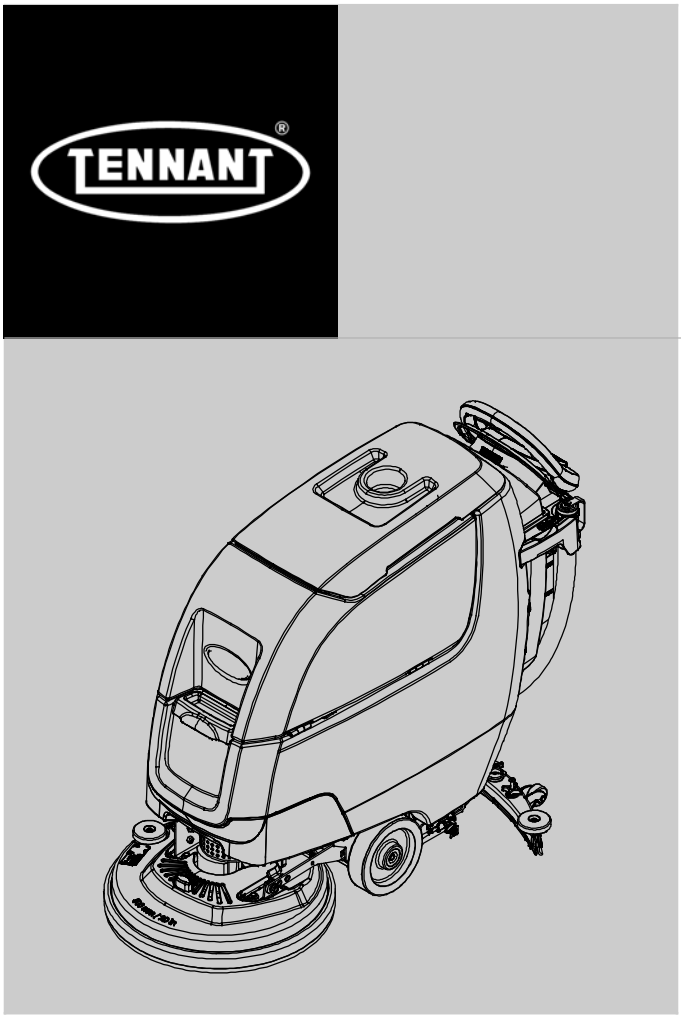
T300e

Walk-Behind Floor Scrubber



English EN

Operator Manual

***Hygenic*® Fully Cleanable Recovery Tank**
Tennant*True*® Parts

ec H2O® NanoClean

North America

For the latest Parts manuals and other language Operator manuals, visit:

www.tennantco.com/manuals

9014506
Rev. 01 (02-2017)

INTRODUCTION

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

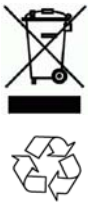


Read this manual completely and understand the machine before operating or servicing it.

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 maintenance instructions provided.
- The machine is maintained with manufacturer supplied or equivalent parts.

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



PROTECT THE ENVIRONMENT

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

Always remember to recycle.

Tennant Company
PO Box 1452
Minneapolis, MN 55440
Phone: (800) 553- 8033

www.tennantco.com

Trojan and HydroLINK are registered trademarks of Trojan Battery Company.

Specifications and parts are subject to change without notice.

Original Instructions. Copyright ©2015- 2017 Tennant Company.
All rights reserved.

INTENDED USE

The automatic floor scrubber is intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses. It is designed to scrub hard floor surfaces (concrete, tile, stone, synthetic, etc.) in an indoor environment. This machine is not intended for cleaning carpets or sanding wood floors. Use only recommended pads/brushes and commercially available floor cleaning detergents**.** Do not use this machine other than described in this Operator Manual.

MACHINE DATA

Please fill out at time of installation for future reference.

Model No. - _____

Serial No. - _____

Installation Date - _____

SERIAL NUMBER LOCATION



UNCRATING MACHINE

Carefully check machine for signs of damage. Report damages at once to carrier. Contact distributor or Tennant for missing items.

To uncrate the machine, remove straps, wheel blocks and shipping brackets. Using the supplied ramp carefully back the machine off the pallet. Make sure scrub head is in the raised position.

ATTENTION: Do not remove machine from pallet without using ramp, machine damage may occur.

