



TORNADO®

Stand-On Automatic Scrubber

Operations and Maintenance Manual
For Commercial Use Only



Model No. TS120-S59-U

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Operating Instructions

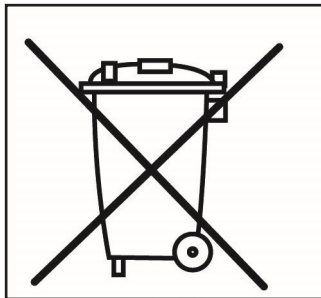
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INTRODUCTION

Your new Tornado unit is a high quality, precision-made product. All parts used in the manufacturing of this unit have passed rigid quality control standards prior to assembly. Please safeguard the original receipt/invoice given at the time of purchase. If you experience any problems with your unit during the warranty period, the original receipt/invoice will act as proof of purchase.

Upon receipt, inspect outer box for exterior damage. Unpack all internal parts, ensure no hidden damage is found.

Each unit is tested and thoroughly inspected prior to shipping. If damage is discovered, immediately notify the transportation company that delivered your machine and request an inspection. As a manufacturer, we are unable to act upon any claim for concealed damage and you must originate the claim. Be sure to keep the carton, packing inserts, and carrier's receipt until the inspector has verified your claim.



Protect the environment
Please dispose of packaging materials in an environmentally safe way according to local waste disposal regulations.



Always remember to recycle.



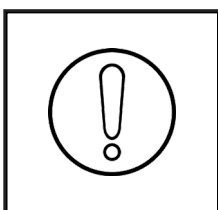
Warranty

Within 30 days of purchase, to activate product warranty, go to:
<https://tornadovac.com/services/warranty-registration-form.aspx>
For warranty information go to www.tornadovac.com.



Warning Labels

Prior to operating the unit, read and understand completely this owner's manual paying special attention to warning labels. These labels indicate a potentially hazardous situation that could result in death or serious injury if not avoided. Use only as described in this manual.



Important

There are no owner serviceable parts inside this machine. Removal of screws to access internal components will void all warranty claims.

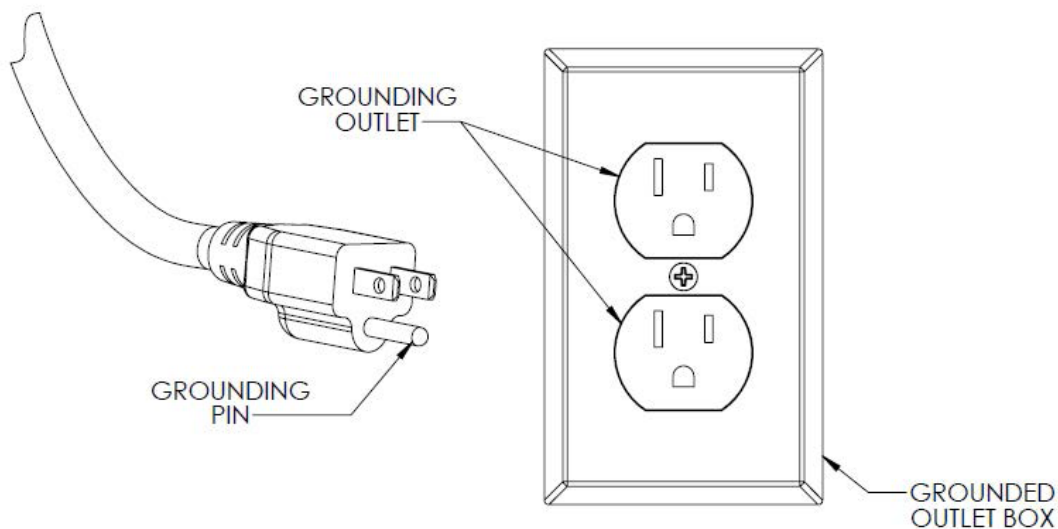
GROUNDING INSTRUCTION

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



Improper connection of the equipment grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the appliance. If the plug will not fit the outlet, have the proper outlet installed by a qualified electrician. **DO NOT REMOVE THE GROUNDING PIN FOR ANY REASON.**

This battery charger is for use on a nominal 115-volt circuit and has a grounding plug that appears as shown below.



IMPORTANT SAFETY INSTRUCTIONS

Read and understand this owner's manual and all labels on the unit before operating. Safety is a combination of common sense, staying alert, and knowing how your unit works. To reduce the risk of personal injury or damage to your unit, use only as indicated in this manual.



FOR COMMERCIAL USE ONLY

To reduce the risk of fire, electrical shock, or injury, the instructions below must be read and understood completely prior to machine operation.

1. This machine must only be used for the manufacturer's approved application as described in this manual.
2. The machine must be unpacked and assembled in accordance with these instructions before connecting to the electrical supply
3. Only genuine accessories and spare parts provided with the machine or those approved by the manufacturer should be used. The use of other accessories may impair the safety of the machine. All repairs must be performed by a qualified service agent.
4. **DO NOT** modify the machine from its original design.
5. Operators must be fully trained in the use of the machine in accordance with these instructions and be able to perform regular user maintenance as outlined in this manual.
6. Operators should be physically capable to maneuver, transport and operate the machine.
7. Operators should be able to recognize unusual operation of the machine and report any problems.
8. This machine 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 instruction concerning use of the machine and are under supervision by a person responsible for their safety.
9. Keep children and unauthorized persons away from the machine when in use. **DO NOT** use the machine as a toy.
10. **DO NOT** use with a damaged cord or plug. If it has been damaged, left outdoors or dropped in water, return it to a service center for inspection and/or repair.
11. **DO NOT** use where hazardous dust is present.
12. **DO NOT** use in an explosive environment.
13. **DO NOT** pick up or use near flammable or combustible fluids, hazardous dusts or vapors.

IMPORTANT SAFETY INSTRUCTIONS

14. CAUTION –If it is suspected that there is hazardous dust or flammable/corrosive material, stop cleaning the area immediately and consult your supervisor.
15. DO NOT use to clean up any burning or lighted materials such as cigarettes, matches, ashes, or other combustible objects.
16. Only use the machine on firm, level surfaces. DO NOT use the machine on gradient or slope of more than 2%.
17. CAUTION –This machine is for dry, indoor use only and should not be used or stored outdoors or in wet conditions. Protect from rain.
18. Take care when using this machine near the top of stairs to avoid loss of balance.
19. DO NOT cover the machine when in use.
20. DO NOT run the machine dry as this could damage the floor surface and/or the machine itself.
21. DO NOT leave the machine running unattended.
22. Keep hair, loose clothing, hands, feet, and all other parts of the body away from openings and moving parts. Do not put hands under base as rotating parts can cause injury.
23. DO NOT put any object into openings. DO NOT use with any opening blocked. Keep free of dust, debris and anything that may reduce airflow.
24. DO NOT use volatile or combustible solvents (e.g., diesel, petrol, PA, trichloroethane) nor any corrosive, toxic, or highly irritant substance to wash floors, even if diluted. In the event of accidental contact with any such substances (e.g., due to spills) follow the decontamination procedures in force at the user site. If in any doubt about the condition of the machine, contact Tornado or the dealer/agent who supplied the machine.
25. DO NOT leave the machine unattended when plugged in. Unplug from outlet when not in use and before changing brushes or attempting any maintenance or adjustment.
26. DO NOT fill the machine with water hotter than 104°F (40°C).
27. When used on escalators, ensure the machine is positioned at the bottom of the escalator with the escalator moving towards the operator.
28. DO NOT pull or carry by cord, use cord as a handle, close a door on cord, or pull cord around sharp edges on corners.
29. DO NOT run machine over cord. Keep cord away from heated surfaces.
30. DO NOT unplug by pulling on cord. To unplug, grasp the plug, not the cord. Do not handle plug or machine with wet hands. Turn off all controls before unplugging.
31. Connect only to a properly grounded outlet. See grounding instructions.
32. Use care to keep electrical supply cable from contacting moving parts such as floor brushes.
33. Make sure voltage and frequency at the wall receptacle correspond with that indicated on nameplate before plugging in machine.
34. The machine must be kept clean and in good condition with regular inspections of the power cord and plug for signs of any damage. If any parts are damaged, they shall only be replaced by an approved part by the manufacturer, its service agent or a similar qualified person in order to avoid a hazard.
35. Only replace the power cord with original OEM equipment.

