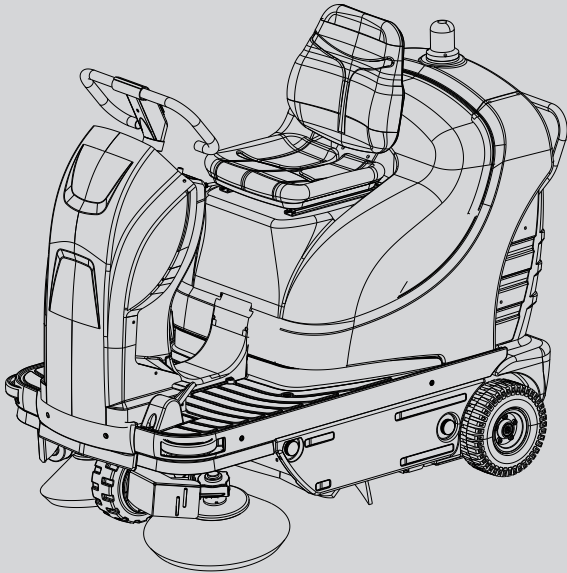




S680

BATTERY SWEEPER

OPERATOR'S MANUAL (EN)



Model Part No.:
MSUB00726 - SWEEPER [S680, 180AH GEL, ANZ]



ANZ



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IMPORTANT SAFETY

PRECAUTIONS

Parts of the text requiring special attention are printed in bold and preceded by the symbols illustrated and described below.



! DANGER:

Indicates the need for care in order to avoid serious consequences that could lead to the death of personnel, or to situations representing a possible health and safety hazard.

! ATTENTION:

Indicates the need for care in order to avoid serious consequences that could involve harm being done to the machine or to the workplace, or lead to economic losses.



! DANGER: If lead-acid (WET) batteries are installed in the machine, keep sparks, flames and smoking materials away from the batteries. Explosive gases can escape during normal use, particularly when recharging the batteries.



! DANGER: If lead-acid (WET) batteries are installed in the machine, charging the batteries produces highly explosive hydrogen gas. Keep the seat cowling tilted toward the steering wheel throughout the battery charging cycle and carry out this procedure only in well-ventilated areas, away from naked flames.



! DANGER: Do not operate the machine in the presence of flammable liquids or vapours, or combustible dusts.



! DANGER: Never pick up toxic materials.



! DANGER: Never pick up burning or incandescent objects.



! DANGER: This machine must not be used on floors where there are hazardous coatings / finishes / materials.

! ATTENTION: Never use the machine on wet surfaces.

Do not use the machine:

- without having read the operating and maintenance manual.
- without having been trained in its use.
- without having been specifically entrusted with its use.
- if legally under age.
- without the debris bin and/or filter in place.
- if the machine is not working properly.
- in places without adequate lighting.
- in explosive environments.
- on public roads.
- where there is dirt that can be harmful to health (dust, gas, etc.).
- where there is danger of falling objects, unless the machine is equipped with an overhead protective structure.
- In areas that are too dark to safely see the controls or operate the machine.

Clothing and equipment:

- Wear safety shoes with non-slip soles.
- Wear protective eyewear or visor and safety garments.
- Depending on the surface being cleaned and on the environment, the protective measures necessary for atomized sprays include respiratory masks with class FFP2 or equivalent or higher protection.

Before starting the machine:

- Check that the machine is not damaged.
- Check the operation of the brake.
- Check that all safety devices are in place and operating correctly.

When using the machine:

- The machine must be operated by one person only.
- Park the machine on a flat, level surface.
- Do not allow children to play on or near the machine.
- Do not use the machine to pick or suck up liquids.
- Do not use the machine to pick up wires, ropes, straps or similar materials.
- Evaluate the type of building the machine is operating in (e.g: hospitals, pharmaceutical or chemical industries, etc.) and scrupulously comply with the safety regulations and conditions in force in these facilities.
- The machine must not be used for purposes other than those expressly intended.
- The machine is intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and business premises generally. Do not use for other purposes.
- Keep all parts of body inside operator station

while machine is moving.

- The machine must be stored only indoors.
- Do not allow the machine to be used as a toy.
- The machine is not designed for towing or being towed.
- Never rest objects of any significant weight on the machine, for whatever reason.
- Never obstruct the air inlet and release vents.
- Never remove, modify or circumvent safety devices.
- During use, atomized spray may form. Inhaling this atomized spray can be harmful to health.
- Work providers must conduct a risk assessment in order to specify the necessary protective measures relating to the formation of atomized sprays, depending on the surface being cleaned and the environment. Masks with class FFP2 or equivalent or higher protection are suitable for protecting against the inhalation of atomized spray.
- Keep hands away from moving parts.
- In the case of malfunction and/or faulty operation, turn the machine off immediately (disconnect from the batteries/mains power supply) and do not tamper with it; contact a service centre approved by the manufacturer.
- The machine is designed to operate in temperatures between +4°C and +40°C. It can be stored in temperatures between +0°C and +50°C when not in use.
- The machine is designed to operate at relative humidity levels between 30% and 95%.
- The machine can operate at altitudes up to 2000 m maximum.
- Use the brake to stop the machine.
- Do not use the machine to clean surfaces on slopes or gradients steeper than indicated on the data plate.
- Do not operate the machine on slopes or gradients steeper than indicated on the data plate.
- When using the machine on gentle gradients, do not move transversely across the slope, but keep the machine on a line parallel to the direction of the incline, manoeuvring carefully and without making U-turns.
- The machine must not be used by persons (including children) with diminished physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised by a person responsible for their safety and have received instruction in the use of the machine.
- Never use the machine to transport people or goods or for towing.
- Do not wear jewellery, watches, ties or other items.
- The operator must always use Personal Protective Equipment: protective apron or

overalls, non-slip waterproof shoes, rubber gloves, protective eyewear and ear defenders, and mask for protection of the respiratory airways.

Before leaving the machine or before maintenance:

- Park the machine on a flat, level surface.
- Turn off the machine and remove the ignition key.
- Apply the parking brake.

When performing maintenance:

- All operations must be carried out in conditions guaranteeing adequate visibility and lighting.
- Isolate the machine from its power source by disconnecting the batteries.
- The operator must always use Personal Protective Equipment: protective apron or overalls, non-slip waterproof shoes, rubber gloves, protective eyewear and ear defenders, and mask for protection of the respiratory airways.
- Do not wear jewellery, watches, ties or other items.
- Do not push or tow the machine without an operator sitting in the driving seat and able to control the steering wheel.
- Protect the batteries from impurities such as metal dust.
- Take care when handling battery acid, and avoid contact. In the event of battery fluid leakage, do not touch the fluid and observe the following precautions: Contact with the skin can cause irritation; wash with soap and water. Inhalation of vapours can cause irritation to the airways; stay out in the open air and consult a doctor. Contact with the eyes can cause irritation; wash the eyes immediately, flooding with water for at least 15 minutes, and consult a doctor.
- Never rest tools on the batteries as they could cause short circuits leading to explosions.
- Always use the battery charger accompanying the machine (if supplied), or if not, a product with specifications as recommended in the technical data.
- Installation of the battery should be entrusted to a TENNANT approved service technician.
- Inspect the power cable of the battery charger periodically to ensure that it is not damaged; in the event of damage being discovered, the appliance cannot be used. Replacement of the cable should be entrusted to a TENNANT approved service technician. Detach both connections of the battery charger (AC side and DC side).
- Do not tug at the battery charger cable to disconnect it from the socket: grip the plug firmly and pull.

- Never wash the machine with water jets.
- Cleaning and maintenance operations that can be performed by the user must not be entrusted to children unless under supervision.
- All repairs must be carried out by a TENNANT approved service technician.
- Use only original accessories and spare parts supplied exclusively by the manufacturer, as only these are able to guarantee safe and trouble-free operation of the machine.
- Never use parts removed from other machines or from other kits.

When the machine is to be loaded onto or unloaded from a vehicle:

- Empty the debris bin before loading the machine.
- Do not drive the machine on a slippery ramp.
- Take particular care when operating the machine on ramps.
- Turn off the machine and remove the ignition key.
- Lock the wheels of the machine.
- Use straps to anchor the machine.

KEEP THESE INSTRUCTIONS SAFE.

SAFETY SYMBOLS



WARNING! RISK OF ENTANGLEMENT



WARNING! RISK OF ACID BURNS



MAXIMUM SLOPE



OPERATOR MANUAL, INSTRUCTIONS FOR USE



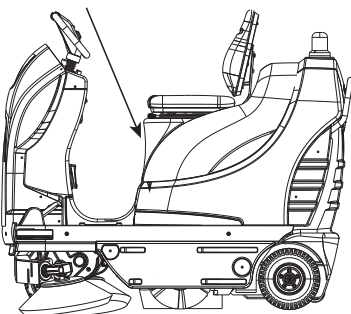
READ THE OPERATOR MANUAL



DIRECT CURRENT SYMBOL



INSULATION CLASS: THIS CLASSIFICATION ONLY APPLIES TO BATTERY POWERED MACHINES.



SAFETY LABEL. THE SAFETY LABEL IS MOUNTED ON THE MACHINE IN THE LOCATION INDICATED. REPLACE THE LABEL IF BECOMES DAMAGED OR ILLEGIBLE.

TECHNICAL SPECIFICATIONS

Cleaning width		mm	650
		inches	25,6
Cleaning capacity per hour		m²/h	4730 - 5860
		ft²/h	50913.29 - 63076.51
Main brush diameter		mm	280
		inches	11.02
Side brush diameter		mm	400
		inches	15,74
Main brush motor power		W	300
		HP	0.4
Side brush motor power		W	60
		HP	0.08
Drive motor power		W	400
		HP	0.53
Suction motor power		W	180
		HP	0.24
Filter shaker motor power		W	90
		HP	0.12
Machine power (P _M)		W	1200
		HP	1.6
Maximum speed		km/h	6
		mph	3.72
Debris bin capacity		l	70
		galls.	18.49
Panel filter surface area		m²	3,8
		ft²	40.9
Front wheel diameter		mm	250
		inches	9.84
Rear wheel diameter		mm	250
		inches	9.84
Negotiable gradient			16% / 9°
Gross weight (GVW)		kg	475
		lbs	1047
Weight of the machine in transit without batteries		kg	173
		lbs	381.39
Weight of the machine in transit with batteries		kg	309
		lbs	681.22
Number of batteries		no.	4
Machine voltage V _M		V	24Vdc
Individual battery capacity		Ah (5h)	180
Individual battery weight		kg	34
		lbs	74,95
Supply voltage (battery recharge)	Version without on board battery charger	V	24Vdc
Max current (battery recharge)		I	23A
Machine dimensions		mm	X=1400 x Y=816 x Z=1142
		inches	X=55 x Y=32 x Z=45
Battery compartment dimensions (length, width, height)		mm	480 x 370 x 360
		inches	18.9 x 14.6 x 14.1
Packed size (length, width, height)		mm	1530 x 950 x 1460
		inches	60.23 x 37,4 x 57.48
Sound pressure - Annex DD (Emission of acoustical noise) EN 60335-2-72: 2012		LpA (dB)	72

Measurement uncertainty		K (dB)	3
Measured sound power		Lwa (dB)	74
Measurement uncertainty		K (dB)	3
Guaranteed sound power		Lwa,g (dB)	75
Measurement uncertainty		K (dB)	3
Vibration level (hand) - IEC 60335-2-72		HAV m/sec ²	1,1
Measurement uncertainty, k		m/sec ²	0,6
Vibration level (body) - IEC 60335-2-72		HBV m/sec ²	0,5
Measurement uncertainty, k		m/sec ²	0,2
IP degree		IP	IPX3

Gross weight (GVW): maximum permissible weight with the machine fully loaded and ready for use. The gross weight of the machine includes the detergent solution tank full of clean water, empty dirty water tank (half full in the case of recycling systems), empty dust bags, the hopper filled to its rated capacity, the largest recommended batteries and all accessories such as cables, hoses, detergent, mops and brushes.