TABLE OF CONTENTS

OPERATION

IMPORTANT SAFETY INSTRUCTIONS 4
SAFETY LABELS 6
MACHINE COMPONENTS 7
MACHINE SYMBOLS 8
CONTROL PANEL COMPONENTS 8
INSTALLING BATTERIES 9
BATTERY PACK LIFT- OUT TRAY (Option) . 9
HOW THE MACHINE WORKS 10
BRUSH AND PAD INFORMATION 10
MACHINE SETUP 11
ATTACHING SQUEEGEE ASSEMBLY 11
INSTALLING BRUSH/PAD - 3 Lug Disk 11
INSTALLING BRUSH/PAD - Insta- Click Magnetic Disk (Option) 12
INSTALLING PAD - Orbital 13
INSTALLING CYLINDRICAL BRUSHES 13
FILLING SOLUTION TANK 14
ec-H2O NanoClean WATER CONDITIONING CARTRIDGE (ec-H2O model) 15
ACCESSORY RAIL 15
MACHINE OPERATION 16
PRE-OPERATION CHECK LIST 16
OPERATING MACHINE 16
WHILE OPERATING MACHINE 18
EMERGENCY SHUT-OFF BUTTON 19
BATTERY DISCHARGE INDICATOR 19
CIRCUIT BREAKER PANEL 19
HOUR METER 19
DRAINING TANKS 20
DRAINING RECOVERY TANK 20
DRAINING SOLUTION TANK 20
SERVICE INDICATOR CODES 21

MAINTENANCE

MAINTENANCE CHART 24
MACHINE MAINTENANCE 25
AFTER DAILY USE 25
AFTER WEEKLY USE 26
AFTER EVERY 50 HOURS OF USE 27
AFTER EVERY 100 HOURS OF USE 27
ELECTRIC MOTORS 27
BELTS 28
ORBITAL SCRUB HEAD ISOLATORS 28
BATTERIES 28
MAINTENANCE-FREE BATTERIES 28
FLOODED (WET) LEAD-ACID BATTERIES . 28
CHECKING CONNECTIONS / CLEANING .. 29
CHARGING BATTERIES 29
BATTERY CHARGER SETTINGS 30
HYDROLINK® BATTERY WATERING SYSTEM 32
SQUEEGEE BLADE REPLACEMENT 33
ec-H2O NanoClean WATER CONDITIONING CARTRIDGE REPLACEMENT 34
LOADING/UNLOADING MACHINE FOR TRANSPORTING 35
STORING MACHINE 35
Freeze Protection 35
TROUBLESHOOTING 36

SPECIFICATIONS

GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE .. 38
MACHINE DIMENSIONS 40

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

The following warning precautions are used throughout this manual as indicated in their description:

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

FOR SAFETY: To identify actions which 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: To Reduce the Risk of Fire, Explosion, Electric Shock or Injury:

- **Read manual before operating machine.**
- **Do not use or pick up flammable materials.**
- **Do not use near flammable liquids, vapors or combustible dusts.**

  This machine is not equipped with an explosion proof motor. The electric motor will spark upon start up and during operation which could cause a flash fire or explosion if machine is used in an area where flammable vapors/liquids or combustible dusts are present.
- **Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.**
- **Disconnect battery cables and charger cord before cleaning and servicing machine.**
- **Do not charge batteries with damaged cord. Do not modify plug.**

  If the charger supply cord is damaged or broken, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.
- **Do not use outdoors. Store indoors.**
- **Spinning pad/brush, keep hands away.**

⚠ WARNING: Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

WARNING: This machine contains chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm.

FOR SAFETY:

1. **Do not operate machine:**
   - **Unless trained and authorized.**
   - **Unless operator manual is read and understood.**
   - **Unless mentally and physically capable of following machine instructions.**
   - **Under the influence of alcohol or drugs.**
   - **While using a cell phone or other types of electronic devices.**
   - **If not in proper operating condition.**
   - **In outdoor areas. This machine is for indoor use only.**
   - **In areas where flammable vapors/liquids or combustible dusts are present.**
   - **With pads or accessories not supplied or approved by Tennant. The use of other pads may impair safety.**
   - **In areas with possible falling objects.**
   - **In areas that are too dark to safely see the controls or operate machine.**
2. **Before operating machine:**
   - **Check machine for fluid leaks.**
   - **Make sure all safety devices are in place and operate properly.**
3. **When operating machine:**
   - **Use only as described in this manual.**
   - **Report machine damage or faulty operation immediately.**
   - **Wear closed-toe, non-slip work shoes.**
   - **Reduce speed when turning.**
   - **Go slowly on inclines and slippery surfaces.**
   - **Do not scrub on inclines that exceed 9% grade or transport on inclines that exceed 21% grade.**
   - **Follow site safety guidelines concerning wet floors.**
   - **Follow mixing, handling and disposal instructions on chemical containers.**
   - **Do not carry passengers on machine.**
   - **Use care when reversing machine.**
   - **Keep children and unauthorized persons away from machine.**
   - **Do not allow machine to be used as a toy.**

