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**Operations & Maintenance Manual
For Commercial Use Only**



**BD 14/4 COMPACT AUTO-SCRUBBER
MODEL NO: 99414**

NOTES

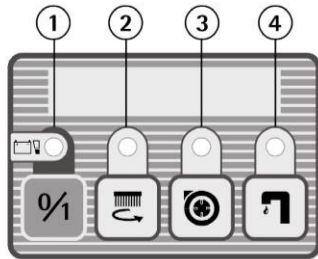
For warranty information go to www.tornadovac.com

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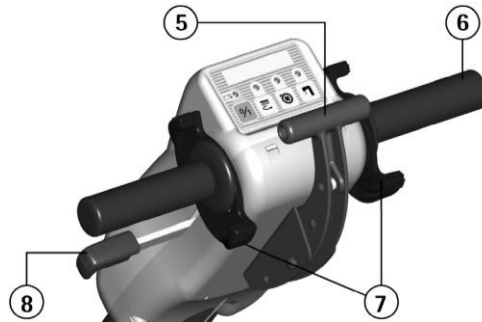
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INSTRUMENT BOARD AND CONTROLS

1. MAIN SWITCH WITH LIGHT
2. BRUSH MOTOR SWITCH WITH LIGHT
3. VACUUM MOTOR SWITCH WITH LIGHT
4. SOLENOID VALVE SWITCH WITH LIGHT



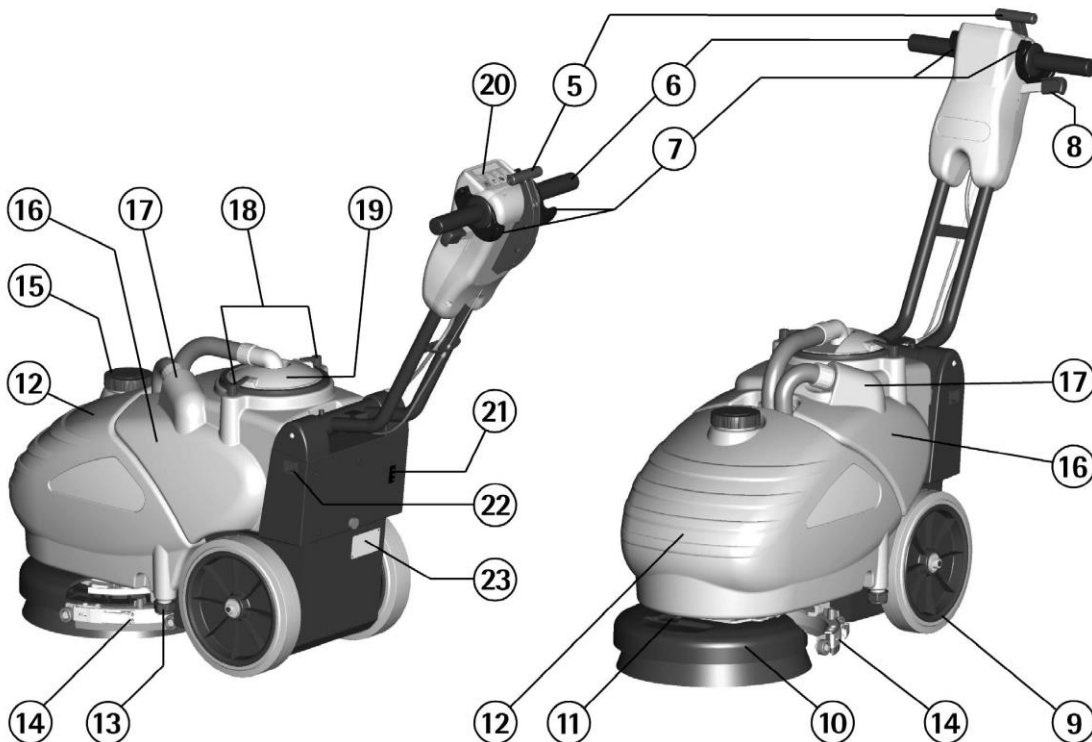
5. SQUEEGEE LIFT LEVER
6. HANDLE BARS
7. BRUSH ACTIVATION LEVERS
8. HANDLE BAR RELEASE LEVER



MACHINE

9. WHEELS
10. BRUSH BASE ASSEMBLY
11. SOLUTION FLOW ADJUSTMENT
12. SOLUTION TANK
13. SOLUTION TANK DRAIN
14. SQUEEGEE ASSEMBLY
15. SOLUTION TANK CAP
16. RECOVERY TANK

17. INLET OPENING SQUEEGEE HOSE
18. RECOVERY COVER LEVERS
19. RECOVERY COVER
20. INSTRUMENT BOARD
21. CHARGE LEVEL INDICATOR
22. POWER CABLE OUTLET
23. SERIAL NUMBER PLATE