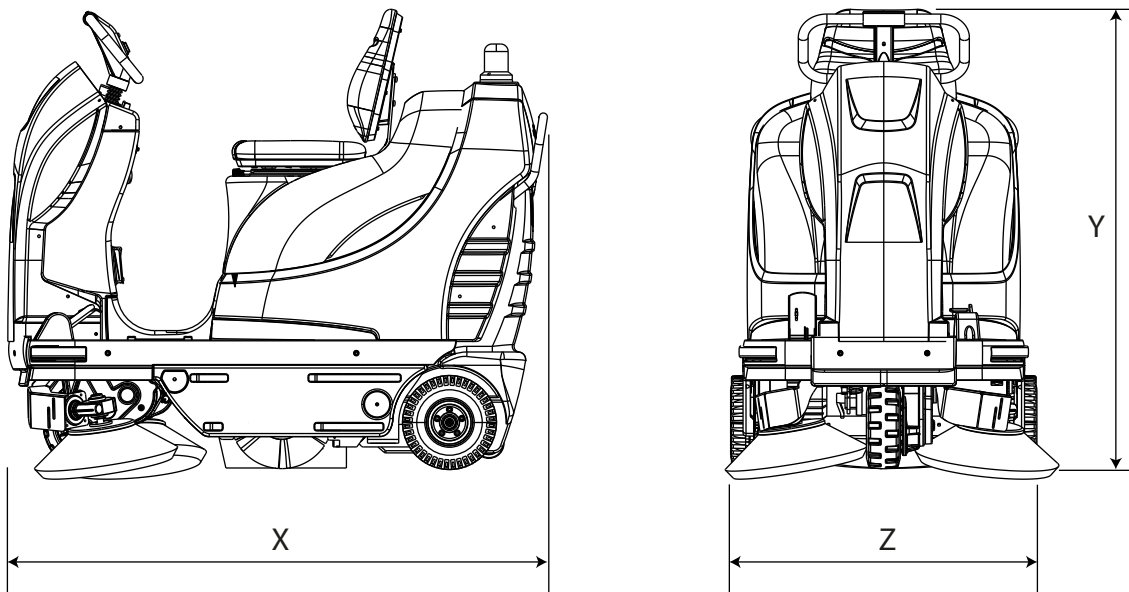
Transported weight: the weight of the machine including batteries, but excluding optionals (for example, the operator's cabin, FOPS (Falling Object Protective Structure), second and third side brushes and front brush attachment), fresh water (in the case of scrubbers or combination machines) and the weight of a standard operator (75 kg).

Data subject to changes without prior warning

V, I: charging / supply values

V_M , P_M : machine in average operating conditions (all functions active)

MACHINE DIMENSIONS



X-Y-Z: See "TECHNICAL SPECIFICATIONS" table

GENERAL INFORMATION

Purpose of this manual

This manual has been written by the Manufacturer and is an integral part of the [machine](#)¹.

It defines the purpose for which the machine has been designed and constructed and contains all the information required by [operators](#)².

In addition to this manual, which contains information for operators, other publications are available providing specific information for [maintenance personnel](#)³.

The terms “right” and “left”, “clockwise” and “anti-clockwise” refer to the forward movement of the machine.

Constant compliance with the instructions provided in this manual guarantees the safety of the operator and the machine, ensures low running costs and high quality results and extends the working life of the machine. Failure to follow these instructions may lead to injury to the operator or damage to the machine, floor and environment.

Consult the table of contents at the beginning of the manual to find the section of interest without delay.

Although your machine may differ appreciably from the illustrations in this document, the correctness and validity of the instructions contained in this manual are guaranteed.

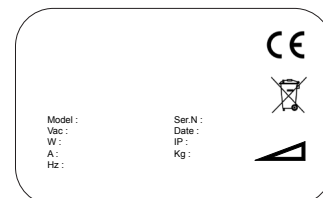
Identifying the machine

The nameplate provides the following information:

- Name of manufacturer.
- Model.
- Serial number.
- Year of manufacture.
- Power supply voltage (charging/supply value).
- Current intensity (maximum charge level, in line as far as possible with the value indicated by the battery manufacturer).
- Gross weight.
- IP degree of protection.
- Machine voltage (in average operating conditions).
- Machine power (in average operating conditions).
- Maximum negotiable gradient.

Documentation provided with the machine

- User manual;
- Wall Chart;
- Battery Charger User Manual (included with charger).



¹ The definition "machine" replaces the trade name covered by this manual.

² Persons responsible for using the machine without performing any operations requiring precise technical skills.

³ Persons with experience, technical training and a knowledge of legislation and standards, able to perform all the necessary operations and to recognise and avoid possible risks in handling, installation, use and maintenance of this machine.

TECHNICAL INFORMATION

Main parts of the machine

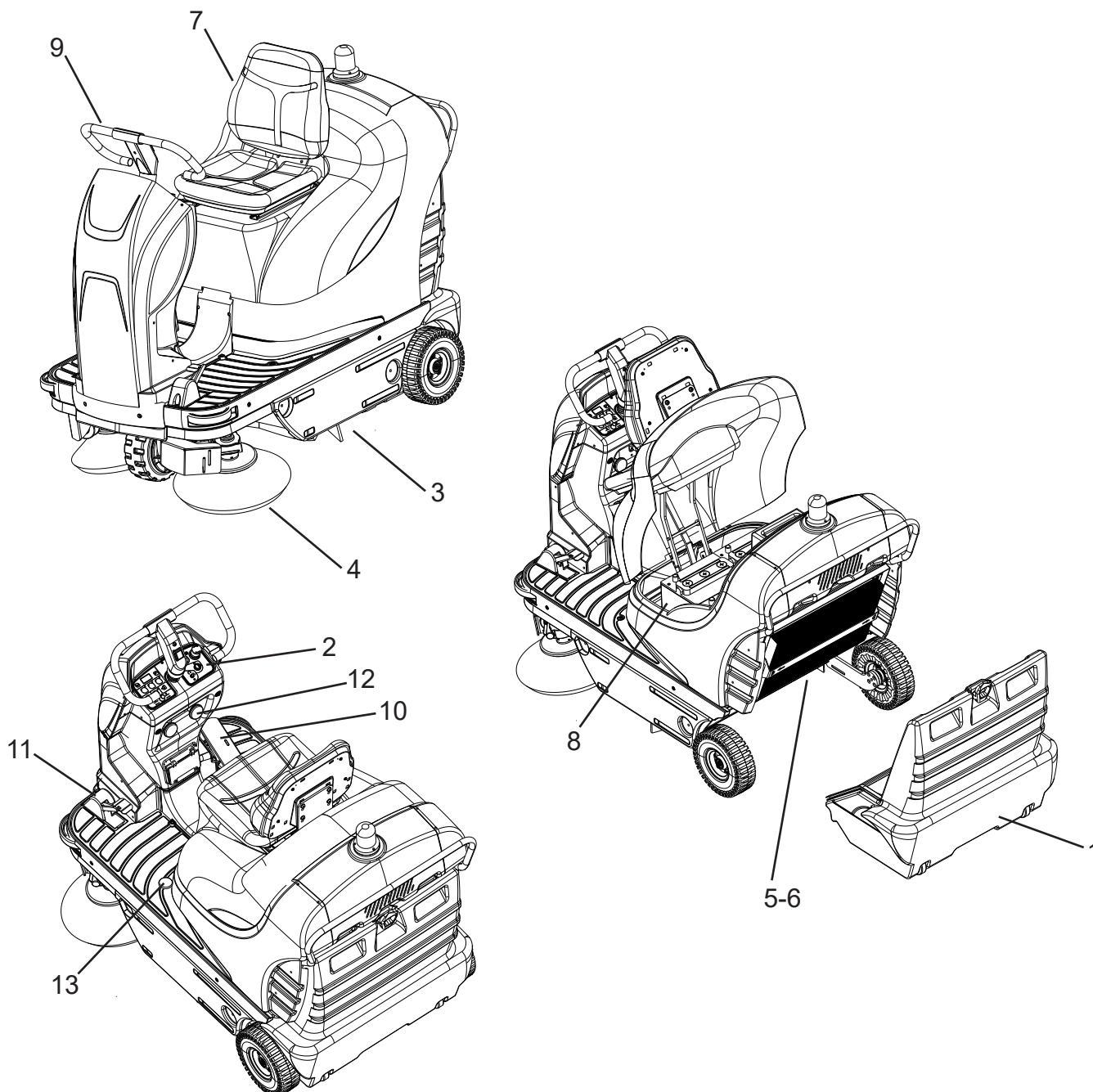
General description

The machine described in this manual is a motorized sweeper designed to sweep floors in civil and industrial premises.

The motorized sweeper may be used to clean the residues of industrial processes, dust and dirt in general on all relatively even, flat and hard surfaces such as concrete, asphalt, porcelain stoneware, ceramic tiles, sheet metal, marble, embossed or smooth rubber or plastic mats.

The main parts of the machine are listed below:

1. Debris bin.
2. Control panel.
3. Centre brush.
4. Side brush.
5. Suction filter.
6. Filter shaker.
7. Driver seat.
8. Battery compartment.
9. Steering wheel.
10. Accelerator pedal.
11. Service and parking brake pedal.
12. Side brush operating lever.
13. "Lift flap" operating pedal, allows the centre brush to pick up bulky objects.



Control panel

The machine has the following controls and indicator lights:

14. Emergency stop button: acts as a safety device.
15. Speed potentiometer: regulates the maximum speed of the machine forwards and backwards.
16. Direction selector switch, to set movement of the machine to forwards or reverse.
17. Display, showing: Battery voltage (Volt), Alarm codes and Hour counter.
18. Horn button.
19. Suction button: enables/disables the suction motor.
20. Work program buttons (AUTOMATIC MACHINE OPERATION): buttons used to set the machine's work program:
 - P1, light duty cleaning program.
 - P2, medium duty cleaning program.
 - P3, heavy duty cleaning program.
21. Drive wheel LED status indicator.
22. Programming button: press this button to scroll the parameters that can be set in the machine's software.
23. Speed potentiometer, regulates the speed of rotation of the side brushes.