CLEANING AGENTS

- When using cleaning and care agents, the manufacturer's danger warnings must be followed, and proper PPE must be worn per manufacturer's instruction.
- Only use low-foaming, non-combustible cleaning agents which DO NOT contain generally health-hazardous substances.
- Please ensure that after each use, any chemical residue is rinsed out with clean water.



The manufacturer cannot accept responsibility for damage caused when the appliance is not used in accordance with the instructions provided or for uses other than those for which it was intended.

OPERATOR GUIDELINES

Let the machine do the work. Grip the handle as lightly as possible.

- Wear suitable footwear to avoid slipping.
- Wear suitable clothing to keep dry.
- Do not smoke when using the machine.
- Do not use excessively foaming or highly corrosive cleaning solutions.



This machine is heavy. Do not attempt to lift the machine without assistance. Incorrect lifting techniques may result in personal injury.



GENERAL RULES OF THE BATTERIES

- At any intervention on the batteries, use suitable acid-proof gloves and glasses.
- Do not smoke near the batteries and do not approach them with free flames.
- Check that a fire extinguisher is available on site.
- Be very careful in case of leakages or liquid outlets because corrosive.
- Do not place any metallic tools onto the batteries. Risk of short circuit!
- It is compulsory to hand over exhaust batteries, classified as dangerous waste, to an authorized institution according to the current laws.

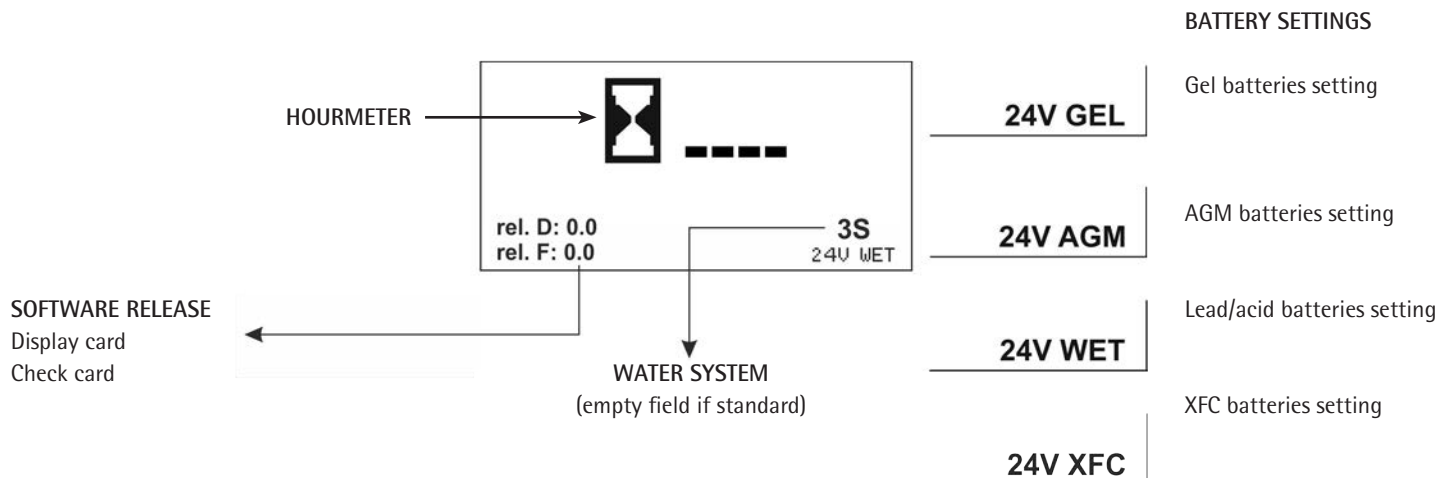
SYMBOLLOGY

READING THE DISPLAY DISPLAY WHEN SWITCHING ON

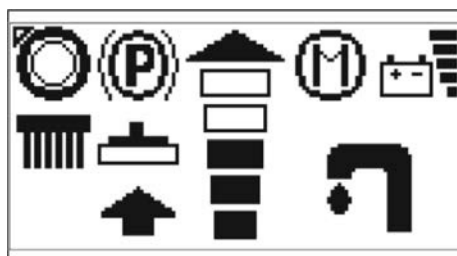
When the machine is switched on the display shows the following screen.

BDSO
20/21






The next screen shows:













CONTROLS DISPLAY



SYMBOLLOGY ON THE MACHINE

Parking brake on 
Automatic mode 
Manual mode 
Battery charge level 
Suction motor off 

Suction motor on 
Suction motor silent mode 
Brush base up 
Brush base down 
Brush base on 

Squeegee up 
Squeegee down 
Maximum speed 
Solenoid valve on 
Solenoid valve off 

MANUAL SYMBOLS



Open book symbol.
Indicates that the operator has to read the manual before the use of the machine.



Obligation symbol requiring to wear the safety glasses.



Open book symbol.
For the proper functioning of the on-board battery recharger (optional), read the manual of the constructor.



Obligation symbol requiring to wear the safety gloves.



Warning symbol.
Read carefully the sections marked with this symbol, for the safety of both the operator and the machine.



Symbol preceding an information about the correct use of the machine.



Warning symbol.
Risk of acid leaking from the batteries.



Symbol indicating operations to be carried out only by qualified personnel.



This symbol points that it is imperative to disconnect the wiring from the batteries using the connector, before any operation on the machine.

TECHNICAL SPECIFICATIONS

TECHNICAL DESCRIPTION	U/M	TS120-S59-U
Cleaning width	mm/in	508/20
Squeegee width	mm/in	685/27
Working capacity	sqm/h/sqft/h	2032/21,872
Brush diameter	mm/in	508/20
Brush rpm	rpm	140
Pressure on the brush	kg/lbs	48/22 max
Brush motor	W/A	380/16
Traction motor	W/A	280/11
Type of drive		automatic
Movement speed	kmh/mph	4/2.5
Maximum gradient		10%
Suction motor	W/A	490/20
Suction vacuum	mbar\in water lift	120/48
Solution tank	l/gal	58/15
Recovery tank	l/gal	80/21
Machine length	mm/in	1220/48
Machine height	mm/in	649/26
Machine width (without squeegee)	mm/in	698/27
Capacity of the batteries	V/Ah5h	24/110
Weight of the batteries	kg/lbs	74/163
Battery tray	mm/in	365x338x290 /14x13x11.5
Weight of the machine (empty and without batteries)	kg/lbs	153/337
Acoustic pressure level (in conformity with IEC 704/1)	dB(A)	<70
Class		III
Protection level	IP	X3
Tension	V	24

BRUSH SELECTION

RECOMMENDED BRUSH

Brush must be chosen depending on type of floor and dirt to be removed. The employed material and the bristle diameter are the elements that distinguish different types of brush.

