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Tornado® Operations & Maintenance Manual

MODEL NO.
99690 BD 22/14, 99720 BD 26/14

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Long-term buyer protection warranties

Tornado Standard Warranty Program*

Warranties do not cover components subject to normal wear or abuse and misuse, and have other limitations not specified here. For full details, contact your Authorized Tornado Distributor, Service Center, or the Tornado Service Department. **Tornado sales and services representatives are not authorized to waive or alter the terms of this warranty, or to increase the obligations of Tornado under the warranty.**	**10 Years:** ***All plastic tanks and rotationally-molded bodies***
	2 Year: ***On all Tornado components*** ***except as shown below***
	1 Year: ***Labor on all Tornado cleaning equipment*** ***except as shown below***
	1 Year: ***Warranty on batteries and chargers, one year, pro-rated*** All battery warranties are handled by the battery manufacturer, please call customer service for more information.

Thank you for choosing Tornado products. We are proud to offer the most complete line of commercial and industrial cleaning equipment in the industry. Our reputation for quality, innovation and durability is unsurpassed.

* Effective January 1st, 2007. Terms subject to change without notice.
1)Windshear™ Blower-Dryers, Insulation Blowers, CK LW 13/1, CK 14/1, CV 30, CV 38, Pro PAC Vacs, PV 6 Back Pack Duo-Upright Carpetkeepers™, and all chargers are warranted for 1 (one) year for both parts and labor.
2)Warranties on the EB30 are 90 days (batteries, charger, parts, accessories)
3)Warranties on all riding sweepers including the ICC1, KM 100/100 R, KMR 1250, and KMR 1700 are 24 months parts/6 months labor OR 1000 hours of operation, whichever comes first. Warranties on all riding scrubbers inluding the 75/140 & 90/140 are 24 months parts/12 months' labor OR 1,000 hours of operation whichever comes first.
4)All non-wear item parts purchased after warranty expiration are warranted for 90 days.
5)Warranty starts from the date of sale to the consumer 6 months after dealer purchased the unit from Tornado, whichever comes first.

Note: Tornado, The Latest Dirt, Floorkeeper, Carpetkeeper, Carpetrinser, Carpetrinser/Dryer, Headmaster, Taskforce, PAC-VAC, T-Lite, Glazer, Windshear, Max-Vac, CV 30, CV 38, and Trot-Mop are trademarks of Tornado Industries.