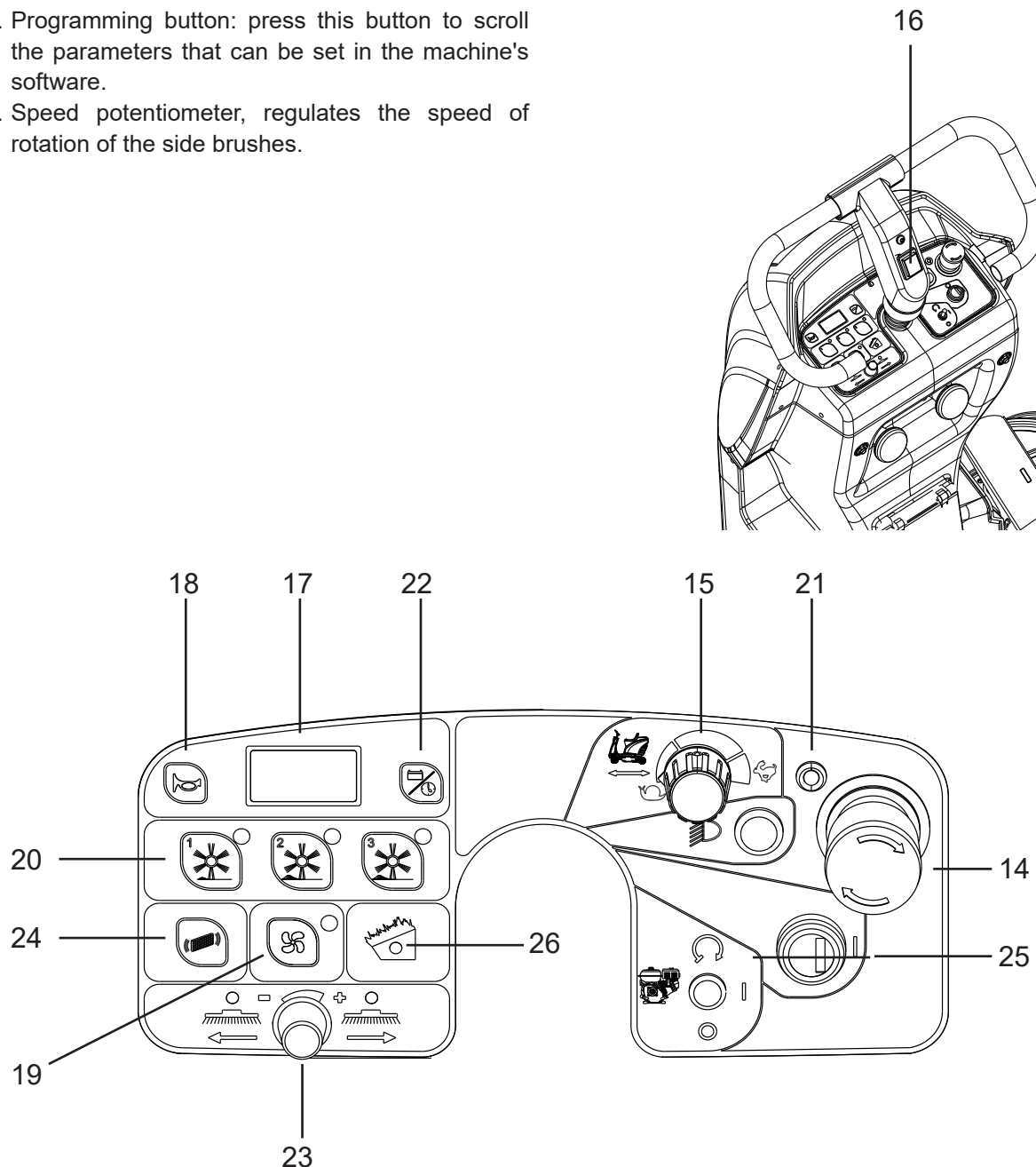
24. Filter shake button, enables manual operation of the filter shaker.

25. Main switch/Ignition switch: connects and disconnects electrical power to and from all functions of the machine.

26. Not used.

Accessories

See list of recommended spare parts



HANDLING AND INSTALLATION

Lifting and transporting the palletized machine

! ATTENTION: during all lifting operations, make sure the palletized machine is firmly secured to prevent it tipping over or being accidentally dropped.

The machine must be loaded onto/unloaded from vehicles in areas with adequate lighting.

The machine is packaged on a wooden pallet by the Manufacturer. It must be loaded on to the transporting vehicle using suitable equipment (see Directive 2006/42/EEC and subsequent amendments and/or additions). At destination, it must be unloaded using similar means.

The palletized body of the machine can be lifted only with the aid of a fork lift truck. Handle with care to avoid impact and ensure the machine is not overturned.

Inspection on delivery

When the carrier delivers the machine, make sure the packaging and machine are both whole and undamaged. If the machine is damaged, make sure the carrier is aware of the damage and before accepting the goods, reserve the right (in writing) to request compensation for the damage.

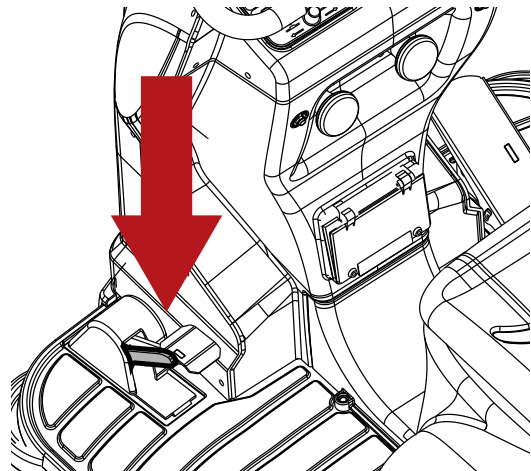
Unpacking

! DANGER: when unpacking the machine, the operator must wear suitable Personal Protection Equipment (gloves, eyewear, etc.) to limit the risk of injury.

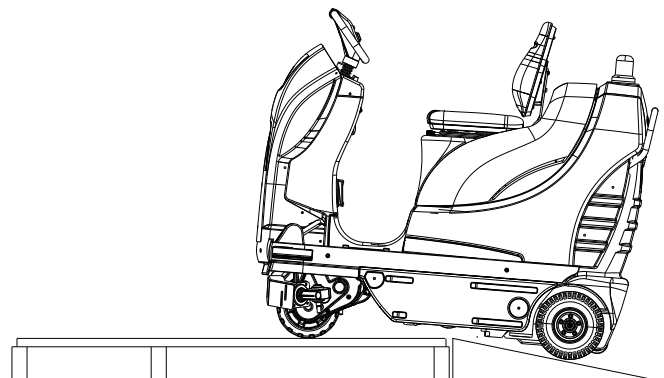
When unpacking the machine, proceed as follows:

- Cut and remove the plastic straps using scissors or nippers;
- Remove the cardboard packaging;
- Remove the side brushes placed inside the battery compartment;
- Remove the bags placed inside the battery compartment and check the contents: user manual; CE certificate of conformity; quick guide; battery bridges with terminals; 1 x connector for battery charger; 2 x hex wrench;

- Remove the metal brackets securing the front/rear wheels and the machine chassis to the pallet base.
- Release the parking brake.



- Using a ramp, push the machine off the pallet in the reversing direction. The machine must not be lifted.



- Remove the brush from its packaging.
- Clean the outside of the machine, taking care to observe safety regulations.

Once the machine is clear of the packaging, proceed to install the batteries, referring to the section “**Batteries: installation and connection**”.

The various items of packaging can be kept, if so desired, as these can be reused to protect the machine in the event of it being moved to a different site or sent to a repair workshop.

If not retained, the packaging must be disposed of in compliance with current regulations.

Batteries

! ATTENTION: do not use NON-rechargeable batteries

Two different types of battery can be installed on these machines:

Leak-proof tubular batteries (WET): the electrolyte level must be checked regularly.

Sealed batteries (GEL or AGM): this type of battery requires no maintenance.

The technical specifications of the battery must correspond to those listed in the section on the “**Technical specifications**” of the machine. The use of heavier batteries could seriously jeopardize manoeuvrability and lead to the drive motor overheating. Lighter batteries of lower capacity, on the other hand, will need to be charged more frequently.

Setting the battery type on the machine

! NOTICE

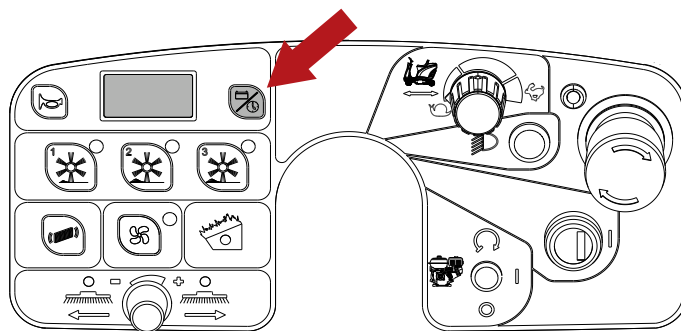
Enter the type of battery installed in the machine software settings.

! ATTENTION: when machines are shipped with batteries installed, the “battery type” parameters are factory-set.

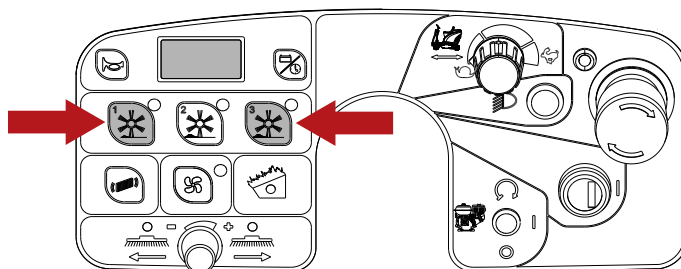
Follow the instructions below to adjust the machine logic settings for the type of battery installed.

- Switch the machine off by turning the key.

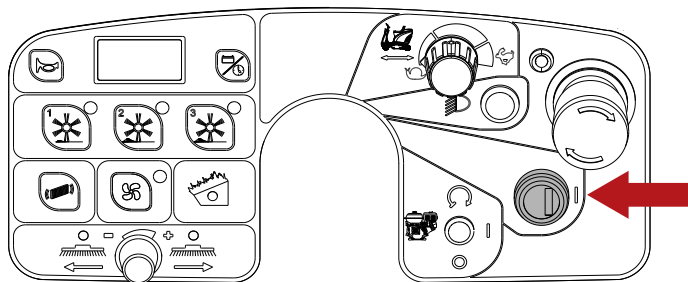
- Press the programming button four times.



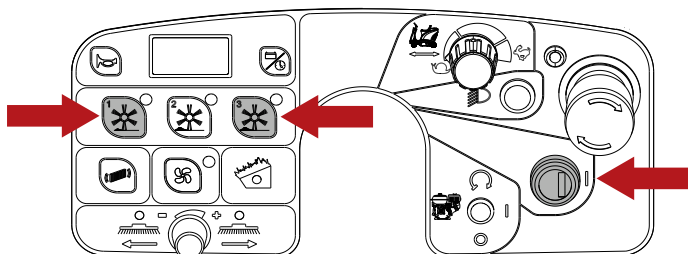
- Select the type of batteries installed using the “P1” or “P3” buttons: “battery ACID” or “battery GEL”.



- Store the parameter by pressing and holding the programming button until the display shows the software version installed.



- Press buttons “P1” and “P3” at the same time, then turn the key to switch the machine on.



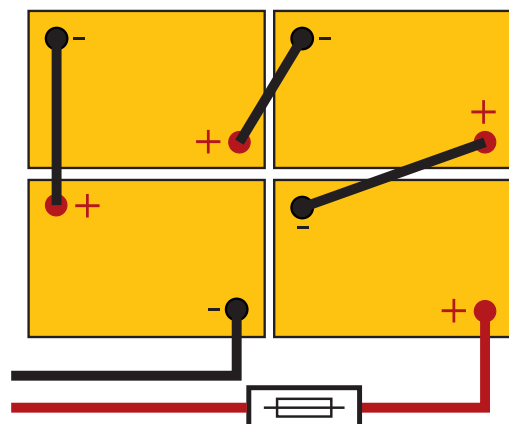
WET batteries, preparation:

- ! DANGER:** The operations of preparing, installing, connecting and removing the batteries must be entrusted to a TENNANT-approved service technician (referred to hereinafter as skilled technician).
- ! DANGER:** during installation of the batteries or any type of battery maintenance, the skilled technician must wear the Personal Protective Equipment (gloves, eyewear, overalls, etc.) needed to limit the risk of accidents. Keep away from naked flames, do not short circuit the battery poles, do not generate sparks and do not smoke.
- ! DANGER:** in the event of battery fluid leakage, do not touch the fluid and observe the following precautions:
Contact with the skin can cause irritation; wash with soap and water.
Inhalation of vapours can cause irritation to the airways; stay out in the open air and consult a doctor.
Contact with eyes can cause irritation, wash eyes immediately and thoroughly with water for at least 15 minutes; consult a doctor.