TECHNICAL DESCRIPTION		
Cleaning width	Inch	14
Squeegee width	Inch	16
Battery Voltage	V	24
Capacity of the batteries	Ah ₅	28
Power installed	W/A	430/18
Working capacity, up to	Sq.ft./h	11,300
Brush diameter	Inch	14
Brush speed	RPM	170
Brush pressure (max)	Lbs.	55
Vacuum suction	Water Lift	36"
Type of drive		semi-automatic
Maximum gradient	%	2
Capacity solution tank	Gallon	4
Capacity recovery tank	Gallon	4.2
Machine length (min)	Inch	29
Machine height	Inch	21.6
Machine width	Inch	16.3
Machine weight (with batteries)	Lbs.	143
Weight of the batteries	Lbs.	48
Recharging time max	Hour	10
Battery compartment with support (L x W x H)	Inch	8.5 x 10.6 x 7.5
Sound Level	dB(A)	<70
Battery charger	V ~	100-240
Battery charger: frequency	Hz	50-60
Battery charger: nominal current	Amps	5

INTRODUCTION

Thank you for having chosen our machine. This floor cleaning machine is used for industrial and commercial cleaning and is able to clean any type of floor except carpet. During its forward movement, the combined action of the brushes and the solution removes the dirt which is recovered through the rear vacuum assembly, resulting in a clean dry surface. The machine must be used only for such purpose. It gives the best performance if it is used correctly and maintained in working order. We therefore ask you to read this instruction booklet carefully whenever difficulties arise in the course of the machine's use. We ask you to contact our service department for all advice and servicing when necessary.


GENERAL SAFETY RULES


The rules below have to be followed carefully in order to avoid damage and injury.


- Read the labels carefully on the machine. Do not cover them for any reason and replace them immediately if damaged.
- The machine must be used exclusively by authorized staff that have been instructed for its use.
- During the operation of the machine, pay attention to other people especially to children.
- When children are present, do not let them play with the machine.

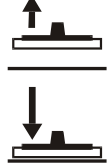
- The socket for the battery charger must be equipped with a standard ground system.
- Do not mix different detergents, avoiding harmful odors.
- Storage temperature: between 40°F and 131°F (5°C and +55°C).
- Operating temperature: between 40°F and 104°F (5°C and 40°C).
- The humidity should not exceed 95%.
- Do not use the machine in explosive atmosphere.
- Do not use the machine as a means of transport.
- Do not use acid solutions which could damage the machine and/or the persons.
- Avoid working with the brush when the machine is standing still, in order to prevent floor damage.
- Do not use the machine on surfaces covered with inflammable liquids or dusts (for example hydrocarbons, ashes or soot).
- In case of fire, use a powder fire extinguisher.
- Do not use water.
- Do not strike shelveings or scaffoldings, where there is danger of falling objects.
- Do not use the machine on areas having a higher gradient than the one stated on the number plate.
- The machine has to carry out simultaneously the operations of washing and drying. Different operations must be carried out in restricted areas prohibited to unauthorized personnel.


- Signal the areas of moist floors with suitable signs.
- If the machine does not work properly, check by conducting simple maintenance procedures. Otherwise, ask for technical advice from an authorized assistance center.
- Where parts are required, ask for ORIGINAL spare parts from the distributor and/or from an authorized dealer.
- Use only ORIGINAL brushes.
- For any cleaning and/or maintenance operation remove the power supply from the machine.
- Do not take off the protections which require the use of tools to be removed.
- Do not wash the machine with direct water jets or with high water pressure nor with corrosive material.
- Every 200 working hours have a machine check by an authorized service department.
- Before using the machine, check that all panels and coverings are in their position as indicated in this maintenance catalog.
- Restore all electrical connections after any maintenance operation.
- Dispose of normal wear and tear item in strict conformance of local rules and regulations.
- When the machine is taken out of service, dispose of it in conformance of local rules and regulations.

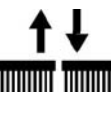
Symbol denoting the solution valve.
 Indicates the solution valve lever. Indicates the signal lamp of the solenoid valve functioning.


Symbol denoting the brush.
 Indicates the switch of the brush motor.


Symbol denoting the suction motor.
 Indicates the switch of the suction motor.


Symbol denoting up – down of the squeegee.
 Indicates the squeegee lever.


Symbol denoting the selection switch of the driving speed.



Symbol that indicates the lever for the brush base lifting or the push button up/down brush base.



Symbol denoting the charge level of the batteries.



Symbol denoting the hour meter.



Indication of the maximum temperature of the solution detergent.
 It is placed near the charging hole of the solution tank.

Symbol denoting the brake.
 Indicates the signal lamp of the brake on.

Symbol denoting the brake.
 Indicates the lever of the emergency and parking brake.

Symbol denoting the crossed bin. Indicates that at the end of its activity, the machine has to be disposed conforming to the laws in force.


Symbol denoting the open book.
 Indicates that the operator has to read the manual before the use of the machine.

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

BEFORE USE

Handling of the packed machine

The machine is supplied with suitable packing.

The total weight is 165lbs.

Packing dimensions:

Base: 30 in x 16 in

Height: 24.5 in.

