



VANMAR
EQUIPMENT CO

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VMS20M / VMS20CM
VANMAR EQUIPMENT WALK-BEHIND
AUTOMATIC FLOOR SCRUBBER





INTRODUCTION

This manual is furnished with each new model. It provides necessary operation and maintenance instructions.

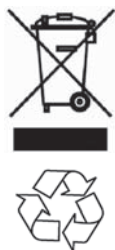


Read this manual completely and understand the machine before operating or servicing it.

This machine will provide excellent service. However, the best results will be obtained at minimum costs if:

- The machine is operated with reasonable care.
- The machine is maintained regularly - per the machine maintenance instructions provided.
- The machine is maintained with manufacturer supplied or equivalent parts.

To view, print or download manuals online visit www.vanmarequipment.com.



PROTECT THE ENVIRONMENT

Please dispose of packaging materials, used components such as batteries and fluids in an environmentally safe way according to local waste disposal regulations.

Always remember to recycle.

MACHINE DATA

Please fill this form at the time of installation for future references.

Model No.- _____

Serial No.- _____

Installation Date- _____

INTENDED USE

The VMS20M & VMS20CM is a commercial autoscrubber machine designed to wet scrub both rough and smooth hard surfaces (concrete, tile, stone, synthetic, etc). Typical applications include schools, hospitals / health care facilities, office buildings, and retail centers. Do not use this machine on soil, grass, artificial turf, or carpeted surfaces. This machine is intended for indoor use only. This machine is not intended for use on public roadways. Do not use this machine other than described in this Operator Manual.

VANMAR EQUIPMENT CO.

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Specifications and parts are subject to change without notice.
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SAFETY PRECAUTIONS

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

The following symbols are used throughout this manual as indicated in the descriptions:



WARNING: To warn of hazards or unsafe practices that could result in severe personal injury or death.

FOR SAFETY: To identify actions that must be followed for safe operation of equipment.

The following information signals potentially dangerous conditions to the operator. Know when these conditions can exist. Locate all safety devices on the machine. Report machine damage or faulty operation immediately.



WARNING: Flammable materials can cause an explosion or fire. Do not use flammable materials in tank(s).



WARNING: Flammable materials or reactive metals can cause an explosion or fire. Do not pick up.

FOR SAFETY:

1. Do not operate machine:
 - Unless trained and authorized.
 - Unless operator manual is read and understood.
 - Under the influence of alcohol or drugs
 - While using a cell phone or other types of electronic devices
 - Unless mentally and physically capable of following machine instructions.
 - With brake disabled.
 - If it is not in proper operating condition.
 - In areas where flammable vapors/liquids or combustible dusts are present.
 - In areas that are too dark to safely see the controls or operate the machine.
 - In areas with possible falling objects unless equipped with overhead guard.
2. Before operating the machine:
 - Check machine for fluid leaks.
 - Make sure all safety devices are in place and operate properly.
 - Check brakes and steering for proper operation.
3. When using machine:
 - Use only as described in this manual.
 - Use brakes (if equipped) to stop machine.
 - Go slowly on inclines and slippery surfaces.
 - Reduce speed when turning.
 - Keep all parts of body inside operator station while machine is moving.



- Use care when reversing machine.
 - Never allow children to play on or around machine.
 - Do not carry passengers on machine.
 - Always follow safety and traffic rules.
 - Report machine damage or faulty operation immediately.
 - Follow mixing, handling and disposal instructions on chemical containers.
 - Follow site safety guidelines concerning wet floors.
4. Before leaving or servicing machine:
- Stop on level surface.
 - Turn off machine and remove key.
5. When servicing machine:
- All work must be done with sufficient lighting and visibility.
 - Avoid moving parts. Do not wear loose clothing or jewelry, and secure long hair.
 - Block machine tires before jacking machine up.
 - Jack machine up at designated locations only. Support machine with jack stands.
 - Use hoist or jack that will support the weight of the machine.
 - Do not push or tow the machine on inclines with the brake disabled.
 - Do not power spray or hose off machine near electrical components.
 - Disconnect battery connections before working on machine.
 - Avoid contact with battery acid.
 - Battery installation must be done by trained personnel.
 - All repairs must be performed by a trained service mechanic.
 - Do not modify the machine from its original design.
 - Use VANMAR supplied or approved replacement parts.
 - Wear personal protective equipment as needed and where recommended in this manual.
6. When loading/unloading machine onto/off truck or trailer.
- Drain tanks before loading machine.
 - Lower scrub head and squeegee before strapping down machine.
 - Turn off machine and remove key.
 - Use ramp, truck or trailer that will support the weight of the machine and operator.
 - Do not push the machine onto/off the truck or trailer unless the load height is 15" or less from the ground.
 - Block machine tires.
 - Strap machine down to truck or trailer.



For Safety: wear hearing protection.



For Safety: wear protective gloves.



For Safety: wear eye protection.



For Safety: wear protective dust mask.

WARRANTY

VANMAR Equipments full line of commercial cleaning equipment has been manufactured, tested and inspected in accordance with specific engineering requirements. These machines are warranted to be free from defects in workmanship and materials for periods as follows from the date of purchase.

- 7 Years Roto molded components
- 3 Years Parts (excluding wear items)
- 1 Year Labor
- 1 Year AGM Batteries

Travel time for warranty repair is authorized for a period of ninety (90) days following the date of sale to the end user, with a maximum of three (3) hours per claim.

This warranty extends to the original user/purchaser and only when used, operated and maintained in accordance with **VANMAR** Equipments Operating and Maintenance instructions.

This warranty does not apply to certain wear parts and accessories of the machine such as carbon motor brushes, floor brushes or pad drivers, belts, hoses, squeegee blades, etc., nor does it apply to damage or failure caused by improper use, abuse or neglect. Warranty credit or replacement of return parts including motors, switches, etc., is subject to incoming inspection of those items.

To secure repair under this warranty, the following procedure should be taken:

1. After the expiration of the ninety (90) day travel time warranty period, the customer is responsible for warranty travel payment or the inoperative machine or warranted parts must be delivered to the authorized dealer with shipping and delivery charges prepaid. If unable to locate the Dealer, you may contact **VANMAR** Equipment at the address listed herein for the location of the nearest **VANMAR** Equipment repair center or agent or for other instructions pertaining to your warranty difficulty.
2. Upon compliance with the above warranty procedure, all warranted repairs will be completed at no additional charge or cost to the user.
3. Only **VANMAR** Equipment or its authorized dealers and agents may make no charge warranty repairs on this product. All others do so at their own risk.

This warranty limits **VANMAR** Equipment liability to the repair of the product and/or warranted parts replacement and does not include incidental or consequential damages arising from the use of a **VANMAR** Equipment machine whether defective or not.

BATTERY WARRANTY In addition to the terms above, any original equipment **VANMAR** Equipment Battery which becomes unserviceable under normal use within a period of 1 year from date of sale to the original user will be repaired or replaced with one of equal specification at our option, F.O.B. any authorized **VANMAR** Equipment repair center, with no charge to user, except transportation costs. This warranty is in lieu of all other expressed or implied warranties and is extended to the original purchaser/user.



SAFETY LABELS

Safety labels are marked on appropriate surfaces according to their contents. Please replace the labels in case they are missing, damaged or difficult to recognize. Caution Label—located on the cover of recovery tank.