Batteries: installation and connection

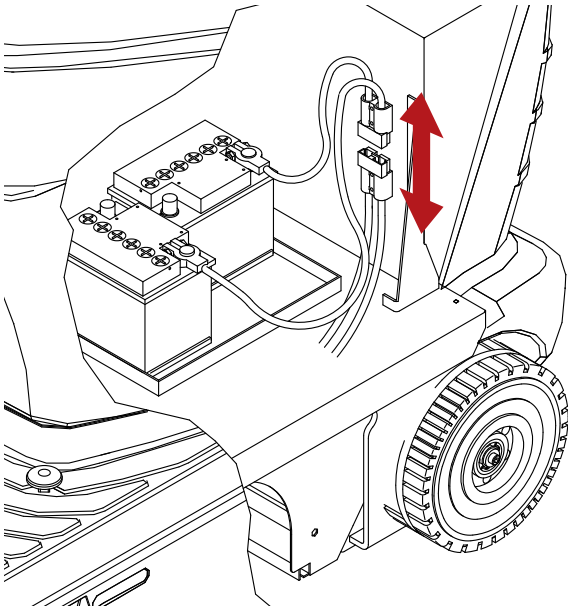
- ! DANGER:** during installation of the batteries or any type of battery maintenance, the skilled technician must wear the Personal Protective Equipment (gloves, eyewear, overalls, etc.) needed to limit the risk of accidents. Keep away from naked flames, do not short circuit the battery poles, do not generate sparks and do not smoke.
- ! DANGER:** in the event of battery fluid leakage, do not touch the fluid and observe the following precautions:
Contact with the skin can cause irritation; wash with soap and water.
Inhalation of vapours can cause irritation to the airways; stay out in the open air and consult a doctor.
Contact with eyes can cause irritation, wash eyes immediately and thoroughly with water for at least 15 minutes; consult a doctor.
- ! ATTENTION:** the operation of installing and connecting the batteries must be carried out by qualified personnel.
- ! ATTENTION:** before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.
- ! DANGER:** Make sure you connect the terminals marked with a "+" to the positive poles of the battery. Do not check the battery charge by sparking.

Tilt the seat cowling toward the steering wheel, then place the batteries in the compartment, positioning them as indicated by the drawing.



Connect the wiring terminals to the battery poles, tighten and cover with Vaseline.

Plug the battery connector into the machine



Return the seat cowl to the working position.
When using the machine, follow the instructions below.

Choosing OFF-BOARD battery charger



! DANGER: use a battery charger with CE marking that is in compliance with product standard (EN 60335-2-29), equipped with double insulation or reinforced insulation between input and output and with SELV type output circuit.

! ATTENTION: check that the battery charger is compatible with the batteries being charged.

Tubular lead acid (WET) batteries: the use of an electronic battery charger is recommended; in any event, consult the manufacturer and the battery charger manual to confirm the suitability of the external battery charger.

Gel or AGM batteries: use a charger intended specifically for the type of battery.

Preparation of OFF-BOARD battery charger

! ATTENTION: authorized service technician required to perform this procedure.

When using a battery charger not provided with the machine, it must be fitted with the connector included in the machine equipment package.

The connector supplied for the external battery charger is compatible with cables of maximum cross-section 16mm². Proceed as follows to fit the connector:

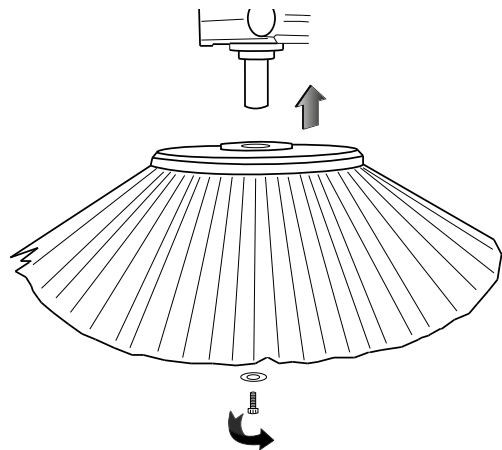
Remove around 13 mm of the protective sheath from the red and black conductors of the battery charger cable;
Attach the ends to the contacts of the connector and squeeze forcibly with suitable crimping pliers;
Make certain the polarity is correct (red + black -) when attaching the wires to the connector.

Fitting the side brush

! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

Assembly:

- Undo the screw on the motor shaft.
- Check that the drive key is located in the keyway of the motor shaft.
- Position the brush complete with flange on the motor shaft.
- Retighten the clamp screw.



Disassembly:

- Repeat the steps described above in reverse order.

PRACTICAL GUIDE FOR THE OPERATOR

Clothing and equipment

Wear safety shoes with non-slip soles.

Wear protective eyewear or visor and safety garments.

Depending on the surface being cleaned and on the environment, the protective measures necessary for atomized sprays include respiratory masks with class FFP2 or equivalent or higher protection.

Before starting the machine

Clear away larger items of refuse before sweeping. Pick up any pieces of wire, tape, string and similar items that could become entangled around the brushes.

Preparing the machine for work

Proceed as follows before starting work:

- Check that the batteries are fully charged, and if not, carry out the recharging procedure: when undertaking this operation, refer to the section “Charging the batteries”.
- Make certain that the debris bin is empty and, if not, empty it referring to the section “Emptying the debris bin”.

! ATTENTION: when sweeping on carpet, it's recommended to install the optional Pre-filter (p/n FTDP00202).

! NOTICE

The operator seat can be adjusted for position, to make the use of the machine more comfortable.

Working

! ATTENTION: do not use the machine without first reading the operating and maintenance manual.

! ATTENTION: avoid sweeping up pieces of wire, tape, string and similar items that could become entangled around the brushes.

! NOTICE

Releasing the accelerator pedal, all of the functions are stopped automatically within 5 seconds (Power Off); in this standby condition, the indicator light corresponding to the selected program will blink. To reactivate the functions, simply move the machine forward, without deselecting the program (Power Off-On).

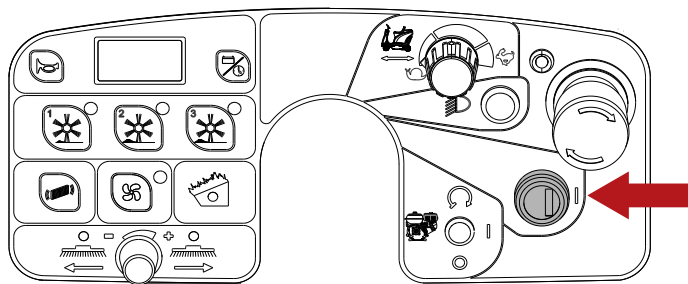
! NOTICE

The “Power Off” system can be enabled/disabled by way of the machine software menu; refer to the section “USER MENU”.

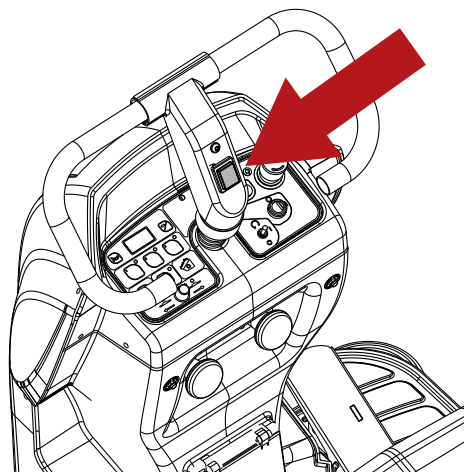


! DANGER: Never sweep up combustible powders, flammable or explosive liquids (e.g. petrol, fuel oil, etc.), acids and solvents (e.g. paint thinners, acetone etc.) even if diluted.

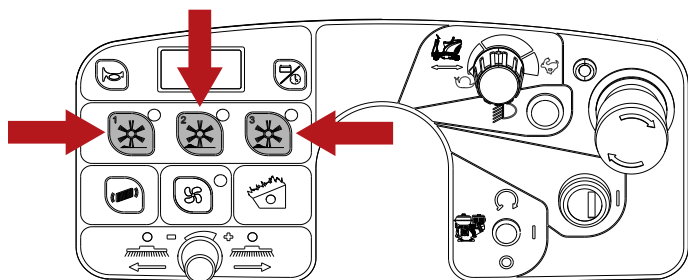
- Sit on the seat.
- Turn the ignition key to switch the machine on.



- Use the drive selector to select the drive direction.



- From the three available programs, select the one most suitable for the work being performed; by pressing these buttons, all of the functions relating to the selected program will be activated (brush motor, suction motor):

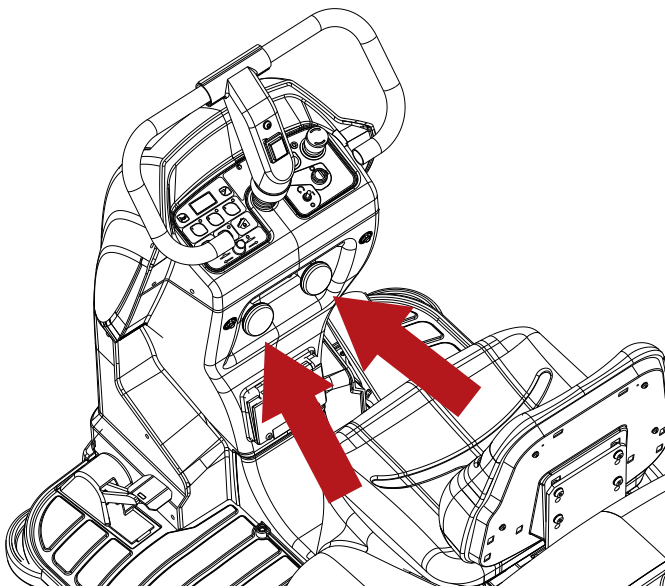


- P1, light duty cleaning program for quartz concrete floors, smooth floors.
- P2, medium duty cleaning program for fitted carpet or other surfaces.
- P3, heavy duty cleaning program for asphalt or uneven floors with coarse debris.

! NOTICE

To change from one program to another, first deselect the existing program, then select the new program.

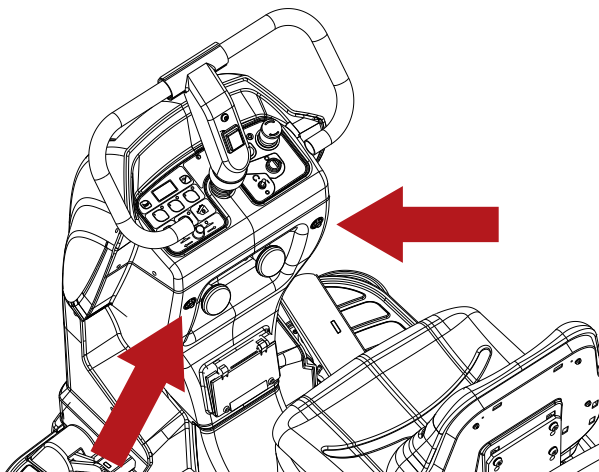
- Lower the side brushes by pulling the relative levers out and easing them down.



! NOTICE

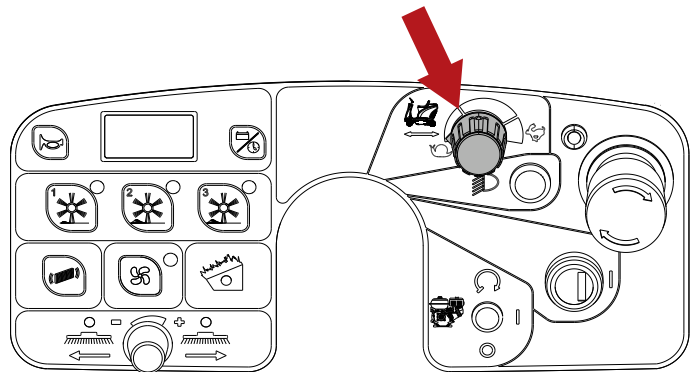
A resettable fuse is fitted above each of the side brush operating levers.

In the event that a side brush should stop working, press the button to reset the fuse.