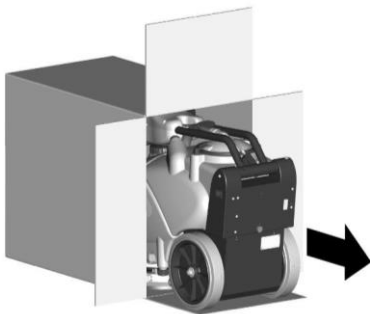


ATTENTION:

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

Unpacking the machine

1. Open the packing as shown in the figure.
2. Carefully take the machine off the packaging.
3. Keep packaging for future transport needs.



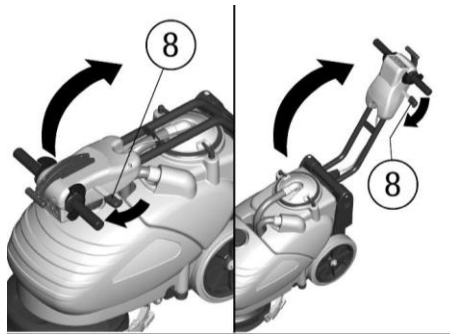
Movement of the handle bar

The handle bar in the package arrives in the closed position.

To rotate the handle bar in one of the different working positions to move the machine:

1. Pull up the release lever (8) near the handle bar.
2. Rotate the handle bar into the working position while holding the release lever (8).
3. Release the release lever (8) to lock the handle bar.

Use the same procedure for further height adjustment of the handle bar to find the most comfortable working position.

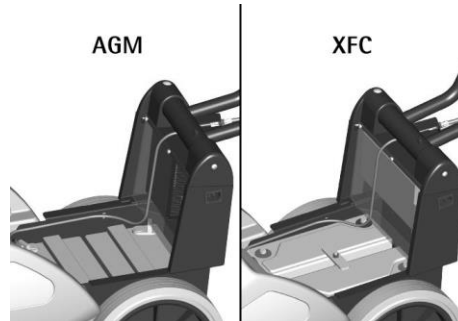


Battery

This machine is supplied with two batteries already connected in series, placed in its appropriate compartment under the recovery tank.

In case the batteries need to be disassembled and/or replaced, please contact the authorized technical assistance.

In fact, the replacement must be made exclusively with batteries which have the identical performances as the ones already installed.



To reach the battery compartment it is necessary to:

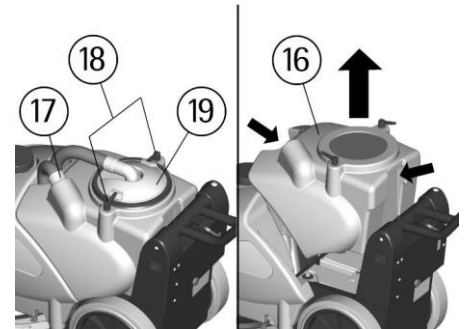
1. Remove the squeegee hose from its seat (17).
2. Remove the suction filter cover (19) after turning the blocking levers (18).
3. Lift and remove the recovery tank (16) holding it from the provided handles. One on the front and one on the rear of the tank



ATTENTION:

Strictly follow manufacturer/distributor indications for the maintenance and daily recharge of the batteries.

Specialized staff, using suitable protection accessories must execute all installation and maintenance operations.



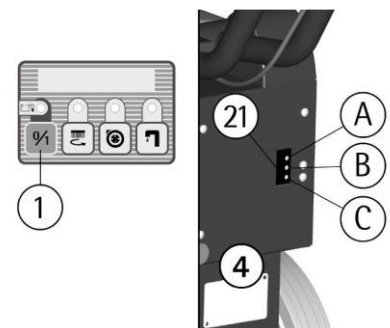
Battery recharging

(Standard version with AGM batteries) The charge level of the battery is visible by first activating the main switch (1) placed on the instrument board, through three luminous LEDs placed on the frame in the rear part of the machine.

A: green LED on = batteries are charged.

B: orange LED on = level at half charge.

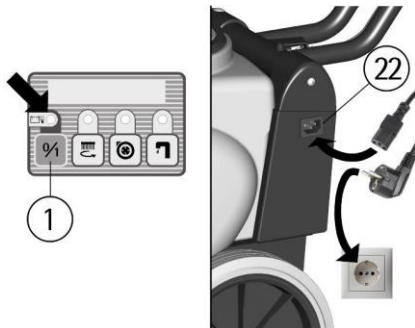
C: red LED on = complete discharge of the batteries with consequent automatic switching off of all the machine's function.



To prevent permanent damage to the batteries, it is essential to completely discharge every 6 or 7 cycles, providing for the recharge only when the red signal of discharged batteries is activated. In fact, an extended series of charging cycles carried out when the batteries still have a residual charge, causes a battery to deteriorate, shortening the battery life.

NOTE: Never leave batteries completely discharged even if the machine is not used. During the recharging operation a device is activated that restricts the machine from functioning.