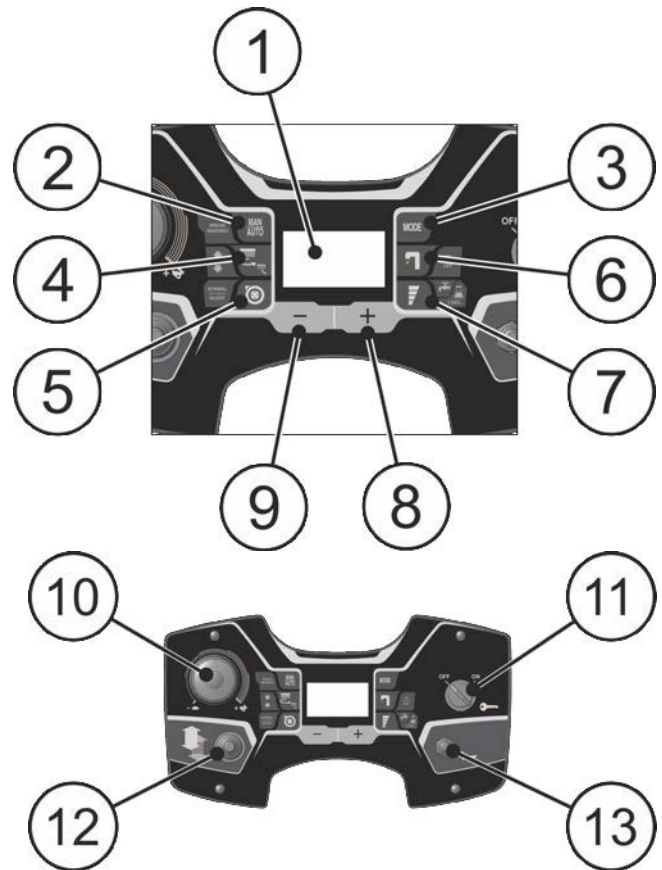
MATERIAL CHARACTERISTICS
PPL (Polypropylene) Good wear resistance. Maintains a characteristic with hot water up to 140°F (60°C). It is not hygroscopic.
NYLON Excellent wear resistance, even with hot water over 140°F (60°C). It is hygroscopic. It loses its physical characteristics over time.
TYNEX Nylon bristles with grains of abrasive material. Use with caution in order not to mark the floor or ruin the polishing.
BRISTLES THICKNESS Thicker bristles are more rigid and must be used on smooth floor or floor with small joints. On irregular floors with deep joints or relieves, it is recommended to use softer bristles which penetrate more easily and deeper. Please be aware that when brush bristles are worn out and therefore too small, they become rigid and unable to penetrate and clean deeper. This may also happen with thicker bristles creating brush vibration.
PAD HOLDER It is equipped with anchor points that permit the locking of the abrasive pad. The pad is recommended to clean smooth floors.

CODE	QTY	DESCRIPTION	USE
48902010	1	Brush PPL 0.3	Irregular floors with large joints.
48902020	1	Brush PPL 0.7	Smooth floors with small joints and persistent dirt.
48902030	1	Brush PPL 0.9	Smooth floors with small joints and persistent dirt.
48902040	1	Brush TYNEX	Floors of resistant material and particularly dirty.
48902050	1	Brush PPL 0.6	Normal floors.
48902060	1	Brush 5-mix	For all types of floors.
48802010	1	Pad holder + center lock green	For pads of 20", for smooth surfaces cleaning.

CONTROLS

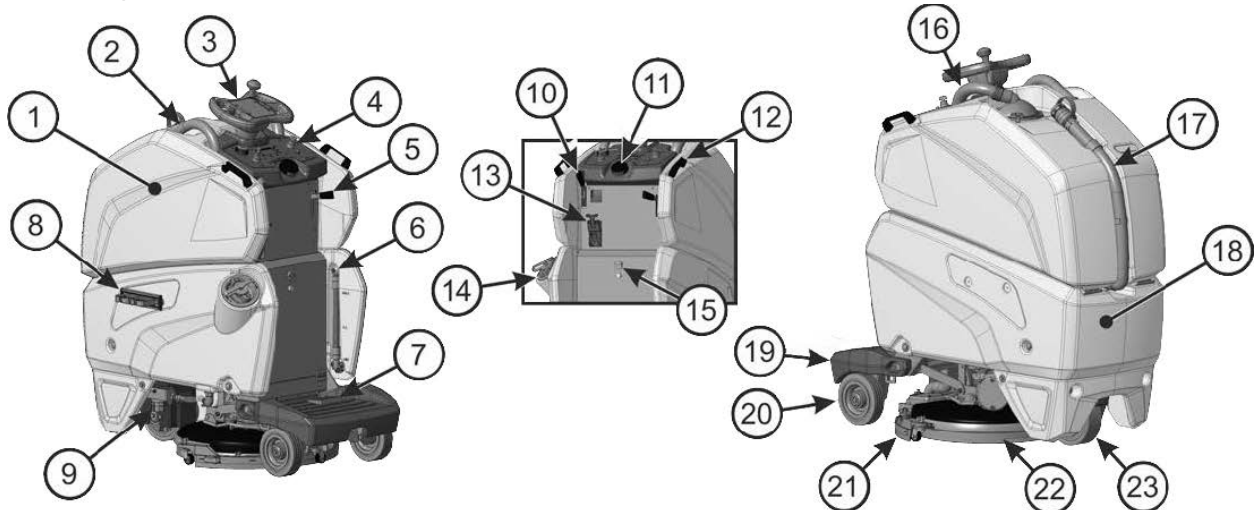
DISPLAY AND CONTROLS LEGEND

1. DISPLAY
2. CLEANING MODE SELECTION BUTTON:
 - AUTOMATIC
 - MANUAL
 - BREAK WASHING
3. WORKING MODE SELECTION BUTTON
 - STANDARD
 - 3S
 - 3SD
4. UP/DOWN AND UNLOCK, BRUSH BASE BUTTON
5. SUCTION MOTOR BUTTON
 - ON/OFF
 - SILENT MODE
6. OPEN/CLOSE SOLENOID VALVE
7. SOLUTION LEVEL BUTTON (ONLY FOR 3S/3SD)
8. MAXIMUM SPEED INCREASE BUTTON
9. MAXIMUM SPEED DECREASE BUTTON
10. SPEED ADJUSTMENT KNOB
11. OFF/ON KEY SWITCH
12. FORWARD/BACKWARD SPEED LEVER
13. HORN



MACHINE LEGEND

1. RECOVERY TANK
2. SQUEEGEE HOSE
3. STEERING WHEEL
4. DASHBOARD AND CONTROLS
5. SQUEEGEE LEVER
6. WATER LEVEL HOSE
7. DRIVE PEDAL
8. SIDE BROOMS SUPPORT LOCKS (OPTIONAL)
9. DETERGENT SOLUTION FILTER
10. WATER VALVE LEVER
11. DETERGENT SOLUTION LOAD CAP (ONLY FOR 3SD - OPTIONAL)
12. TANK LIFTING HANDLES
13. BATTERY CONNECTOR
14. SOLUTION LOAD CAP
15. BATTERY VAN CLOSING LEVER
16. SUCTION MOTOR HOSE
17. DRAIN HOSE
18. SOLUTION TANK
19. FOOTBOARD/OPERATOR PRESENCE DEVICE
20. REAR WHEELS
21. SQUEEGEE ASSEMBLY
22. BRUSHES BASE ASSEMBLY
23. TRACTION ASSEMBLY





GENERAL SETTINGS

To enter the settings menu, use the dashboard buttons and proceed as follows:

1. Keep buttons (1) and (5) pressed simultaneously
2. Turn the key switch on
3. When "INSERT PASSWORD:0" is shown on the display, press button (2) to confirm.