4. **Before leaving or servicing machine:**
   - **Stop on level surface.**
   - **Set the parking brake, if equipped.**
   - **Turn off machine and remove key.**
5. **When servicing machine:**
   - **Disconnect battery connection and charger cord before working on machine.**
   - **All work must be done with sufficient lighting and visibility.**
   - **All repairs must be performed by trained personnel.**
   - **Use Tennant supplied or approved replacement parts.**
   - **Do not modify the machine from its original design.**
   - **Do not jack up machine.**
   - **Avoid moving parts. Do not wear loose clothing or jewelry and secure long hair.**
   - **Do not disconnect the off-board charger's DC cord from the machine's receptacle when the charger is operating. Arcing may result. If the charger must be interrupted during charging cycle, disconnect the AC power supply cord first.**
   - **Do not use incompatible battery chargers as this may damage battery packs and potentially cause a fire hazard.**
   - **Inspect charger cord regularly for damage.**
   - **Keep work area well ventilated.**
   - **Avoid contact with battery acid.**
   - **Keep all metal objects off batteries.**
   - **Do not power spray or hose off machine.**
   - **Use a hoist or adequate assistance when lifting batteries.**
   - **Battery installation must be done by trained personnel.**
   - **Wear personal protection equipment as needed and where recommended in this manual.**



For Safety: wear protective gloves.



For Safety: wear eye protection.

6. **When loading/unloading machine onto/off truck or trailer:**
   - **Drain tanks before loading machine.**
   - **Use a ramp, truck or trailer that can support the machine weight and operator.**
   - **Do not operate the machine on a ramp incline that exceeds a 21% grade level.**
   - **Use a winch if ramp incline exceeds a 21% grade level.**
   - **Lower the scrub head and squeegee before tying down machine.**
   - **Turn machine off and remove key.**
   - **Set parking brake (if equipped).**
   - **Block machine wheels.**
   - **Use tie-down straps to secure machine.**

SAFETY LABELS

The safety labels appear on the machine in the locations indicated. Replace labels if they are missing or become damaged or illegible.

WARNING LABEL - Located on recovery tank cover.





WARNING LABEL -
Spinning pad. Keep hands away.

Located on disk scrub head model.



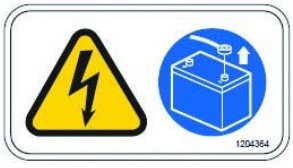
WARNING LABEL -
Spinning brush. Keep hands away.

Located on cylindrical scrub head model.



WARNING LABEL -
Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

Located on Insta-Click magnetic pad driver/brush.



WARNING LABEL -
Electrical hazard. Disconnect battery cables before servicing machine.

Located on circuit breaker panel.



FOR SAFETY LABEL -
Do not power spray or hose off machine. Electrical malfunction may occur.