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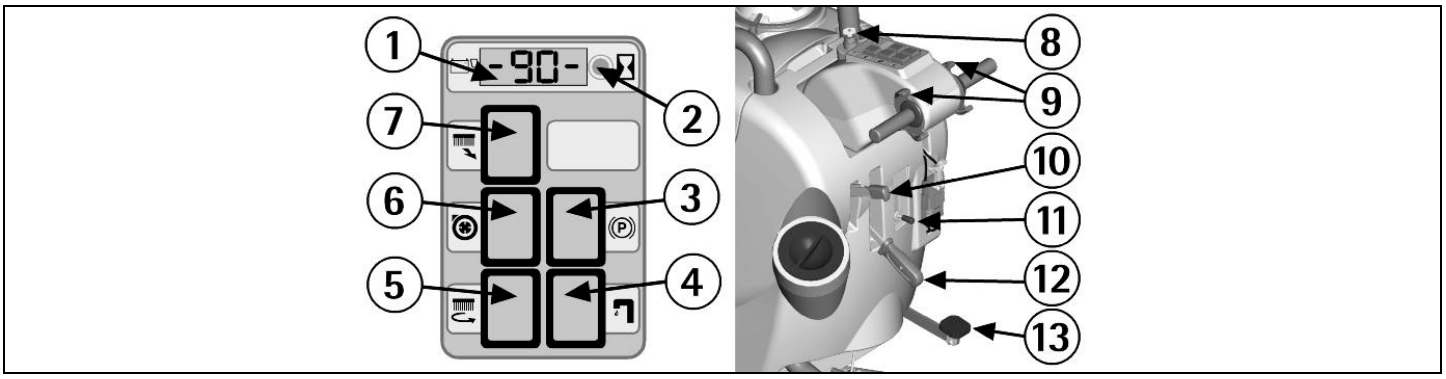
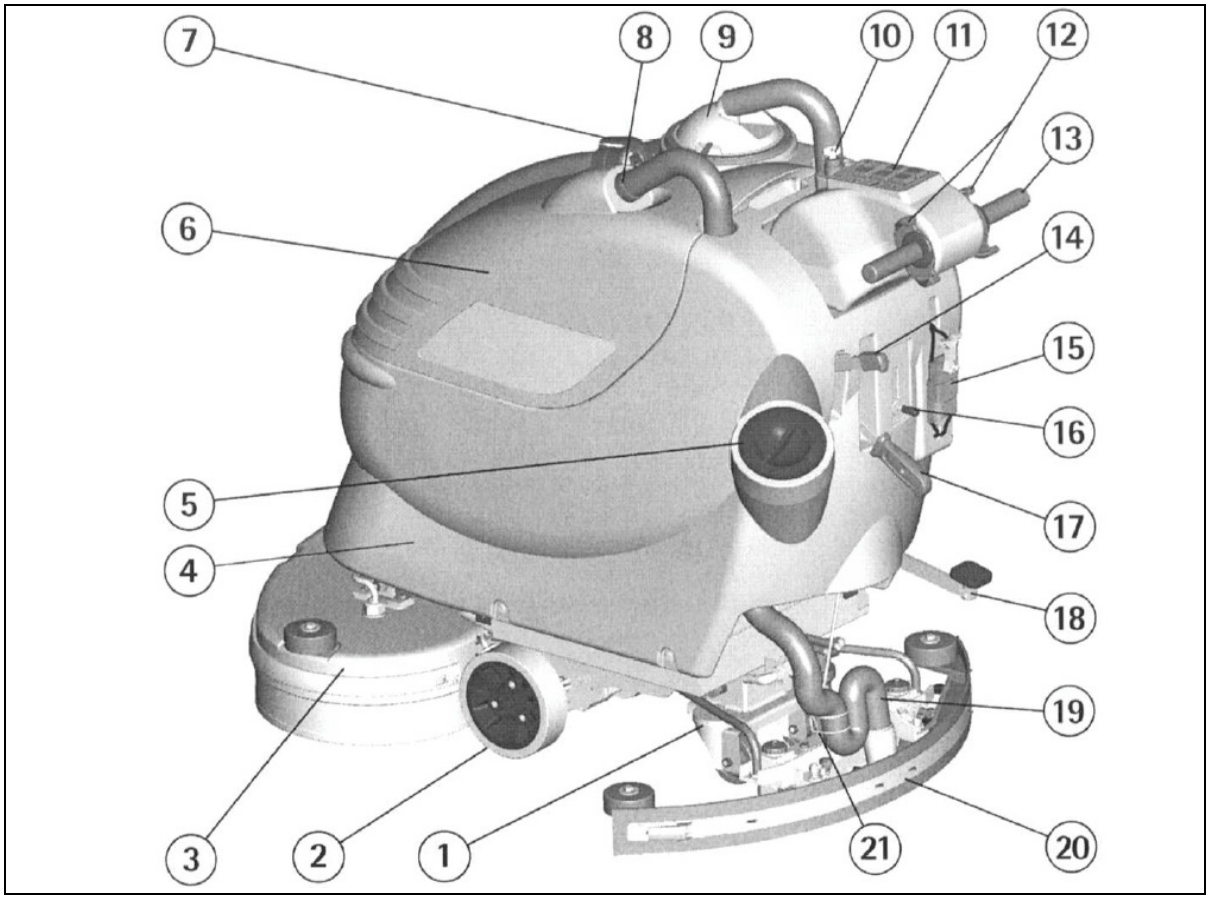
INSTRUMENT BOARD AND CONTROLS

1. DISPLAY: CHARGE LEVEL, BATTERIES/HOUR METER
2. PUSH BUTTON: VISUALIZATION HOUR METER (DISPLAY)
3. SIGNAL LAMP: BRAKE ON
4. SIGNAL LAMP: SOLUTION VALVE OPEN
5. BRUSH MOTOR SWITCH
6. SUCTION MOTOR SWITCH
7. PUSH BUTTON: BRUSH RELEASE
8. SWITCH WITH KEY
9. DRIVE CONTROL LEVERS
10. PARKING / EMERGENCY BRAKE LEVER
11. SOLUTION VALVE LEVER
12. SQUEEGEE LIFTING LEVER
13. BRUSH BASE LIFTING PEDAL