Bring the machine on a level surface near a suitable outlet. Switch off the main switch (1). Connect the main cable supplied with the machine both to the machine (22) and to the outlet socket as indicated in the figure. At the end of the charging phase take off the main cable.



ATTENTION:

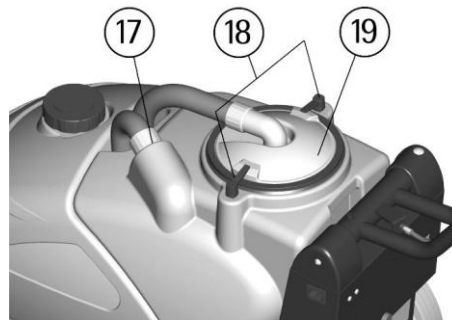
Never charge batteries with a non-suitable charger. Strictly follow the instructions supplied by the battery and charger manufacturer.

Battery disposal

It is mandatory to hand over exhausted batteries, classified as dangerous waste, to an authorized institution according to the local laws.

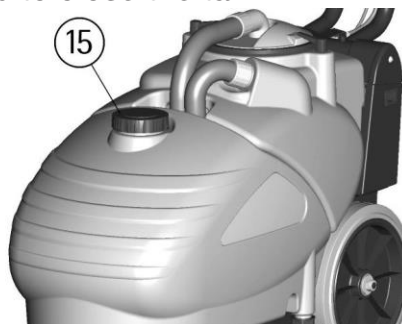
Recovery tank

Check that the cover of the vacuum filter (19) is correctly secured, after rotating the levers (18). Furthermore, check that the squeegee hose is correctly seated in its seat (17).



Solution tank

The capacity of the solution tank is indicated in the technical data. Remove the solution tank cap (15) placed in the top part of the machine and fill the solution tank with clean water at a maximum temperature of 122°F (50°C). Add liquid detergent in the percentage and conditions recommended by the manufacturer. To avoid excessive foaming, which could cause problems to the vacuum motor, use the minimum percentage of detergent. Screw down the cap to close the tank.



ATTENTION:

Always use low foam detergent.

To avoid excessive foaming, before starting working operation, add into the recovery tank a minimum quantity of anti-foam product. Never use pure acid.

FLOOR CLEANING

Starting the machine

The push buttons on the instrument board are equipped with an upper green signal light that will light when the control is activated.

1. Switch on the machine pressing the main switch (1).
2. Check the battery charge level (see under “BATTERY RECHARGING”).

3. Lower the squeegee by rotating the handle of the squeegee lifting lever (5) placed in the center of the handle bar.

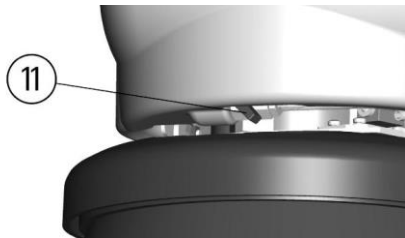
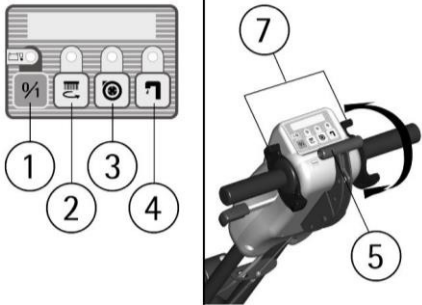
4. Press the switch for the brush motor (2).
5. Press the switch for the vacuum motor (3).
6. Press the switch for the solenoid valve (4).

The machine is equipped with a solenoid valve, therefore the solution flow will be activated automatically by pressing the brush activation levers (7). Releasing these levers, will stop the flow automatically.

7. Pressing the brush activation levers (7) the brush will start rotating. The solution flow begins to flow and the squeegee will start drying the floor.

8. During the first few feet check the solution flow lever. The solution flow adjustment is preset at the factory to satisfy the cleaning of most floors. If it is necessary to adjust the quantity of solution onto the floor, adjust the solution flow lever (11).

9. When moving the machine backwards, make sure that the squeegee is lifted.



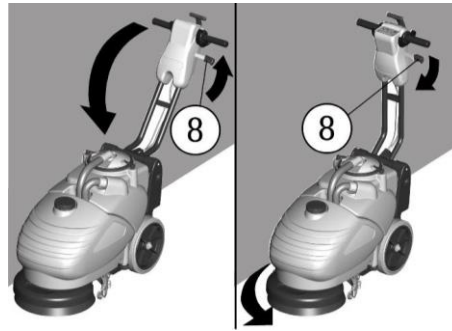
Handle bar adjustment

When approaching obstacles or walls, it is possible to better handle the machine by adjusting the handle bar to a more upright position.

To rotate the handle bar:

1. Lift up on the release lever (8)
2. Rotate the handle bar into the new working position keeping the release lever (8) pulled.
3. Release the lever (8) to lock the handle bar.

Once the obstacle has been passed repeat the operation to return to the previous working position. This operation is also possible with the machine in motion by temporarily holding the handle bar release levers (8).