Once entered the GENERAL SETTINGS it will be possible to change the following settings by simply scrolling through the menu using buttons (1) and (3).

SELECT THE DISPLAY LANGUAGE

English is the default language, it is possible to switch to Italian.

To select the language scroll with the button (1) and (3) until is shown "Language". Press buttons (4) and (5) to select the language. Press button (2) to confirm.

CHANGE THE BATTERY SETTING

Once entered the general settings it is possible to set the machine depending on the batteries installed (AGM / GEL / LEAD-ACID / XFC).

To select the setting scroll using buttons (1) and (3) until is shown "Battery". Press buttons (4) and (5) to select the battery type. Press button (2) to confirm.



A wrong setting could damage the batteries irreparably.

ALWAYS verify that the correct parameter is set.

The battery setting can be seen when turning on the machine (see "SETTING THE BATTERIES or READING THE DISPLAY").

DISPLAY CONTRAST

Once entered the general settings it is possible to set the display tune

Scroll with the button (1) and (3) until is shown "Display tune". Press buttons (4) and (5) to select the tune. Press button (2) to confirm.

DISPLAY BRIGHTNESS

Once entered the general settings it is possible to set the display brightness.

Scroll with the button (1) and (3) until is shown "Display brightness".

Press buttons (4) and (5) to select the brightness. Press button (2) to confirm.

ASSEMBLY

BEFORE USE

HANDLING OF THE PACKED MACHINE

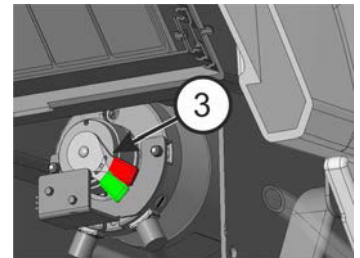
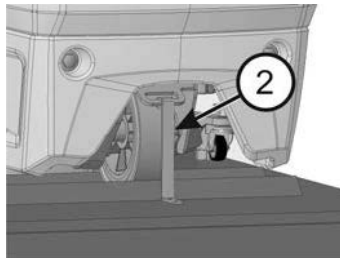
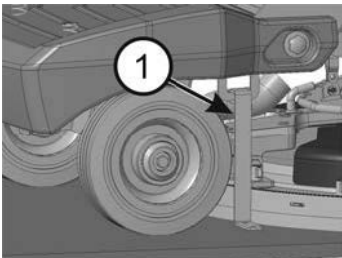
The machine is supplied with suitable packing foreseen for fork lift truck handling.
For the package dimensions please look at the “TECHNICAL DESCRIPTION” table.



Do not place more than 2 packages on top of each other.

UNPACKING AND MANUALLY MOVING THE MACHINE

1. Remove the external packing.
2. Unscrew the supports (1+2) that fix the machine to the platform.



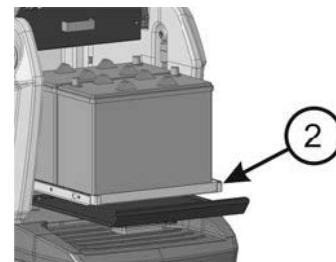
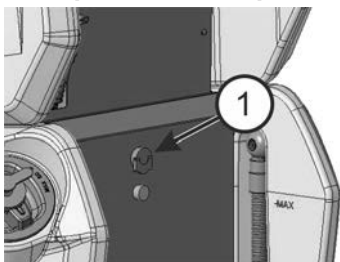
3. Before releasing the machine from the platform it is necessary to unlock the parking brake that stops the traction wheel. To do that open the lever (3). The red position stands for the braked machine, the green position stands for the unlocked parking brake.
4. Move the machine backwards, as indicated in the picture, avoiding heavy contacts against mechanical parts.



5. Restore the electric brake bringing back the lever on the “red” position as showed in paragraph 3.
Keep the platform and the brackets for an eventual transport.
The portable slope is not included in the packaging.

ACCESS TO THE BATTERY TRAY

The machine is provided with an extractable tray for the batteries installment. To access it, turn the knob (1) and pull the compartment (2) out.



INSTALLING THE BATTERIES

The standard machine is provided with the batteries set on lead/acid.

For different settings see chapter “BATTERY SETTINGS”.

The machine requires the use of serial connected batteries placed in their dedicated tray.

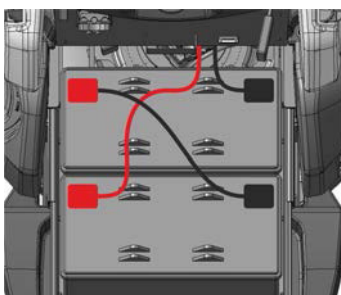
Batteries must be handled using suitable lifting equipment (due to weight, considering the type of batteries chosen, and coupling system). The batteries must be in accordance with CEI 21-5 Norms.



Strictly follow manufacturer/distributor indications for the maintenance and charge of the batteries. All installation and maintenance operations must be executed by specialized staff, using suitable protection accessories.

For batteries installation it is necessary to reach the battery compartment as indicated under paragraph “ACCESS TO THE BATTERY VAN”).

1. Put the batteries in the housing.
2. Connect the terminals, respecting the polarities, avoiding contact with other parts that could create short circuit, covering the battery poles with terminal protections.



BATTERY CHARGER



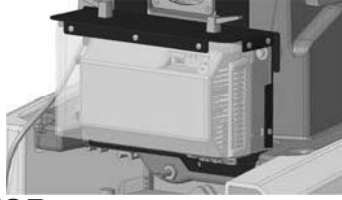
Make sure that the battery charger is suitable for the installed batteries both for their capacities and type (lead/acid or GEL and equivalent). In the plastic bag containing the use and maintenance you will find the coupling connector for the recharger. It must be assembled onto the cables of your charger, following the instructions given by the manufacturer.

ON-BOARD BATTERY CHARGER (OPTIONAL)

If the machine is equipped with the incorporated battery charger please refer to the instructions of the constructor of this equipment what the charging operations occur.

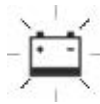
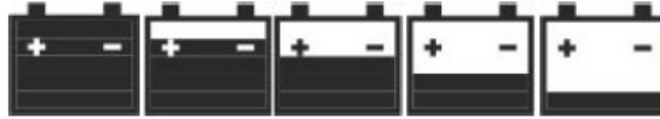
The battery charger is connected directly to the battery poles. During the charge a system is activated that does not allow the machine functioning.

The battery charger cable have a maximum length of 2 meters and must be connected to a single phase plug CEE 7/7 type.

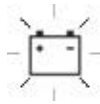


BATTERY CHARGE LEVEL INDICATOR

The battery charge level is displayed with its related symbol (see “CONTROLS DISPLAY”).



When the last segment of charge starts blinking, the battery is almost discharged and the suction and brushes functions are disabled.



When even the last segment of charge turns off, the battery is discharged completely and the machine stops.

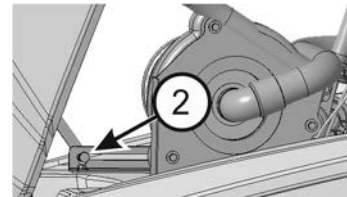
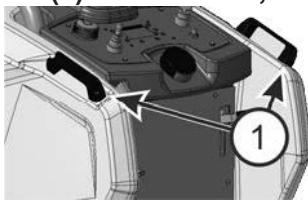
LIFTING THE RECOVERY TANK

For some ordinary maintenance operations, like battery charging, it could be necessary to open the recovery tank.

Grab the handles (1) and lift it.

Open it to its maximum extension in order to lock the opening system..