MACHINE

1. CASTER WHEELS
2. WHEELS
3. BRUSH BASE
4. SOLUTION TANK
5. SCREW CAP FOR INLET DETERGENT SOLUTION
6. RECOVERY TANK
7. PLUG EXHAUST HOSE RECOVERY TANK
8. INLET OPENING SQUEEGEE HOSE
9. SUCTION COVER
10. SWITCH WITH KEY
11. INSTRUMENT BOARD
12. DRIVE CONTROL LEVERS
13. HANDLE BARS
14. PARKING / EMERGENCY BRAKE LEVER
15. BATTERY CONNECTOR
16. SOLUTION VALVE LEVER
17. SQUEEGEE LIFTING LEVER
18. BRUSH BASE LIFTING PEDAL
19. SQUEEGEE HOSE
20. SQUEEGEE ASSEMBLY
21. SPRING SQUEEGEE HOSE GUIDE



PRODUCT SPECIFICATIONS		
MODEL	BD22/14	BD26/14
Machine Dimensions		
L X W X H	50” x 24” x 42”	54” x 28” x 43”
Net Weight	223	245
Solution / Recovery Tank	14 / 15 gal.	14 / 15 gal.
Squeegee Width	33”	33”
Design Characteristics		
Tank Construction	Polyethylene	Polyethylene
Cleaning System		
Brush Type	Disk	Disk
Brush Width	22“	26“
Brush RPM	165	200
Brush Pressure	79 lbs.	110 lbs.
Cleaning Path	22”	26”
Productivity		
Cleaning Rate (Sq. Ft Per Hour)	9740	10000
Motors		
Vacuum Motor	.6 hp	.6 hp
Traction Motor	.25 hp	.25 hp
Brush Motor	.6 hp	1.1 hp
Sound Level	67 dB	67 dB
Battery		
Voltage	24	24
Amps	180	180

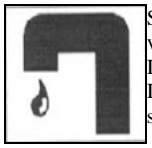
INTRODUCTORY COMMENT

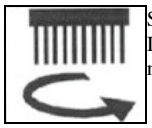
Thank you for choosing our machine. This floor-cleaning machine is used for industrial and commercial cleaning and is able to clean any type of floor. During its forward movement, the action of the brush and the detergent solution removes the dirt, which is picked up by the suction system, resulting in a dry surface.
The machine must be used only for this purpose. It gives the best performance when it used correctly and maintained properly. Therefore, we ask that you read this instruction booklet carefully whenever difficulties arise in the course of the machine's use. If needed, please contact our service department for advice and/or service.

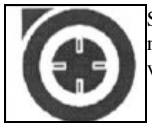
GENERAL RULES

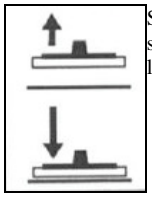
The rules below have to be followed carefully in order to avoid damage to the machine and injuries to the operator.
- Read the labels carefully on the machine. Do not cover them for any reason and replace them immediately if damaged.
- The machine must be used exclusively by authorized staff that has been instructed for its use.
- When using the machine, pay attention to other people, especially children.
- In case of danger, immediately use the emergency brake.
- To park the machine, take off the key and put on the parking brake.
- Do not mix different detergents to avoid harmful odors.
- Do not place any liquid containers onto the machine.
- The storage temperature has to be between -13°F and +131°F.
- The operating temperature should be between 32°F and 104°F.
- The humidity should be between 30 and 95%.
- Do not use the machine in an explosive atmosphere.
- Do not use the machine as a means of transportation.
- Do not use acidic solutions, which could damage the machine and/or injure people.
- Do not use the machine on surfaces covered with flammable liquids or dust (for example hydrocarbons, ashes or soot).
- In case of fire, use a powder fire-extinguisher. Do not use water.
- Watch out for shelves and/or scaffoldings when operating the machine.
- Use the appropriate speed based on floor conditions (type of floor, dirtiness, etc.).
- Do not use the machine on areas that have 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 non-authorized personnel.
- Signal the areas of moist floors with suitable signs.
- If the machine does not work properly, check by conducting simple maintenance procedures. Otherwise, contact an authorized technical assistant for advice.
- When parts are required, ask for ORIGINAL spare parts from the distributor or an authorized dealer.
- Use only ORIGINAL brushes.
- When cleaning and performing maintenance operations, disconnect the power supply plug from the machine.
- Do not wash the machine with corrosive material, direct water jets or high water pressure.
- Every 200 working hours, have the machine checked by an authorized service center.
- In order to avoid scales on the solution tank filter, do not fill the detergent solution hours before it is used.
- Before using the machine, check that all panels and coverings are in position as indicated in this use and maintenance catalog.
- Be sure the recovery tank is empty before lifting it.
- Restore all electrical connections after any maintenance operation.
- When your machine has to stop activity, provide the appropriate waste disposal for its materials, especially oils, battery and electronic components. Consider that the machine itself has been constructed by recyclable materials.