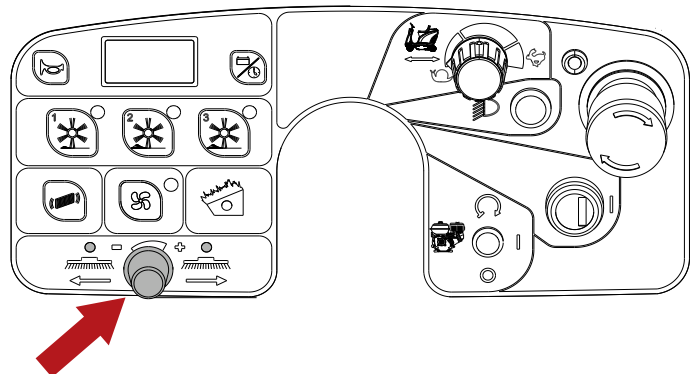


- Start cleaning, turning the steering wheel by hand and depressing the accelerator pedal.

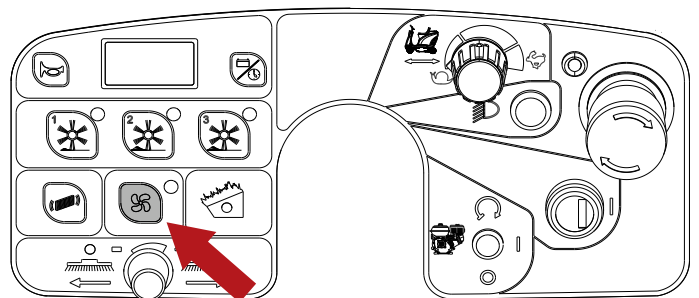
- The maximum operating speed can be set by turning the speed potentiometer.



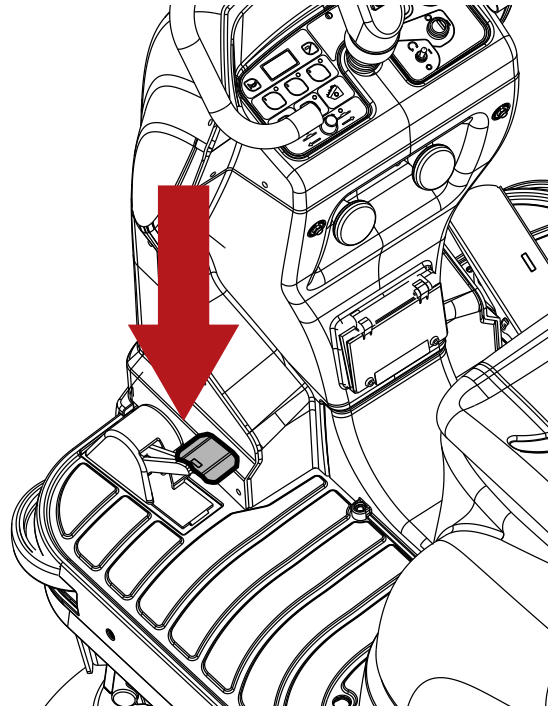
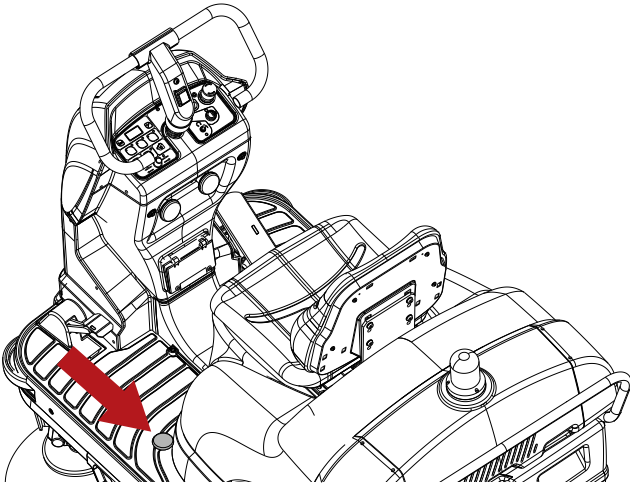
- The maximum speed of rotation of the side brushes can be set by the operator.



- If the machine has to be used on damp ground, it is essential to protect the paper filter: accordingly, shut off the suction motor by pressing the suction button.



- Press the "Lift Flap" pedal to pick up bulky items. To apply the parking brake, depress the brake pedal fully.



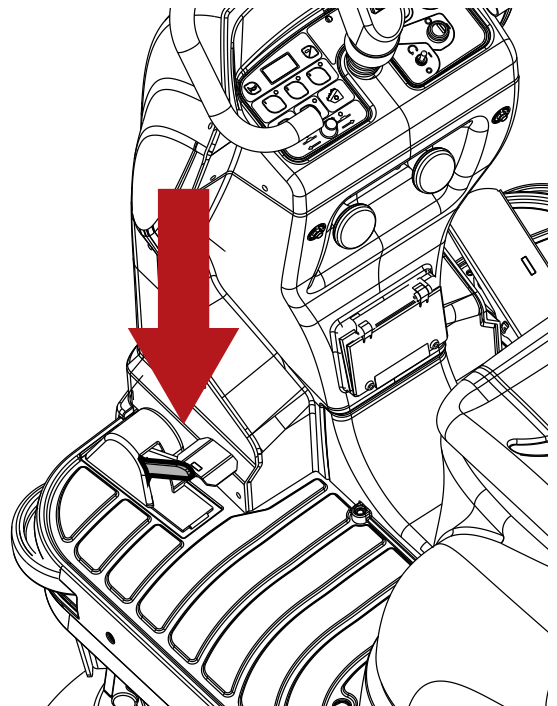
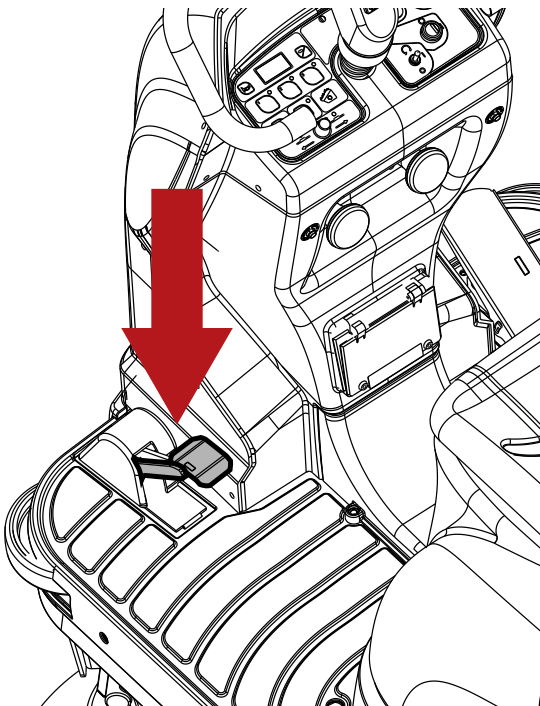
To stop the machine, release the accelerator pedal and depress the brake pedal; refer to the section "**Service brake and parking brake**".

Before leaving the machine unattended, stop on a flat and level surface, switch off the machine, remove the ignition key, make certain that the side brushes are raised clear of the ground, and apply the parking brake.

Service brake and parking brake

To apply the service brake, depress the brake pedal and at the same time operate the parking brake release lever.

To release the parking brake, press the release lever next to the pedal.



During operation of the machine

- Keep the cleaning passes as straight as possible.
- Overlap successive cleaning passes by a few centimetres.
- Adjust the speed of the machine according to the type of cleaning. Use the minimum brush pressure settings, as far as practically possible.
- Check the battery charge indicator to ensure there will be sufficient power for completion of the cleaning operation.

! ATTENTION: Do not operate the machine on slopes or gradients steeper than indicated on the data plate.

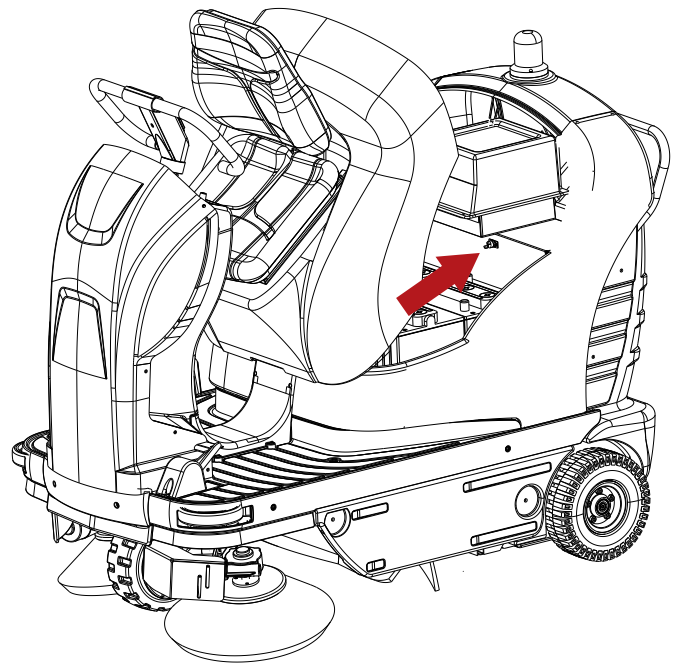
! ATTENTION: When using the machine on gentle gradients, do not move transversely across the slope, but keep the machine on a line parallel to the direction of the incline, manoeuvring carefully and without making U-turns.

Emergency stop button

In the event of emergency, this button isolates the machine from its power source.

To cut off the power supply, press the button.

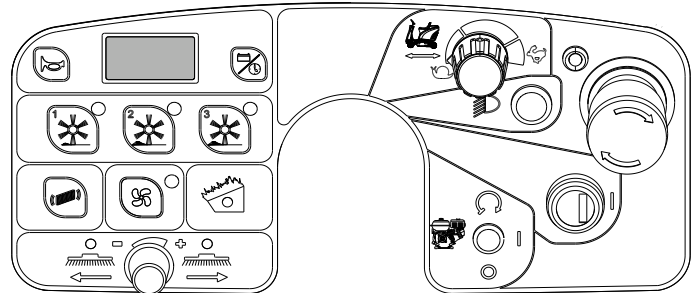
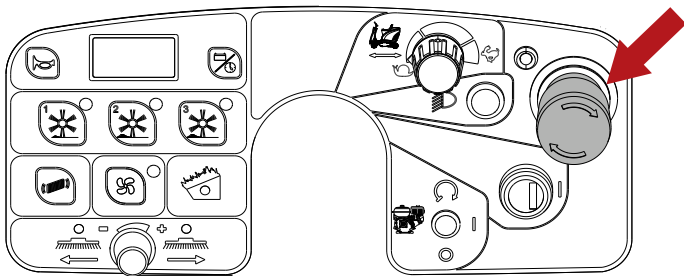
To restart the machine, rotate the button.



Battery charge indicator

The display indicates the battery voltage: when the value drops below a given level, all cleaning functions are stopped, whereas the drive system remains enabled. Refer to the section “**Alarms / display messages**”.

Proceed to recharge the batteries: for this operation, refer to the section “**Recharging the batteries**”.



Safety thermostat

The safety thermostat is located in the position shown.

Should a fire happen to start up inside the debris bin, the thermostat will cause the the suction fan to shut off.

Proceed as follows:

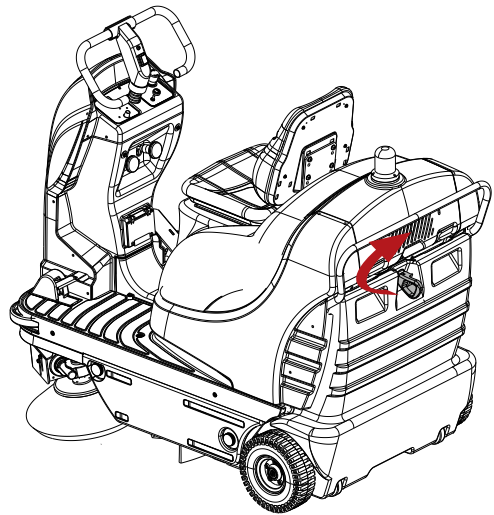
- Move the machine to a safe area.
- Remove the ignition key and apply the parking brake.
- Open the debris bin and remove the source of the heat.