Move the lever (2) to unlock it, then close the tank keeping a hand on the handle (1).



BATTERY CHARGING



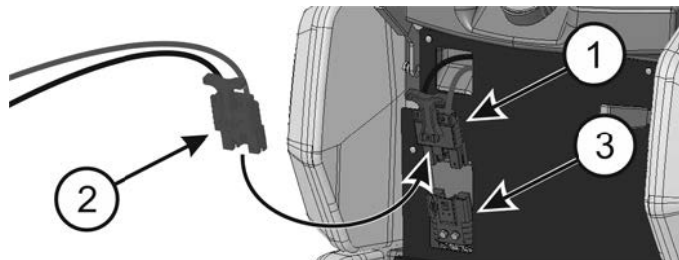
1. Plug the connector (2) of the battery charger into the battery connector (1).

2. Proceed with the charge, keeping the recovery tank open

Once the battery recharging is completed:

3. Disconnect the connector of the battery charger from the battery connector (1).

4. Connect the machine connector (3).



BATTERY CHARGING USING THE ON-BOARD CHARGER (OPTIONAL)



Take the machine to a level surface near a power plug.

1. Turn off the machine using the key switch.
2. Insert the main plug into the main socket.
3. Proceed with the charge keeping the recovery tank lifted (see paragraph “ACCESS TO THE BATTERY COMPARTMENT” in “BEFORE USE”).
4. Do not take off the plug from the main socket until the indication of the end of charge is displayed.

At the end of the charge, take off the plug from the main socket.

Never charge the batteries with a non suitable battery charger.

Carefully follow the instructions provided by the battery charger and the batteries manufacturers.

NOTE: Never leave the batteries completely discharged for long periods of time even if the machine is not used. In case of traditional batteries, please check the electrolyte level every 20 charging cycles and eventually fill them up with distilled water. Never leave the batteries discharged for more than two weeks.

If lead/acid batteries are installed there could be the risk of gas exhalations and emission of corrosive liquids.

Fire danger: do not approach with free flames.

ASSEMBLING THE BRUSH

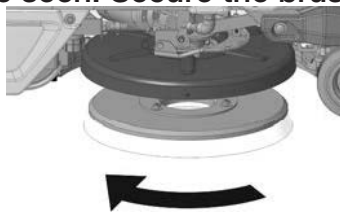
To assemble the brush it is necessary to have the brush base lifted from the floor. If it is not in such position, proceed as follows:

Without having an operator aboard, turn the key to switch on the display, then after 3 seconds, automatically all the working assemblies will reset themselves and lift from the floor.

Turn off the machine using the key switch.



With the brush base lifted, manually rotate the brush until the central screw, where to fix the support and to lock the brush, can be seen. Secure the brush as shown in the picture.



Use only brushes provided with the machine or the ones specified on the “BRUSHES and OPTIONAL” manual. Using other brushes could compromise the good cleaning.

ASSEMBLING AND DISASSEMBLING THE SPLASH GUARDS

The two splash guards must be assembled on the brush base cover.

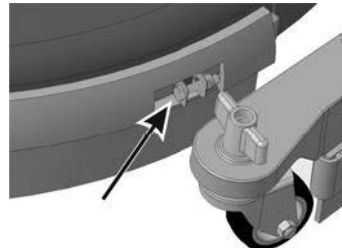
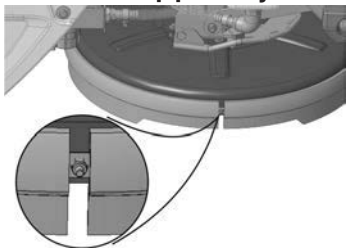
1. Insert the metal supports inside the dedicated housings on the rubber. Place the round hole to the plain end of the support on the screw in front of the cover. Secure the supports by tightening the nut.

2. Screw the screws on the rear part of the cover, on the free end of the metal supports and the locks.

The operation has to be made for both the splash guards rubbers.

With the brush on, the splash guard rubber has to slightly touch the floor.

To disassemble the supports just repeat these operations in reverse order.

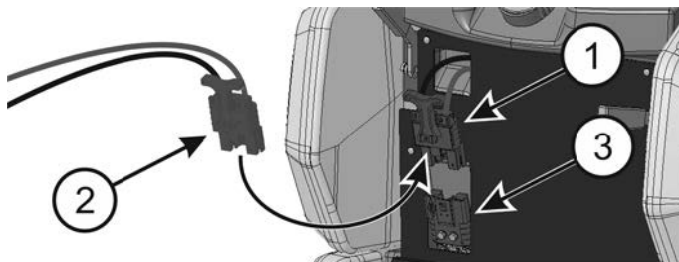


FLOOR CLEANING

CONNECTING THE BATTERY CONNECTOR AND SWITCHING ON THE MACHINE

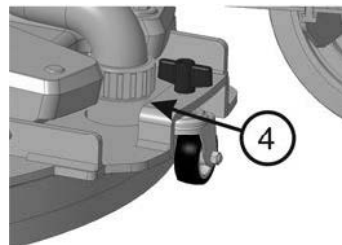
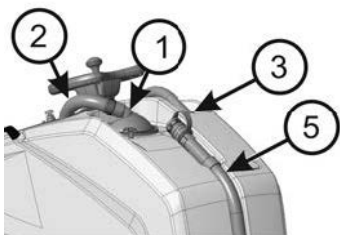
Once that the battery charging has been completed:

1. Disconnect the connector (2) of the battery charger from the battery connector (1).
2. Connect then the battery connector (1) to the machine connector (3).



RECOVERY TANK

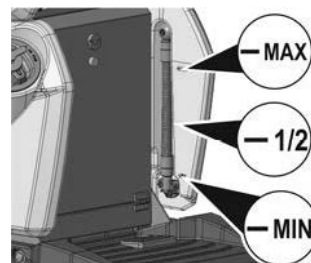
Check that the suction filter cap (1) is properly secured after turning the levers and that it is properly connected to the suction motor hose (2). Verify that the squeegee hose is properly inserted in its locations (3) and (4), also check that the draining hose cap (5) on the front of the machine is closed.



ASSEMBLY

DETERGENT SOLUTION TANK

Grab the hose cap (1) located on the left side of the machine, pull out the hose and after opening the cap, connect the hose to the water valve. Fill the solution tank with clean water at a temperature not over 122°F (50°C). Add detergent solution with the concentration provided by the manufacturer. To avoid the excessive production of foam that could cause damages to the suction motor, use a minimum percentage detergent solution. On the rear part of the machine is located the water level hose, which allows users to see the amount of detergent solution inside the tanks, both when loading it and when working.



Always use a foam-controlled detergent. To safely avoid the production of foam, before starting to work, add also a small amount of anti-foam solution in the recovery tank. Never use pure acids.

WORK

A safety device prevents the machine's movement if the operator is not properly placed on the footboard.

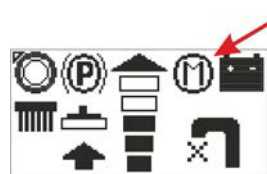
To turn on the machine:

1. Step on the footboard.
 2. Turn the key (1) clockwise to turn on the machine.
 3. Check the battery level on the display.
- The machine will go automatically in manual mode (MAN).
4. Select the driving direction using the lever (2).



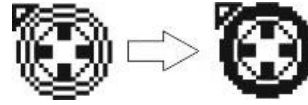
MANUAL MODE WORK

1. Check that the machine is set in manual mode, if not press button (1) and the display will show the corresponding symbol.

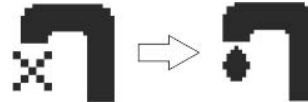


OPERATION

2. Press the suction motor button (2); the suction motor symbol changes depending if the motor is turned on or off, the motor will then start to work.