Charging label—on the bottom of recovery tank

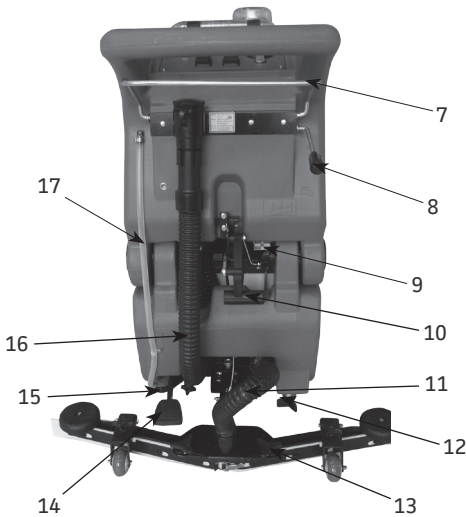
revolving brush label—on the top of brush head
Warning: Revolving brush working, DO NOT touch.
Switch off the machine before repairing.

CONTENTS

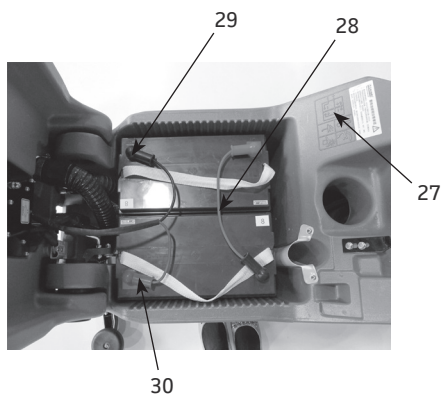
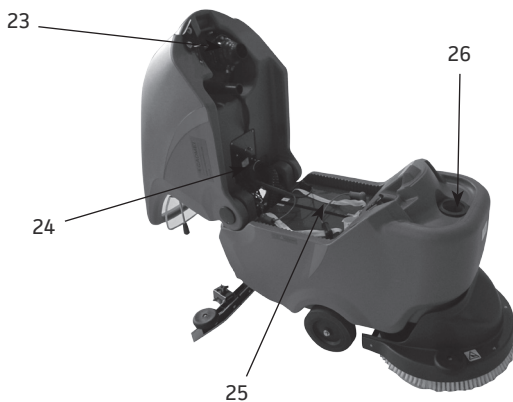
Introduction.....	2	Overload Circuit Breaker.....	23
Safety Precautions.....	3	Timer.....	24
Warranty.....	5	Drain the Tanks.....	24
Safety Labels.....	6	Drain the Solution Tank.....	25
Machine Components.....	8	Battery Charge.....	26
Symbols on Control Panel.....	12	Specifications for Battery Charger.....	26
Machine Installation.....	12	Use of Charger.....	26
Install the Batteries.....	13	Charger LED Indicator.....	27
External Power Settings.....	14	Maintenance.....	28
Cleaning Brush and Pads.....	15	Daily Maintenance.....	28
Machine Installation.....	16	Monthly Maintenance.....	31
Connect Squeegee Assembly.....	16	Squeegee Blade Replacement.....	32
Install Brush/ Pads.....	17	Squeegee Blade Adjustment.....	33
Fill the Solution Tank.....	19	Push, Tow and Transport the Machin.....	36
Machine Operation.....	19	Machine Storage.....	37
Pre-operational Check.....	19	Troubleshooting.....	38
Start the Machine.....	20	Fault Codes of Charger.....	40
During Operation.....	22	Machine Dimension / Capacity.....	42
Battery Electricity Meter.....	22		



COMPONENTS OF MODEL VMS20M



1. Recovery tank cover
2. Main handle
3. Solution tank opening
4. Brush cover
5. Brush
6. Traction wheel
7. Drive handle
8. Solution adjustment
9. Anderson connector
10. Squeegee lifting handle
11. Vacuum hose
12. Solution tank filter
13. Squeegee assembly
14. Foot pedal/scrub deck
15. Solution tank drain outlet
16. Discharge hose/recovery tank
17. Solution tank sight gauge
18. Battery & hour meter



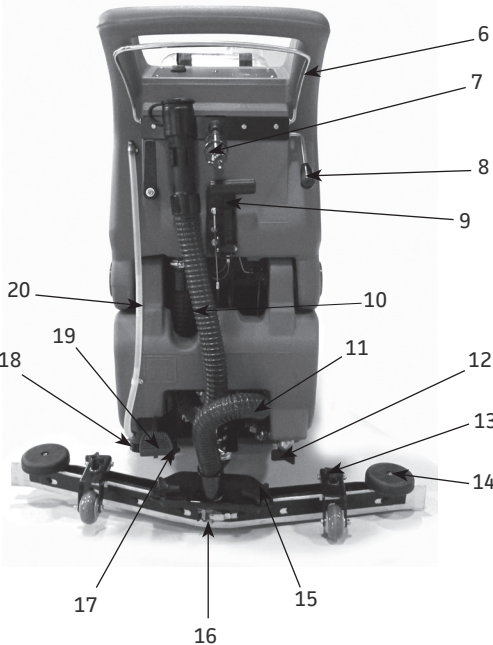
- 19. Overload protector
- 20. Vacuum motor switch
- 21. Brush motor switch
- 22. Key switch
- 23. Vacuum motor
- 24. Control panel
- 25. Battery
- 26. Solution tank filter
- 27. Battery connection diagram
- 28. Battery connection cables
- 29. Battery cathode line (black)
- 30. Battery anode line (red)

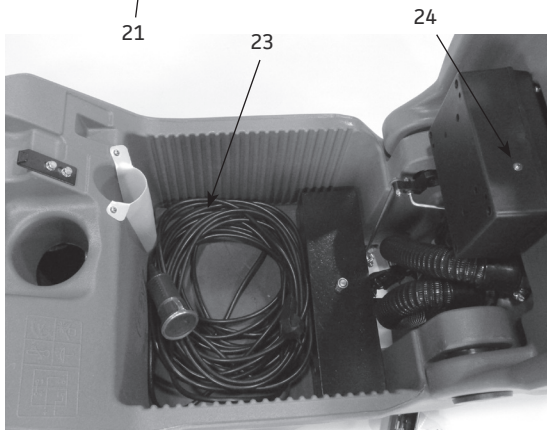
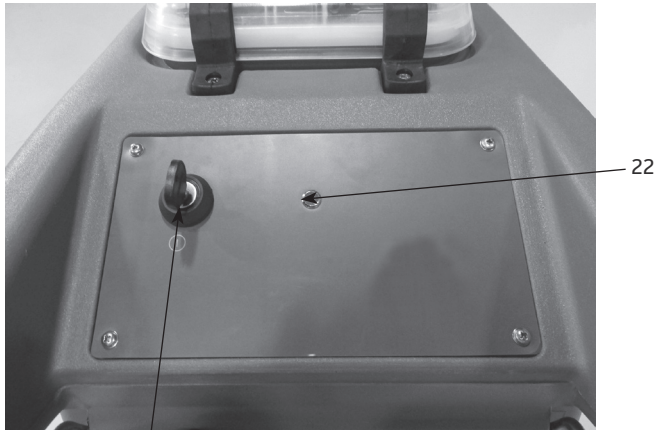