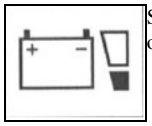
SYMBOLS


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

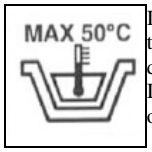

Symbol denoting the brush.
Indicates the switch of the brush motor.


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


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


Symbol denoting the charge level of the batteries.

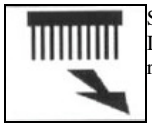
Symbol denoting the hour meter.



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 brush release.
Indicates the push button used to release automatically the brushes.

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

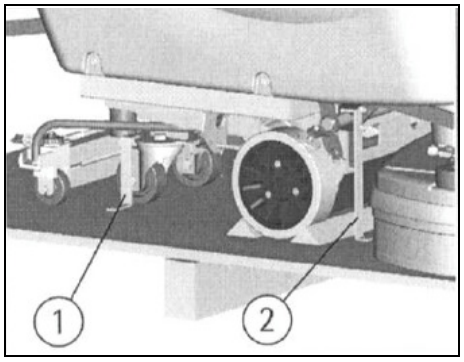
Warning symbol.
Read carefully the sections marked with this symbol, for the security of both the operator and the machine.

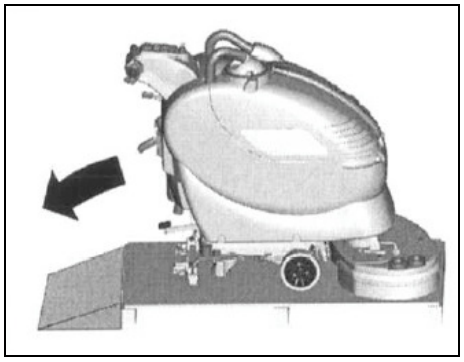
BEFORE USE

The machine is supplied with suitable packing for forklift truck handling.
The total weight is 269 lbs.
Packing dimensions:
Base: 54.13 in x 26.18 in
Height: 46.65 in.

⚠**ATTENTION:**
Do not place more than 2 pallets on top of each other.

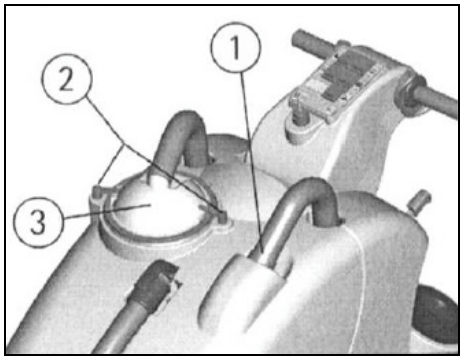
UNPACKING THE MACHINE
1. Remove the external packing.
2. Unscrew the brackets (1+2) that secure the machine to the pallet.
3. Move the machine backwards, as indicated in the figure, avoiding heavy contacts to mechanical parts.
4. Keep the pallet and the brackets for future transport.

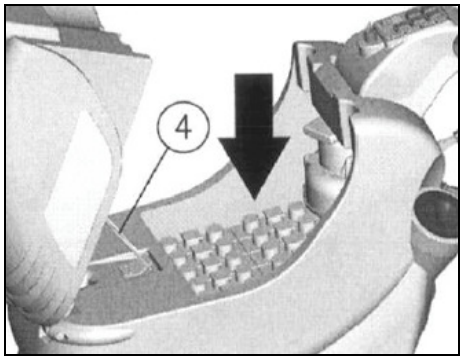




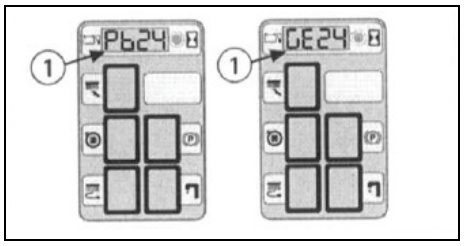
BATTERY INSTALLATION AND SETTING THE BATTERY TYPE
This machine is equipped either with two batteries at 12V in serial connection or elements of DIN-type assembled together and connected in series for a total of 24 Volt, placed in its appropriate compartment under the recovery tank. It must be handled using suitable lifting equipment (due to weight, consider the type of batteries chosen, and coupling system).
The batteries must be in accordance with CEI 21-5 Norms.