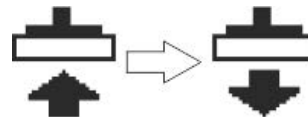
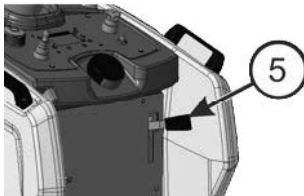
3. Press the solenoid valve button (3); the solenoid valve symbol changes depending if the valve is closed or open.



4. Lower the brush base on the floor pressing button (4); the display will show first the lifting down symbol and then the brush on symbol



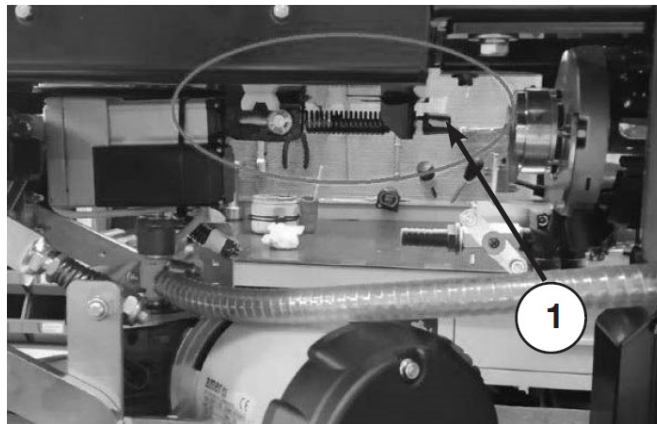
5. Lower the squeegee using the lever (5).



6. While running the first few meters check that the squeegee adjustment guarantees a perfect drying action and that the detergent solution flow is appropriate. It has to be sufficient to wet the floor uniformly avoiding the leakage of detergent from the splash guards. Always consider that the correct quantity of solution detergent depends on the type of floor, dirtiness and machine speed.

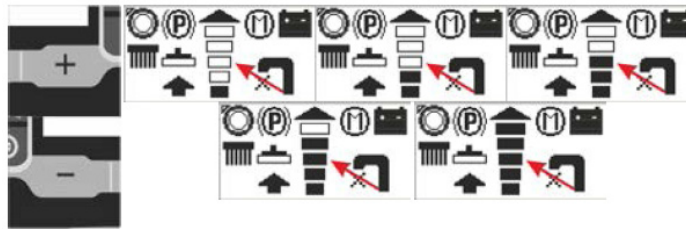
ADJUSTMENT OF THE BRUSH PRESSURE

Through the register (1) placed on the internal part of the rear left wheel, it is possible to adjust the brush pressure on the cleaned surface. By turning the wing nut clockwise the pressure increases, rotating the wing nut counterclockwise, the pressure decreases. This device allows a more efficient cleaning action also on very difficult and dirty surfaces.



SPEED ADJUSTMENT, FORWARD AND BACKWARD

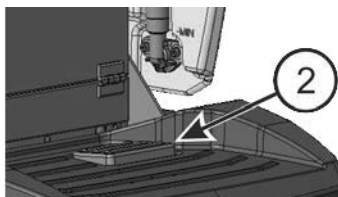
Before running the machine select the maximum speed level during work. Press buttons (+) and (-) to see the speed level on the display.



To move the machine select the direction using the lever (1) placed on the dashboard.



Press the pedal (2) placed on the footboard to enable the drive.



Use the knob (3) to adjust the speed during work. The speed will change from the minimum to the maximum previously set and visible on the display.

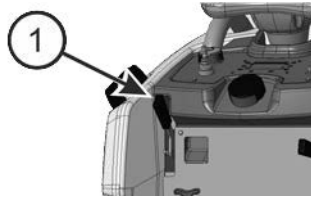


When working it is necessary to lift the squeegee to enable the backward drive.

OPERATION

DETERGENT SOLUTION FLOW ADJUSTMENT

In standard mode the detergent solution flow adjustment is made through the lever (1) both in MAN and AUTO mode.

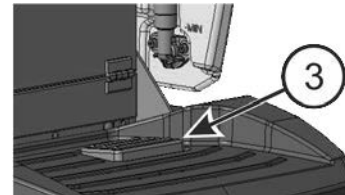
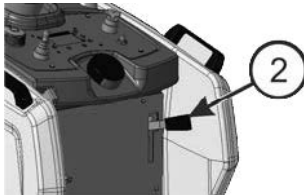


AUTOMATIC MODE WORK

1. Automatic mode is helpful to ease the operator work.
2. Check that the machine is set in automatic mode, if not press button (1) and the display will show the corresponding symbol.



3. Lower the squeegee using the lever (2).
4. Press the drive pedal (3) on the footboard.



Once the pedal is pressed the machine runs forward, the brush base goes down and simultaneously the solenoid valve opens itself and brushes and suction motor start working. To adjust the detergent flow see under “DETERGENT SOLUTION FLOW ADJUSTMENT”. After releasing the pedal: the brush base goes up, the brushes motors stop, the solenoid valve closes itself, and the suction motor shuts off.



If, during the work in automatic mode:

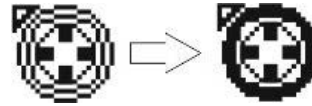
- the brush base, solenoid valve or suction motor button is pressed, the machine switch to manual mode;
- the squeegee lever is lifted, the suction motor shuts off after a few seconds; when the lever is lowered the suction motor turns back on.

OPERATION

SILENT MODE SUCTION MOTOR

It is possible to start the silent mode of the suction motor by pressing for a few seconds the switch-on button (1) of the suction motor.

When the silent mode is on the symbol on the display changes.



STAND-BY MODE

After 10 minutes of inactivity, if the machine is on, it goes in stand-by mode and the display turns off. To start again press any button on the instrument board, the display will turn on again and after a few seconds the machine returns operative.

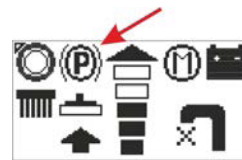
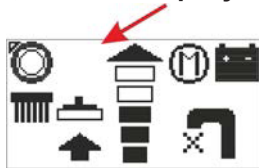
HORN

The machine is provided with a horn that can be activated pressing button (1).



PARKING BRAKE

The machine is equipped with a parking brake on the traction motor wheel that operates at the complete release of the pedal or when the machine is without batteries. In case of an emergency or simply to stop the machine, it is sufficient to release the pedal. The brake remains applied until the pedal is pressed again. When the batteries are connected and when the key switch is positioned on 1, on the display for the brake signal comes on.



BRUSHES MOTOR OVERLOAD PROTECTION SYSTEM

The machine is equipped with a protection device of the brushes motor.

This device blocks the motor functioning in order to protect it and indicates the overload on the display with the message "ALARM 1".

When this happens, try to reduce the brushes pressure (see under "ADJUSTMENT OF THE BRUSHES PRESSURE").

If the problem persists, contact the authorized service center.

OVERFLOW SYSTEM



In order to avoid serious damages to the suction motor, the machine is equipped with a float that intervenes when the recovery tank is full. When this happens, it is necessary to empty the recovery tank. Hold the exhaust hose of the machine. Take off the plug and empty the recovery tank into appropriate containers, according to the standard norms.

MACHINE STOP AFTER CLEANING OPERATION BREAK WASHING MODE

IN AUTOMATIC OR MANUAL WORKING MODE:

1. At the end of the washing cycle, keeping the button (1) pressed, the functioning of BREAK WASHING is chosen.

2. When the mode is on, BREAK WASHING is shown on the display.

This way, automatically, the brushes lift, the solenoid valve shuts down and it is possible to finish the drying operation for a total time of about 15 seconds, afterwards the suction stops.