COMPONENTS OF MODEL VMS20CM



1. Recovery tank cover
2. Main handle
3. Solution tank opening
4. Brush cover
5. Brush
6. Drive handle
7. Power connection (110V)
8. Solution adjustment
9. Squeegee lifting handle
10. Discharge hose/recovery tank
11. Vacuum hose
12. Solution tank
13. Squeegee regulating adjustment
14. Roller
15. Squeegee assembly fastener
16. Squeegee assembly
17. Brush pressure adjustment
18. Solution tank drain outlet
19. Foot pedal/scrub deck
20. Solution tank sight gauge
21. Main power switch





- 22. Power indicator
- 23. External power cord
- 24. Control panel



Symbols on Control Panel



Main power switch



Overload protector



Speed control



Forward/backward switch

Machine Installation

Unpacking the machine

1. Remove the outer packing.
2. The machine is fastened to the pallet with tie down brackets. Remove
3. the brackets with a Phillips tip with a cordless screwdriver.
4. Remove the steel fixed block prior to removing from pallet.
5. Using a ramp, push the machine backwards down from the pallet.
6. Keep the pallet and brackets for any future transport needs.

Supplied parts: (VMS20M only)

- 2 12V batteries
- 220V, 15A intelligent charger
- Battery installation cables
- Covers and hardware for battery connection
- Squeegee assembly
- 1 malish brush and 1 malish pad holder

Battery Installation On VMS20M

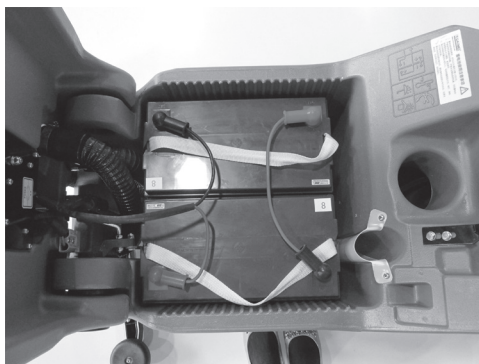
FOR SAFETY: Wear safety gloves and eye protection before working on the batteries or battery connection.

Suggested specifications of batteries:

Two sets of 12V, 100Ah Chil-Wee maintenance free batteries.

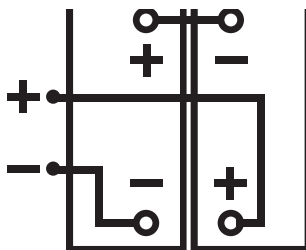
Maximum size of battery: 176mm×332mm× 214 mm (w×l×h).

1. Stop the machine on a level surface, turn off all the power switches and remove the key.
2. Lift the recovery tank so that battery compartment is accessible. (Figure 1).



(Figure 1)

3. Fix the batteries into the compartment, and place battery connecting parts following the diagram below (Figure 2).
4. Connect battery cables to battery posts following the diagram below (Figure 2) with red cable to the anode post (+) and black cable to cathode post (-).



(Figure 2)



External Power Settings On VMS20CM

Specifications of external power: 110V/220-240V

1. Stop the machine on a level surface, turn off all the power switches and remove the key.
2. Lift the recovery tank and take out the external power cable. (Figure 3).



Figure 3

3. Connected the external power cable to the machine's power port with care following the diagram below (Figure 4).

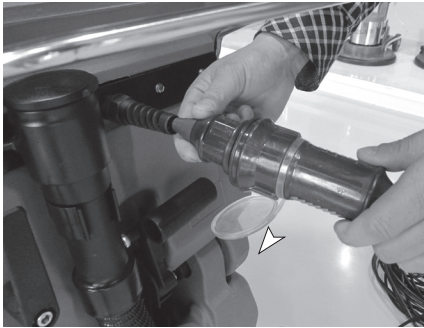


Figure 4

4. Plug the power cable's plug into a socket that is well grounded following the diagram below (Figure 5)

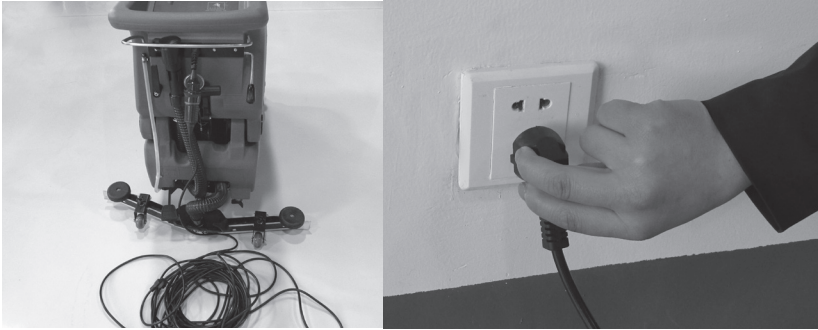


Figure 5

Cleaning Brush and Pads

- Use appropriate brushes for optimal cleaning.
- Specifications of recommended brushes and pads are given as follows:
- Pad holder: 20" Malish pad holder
- Brush: 20" Malish Brush



Machine Installation

Connect Squeegee Assembly

1. Stop the machine on a level surface, turn off all the power switches and remove the key.
2. Pull the squeegee lifting rod upwards (Figure 6).

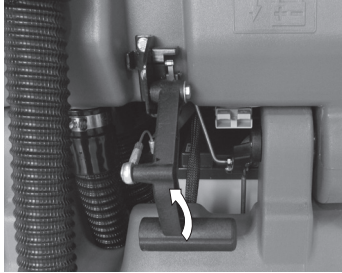


Figure 6

3. Fix the squeegee assembly to squeegee installation bracket following the diagram below (Figure 7). Place the fastening knob into the socket completely before tightening.



Figure 7

4. Connect vacuum hose to the squeegee assembly as is shown below (Figure 8).

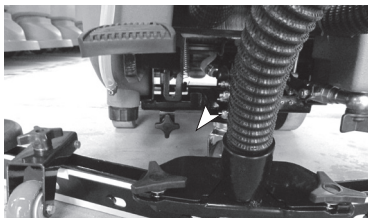


Figure 8

5. Check squeegee blade and make proper adjustment if necessary (please refer to "Squeegee Blade Adjustment" in page 33).

Install Brush / Pads

FOR SAFETY: Stop the machine on a level surface, turn off all the power switches and remove the key before installing the brushes or pad holder.

1. Stop the machine on a level surface, turn off all the power switches and remove the key.
2. Push the lifting pedal down while moving it to the right (as indicated by the arrow) to lift the brush head (Figure 9).

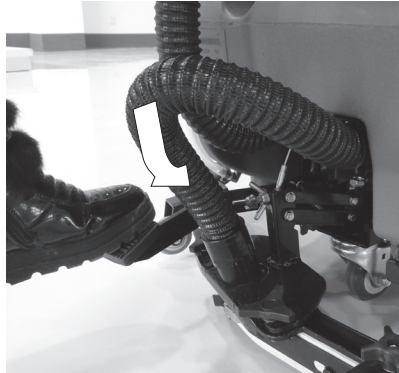


Figure 9

3. Place the pad on pad holder before installing the pad holder (Figure 10).

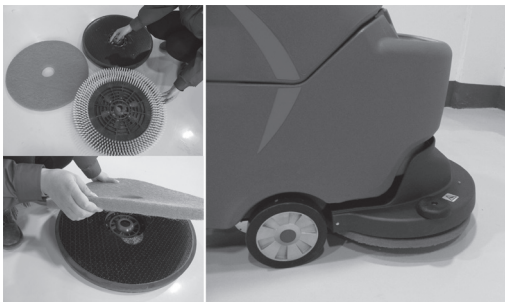


Figure 10



- Center the pad holder/brush on brush motor (Figure 11).