For battery installation, proceed as follows:
1. Take off the squeegee hose (1).
2. Take off the suction cover (2) after turning the blocking levers (3).
3. Lift the recovery tank by rotating it and keep it in place using the bar (4).
4. Place the batteries in the compartment.
5. Connect the terminals, respecting the polarities, avoiding contact with other parts that could create short circuit.
6. Reassemble all parts.





⚠**ATTENTION:**
The machine and its battery check card show the use of traditional lead batteries.
CHECK SETTING OF THE CHECK CARD ON THE INDICATOR (1).
In case of WET battery installation, it is necessary to set the battery check card.
Please contact an authorized technical assistant.



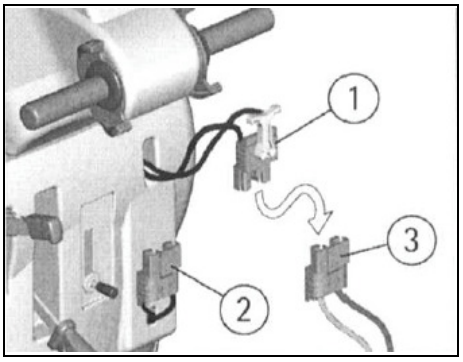
⚠**ATTENTION:**
Strictly follow manufacturer/distributor indications for the maintenance and recharge of the batteries. Specialized staff, using suitable protection accessories, must execute all installation and maintenance operations.

BATTERY CHARGER
Be sure that the battery charger is suitable for the installed batteries both for their capacities and type (lead/acid or WET and equivalent).

In the plastic bag containing the use and maintenance you will find the coupling connector for the charger. It must be assembled onto the cables of your charger. Follow the instructions given by the manufacturer.

⚠**ATTENTION:**
Qualified staff must carry out this operation. A wrong or faulty cable connection can create serious damages or injuries.

BATTERY RECHARGING
Bring the machine on a leveled surface.
Plug in the battery connector (1), placed in the rear part of the machine, to the connector (3) of the battery charger.

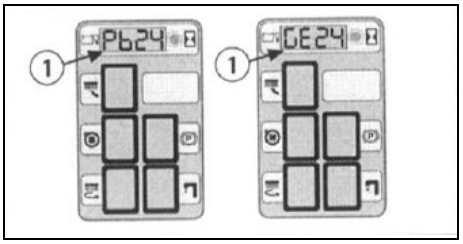


⚠**ATTENTION:**
Never charge a WET battery with a non-suitable recharger. Strictly follow the instructions supplied by the battery and charger manufacturer.
In order not to cause permanent damage to the batteries, it is necessary to avoid their complete discharge. Provide recharging within a few minutes after the battery discharge signal starts blinking.
NOTE: Never leave batteries completely discharged even if the machine is not used. In case of a traditional battery, please check the electrolyte level every 20 recharging cycles and fill them up with distilled water when necessary.

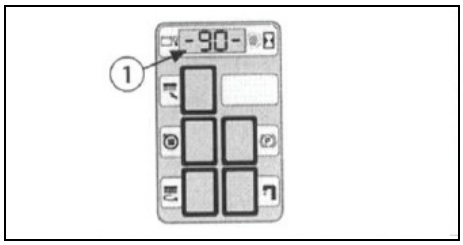
⚠**ATTENTION:**
For the recharge of the batteries, it is necessary to strictly follow all the indications given by the manufacturer/distributor. Qualified staff must carry out all the installation and maintenance operations. Danger: Gas exhalations, emission of corrosive liquids. Do not approach in case of fire.

BATTERY DISPOSAL
Hand over exhaust batteries, classified as dangerous waste, to an authorized institution according to the current laws.

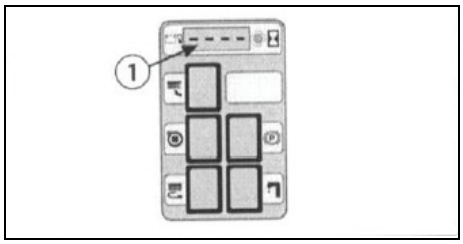
BATTERY CHARGE LEVEL INDICATOR
WHEN THE MACHINE IS SWITCHED ON, THE DISPLAY (1) SHOWS THE SETTING OF THE BATTERY CHECK CARD:
GE 24: check card set for WET batteries.
Pb 24: check card set for lead batteries.