NOTE: all these phases are carried out with the machine operating, so that the squeegee can dry the interested cleaning area from the “drying phase of the brushes” and furthermore can dry the suction hose of its dirty water.

At any time it is possible to interrupt the procedure BREAK WASHING by stopping the drive.

During the BREAK WASHING, if the drive pedal is released for more than 3 seconds the machine will automatically switch to manual mode (MAN).



The mode (BREAK WASHING) is specific for the transfer at the end of the cleaning operation.

Transport:

1. Take extreme care when moving the machine up or down steps or stairs.
2. Incorrect lifting techniques may result in personal injury.
3. As stated earlier in this manual, this machine is heavy. Do not attempt to lift the machine without assistance.
4. Carefully wrap the charger power cord and store in a dry, indoor location.
5. DO NOT expose the machine to rain or moisture.
6. When transporting the machine, ensure that all components, tanks and removable parts are securely fastened and that the charger power cord and plug are not trailing.
7. DO NOT lift or transport the machine while it contains liquid as this will add considerable weight to the unit.

Storage:

1. Always unplug, empty, wipe down and dry the machine after use.
2. Both the solution and recovery tanks should be emptied and flushed out with clean water to ensure the seals and pumps are free from any cleaning detergents.

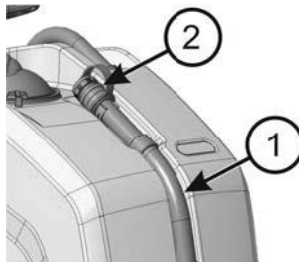
MAINTENANCE

DAILY MAINTENANCE

DRAINING AND CLEANING THE RECOVERY TANK



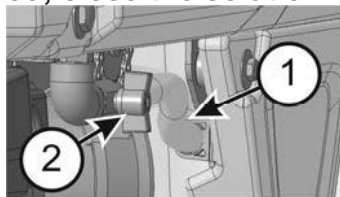
1. Hold the exhaust hose placed on the front part of the machine after having taken it off from its fixing support.
2. Take off the plug from the exhaust hose acting upon its lever and empty the recovery tank into appropriate containers, in compliance with the respective rules what the liquid disposal concerns.
3. Clean the inside of the tank using a water jet.



DRAINING AND CLEANING THE SOLUTION TANK



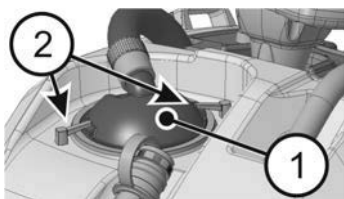
1. Hold the exhaust hose (1) placed on the right side of the machine after having removed it from its fixing support.
2. Open the solution valve (2) of the exhaust hose located on it and empty the solution tank into appropriate containers, in compliance with the respective rules what the liquid disposal concerns.
3. Rinse the tank with a water jet.
4. Once it has been completely emptied, close the solution valve (2).



CLEANING THE SUCTION FILTER



1. Open the cover (1) and unscrew the knob (2) to release the filter protection (3).
2. Rotate the filter protection clockwise to release it.
3. Take off the filter and its protection.
4. Clean with a water jet especially the bottom part and the sides of the filter.
5. Do the cleaning procedure precisely.



6. Reassemble the filter.



AUTOMATIC DISASSEMBLING OF THE BRUSH



1. Put the drive selector lever in the central position.
2. Turn on the machine turning the key clockwise (1).
3. Keep the button (2) pressed for a few seconds.



4. Turn off the machine.

CLEANING THE BRUSH



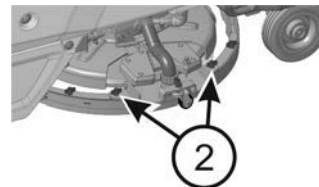
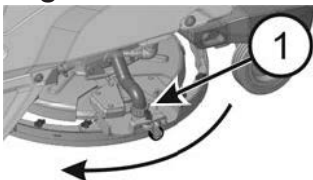
Take off the brush to clean it with a water jet (to read how to do it see chapter “DISASSEMBLING THE BRUSH”).

CLEANING THE SQUEEGEE



Keeping the squeegee clean ensures a better floor cleaning:

1. Lift the brush base, then rotate the squeegee on the side.
2. With the squeegee in such position, take off the squeegee hose coupling (1).
3. Completely unscrew the wing nuts (2) in order to release the squeegee.
4. Carefully clean the joint of the squeegee cleaning eventual dirt deposits and carefully clean also the squeegee rubbers.



MAINTENANCE

WEEKLY MAINTENANCE REAR SQUEEGEE RUBBER CHECK

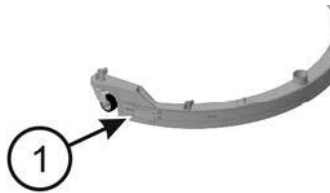


Check the squeegee rubber wearing and eventually turn it or replace it.

For the replacement it is necessary:

1. Take off the squeegee (see chapter “CLEANING THE SQUEEGEE”).
2. Unlock the squeegee blade lock (1).
3. Take off the rubber to turn it around or replace it.

To put back the squeegee just repeat these operations backwards.



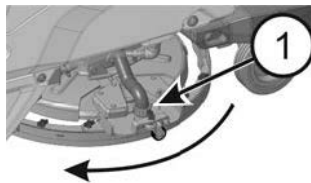
CLEANING THE SQUEEGEE HOSE



Weekly or in case of insufficient suction, it is necessary to check that the squeegee hose is not obstructed. Eventually, to clean it, proceed as follows:

1. With the brush base lifted, rotate the squeegee on one side.
2. With the squeegee in such position, take off the squeegee hose coupling (1).

Do not wash the hose that goes from the suction motor to the recovery tank.



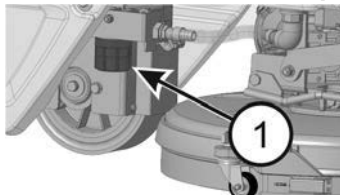
CLEANING THE OUTER FILTER AND THE SOLUTION TANK



Take the machine to the place assigned for the detergent solution draining.

1. Unscrew the filter cap (1) and take the filter out.
2. Wash the filter components with a water jet.

Once finished, close the valve, reassemble the filter and replace the tank cap.

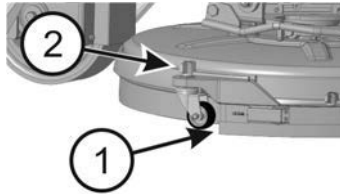


SQUEEGEE HEIGHT ADJUSTMENT

The squeegee height has to be adjusted depending on how much the rubbers are worn. In order to obtain an optimal drying, the lower edge of the rear squeegee rubber (1) must be slightly bent backward along all its length.

To adjust the rubber bending proceed as follows:

Loose the knob (2) for each wheel that you want to adjust. Turn the wheel ferrule clockwise in order to decrease the bending or counterclockwise to increase the bending of the rubber. Lock the knob keeping the ferrule steady.



TWO-MONTHLY MAINTENANCE

FRONT SQUEEGEE RUBBER CHECK

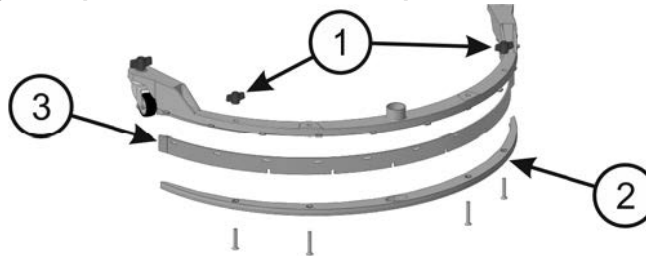


Check the wear of the squeegee rubber and eventually replace it.