Overflow device

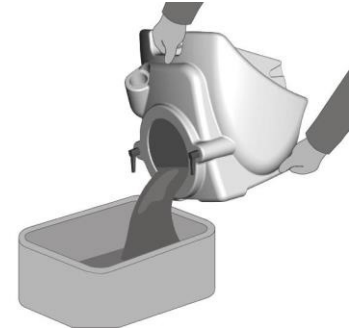
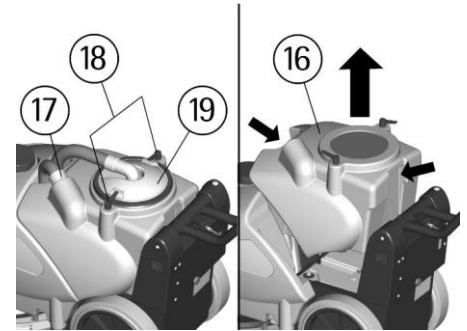
In order to avoid serious damage to the vacuum motor, the machine is equipped with a float that activates when the recovery tank is full, closing the vacuum hose and stopping the suction.

When this happens, it is necessary to empty the recovery tank.

1. Switch off the machine by pressing the main switch.
2. Take off the vacuum filter cover (19) after turning the levers (18).
3. Take off the squeegee hose (17).
4. Lift and remove the recovery tank (16) pulling it by its handles, one on the front and one on the rear of the tank. Empty the recovery tank into appropriate containers, according to the standard norms for the liquid disposal.
5. Reassemble everything.

ATTENTION:

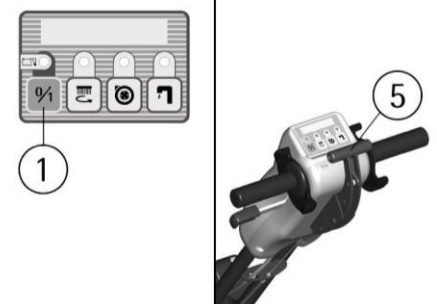
This operation must be carried out using gloves to protect from contact with dangerous solutions.



STOPPING THE MACHINE AFTER CLEANING OPERATION

Before carrying out any type of maintenance:

1. Switch off the main switch (1).
2. Lift the squeegee by rotating the squeegee lift lever upwards (5).
3. Bring the machine to an appropriate place for drain the tank.



ATTENTION:

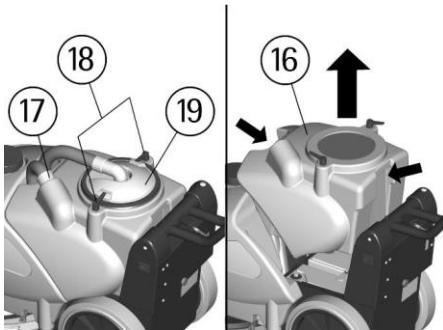
The machine is not equipped with a parking brake, therefore do not leave it on slopes.

DAILY MAINTENANCE

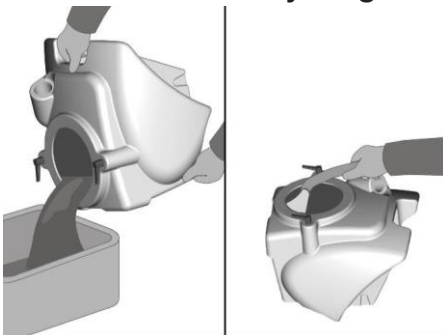
Emptying and cleaning of the recovery tank

To empty and clean the recovery tank:

1. Switch off the machine by pressing the main switch.
2. Take off the suction cover (19) after rotating the levers (18).
3. Take off the squeegee hose (17).
4. Lift and take off the recovery tank (16) holding it with its handles located on the front and back of the tank.



- Empty the recovery tank into appropriate containers, according to the standard norms for the liquid disposal.
5. Clean and rinse the tank and allow to air dry.
 6. Reassemble everything.



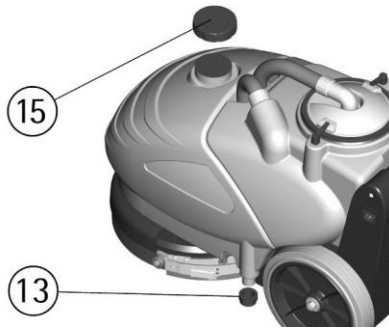
ATTENTION:

This operation must be carried out using gloves to protect from contact with dangerous solutions.

Emptying and cleaning the solution tank

To empty solution remaining in the solution tank:

1. Bring the machine to an appropriate place for draining the tank.
2. Switch off the machine pressing the main switch.
3. Unscrew the cap (15) of the solution tank.
4. Unscrew the drain plug (13) placed in the rear low left part of the machine.