Emptying the debris bin

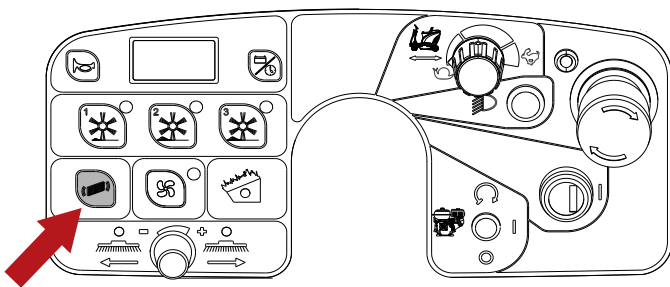
! DANGER: always wear a mask when emptying the debris bin, so as to protect the respiratory tract from the dust that will inevitably be raised during this operation.

When work has finished, proceed to empty the debris bin, following the instructions given below:

- Switch the filter shaker on for 5 seconds.

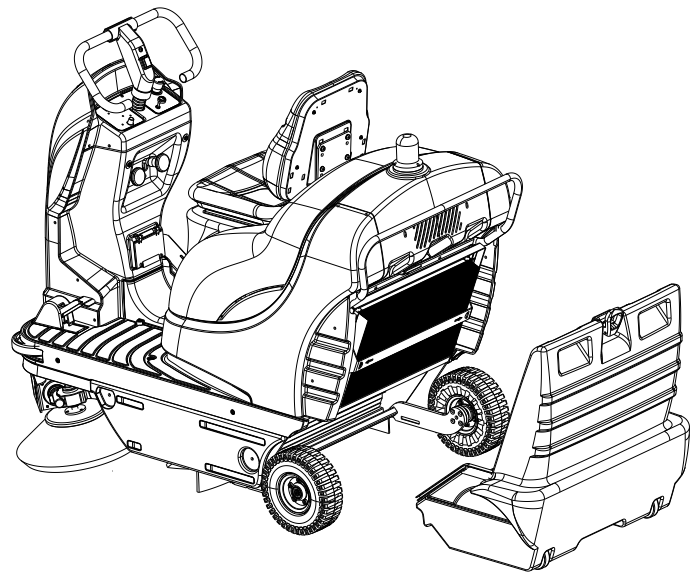


- Remove the bin and empty it.



! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

- Move the machine close to the refuse container.
- Lower and rotate the debris bin clamp lever.

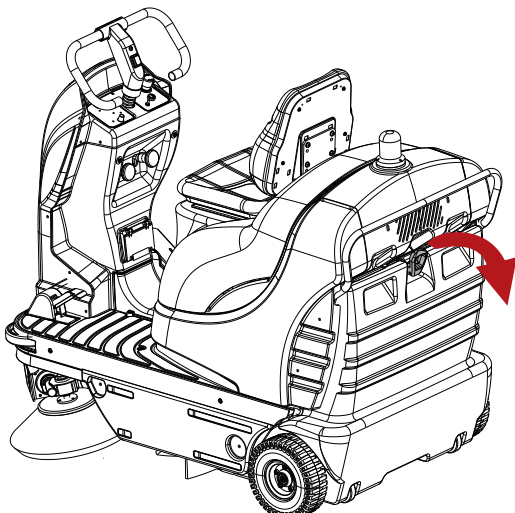


- Reposition the bin and lock in place with the lever.

Moving the machine when not in operation

To move the machine, proceed as follows:

- Turn the ignition key to switch the machine on.
- Select the direction of travel.
- Press the accelerator pedal.
- The top speed of the machine is adjusted by turning the potentiometer.
- To stop the machine, release the accelerator pedal and depress the brake pedal; refer to the section "**Service brake and parking brake**".
- Turn the ignition key to switch off the machine.
- Apply the parking brake: see section "**Service brake and parking brake**".



MAINTENANCE INSTRUCTIONS

! DANGER: no maintenance work of any description must be carried out without first having isolated the machine from its power source. Maintenance operations on the electrical circuit — and in any event, all other operations not explicitly described in this operating manual — must be performed by a **TENNANT** approved service technician, in compliance with current safety regulations and as indicated in the maintenance manual.

Maintenance - General rules

Performing regular maintenance according to the Manufacturer's instructions will improve performance and extend the working life of the machine.

When cleaning the machine, always observe the following precautions:

Avoid using pressure washers. Water could penetrate the electrical compartment or motors leading to damage or short circuits;

Avoid using steam, as the heat could cause the deformation of plastic parts;

Do not use solvents or hydrocarbon based products. These can damage the cowlings and rubber components.

Cleaning the suction motor air filter

The suction filter makes a major contribution to the efficiency of the whole machine. Proper filter maintenance will allow you to obtain the best performance from your machine.

The suction filter can be cleaned as follows:

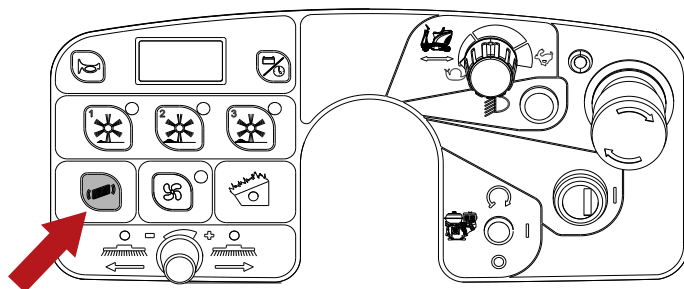
- Using the automatic cleaning system; selecting the work program (P1-P2-P3), the machine is programmed for automatic and cyclical cleaning of the filter at predetermined intervals.

! NOTICE

NOTE: the automatic cleaning system can be enabled/disabled in the machine software menu; refer to the section **"USER MENU"**.

The machine is factory-set with the system **DISABLED**

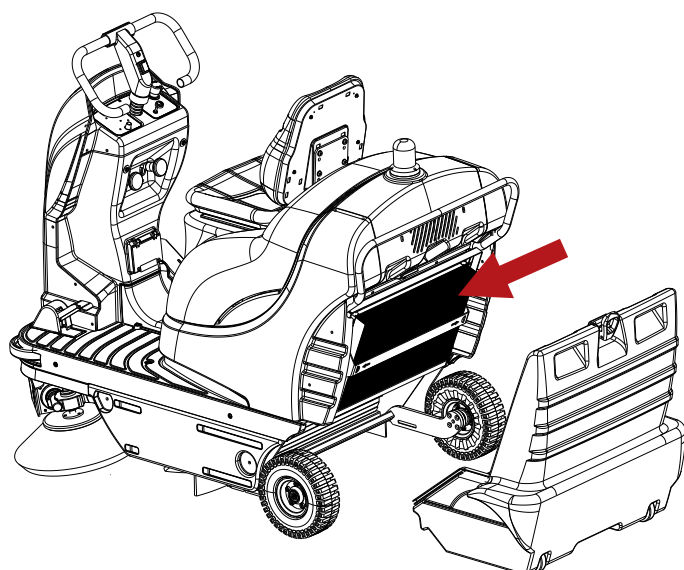
- Using the manual cleaning system; press the filter shaker button and hold it down for a few seconds. Repeat this operation 4 or 5 times while using the machine. This operation should be performed at the end of every working cycle. If the machine is used in a dusty environment (e.g. sawmills, warehouses where vehicles operate, etc.), make sure to use the filter shaker more frequently.



- Cleaning the filter manually; if the filter shaker does not produce the expected result, clean the filter manually. In any event, clean the filter at least once every 50 working hours.

! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

- Take out the debris bin; refer to the section **"Emptying the debris bin"**
- Remove the filter from its housing by turning the 2 clamp handles.
- Blow the filter clean with compressed air (maximum pressure 6 bar).
- Refit the filter and reposition the debris bin.



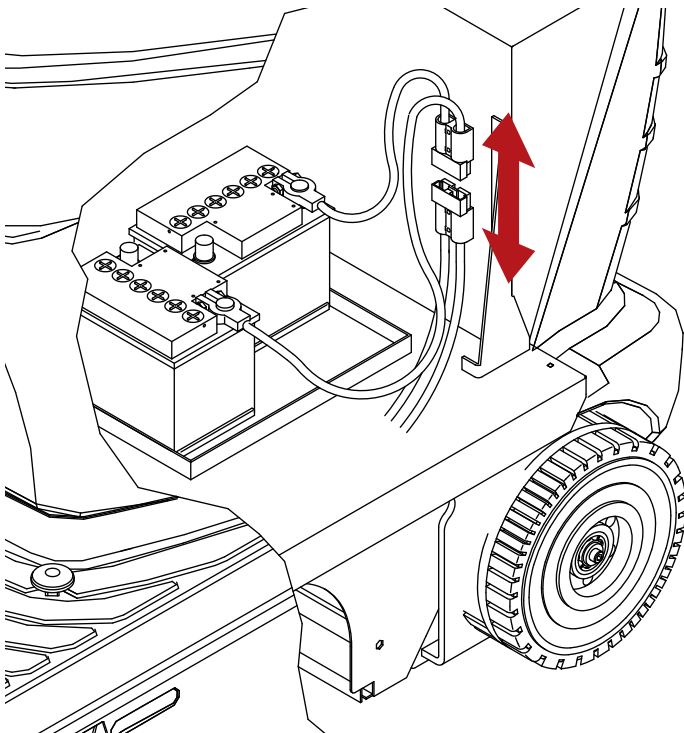
Fuses:

! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

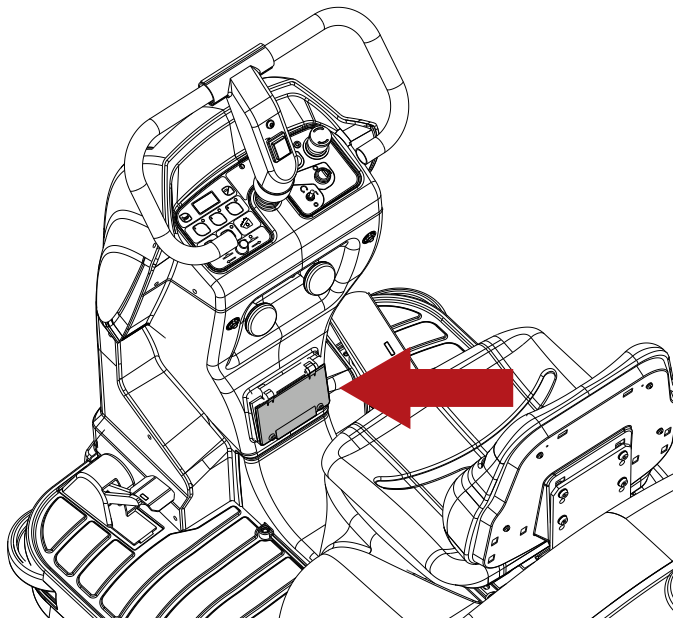
! ATTENTION: never install a fuse with a current rating higher than that specified.

The replacement of fuses must be entrusted only to a TENNANT service centre or to a TENNANT-approved service technician.

Tilt the seat cowling toward the steering wheel, and unplug the battery wiring connector from the electrical system.



Lift the cover to gain access to the fuses.