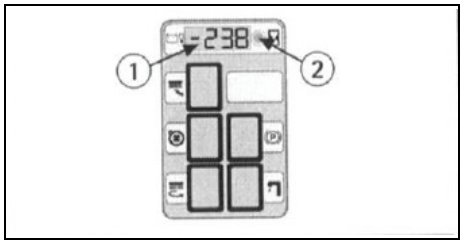
The battery charge level indicator (1) is digital and indicates the percentage of the battery charge. 90 is the maximum charge, down to a minimum of 10, indicating every 10% decrease. When the charge level reaches 20%, the display starts blinking indicating the end of the battery charge.



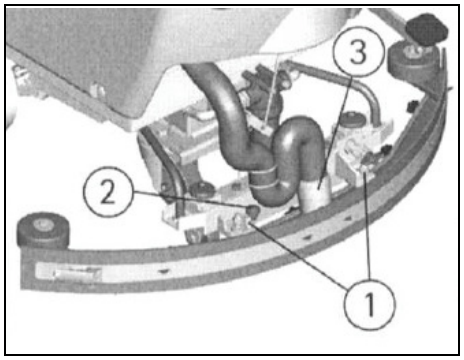
⚠**ATTENTION:**
After a few seconds from the blinking of the four lines, the brush motor stops automatically. It is possible to finish the drying operation before proceeding to the recharge.



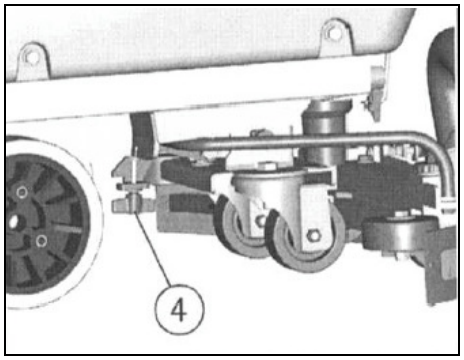
HOUR METER
The machine is equipped with an hour meter located on the same display as the battery charge level indicator (1). Keep the button (2) pressed for more than 3 seconds, the first data indicates the working hours and after a few seconds the working minutes are shown.

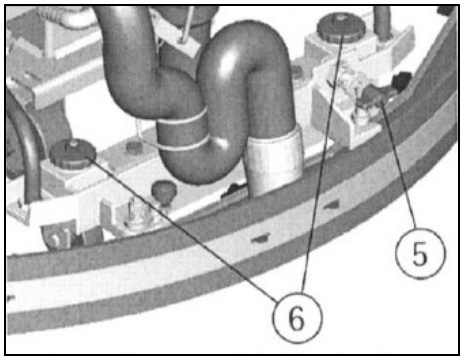


SQUEEGEE ASSEMBLY
With the squeegee support slightly lifted from the floor, slide the two stud bolts (1) placed on the upper part of the squeegee inside the slots on the support. Block the squeegee by rotating the lever (2) clockwise.
Insert the squeegee hose (3) into the coupling, as indicated in the figure.



ADJUSTMENT OF THE SQUEEGEE
In order to have better drying results with the squeegee, the rear rubber must have its lower bending uniformly adjusted in all its length. For squeegee adjustment, use the instructions below:
Adjusting the bend: lower part of the rubber
Adjust the pressure by rotating the wing nut (4). To increase: rotate clockwise. To decrease: rotate counter-clockwise.
The bending is not uniform
Adjust the squeegee inclination by rotating counter-clockwise the wing nut (5) to increase the bending in the central part, and clockwise to increase the bending on the extremities.
Height adjustment
Once the pressure and inclination of the squeegee has been adjusted, make sure that the wheels slightly touches the floor. To adjust, rotate the registers counter-clockwise (6) to lower the wheels or clockwise to raise them. Both wheels must be adjusted in the same measure.