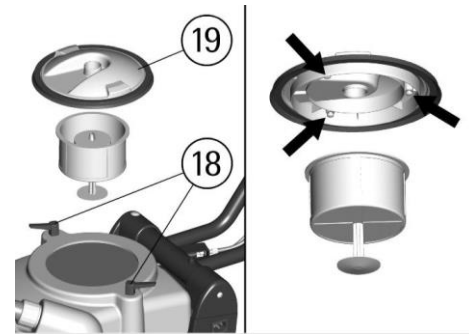


ATTENTION:

This operation must be carried out using gloves to protect from contact with dangerous solutions.

Vacuum filter cleaning

1. Take off the vacuum cover (19) after rotating the blocking levers (18).
2. Take off the filter with the float, bending the filter edge to release it from the screws on the cover.
3. Clean all parts with a water jet and especially the surfaces and filter bottom.
4. Carry out the recovery tank cleaning operations.
5. Reassemble everything.

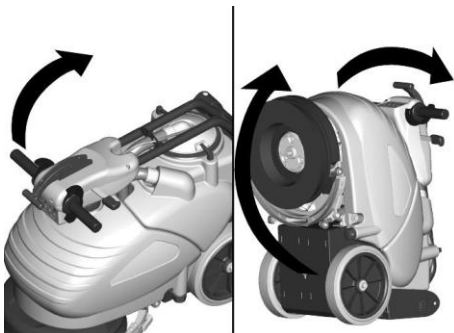
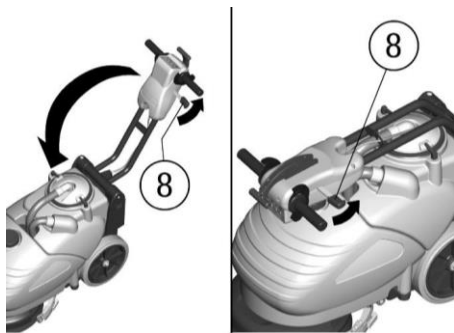


Positioning the machine for maintenance and parking

The machine can assume a vertical positioning, tipped over at the back, after having folded the handle bar onto the machine. This position allows the unit to be stored in a small space and simplifies maintenance operations.

To rotate the machine to a storage position it is necessary to:

1. Switch off the main switch.
2. Check that both tanks are empty, otherwise empty them (see under “EMPTYING AND CLEANING THE RECOVERY TANK” and “EMPTYING AND CLEANING THE SOLUTION TANK”).
3. Pull up on the handle bar release lever (8) near the handle bar.
4. Rotate the handle bar towards the tank keeping the release lever (8) pulled.
5. Release the lever (8) to obtain the handle bar locking position.
6. Holding the handle bar firmly, lift the front part of the machine making it rotate onto the rear wheels bringing it into the vertical position as shown in the figure.



Brush cleaning

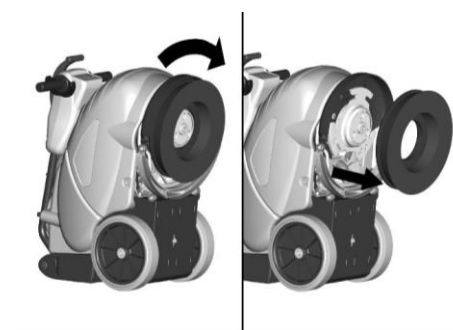
Disassemble the brush and clean it with water (for the disassembly see “BRUSH DISASSEMBLY /ASSEMBLY”).

NOTE: Make sure that the tanks are empty before disassembling the brush.

Brush disassembly/ assembly

1. Tip the machine backwards (see under “POSITIONING OF THE MACHINE FOR MAINTENANCE AND PARKING”) pay attention and remember to switch off the main switch and to empty the tanks before tipping over the machine.

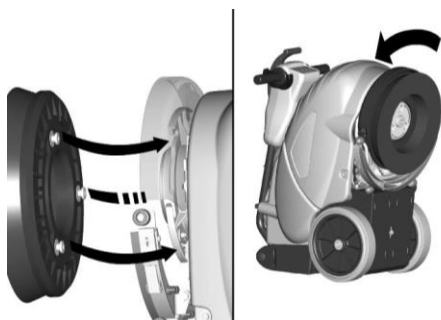
2. With the machine in this position rotate the brush clockwise, as indicated in the figure, until it is released from the seat of the brush holder plate



3. To reassemble the brush, insert the coupling buttons on the brush into the slots of the brush holder plate and rotate counterclockwise until it locks.

⚠ ATTENTION:

The handling of the brush operation must be carried out using suitable gloves to protect both mechanically from contact with the bristles and the chemical risk of contact with dangerous solutions.



Squeegee cleaning

Keeping the squeegee clean guarantees the best drying action.

1. Tip the machine backwards (see under “POSITIONING OF THE MACHINE FOR MAINTENANCE AND PARKING”). Remember to switch off the main switch and to empty the tank before tipping the machine.

2. With the machine in this position clean the internal part of the squeegee inlet, eliminating dirt build up, and clean the squeegee rubbers.