Figure 11

- Push the lifting pedal down while moving it to the left (as indicated by the arrow), press brush motor switch button and hold motor switch handle to finish installing the brush or pad holder (Figure 12).

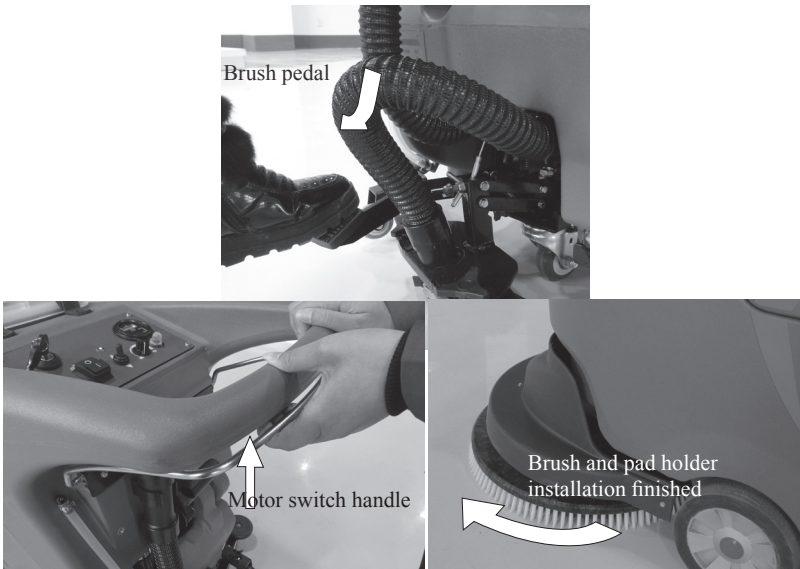


Figure 12

Fill the Solution Tank

Use the solution tank fill-port in the front of the machine to fill solution to solution tank (Figure 13).



Figure 13

Scrubbing method: Pour the suggested amount of your chosen cleaning detergent/liquid and water into solution tank, according to instructions on the cleaning detergent/liquid container.

NOTE: When filling the solution tank with a bucket, make sure that it is clean. **DO NOT** use the same bucket for filling and draining the machine.

ATTENTION: For conventional scrubbing, only use recommended cleaning detergents. Improper detergents (such as washing powder) can cause damage and will void the manufacturer's warranty.

Warning: **DO NOT** use flammable liquids in case of fire or explosion. **FOR SAFETY:** Follow the mixing and handling instructions on chemical/solution containers.

Machine Operation

FOR SAFETY: **DO NOT** operate the machine before fully reading and understanding this operator manual.

Warning: **DO NOT** operate the machine near or in places with inflammable liquids, gas, or combustible dust in case of fire or explosion.

Pre-operational Check

- Clean up the dust on the floor.
- Check battery power indicator (please refer to "Battery Electricity Meter " in page 22 for model 50B).
- Check for the abrasion of pads/brush.



- Check for the abrasion of squeegee blade and make appropriate adjustment.
- Make sure the recovery tank is empty, and that the screen filter has been installed and is clean.

Start the Machine

1. Power on
2. For model VMS20M: Turn the main power switch on, press brush motor button and vacuum motor button (Figure 14).

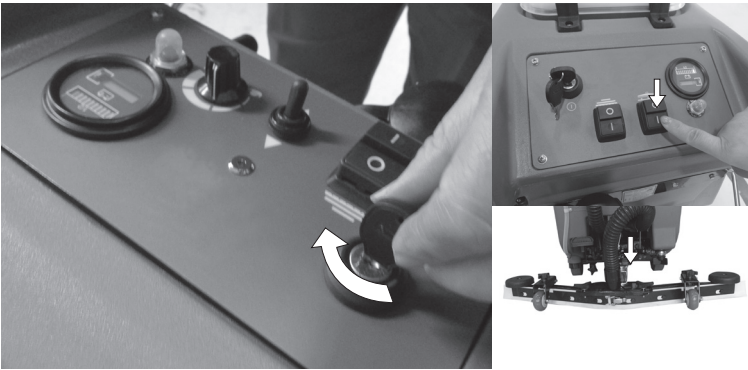


Figure 14

3. For model VMS20CM: Get external power well connected, turn the main power switch on, check whether power indicator displays properly (Figure 15)



Figure 15

4. Lay squeegee lifting handle down, so that the squeegee assembly descends to the ground (Figure 16) and vacuum motor will start.

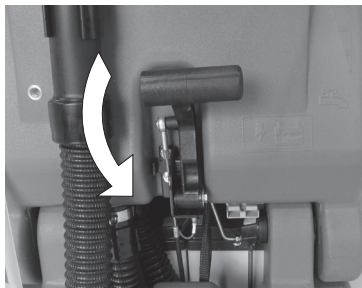


Figure 16

5. Push brush motor pedal down while moving it leftwards (as indicated in the arrow) to lay the brush head down to the floor (Figure 17).

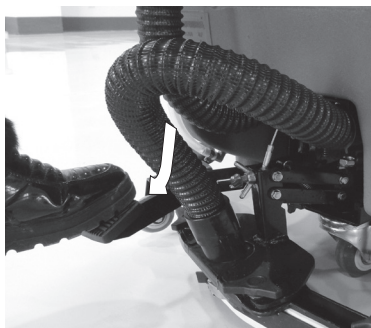


Figure 17

6. Release water valve handle and lift motor switch handle upwards to start scrubbing (Figure 18).

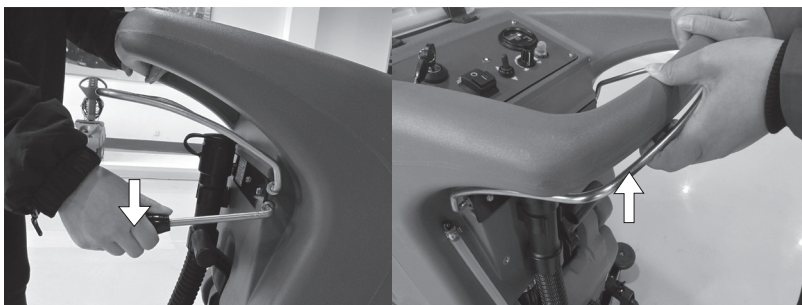


Figure 18

7. Adjust water flow by lifting water valve upward and downward to fit different scrubbing requirements (Figure 19).



Figure 19

8. When stopping, turn off the brush motor and squeegee motor switches as well as the main power switch and lift the brush and squeegee assembly.

During Operation

Warning: **DO NOT** pick up any inflammable materials or reactive metal in case of fire or explosion.

FOR SAFETY: Go slowly on inclines and slippery surfaces and wear non-slip shoes.

