHECK AUX OUTPUT DEVICES AND ASSOCIATED WIRING.
	VACUUM MOTOR TRIP	THE VACUUM MOTOR HAS EXCESSIVE CURRENT. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK FOR SHORT CIRCUIT OR OTHER DAMAGE.
	BRUSH MOTOR TRIP	THE BRUSH MOTOR HAS EXCESSIVE CURRENT, CALL FOR SERVICE AND HAVE TECHNICIAN CHECK FOR SHORT CIRCUITS, PADS OR OTHER DAMAGE.
	THROTTLE TRIP ERROR	THE THROTTLE IS DEFLECTED OR ASSOCIATED WIRING HAS A BREAK OR SHORT CIRCUIT. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK THROTTLE AND ASSOCIATED WIRING.
	CONTROL SYSTEM TRIP	THE TRACTION CONTROL SYSTEM IS IN ERROR. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK ALL CONNECTIONS TO THE CONTROLLER.
	SOLENOID BRAKE	THE BRAKE SOLENOID HAS A BAD CONNECTION. CALL FOR SERVICE AND HAVE TECHNICIAN CHECK CONNECTIONS TO THE BRAKE.
	HIGH BATTERY VOLTAGE	EXCESSIVE BATTERY VOLTAGE, CALL FOR SERVICE AND HAVE TECHNICIAN CHECK BATTERY CONDITION.
	MACHINE IS NOT REPORTING TO KÄRCHER FLEET	MACHINES WITH KÄRCHER FLEET SUPPORT, CALL FOR SERVICE. MACHINES WITHOUT KÄRCHER FLEET SUPPORT, NO ACTION REQUIRED.

## Suggested Spare Parts









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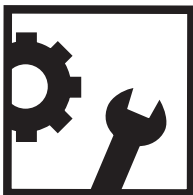


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