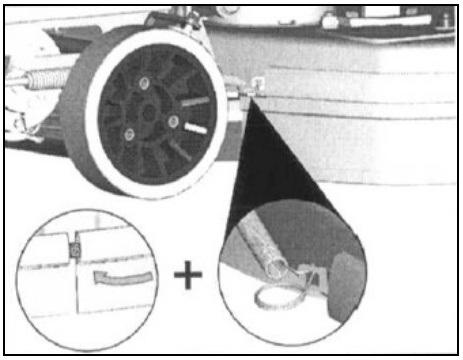




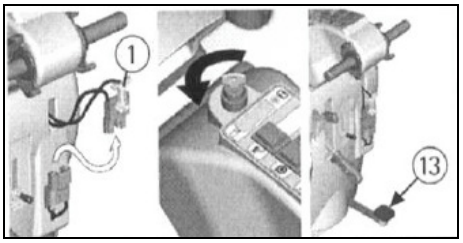
⚠**ATTENTION:**
Every type of floor requires a specific adjustment. For example, concrete floors (where the friction is high) need little pressure, while smooth floors (like ceramics) need higher pressure.

If the cleaning operations are made on the same type of floor, adjust according to rubber wear.

SPLASH GUARD ASSEMBLY
The two splash guards have to be assembled onto the brush base. Insert the metal strips inside the slots on the rubber. Place the round hole at the flat extremity of the strip onto the screw placed in the front part of the brush base. Secure the strips through the nut that blocks it.
Hook the spring in the rear part of the brush base to the slot placed at the extremity of the metal strip. Please follow above instructions for both the splash guard rubbers. Minimize the gap between the two rubbers in the front part of the brush base. With brushes assembled, the splash guard must slightly touch the floor.

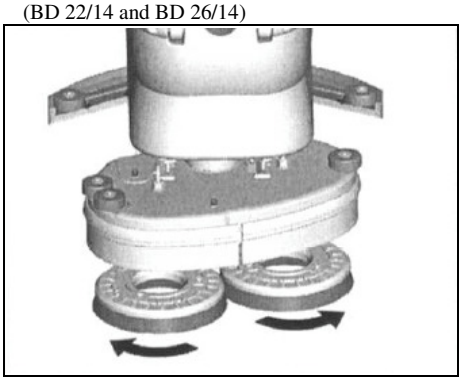


BRUSH ASSEMBLY
1. Take off the electric supply to the brush motor unplugging the battery connector (1). Turn the key counter-clockwise.
2. Lift the brush base by pressing the pedal (13).

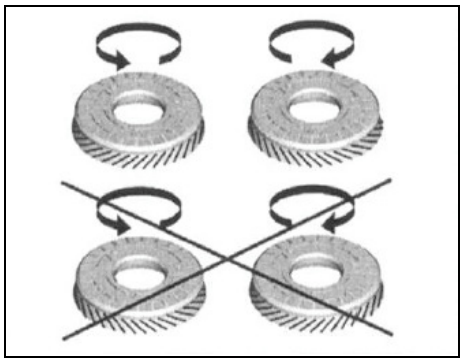


3. With the brush base lifted, insert the brushes into their plate underneath the brush base. Turn them until the three metal buttons are properly seated in their slots; rotate the brushes to push the button towards the coupling spring until they get blocked.
The figure shows the rotation of the brush couplings.

(BD 22/14 and BD 26/14)



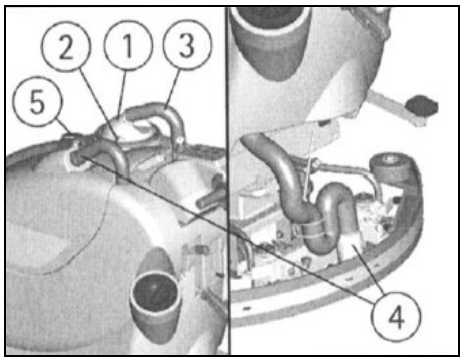
(BD 22/14 and BD 26/14)
To obtain longer brush life, rotate them regularly. Whenever brushes are deformed, we suggest reassembling them in the same position, avoiding the different inclination of the bristles causing excessive motor overload or troublesome vibrations.



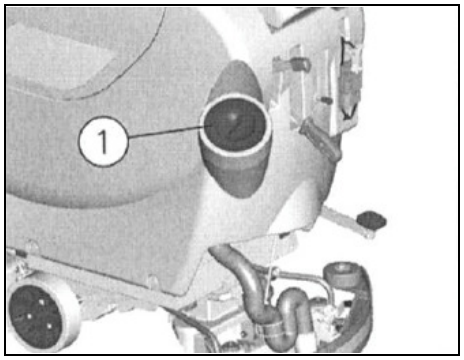
ATTENTION:
Carrying out brush assembly operations with the electric supply on may cause damages to hands.