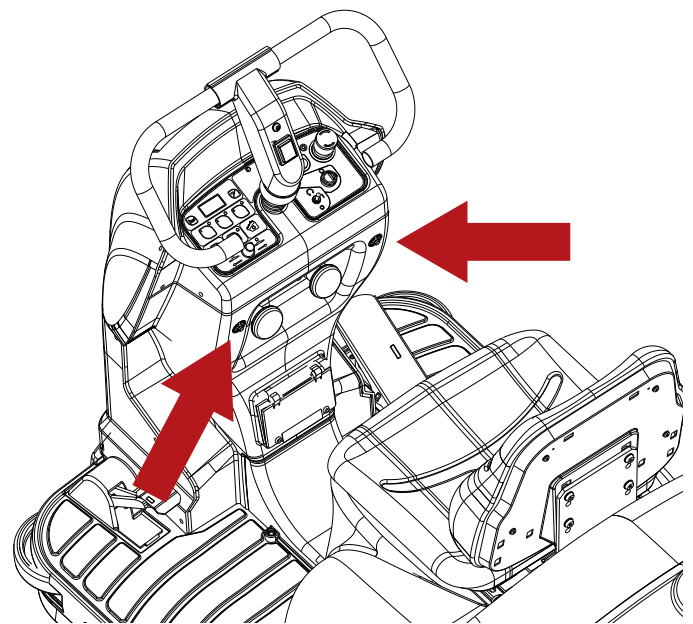


The machine is equipped with resettable fuses also known as thermal fuses. These are resettable devices serving to protect the electrical circuits, which shut off the flow of current in the event of an overload. Once the thermal fuse has been tripped, allow time for it to cool, then press the reset button to restore normal operation.

If the cause of the overload by which the fuse was tripped is still present, the breaker will continue to shut off the flow of current until the issue has been resolved.

! NOTICE

A resettable fuse is fitted above each of the side brush operating levers. In the event that a side brush should stop working, press the button to reset the fuse.



Battery maintenance



! DANGER: do not check the batteries by sparking. Lead-acid (WET) batteries give off flammable vapours: extinguish any naked flames or embers before checking or topping up the batteries.



! DANGER: during any type of maintenance on the batteries, the operator technician must wear the Personal Protective Equipment (gloves, eyewear, overalls, etc.) needed to limit the risk of accidents. Keep away from naked flames, do not short circuit the battery poles, do not generate sparks and do not smoke.



! DANGER: in the event of battery fluid leakage, do not touch the fluid and observe the following precautions:
Contact with the skin can cause irritation; wash with soap and water.
Inhalation of vapours can cause irritation to the airways; stay out in the open air and consult a

doctor.

Contact with eyes can cause irritation, wash eyes immediately and thoroughly with water for at least 15 minutes; consult a doctor.

Useful battery life is dependent on proper maintenance. To obtain best possible efficiency from batteries, observe the following rules:

- Do not leave batteries partially discharged for long periods of time.
- Allow batteries to charge completely before resuming use of the machine.
- Keep batteries clean, with the connections always well tightened.
- Check the level of the electrolyte every two weeks (WET batteries).

Checking the electrolyte level of WET batteries

WET batteries must be inspected periodically to check the level of the electrolyte. Use only distilled water to top up the level so that the plates are covered. Do not overfill (maximum 5 mm above the plates), as the electrolyte could expand and overflow when the battery is charged.

Recharging the batteries



! DANGER: do not check the batteries by sparking. Lead-acid (WET) batteries give off flammable vapours: extinguish any naked flames or embers before checking or topping up the batteries.



! DANGER: carry out the operations described below in a ventilated area.



! DANGER: when charging the batteries, highly explosive hydrogen gas is produced. Leave the seat cowling open (tilted toward the steering wheel) throughout the entire battery charging cycle and carry out this procedure only in well-ventilated areas, away from naked flames.

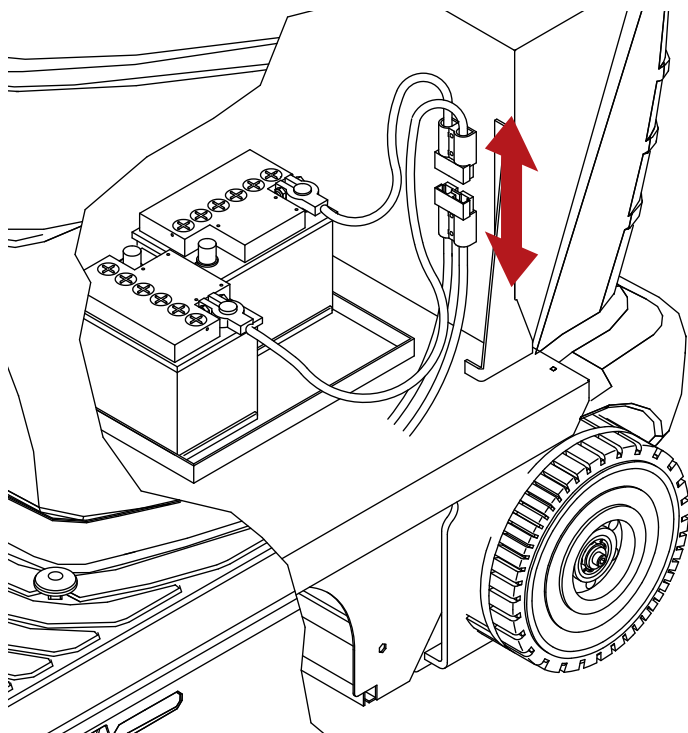
! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

! ATTENTION: before recharging, make certain that the battery charger is set up correctly for the type of battery installed.

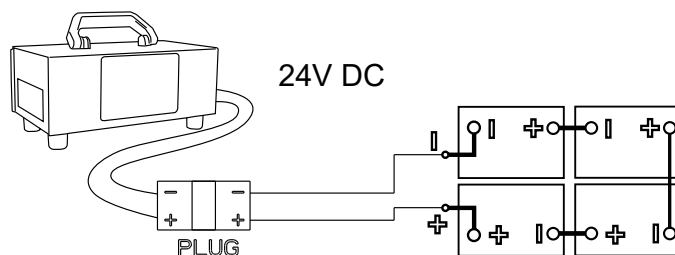
! ATTENTION: run the recharge cycle exactly as specified in the battery charger manual, and at the end of the cycle, detach the connectors.

OFF-BOARD BATTERY CHARGER

- Disconnect the battery pack connector from the electrical system of the machine.



- Connect the battery pack connector to the connector of the battery charger.
- Plug the battery charger into the mains power socket.
- Start the recharge cycle.



Battery: removal

! ATTENTION: the operation of removing the batteries must be carried out by a skilled technician.



! DANGER: in the event of battery fluid leakage, do not touch the fluid and observe the following precautions:

Contact with the skin can cause irritation; wash with soap and water.

Inhalation of vapours can cause irritation to the airways; stay out in the open air and consult a doctor.

Contact with eyes can cause irritation, wash eyes immediately and thoroughly with water for at least 15 minutes; consult a doctor.



! DANGER: When removing the batteries, the skilled technician must wear the Personal Protective Equipment (gloves, eyewear, overalls, etc.) needed to limit the risk of accidents; remove the ignition key from the control panel before proceeding with the removal operation, keep away from naked flames, do not short circuit the battery poles, do not cause sparks and do not smoke.

! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

- Disconnect the battery cables and bridge terminals from the battery poles.
- If necessary, remove the devices fixing the battery to the base of the machine.
- Lift the batteries from the compartment using suitable handling equipment.

REPLACING THE CENTRE BRUSH

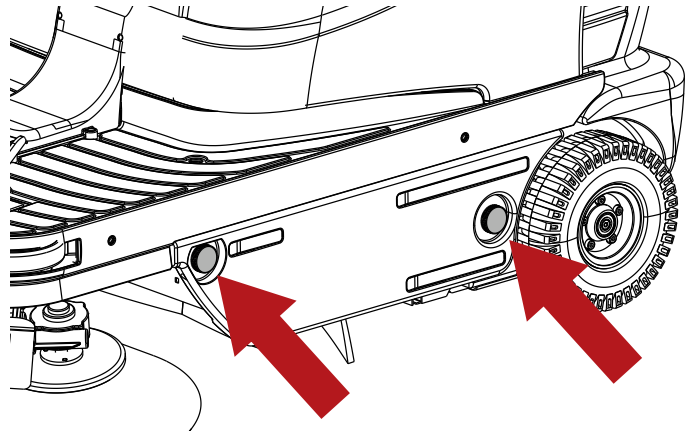
! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

This machine features a system for automatically adjusting the pressure exerted and compensating for the central brush wear.

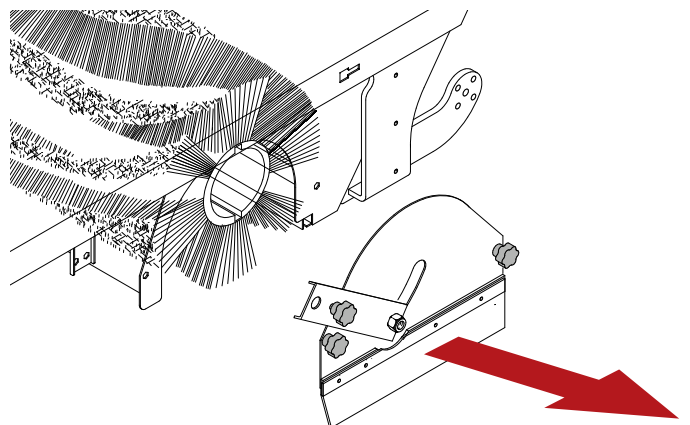
The need to replace the centre brush is indicated by the **WORN BRUSHES** code on the display.

To replace the centre brush, proceed as follows:

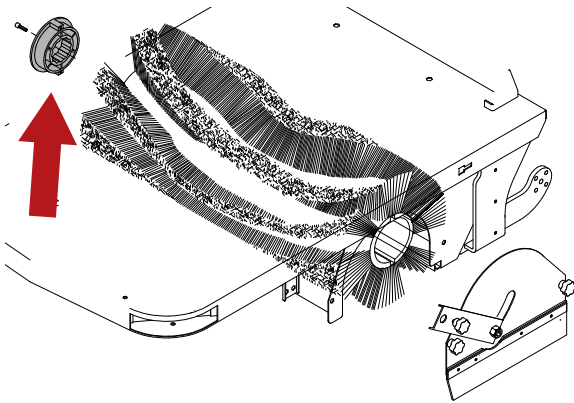
- Unscrew the knobs and open the door on the left of the machine.



- Unscrew and remove the three knobs securing the brush compartment cover.
- Remove the cover of the brush compartment.
- Take out the worn brush.



- Remove the adapter from the core of the old brush and fit it to the new brush, taking care to keep the bristles aligned in the same direction.



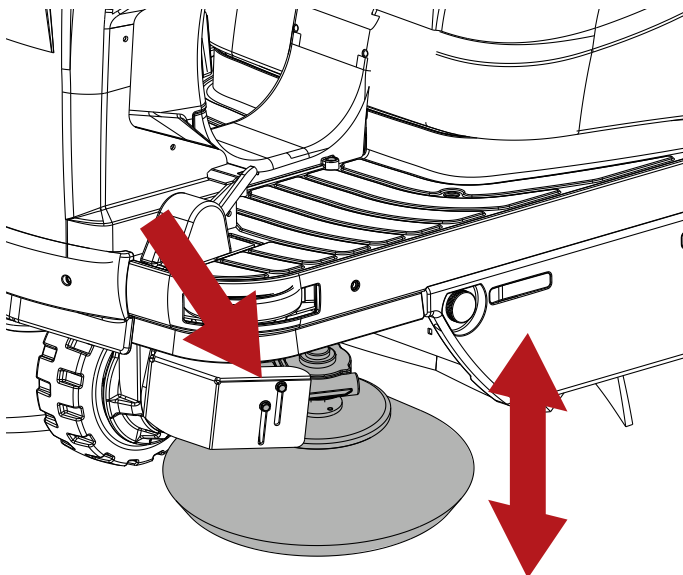
- Fit the new brush and make sure that the adapter is coupled to the drive hub.
- Replace the brush compartment cover, repeating the disassembly operations in reverse order.

Adjusting the side brushes for wear

! ATTENTION: before carrying out the operations described below, stop on a flat and level surface, switch off the machine, remove the ignition key and apply the parking brake.