1. Keep the machine operating to avoid damages to the floor surface.
2. Clean the scrubbing area in advance to avoid scuff marks; if any, clean the squeegee blade to remove any debris on it.
3. **DO NOT** operate the machine on inclines exceeding 5%.
4. Add a moderate quantity of defoamer to recovery tank to remove additional foam.
NOTE: Keep the foam away from sewage screen filter in the recovery tank in case of motor failure.
5. A dual cleaning method is recommended when scrubbing heavily soiled area.

Battery Electricity Meter—Model VMS20M

Battery electricity meter displays battery capacity. When the battery is fully charged, all the indicators will be on and then go out in sequence from right to left.

NOTE: To prolong battery life, charge them after every use. It is best to stop scrubbing and charge the battery cells when the left light is blinking. scrubbing operation will automatically shut off to prevent the battery cells from running out. Charge the battery cells immediately in this case (Figure 20).

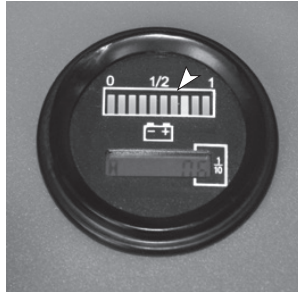


Figure 20

Overload Circuit Breaker-Model VMS20M

This model is equipped with a restorable overload protector with a button located on the control panel (Figure 21) to avoid damages to brush motor. When the overload protector is activated and triggers black-out, please check the reason, then press the overload protector button manually after the motor cools down. Contact an authorized service center for machine maintenance.



Figure 21



Timer-Model VMS20M

The time is used to count the total working hours of the machine. Refer to the timer to judge when to carry out recommended maintenance procedures and record maintenance history (Figure 22).

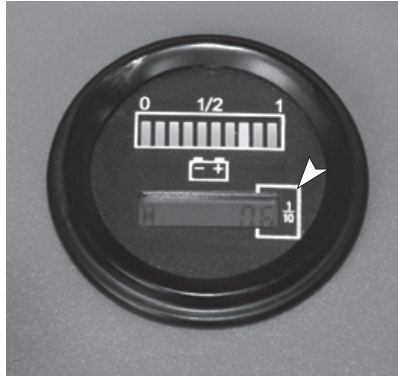


Figure 22

Drain the Tanks

Drain and clean the recovery tank after each time of using.

FOR SAFETY: Stop the machine on a level surface when leaving or servicing it, turn it off and remove the key.

Drain Recovery Tank

1. Carry the machine to a place for drainage and turn the power off.
2. Hold the drain pipe upward, remove its cap and lower the hose down for drainage (Figure 23).



Figure 23

NOTE: DO NOT use the same bucket for filling and draining the machine.

3. Remove and rinse the sewage screen filter within recovery tank (Figure 24).



Figure 24

4. Cleaning the sewage screen filter within recovery tank (Figure 25).



Figure 25

Drain the Solution Tank

Remove solution tank drain-pipe cap to drain the rest of water (Figure 26).

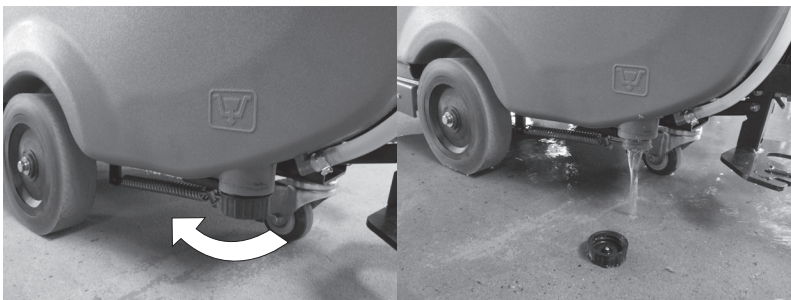


Figure 26

Battery Charge--Model VMS20M

The charger attached to this machine conforms to the charge instructions below.

NOTE: To prolong battery life, charge them after each use.

Specifications for charger

- Charger type: Chil-Wee maintenance free battery
- Output voltage--24V
- Output current--100Ah
- Automated intelligent charger

Use of Charger

Please refer to the charger operation manual attached to the machine for detail information of charger operation.

1. Stop the machine in a well ventilated place. **Warning:** For safety, keep away from stops or open fire to avoid fire or explosion.
2. Stop the machine on a level and dry surface, lift squeegee and brush, turn off all the power switches and remove the key.
3. Open recovery tank cover for ventilation while charging.
4. Plug the charger's AC power cable into a well-grounded power socket.
5. Connect the charger's DC cable to the battery charging port on the back of machine (Figure 27).

NOTE: The machine stops working once the charger is connected to batteries.

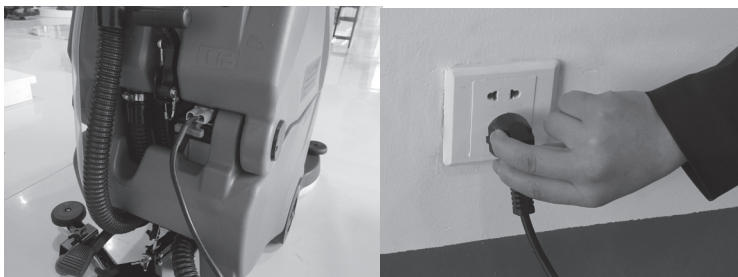


Figure 27

NOTE: DO NOT disconnect the DC cable with the charging port during charging period to avoid arc strike. Unplug the AC power cable in case of forced charging disable.

Intelligent Charger LED indicator

LED Indicator	Indication Status	Working Status
LED1, LED2	Blink, fan stops	Pre-charge status [charging time: 3h]
LED1, LED2	Turn RED, fan running	Constant current status [charging time: 7-8h]
LED1, LED2	Turn RED, fan running	Constant voltage status [charging time: 4.5 h]
LED1, LED2	LED1 turns RED, LED2 turns GREEN, Fan stops	Float charging status [charging time: 4.5h]
LED1, LED2	LED1 goes out, LED2 turns GREEN, fan stops	Charge complete
Note		
Situations when LED2 turns RED	1. Load short-circuit	
	2. Reversed connection	
	3. Battery cable short-circuit	
	4. Over-heat—LED2 turns ORANGE	



Machine Maintenance

Regularly follow the daily, weekly and monthly maintenance procedures faithfully to keep the machine working at maximum capacity.

Warning: disconnect the battery connection before machine maintenance to avoid electricity shock hazard.

Daily Maintenance (after each time of use)

1. Drain and rinse the recovery tank (Figure 28).



Figure 28

2. Remove and rinse the sewage screen filter within recovery tank (Figure 29).

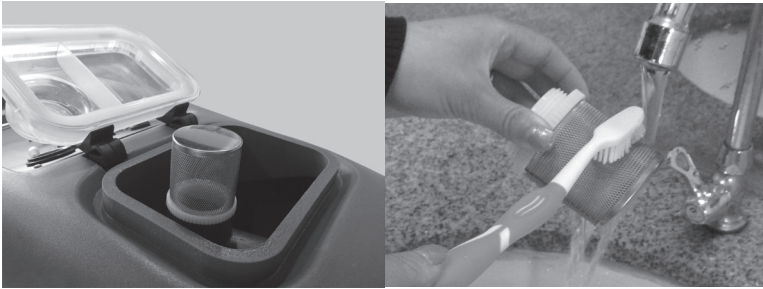


Figure 29

3. Drain the solution tank, remove and clean water screen filter, then reinstall it (Figure 30).



Figure 30

4. Make sure that the brush motor is able to rotate when it is lifted and brush motor button is pressed. Remove the pads and brush for cleaning. Rotate the direction or replace it if the pad is worn (Figure 31).