ORDINARY MAINTENANCE

Brush replacement

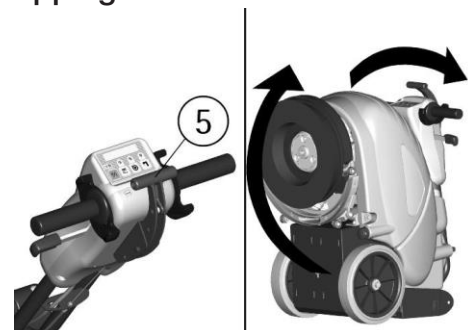
The brush has to be replaced when the brush wear indicator activates. It is possible to use other brush types, depending on condition of the floor to be cleaned. Disassemble the old brush and replace it with a new one (see under “BRUSH DISASSEMBLY/ASSEMBLY”).

Rear squeegee replacement

Check the rear squeegee wear and either turn or replace it. To replacement it is necessary to:

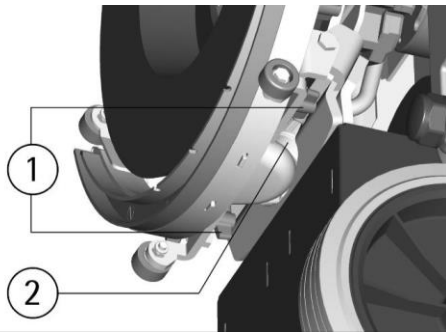
1. Rotate the squeegee lift lever (5) to lower the squeegee assembly.

2. Tip the machine backwards (see under “POSITIONING OF THE MACHINE FOR MAINTENANCE AND PARKING”) remember to switch off the main switch and to empty the tanks before tipping the machine.

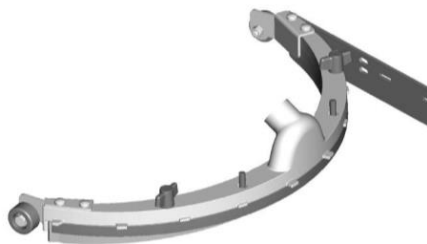
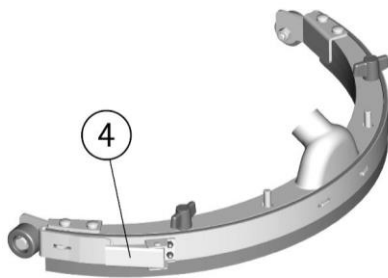


3. With the machine in this position remove the wing nuts (1)

4. Remove the squeegee hose (2) and the squeegee assembly.



5. Release the catch (4) of squeegee blade holder and take the blade off to turn it to a new side or replace it.
6. Check that the coupling and the squeegee hose are not obstructed and clean the entire assembly. To reassemble the squeegee, reverse the operations above.

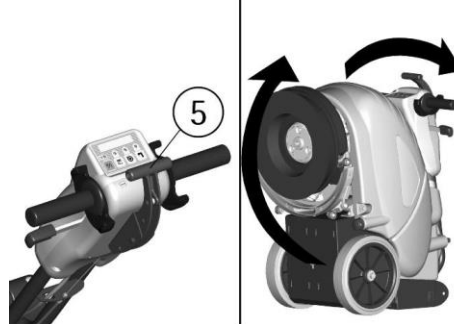


Front squeegee replacement

Check the wear of the front squeegee and replace it when necessary.

For replacement it is necessary to:

1. Rotate the squeegee lift lever (5) to lower the squeegee assembly.
2. Tip the machine backwards (see under "POSITIONING THE MACHINE FOR MAINTENANCE AND PARKING") remember to switch off the main switch and to empty the tank before tipping over the machine.



3. With the machine in this position proceed to disassemble the squeegee and the rear squeegee blade (see under "REAR SQUEEGEE BLADE REPLACEMENT").
4. Take off the wing nuts (6) in the upper part of the squeegee body, separate the two metal parts that form the squeegee body to take off the front blade.

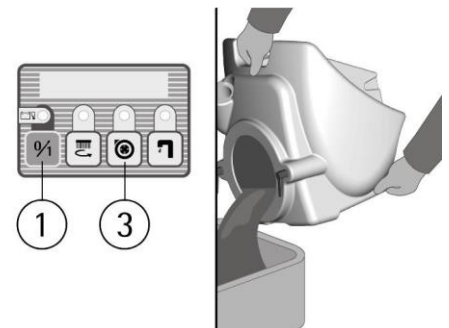
5. Clean and rinse all of the components.
- To reassemble the squeegee, reverse the operations above.



TROUBLESHOOTING GUIDE

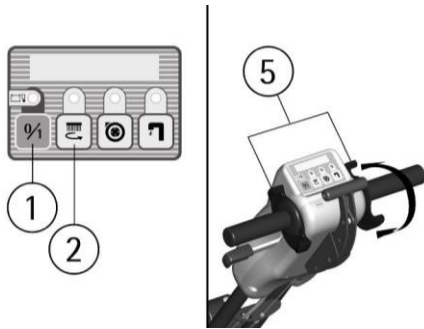
The vacuum motor does not work

1. Check the charge level of the batteries that is visible by first activating the main switch (1) (see under "BATTERY RECHARGING").
 2. Verify that the vacuum motor switch (3) is on.
 3. Check the level in the recovery tank (see under "OVERFLOW DEVICE") and if necessary, empty the tank.
- If the problem persists, please contact the authorized technical assistance.