ATTENTION:
Use only the brushes supplied with the machine. The use of other brushes may damage the machine.

RECOVERY TANK
Check that the cover of the suction filter (1) is correctly secured. After rotating the levers (2), check that the suction motor hose is correctly connected.
Verify that the squeegee hose (4) is correctly inserted into the seats and that the exhaust hose plug (5) placed in the front part of the machine is closed.



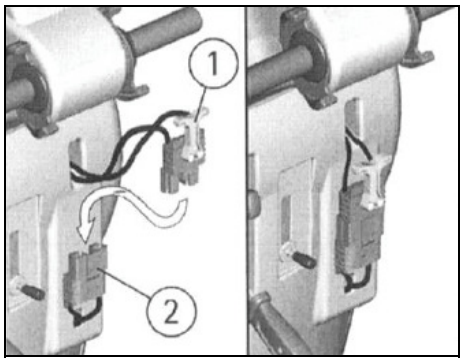
DETERGENT SOLUTION TANK
The capacity of the detergent solution tank is indicated in the technical data.
Open the screw plug (1) placed in the rear left part of the machine and fill the detergent solution tank with clean water at a maximum temperature of 122°F. Add the liquid detergent in the percentage and conditions specified by the manufacturer. To avoid excessive foam presence, which could cause problems to the vacuum motor, use the minimum percentage of detergent. Screw down the plug to close the tank.



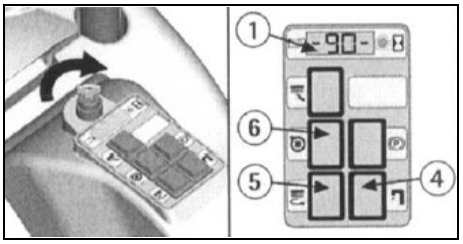
ATTENTION:
Always use low foam detergent. To avoid foam presence, pour into the recovery tank a minimum quantity of anti-foam product before starting the operation.
Never use pure acid.

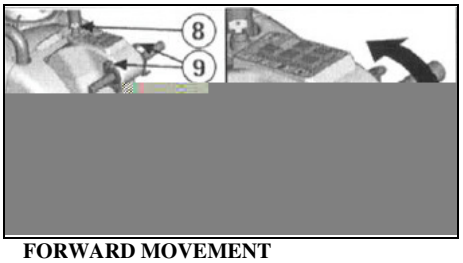
FLOOR CLEANING

CONNECTION OF THE BATTERIES TO THE MACHINE
Plug in the battery connector (1) to the machine connector (2), placed in the rear of the machine.



STARTING THE MACHINE
1. Turn the key (8) clockwise.
2. Check the battery type and the charge level on the display (1).
3. Press the brush motor switch (5).
4. Press the vacuum motor switch (6).
5. Press the brush base lifting pedal (13) to lower the brush base.
6. Pull the solution valve lever (11) to open and adjust the solution detergent flow.
On the instrument board, the indicator of the open solution valve (4) will turn on. The water starts to flow automatically when the control drive levers are rotated (9). Releasing these levers will stop the flow automatically.
7. Using the squeegee lifting lever (12) lower the squeegee.
8. Push the drive control levers (9) to move the machine, the brushes start to rotate and the squeegee starts to dry.
9. Make sure that the detergent solution flow and drying are working properly. Always consider that the correct quantity of solution detergent depends on type of floor, dirtiness and machine speed.





FORWARD MOVEMENT
The traction of the machine is given through an electronically controlled motor.
To move the machine, turn the key (8) and rotate the drive control levers (9) placed on the handle bar. The speed of the machine can be adjusted by the degree of the turn that is applied to the drive control levers. When in reverse, the speed is of the machine is reduced.

ATTENTION:
Moving the machine backwards, make sure that the squeegee is lifted.

WORKING BRAKE
To stop the machine, release the drive control levers (9). The machine is equipped with an electronic braking system. The brushes and the detergent solution flow stop automatically.

EMERGENCY BRAKE
In case of an emergency, immediately stop the machine by pushing the lever of the emergency and parking brake (10) downwards.

This control blocks the machine immediately. The emergency brake functions also as a parking brake. To start again, release the lever by unblocking the parking button on the lever.