Figure 31

5. Cleaning squeegee blade (Figure 32). Lift the squeegee assembly to avoid damages to the blade.

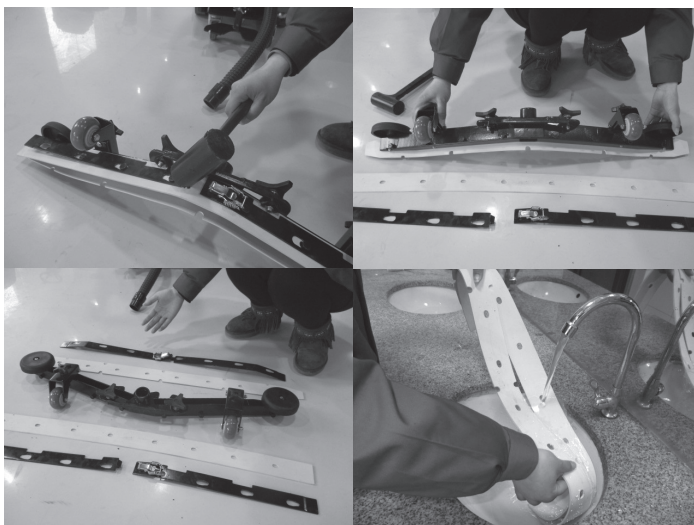


Figure 32



6. Check the abrasion at the edge of squeegee blade (Figure 33), if any, rotate its direction (refer to “Squeegee Blade Replacement” in page 32).

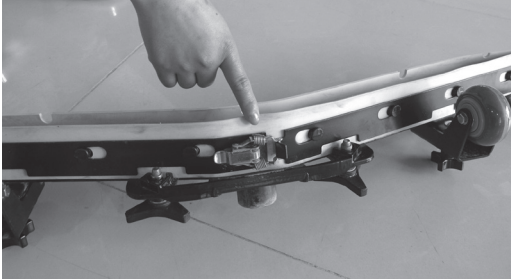


Figure 33

7. Clean the machine with multipurpose detergent and wet cloth (Figure 34). **FOR SAFETY: DO NOT** power spray or hose off the machine. Electrical malfunction may occur.



Figure 34

8. To prolong battery life, charge them after each use (Figure 35) [Model VMS20CM].



Figure 35

Monthly Maintenance

1. Remove the screen filter from solution tank and clean it (Figure 36). Make sure the solution tank is emptied in advance.



Figure 36

2. Clean the battery surface to avoid electrode corrosion, and check the battery connection for slack (Figure 37) [model VMS20M].



Figure 37

3. Check and clean the recovery tank cap (Figure 38). Replace it if it is damaged.

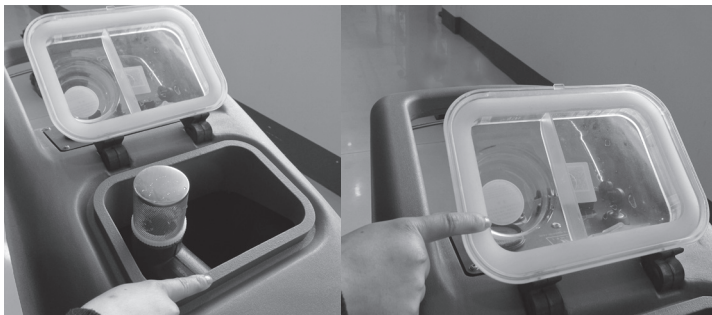


Figure 38



Squeegee Blade Replacement

Every squeegee blade has four sides. Exchange its direction if half of the blade is worn out or replace with a new blade if all the four sides are worn out.

1. Remove squeegee assembly from the machine (Figure 39).

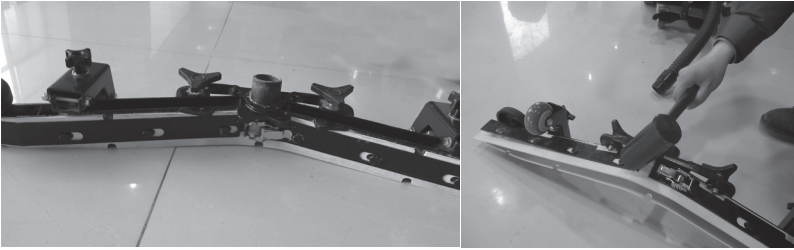


Figure 39

2. Release blade fixation clamp and remove the black blade (Figure 40).

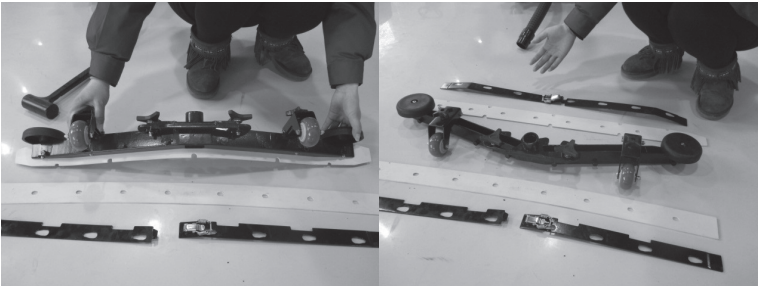


Figure 40

3. Rotated the existing blade to the new edge, and install the rotated blade to squeegee assembly. Be sure the holes in the squeegee blade are completely slid down (Figure 41).

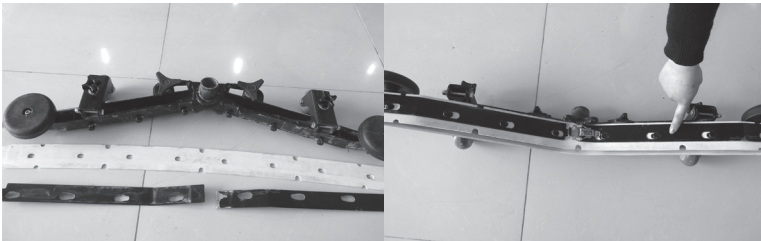
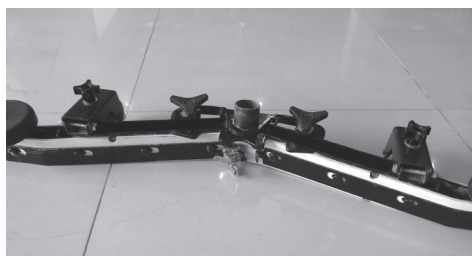


Figure 41

ATTENTION: Comparison between proper and improper installation of squeegee and blade clamp.



proper installation



Improper installation

Squeegee Blade Adjustment

Squeegee blade has been tuned before delivery. It needs adjustment only when its position deviates.

To obtain optimal effect, squeegee assembly caster must be adjusted to a certain height and inclination following the instructions below.