The brush motor does not work

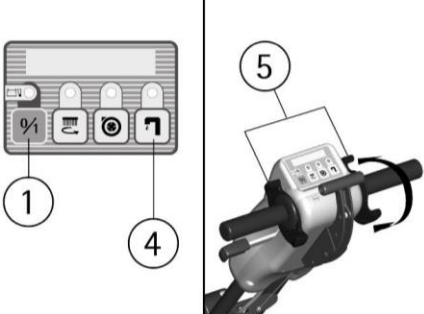
1. Check the charge level of the batteries that is visible when activating first the main switch (1) (see under "BATTERY RECHARGING").
 2. Verify that the brush motor switch (2) is on.
 3. Press the brush activation levers (5).
- If the problem persists, please contact the authorized technical assistance.



Insufficient water on the brush

1. Check that the solenoid valve switch (8) is on.
2. Check the level of the liquid in the solution tank (see under “SOLUTION TANK”).
3. Check that the solution flow adjuster (11), placed in front underneath the solution tank, is sufficiently open.
4. Press the brush activation levers (5).

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

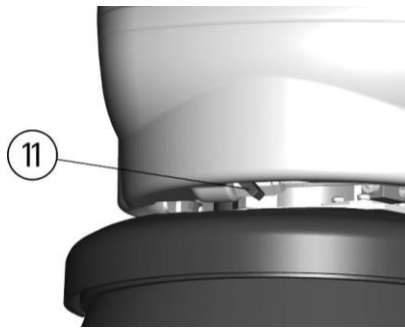


The machine does not clean properly

1. The brush does not have the suitable bristle dimension: use only original brushes. For advice, contact the authorized technical assistance.
2. The solution is insufficient: Adjust the solution flow control (11).
3. Check that the liquid detergent is in the recommended percentage. Contact the authorized technical assistance for advice.

The squeegee does not pick up well

1. Check that the squeegee blades are clean.
2. Check that the vacuum hose is correctly inserted in the proper seat.
3. Clean the vacuum filter.
4. Replace the squeegee blades if worn.
5. Check that the vacuum motor switch is on.



6. Check the level in the recovery tank (see under “OVERFLOW DEVICE”) and if necessary, empty the tank.

Excessive foam production
Check that low foam detergent has been used. Add small quantities of anti foam liquid into the recovery tank. Please be aware that more foam is produced when the floor is not very dirty. In this case please dilute detergent solution.

SCHEDULED MAINTENANCE

MAINTENANCE	DAILY	MONTHLY
RECOVERY TANK CLEANING	X	
VACUUM FILTER CLEANING	X	
BRUSH CLEANING	X	
BRUSH DISASSEMBLY	X	
SQUEEGEE CLEANING	X	
FRONT SQUEEGEE BLADE REPLACEMENT		X
REAR SQUEEGEE BLADE REPLACEMENT		X
SQUEEGEE HOSE CLEANING		X
SOLUTION TANK CLEANING		X



TORNADO[®]

Warranty Registration Form

Please Print Clearly

Company/Institution	
Contact Name	Title
Address	City/State/Zip Code
Phone	Fax
Date of Purchase	Email
Selling Dealer:(Required)	

See white metal plate or sticker on unit for this information.

MACHINE TYPE/MODEL NUMBER:	MACHINE SERIAL NUMBER:
1.	1.
2.	2.
3.	3.
4.	4.

Facility Description (please circle all that apply)			
1. School	6. Manufacturing	11. Airport	16. Other Govt.
2. Retail Store	7. College/University	12. Warehouse	17. Auto Service
3. Restaurant	8. Hospital	13. Apartment/Condo	18. Non-Profit
4. Office Building	9. Nursing Home	14. Supermarket	19. Other (specify)
5. Contract Cleaning	10. Religious Institution	15. U.S. Govt	

<p>How did you first learn about Tornado cleaning and maintenance equipment?</p> <ul style="list-style-type: none"> <input type="radio"/> Contacted by local dealer <input type="radio"/> Previous experience with Tornado products <input type="radio"/> Reputation/Recommendation <input type="radio"/> Advertising <input type="radio"/> Direct mail <input type="radio"/> Website: _____ <input type="radio"/> Blog: _____ <input type="radio"/> Other
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<p>You can complete this form online at www.tornadovac.com/services/warranty-registration-form.aspx</p> <p>This form may also be returned to :</p> <p style="text-align: center;">Tornado Industries 3101 Wichita Court Fort Worth, TX 76140 Fax: 817-551-0719</p>
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Damage or defect arising from abuse, neglect or other misuse is excluded from this warranty. Other items may or may not apply based on your specific machine. If any defect occurs, and service is attempted by non-Authorized Tornado Service Centers, the warranty will be void.