If the side brushes (when lowered) do not touch the floor due to excessive wear, they can be adjusted as follows:

- Lower the side brushes by pulling the relative levers out and easing them down.
- Loosen the adjustment screws on the brush motor support.
- Position the brush by hand, as required.
- Tighten the adjustment screws.



Periodic checks

CHECK	OPERATIONS ON TAKING DELIVERY	OPERATIONS EVERY 30 HOURS	OPERATIONS EVERY 50 HOURS	OPERATIONS EVERY 100 HOURS	OPERATIONS EVERY 400 HOURS
BATTERY ELECTROLYTE LEVEL AND VOLTAGE	X	X OR EVERY TWO WEEKS			
CHECK THE BRUSHES (OR CARBON BRUSHES) ON ALL OF THE ELECTRIC MOTORS AND REPLACE IF WORN					X (*)
BELT WEAR				X (*)	
BRAKE ADJUSTMENT				X (*)	
TIGHTNESS OF THE NUTS AND SCREWS					X
EXTENT OF WEAR ON SIDE BRUSH			X		
CLEANING SUCTION MOTOR AIR FILTER			X		
TIGHTNESS OF SEALS /FLAP	X		X		

(*) To be performed by trained service personnel only

PERIODS OF INACTIVITY

If the machine is not used for some time, for example, on display in a showroom or stored in the warehouse for a period of more than one month, the following operations are required:

- Recharge the batteries completely. During long periods of inactivity, remember to recharge the batteries periodically (at least once every two months) so that they are kept at the maximum charge level.
- Disconnect the batteries from the machine.
- Make certain that the debris bin is completely empty and perfectly clean.

! ATTENTION: remember to check the batteries — if they are not recharged periodically as described above, they could become damaged beyond repair. The manufacturer is not liable for any malfunctions resulting from neglect, improper and/or incorrect use.

! ATTENTION: when the batteries discharge to the minimum level, make certain they are not left in this condition for any length of time, as this can reduce their working life. Check the battery charge level at least once a week

TROUBLESHOOTING

PROBLEMS	CAUSES	SOLUTIONS
The machine raises dust.	Filter clogged.	Shake the filter using the filter shaker and if necessary remove and carefully clean the filter
	Filter damaged.	Replace the filter
	Filter incorrectly fitted.	Fit the filter correctly in position
	Safety thermostat tripped	Remove the heat source from the debris bin.
The machine leaves dirt on the ground.	The main brush has collected string or wire.	Remove the string and wire picked up.
	The flaps are damaged.	Replace the flaps
	Debris bin full.	Empty the debris bin
Centre brush does not rotate.	Belt broken.	Contact customer service
	Cutout tripped.	Reset the fuse
	Reduction drive damaged.	Contact customer service
The side brushes do not rotate.	Cutout tripped.	Reset the fuse
	Microswitch faulty.	Contact customer service
	Reduction drive damaged.	Contact customer service
The suction motor does not work.	Cutout tripped.	Reset the fuse
	Motor damaged.	Contact customer service
	Safety thermostat tripped.	Remove the heat source from the debris bin.
The filter shaker motor does not work.	Cutout tripped.	Reset the fuse
	Motor damaged.	Contact customer service
The machine does not start	Battery terminals disconnected	Check
	Batteries discharged	Recharge
	Emergency stop button pressed	Reset.
	Operator weight-sensing device faulty	Contact customer service
	Operator not correctly seated.	Sit correctly in the seat.
	Main fuse blown	Contact customer service
The battery doesn't hold its charge	No liquid	Top up
	Loose terminal	Tighten

ALARMS/WARNINGS DISPLAYED

Alarm message	Machine behaviour	Description of the problem	Possible solution
MOTOR PAUSE	Drive stops	Drive motor overtemperature > 95°C.	After climbing a gradient this can be quite normal; wait 20 minutes for the motor to cool down. Check that the brake is not locked. Check that the front wheel turns freely.
TRACTION PAUSE!	Drive stops	Electronic control circuit overtemperature > 85°C	If the ambient temperature is high, stop the machine and wait 20 minutes before restarting. If the problem remains, contact a service centre.
BRUSHES CURRENT	The work functions are off	Excess current or centre brush blocked	Check free brush movement or for the presence of any impediments (ropes, plastic and so on)
BATTERY RESERVE	A simple warning that the battery charge is low	Shown when the battery voltage falls below 21.3V	No action needed, except to charge the battery
BATTERY DOWN	The machine's functions are stopped, excluding drive	If the voltage read falls below 20.3V for 3 seconds consecutively	Charge the battery
BATTERY FLAT	The machine stops	If the voltage read falls below 18V for 3 seconds consecutively	Charge the battery
WORN BRUSHES	The machine continues working	Brush no longer able to apply pressure to the floor due to excessive wear	Replace the centre brush
BRAKE	The parking brake is engaged		Release the parking brake.

DRIVE WHEEL PCB ALARMS

If drive is interrupted, the error code should be identified by means of the status LED (fig. 6, ref. 16). If there are no faults, the status LED remains permanently alight while the machine is in operation. If the drive detects a fault, the status LED indicates an errore code:

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example ALARM A1

example ALARM A2

example ALARM A13

example ALARM A14

ALARM A1	Forward Drive switch closed at start-up	Contact customer service
ALARM A2	Reverse Drive switch closed at start-up	
ALARM A3	Potentiometer fault	
ALARM A4	Potentiometer not on zero at start-up	
ALARM A5	Thermal overload cutout	
ALARM A6	Drive PCB fault	
ALARM A7	Overcurrent (motor fault)	
ALARM A8	Fuse or power contacts damaged (drive PCB fault)	
ALARM A9	Undervoltage	
ALARM A10	Overvoltage	
ALARM A11	Overload	
ALARM A12	Disable microswitch active (input fault)	
ALARM A13	Key shutdown sequence active (input fault)	
ALARM A14	Internal memory alarm (drive PCB fault)	

USER MENU

Enter the menu by pressing and holding the display button for 5 seconds while the machine is on, but with no active function.

Pressing button P1 increases the value of the selected variable.

Pressing button P3 decreases the value of the selected variable.

Pressing the display button, the set data is saved and the next item is displayed.

Exit the menu by pressing and holding the display button for 5 seconds.

LANGUAGE, language setting parameter.

PROG.1, brush pressure P1 parameter. Default value 020.

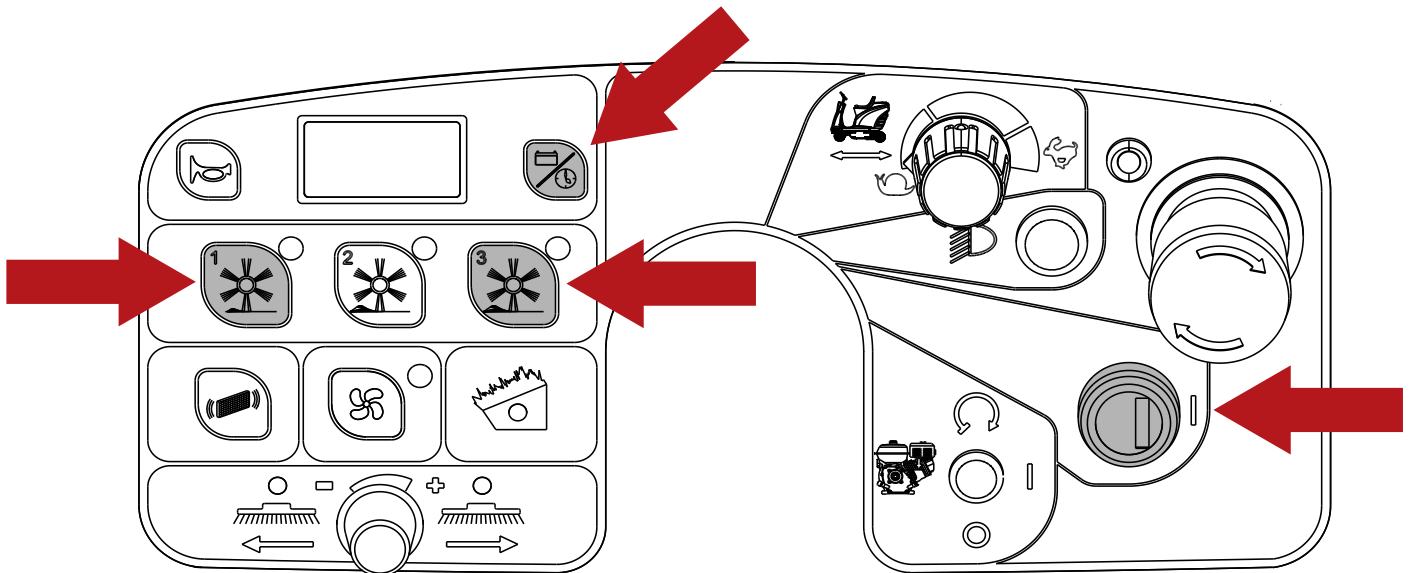
PROG.2, brush pressure P2 parameter. Default value 030.

PROG.3, brush pressure P3 parameter. Default value 040.

POWEROFF, enables/disables the AUTO-POWER ON/OFF system. Default value YES.

ASCENT BRUSH, enables/disables lifting of the centre brush in reverse. Default value YES.

FILTER SHAKER., enables/disables automatic activation of the filter shaker and the activation time. Default value MAN.



RECOMMENDED SPARE PARTS

Part Number	Descriptions
SPPV00056	Main Brush, PPL
SPPV01354	Main Brush, PPL - Soft (Carpet)
SPPV00064	Main Brush, Mix PPL/Steel - Abrasive
PMVR00244	Side Brush, PPL (Standard)
PMVR00409	Side Brush, Mix PPL/Steel - Abrasive (Option)
CMCV00386	Cable, Side Brush Lift
MPVR04709	Side Flap, non-marking (Standard)
MPVR00760	Rear Flap, non-marking (Standard)
MPVR00847	Front Flap, non-marking (Standard)
MPVR04710	Side Flap, Outdoors (Option)
MPVR00761	Front Flap, Outdoors (Option)
MPVR00849	Rear Flap, Outdoors (Option)
FTDP00015	Filter Panel, Polyester (Standard)
FTDP00010	Filter Panel, Paper (Option)
FTDP00202	Pre-Filter (Option)
MTCG00018	Belt, Poly-V
CUVR46942	Main Brush Bearing
MOCC00008	Fan Motor
MOCC00297	Brush Motor
9017784	Brush Motor Carbons
MOCC00032	Side Brush Motor (right side)
MOCC00031	Side Brush Motor (left side)
MEVR31145	Side Brush Motor Carbons
MECB01227	Traction Potentiometer
KTRI05576	Speed Limit Potentiometer
MECB01228	Traction Microswitch
MECI00532	Front Main Contactor
PMQE00017	Brush Actuator Assembly
MOCC00461	Traction Motor
MEVR02378	Traction Motor Carbons
PMTR00084	Rear Wheel, non-marking (Standard)
RTRT00581	Front Wheel, non-marking (Standard)
PMTR00083	Rear Rubber Wheel (Option)
RTRT00036	Front Wheel (Option)
CUVR00005	Rear Wheel Bearing
MLML00034	Pedal Spring

MECE00910	Traction Board
MECE00860	Service Board
MECE00498	Display Board
MEVR00145	Fuse 100 Amp
METT00132	Resetable Fuse 30A
MEVR02806	Main Fuse 60A
METT00135	Resetable Fuse 2A
METT00141	Resetable Fuse 5A
METT00044	Resetable Fuse 10A
MELF33431	Beacon Lamp, 24V 21W
L-390764	Battery, 6Vdc, 180Ah, Gel [Trojan]
L-GF06180V	Battery, 6Vdc, 180Ah, Gel [Exide]
9015391	Charger Kit, 24VDC, Off-Board [Delta-Q]
1026325	Battery Charger Power Cord [Delta-Q Charger]
MECB02065	Battery Charger Power Cord [Supplied SPE Charger]

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