1. Check whether squeegee blade totally contacts and maintains an inclined angle of 45° with the ground.



Figure 42



2. Adjust the regulating nut as indicated by arrow 2 in the following diagram if squeegee blade does not contact the ground or there is a small gap between them. Rotate the regulating nut clockwise to lift the squeegee blade; counter-clockwise rotate the regulating nut to lower the squeegee blade. Adjust the squeegee blade to an optimal status according to actual demands (Figure 43).

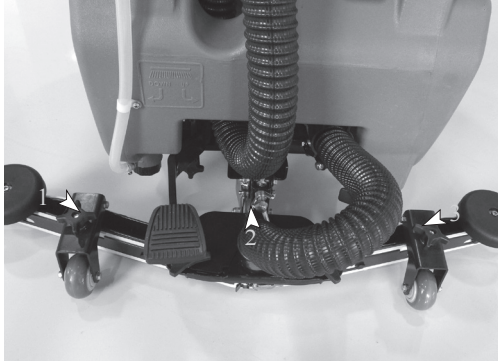


Figure 43

3. Adjust the regulating nut as indicated by arrow 1 in the following diagram if the middle of squeegee blade contacts the ground well but there is a small gap between left side of blade and the ground. Rotate the regulating nut clockwise to lift the left squeegee blade; counter-clockwise rotate the regulating nut to lower the left squeegee blade. Adjust the squeegee blade to an optimal status according to actual demands (Figure 44).

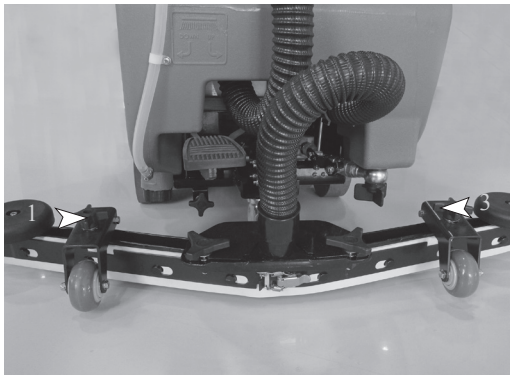


Figure 44

- Adjust the regulating nut as indicated by arrow 3 in the following diagram if the middle of squeegee blade contacts the ground well but there is a small gap between the right side of blade and the ground. Rotate the regulating nut clockwise to lift the right squeegee blade; counter-clockwise rotate the regulating nut to lower the right squeegee blade. Adjust the squeegee blade to an optimal status according to actual demands (Figure 45).

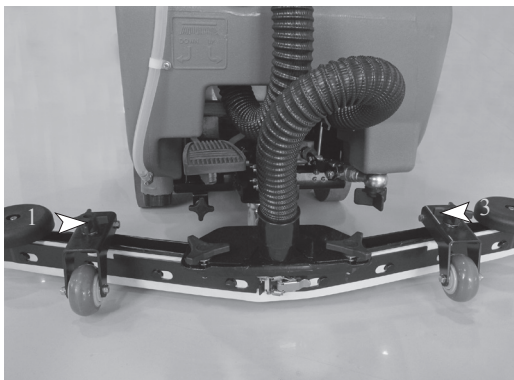


Figure 45

- Counter-clockwise rotate the regulating nut as indicated by arrow 2 in the following diagram if both sides of squeegee blade contact the ground well but there is a small gap between middle of blade and the ground. Be sure the blade contacts the ground well or it forms an inclined angle of 45° with the ground (Figure 46). Adjust the squeegee blade following step 3 or 4 if either side of blade needs adjusting.

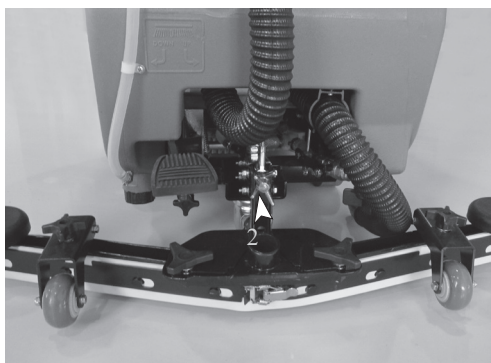


Figure 46



6. Brush pressure adjustment: adjust brush pressure nut clockwise if it is difficult to push the machine during scrubbing (be sure the universal wheels and the casters work well, if not, adjust them with this method). If the pressure spring loosens during scrubbing, it will make the machine difficult to move (Figure 47).

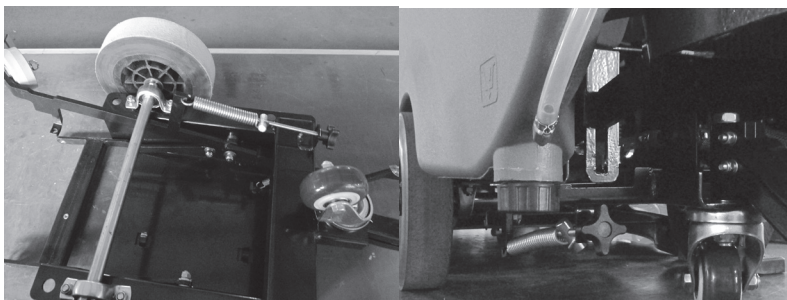


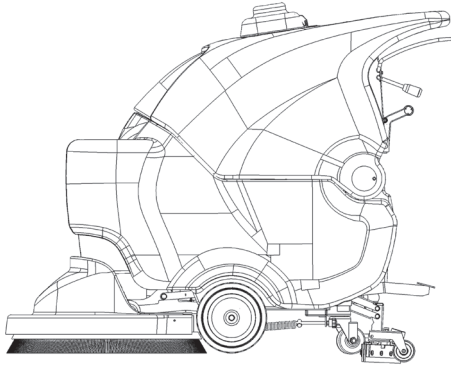
Figure 47

Push, Tow and Transport The Machine

Be certain to follow the procedures below when transporting the machine by trailer or truck:

1. Lift the squeegee and brush head.
2. Load/unload the machine using recommended cargo handling apron.
3. Fix the front of the machine close to the front position of truck or trailer. Lower the brush head and squeegee after the machine is fixed tight.
4. Place a block behind each driving wheel to avoid machine sliding.
5. Fasten the rack of machine with straps to avoid movement. A bracket must be installed on the floor of truck or trailer (Figure 48).

FOR SAFETY: Use the recommended cargo handling apron to load and unload the machine onto and off the truck or trailer. Fasten the machine to the truck or trailer with straps.



Machine Storage

1. Charge the batteries before storage. DO NOT store the machine with battery exhausted. For long-term storage, be sure the batteries are charged every 2-3 months to avoid battery damages due to insufficient voltage.
2. Drain and clean the solution tank and recovery tank.
3. Store the machine in a dry area, keep the squeegee and brush lifted.
4. Open the recovery tank for ventilation.
5. ATTENTION: Keep the machine away from rain, store it indoor.
6. Follow the frost protection instructions below if the machine is stored at a freezing temperature.

Frost Protection

1. Add 1 gallons (4L) recreational vehicle (RV) anti-freezing agent to the solution tank without dilution.

FOR SAFETY: Wear goggles to avoid contact with eyes.