For the replacement it is necessary to:

1. Take off the squeegee (see under paragraph “SQUEEGEE CLEANING”).
2. Disassemble the rear part of the squeegee (see under paragraph “REAR SQUEEGEE RUBBER CHECK”).
3. Unscrew the wing nuts (1) and take off the front rubber holder blade (2).
4. Replace the front rubber (3).

To reassemble the squeegee repeat backwards the operations above mentioned.



SIX-MONTHLY MAINTENANCE

SPLASH GUARDS RUBBER CHECK

With the brushes assembled, the splash guards must slightly touch the floor. If they are worn, they have to be replaced. Just release the lever coupler placed in the rear part of the brushes base group from the ring placed at the free extremity of the metal strip to take off the rubbers and to reinsert the new ones (see under paragraph “SPLASH GUARD ASSEMBLY”). This operation has to be carried out for both splash guards.

MAINTENANCE



Prior to performing any maintenance, ensure unit is OFF and disconnected from power supply.



The following checks may be performed by the operator. Any other service or attempt to service by the operator will void the warranty.

PROGRAMMED MAINTENANCE

PERIODIC ORDINARY MAINTENANCE CHART

INTERVENTION	DAILY	PERIODIC
RECOVERY TANK CLEANING	•	
SUCTION FILTER CLEANING	•	
SOLUTION TANK FILTER CLEANING		•
BRUSHES CLEANING	•	
BRUSHES DISASSEMBLY AND CLEANING	•	
SQUEEGEE CLEANING	•	
FRONT SQUEEGEE RUBBER CHECK		•
REAR SQUEEGEE RUBBER CHECK		•
SPLASH GUARD RUBBER CHECK		•
CHECK SQUEEGEE ADJUSTMENT		•
SQUEEGEE HOSE CLEANING		•
SOLUTION TANK CLEANING		•
CHECK BATTERIES ELECTROLYTE		•



Besides those outlined above, all additional servicing and repairs should only be performed by an Authorized Tornado Servicing Agent.



The following checks may be performed by the operator. Any other service or attempt to service by the operator will void the warranty.

TROUBLESHOOTING GUIDE



The checking of all the other foreseen machine operations is left to the authorized service center. Never leave the batteries completely discharged for a long time. In case of alarm visualizations contact the authorized service center.



If, with the key switch positioned clockwise to switch on the machine, the display and other functions are not activated, it is necessary to check the batteries' connection to the machine (see under paragraph "CONNECTION BATTERIES' CONNECTION AND SWITCHING ON OF THE MACHINE"). If the problem persists, please contact the authorized service center.

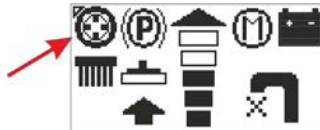
If, on the display those symbols are shown, it means that the parking brake is not engaged. In this situation all the functions of the machine are disabled. To enable the parking brake see "UNPACKING AND MANUALLY MOVE THE MACHINE"



THE SUCTION MOTOR DOES NOT WORK

1. Check the battery charge on the display.
2. Check on the display that the starting signal of the suction motor is on.
3. Check the suction motor connections.

If the problem persists, please contact the authorized service center.

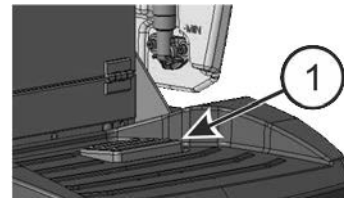
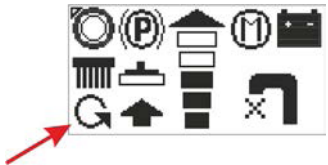


TROUBLESHOOTING

THE BRUSH MOTOR DOES NOT WORK

1. Check the battery charge on the display.
2. Check on the display that the starting signal of the brush motor is on.
3. Press the pedal on the footboard (1) to start the machine.

If the problem persists, please contact the authorized service center.



THE TRACTION MOTOR DOES NOT WORK

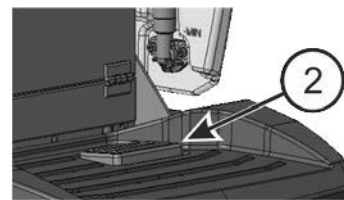
Check the lever position (1).

If alarms are showed on the display it is necessary to turn off and the on the machine to restore its functions.

Check the battery charge on the display.

Press the pedal on the footboard (2) to start the machine.

If the problem persists, please contact the authorized service center.



THE SOLUTION IS NOT SPILLED ON THE BRUSH

The machine is equipped with a solenoid valve that allows the solution go down onto the brush it is necessary to make the brush turn.

1. Check on the display that the solenoid valve is activated.
2. Check that the valve lever is open (1).
3. Check the detergent solution level in the solution tank.
4. Check that the solution filter is clean (see under paragraph "CLEANING THE OUTER SOLUTION FILTER").

TWO-MONTHLY MAINTENANCE

FRONT SQUEEGEE RUBBER CHECK

If the problem persists, please contact the authorized service center.

THE MACHINE DOES NOT CLEAN PROPERLY

1. The brushes do not have the suitable bristle dimension: Contact the authorized service center.
2. The brushes have got worn bristles. Check the brushes wear condition and eventually replace them (the brushes have to be replaced when the bristles have reached a height of about 1/2" (15 mm)).
3. To replace the brushes, see instructions under paragraph "BRUSHES DISASSEMBLY" and "BRUSHES ASSEMBLY".
4. The detergent solution is insufficient: open more the solution valve (see under paragraph "FLOW ADJUSTMENT OF THE DETERGENT SOLUTION").
5. Check that the liquid detergent is in the recommended percentage.
6. Increase the brushes base pressure (see under paragraph "ADJUSTMENT OF THE BRUSHES PRESSURE").

Contact the authorized service center for advice.

TROUBLESHOOTING

THE SQUEEGEE DOES NOT DRY PROPERLY

1. Check that the squeegee rubbers are clean.
2. Check the adjustment of the height and the inclination of the squeegee (see section “ADJUSTMENT OF THE SQUEEGEE” in “BEFORE USE”).
3. Check that the suction hose is correctly inserted in the proper location on the recovery tank or that it is not clogged.
4. Clean the suction filter.
5. Replace the rubbers if worn out.
6. Check on the display that the starting signal of the suction motor is on.
7. Put the motor in standard mode if silenced.
8. Check that the suction motor cap is closed properly.
9. Check that the recovery tank is not full, thereby activating the float.

If the problem persists, please contact the authorized service center.

EXCESSIVE FOAM PRODUCTION

Check that low foam detergent has been used. Eventually add small quantities of anti foam liquid into the recovery tank. Please consider

that a major foam production happens when the floor is slightly dirty.

In that situation please dilute further the detergent solution.

ALARM: TURN SPEED CONTROL SENSOR DEFECTIVE

The machine is provided with a sensor for the speed control when turning which, if damaged, will show the following screen on the display together with the one of the activated function:

Contact an approved service center for maintenance

For operator safety, in case of damage during operation the speed will automatically decrease until the component is restored.

**STEERING
CONTROL
FAILURE**



Tornado Industries, LLC
3101 Wichita Court
Ft. Worth, TX 76140-1755
Phone: 800-VACUUMS
Fax: 1-817-551-0719
WWW.TORNADOVAC.COM



Record of Purchase

Serial Number: _____

Purchase Date: _____

Dealer: _____

Phone Number: _____