ATTENTION: Before operating the machine next time, rinse the solution tank thoroughly to remove the anti-freezing agent.



Troubleshooting

Trouble	Cause	Solution
Machine inoperable	Switch off or switch damaged	Turn switch on or replace it
	Brush motor button off or damaged	Turn switch on or replace it
	Vacuum motor button off or damaged	Turn switch on or replace it
	Motor switch handle failure	Replace the micro-switch
	Battery exhausted or damaged	Charge or replace batteries
	Overload protector activated	Solve short circuit fault and press overload protector
Charger failure	Plug disconnected with power	Check for plug connection
	False connection of battery terminals	Connect terminals properly
	Charger breakdown	Refer to charger fault code
Brush motor failure	Brush lifted above ground or its button damaged	Replace brush motor micro-switch
	Motor switch damaged	Replace motor micro-switch
	Overload protector activated	Solve short circuit fault and press overload protector
	Brush motor connector loosens	Re-fix the connector
	Brush motor damaged	Replace the motor
Machine won't move	Universal wheel damaged	Replace the universal wheel
	Duty caster damaged	Replace duty caster
	Brush adjustment nut loosens	Readjust brush adjustment nut
Vacuum motor failure	Vacuum motor handle micro-switch damaged	Replace micro-switch
	Micro-switch disconnected	Re-plug the connection
	Motor micro-button damaged	Replace micro-switch
	Vacuum motor damaged	Replace vacuum motor
	Recovery tank full	Drain the tank
Little or no solution flow in brush	Solution tank screen filter blocked	Clean solution tank screen filter
	Water valve switch damaged	Replace water valve switch
	Solenoid valve damaged	Replace solenoid valve

Troubleshooting--Continued

Inadequate suction	Recovery tank full or vacuum hose damaged	Drain recovery tank or replace a vacuum hose
	Blow-off hose cap not sealed	Re-cover the cap
	Recovery tank screen filter clogged	Clean screen filter
	Debris at the seal of recovery tank lid	Remove debris and confirm good seal
	Squeegee blade worn out	Replace or rotate the direction of squeegee blade
	Squeegee blade cannot bend	Adjust the height of blade
	Vacuum motor damaged	Replace vacuum motor
	Debris on sewage guide housing	Remove the debris
	Insufficient voltage of batteries	Charge the batteries
Running time shortened	Insufficient voltage of batteries	Get the batteries fully charged
	Battery failure	Replace batteries
	Batteries need maintenance	Refer to "Battery Maintenance"
	Battery charger failure	Repair or replace the charger

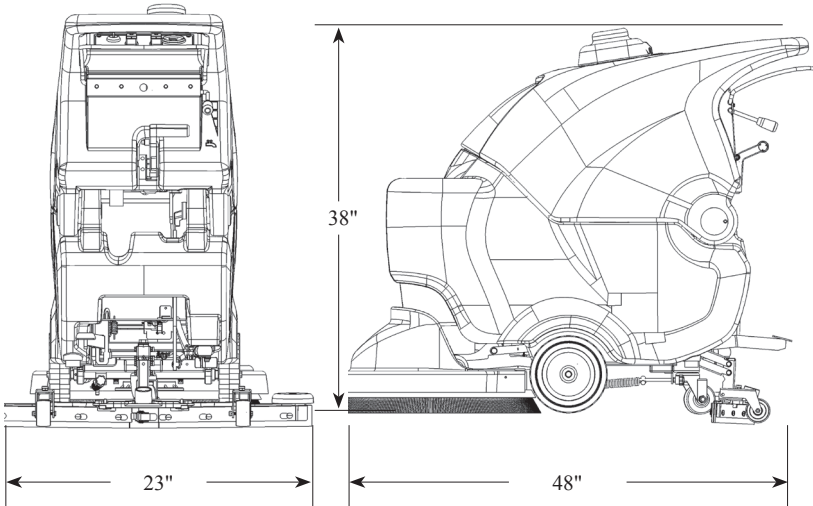


Fault Codes of Charger

Code	Fault	Solution
LED2 turns GREEN and blink	Battery voltage <22V	Charge the battery with 24V, 15-25Ah mode, then continue normal charging with intelligent charger.
	Battery voltage cannot reach 22.4V	
LED2 turns RED	Battery voltage <12V	Battery terminals are not well connected; battery connection failure.
Note	1. Charger for liquid-adding batteries mustn't adapt to maintenance-free batteries to avoid charger burning-out	
	2. Charger for maintenance-free batteries adapts to liquid-adding batteries. But the battery cannot be fully charged	
	3. If battery voltage is lower than 22V, the intelligent charger won't work	
	4. Voltage lower than 23V will activate an alarm to warn for timely charge	
	5. Faults above are only practical for new batteries. In terms old batteries, please replace or maintain them	
	6. In general, the operation interface will raise the alarm in the event of insufficient voltage. In this case, please get the batteries charged time, otherwise faults above will occur.	

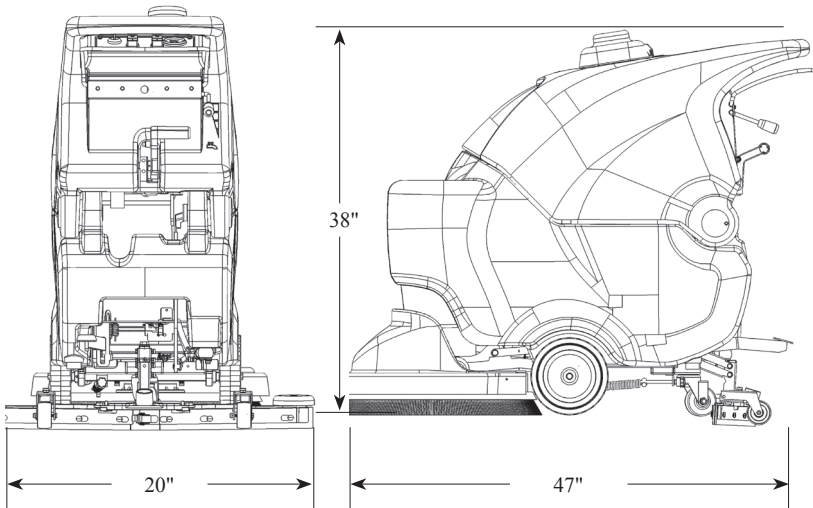


Machine Dimension / Capacity



Technical Specification:

Model	VMS20M
Batteries	24V (2 x 12V batteries)
Batteries Type	AGM
Drive System Brush Motor	560W
Vacuum Motor	450w (AMETEK)
Solution Tank	13 gallons
Recovery Tank	13 gallons
Cleaning Path	20"
Squeegee Width	32"
Number Of Brushes	1
Propelling Motor	350W
Productivity Per Hour	20,990 sq ft
Dimension	48" x 23" x 38"
Net Weight w/o Batteries	275 lbs

**Technical Specification:**

Model	VMS20CM
Voltage / Corded	120 V
Drive System Brush Motor	750W
Vacuum Motor	450w (AMETEK)
Solution Tank	13 gallons
Recovery Tank	13 gallons
Cleaning Path	20"
Squeegee Width	32"
Number Of Brushes	1
Productivity Per Hour	17,690 sq ft
Dimension	47" x 20" x 38"
Net Weight	199 lbs



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