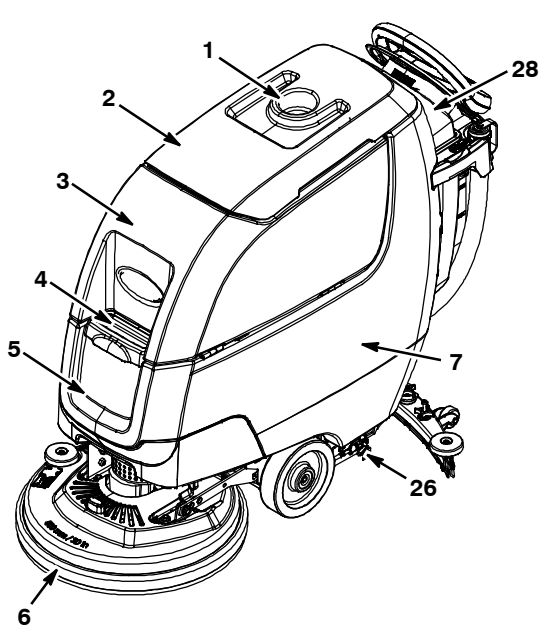
Located on control console

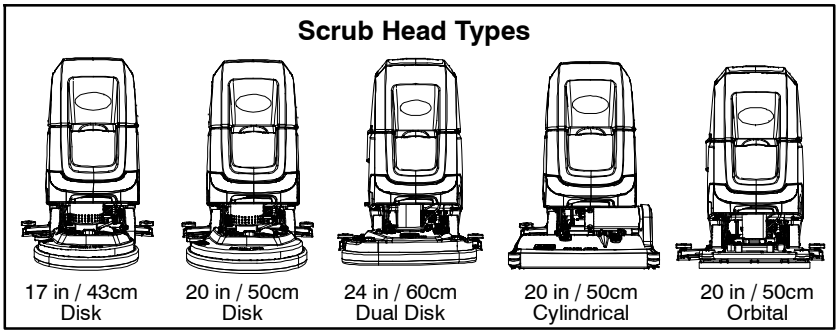


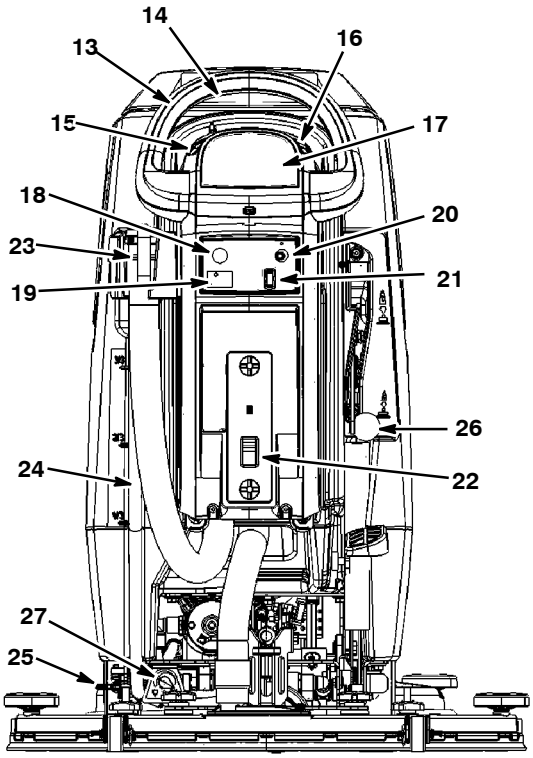
WARNING LABEL -
Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.

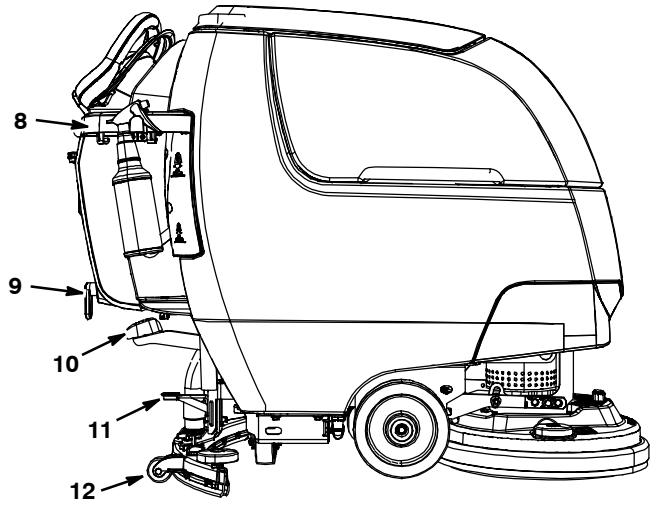
Located on bottom side of recovery tank.

MACHINE COMPONENTS









1. Cup holder/tray
2. Recovery tank lid
3. Recovery tank
4. Solution tank fill-port
5. Solution tank
6. Scrub head
7. Battery compartment
8. Accessory rail(s)
9. On-board battery charger cord hooks
10. Scrub head lift pedal
11. Squeegee foot pad
12. Squeegee assembly
13. Control handle
14. Control handle start bail
15. Speed control knob (drive model)
16. Forward/Reverse lever (drive model)
17. Control panel display
18. Emergency stop button (option)
19. Hour meter
20. Key switch
21. ec-H2O on/off switch (option)
22. Off-board battery charger receptacle
23. Recovery tank drain hose
24. Solution tank level/drain hose
25. Parking brake (option)
26. Dual down pressure lever (option)
27. Solution flow control knob
28. Circuit breaker panel splash guard.

MACHINE SYMBOLS

Fast speed (drive model)

Slow speed (drive model)

Forward / Reverse (drive model)

On

Off

ec-H2O scrubbing (option)

Battery charge

Do not lift by accessory rails

No step

Dual down pressure

Parking brake (option)

No detergent (ec-H2O option)

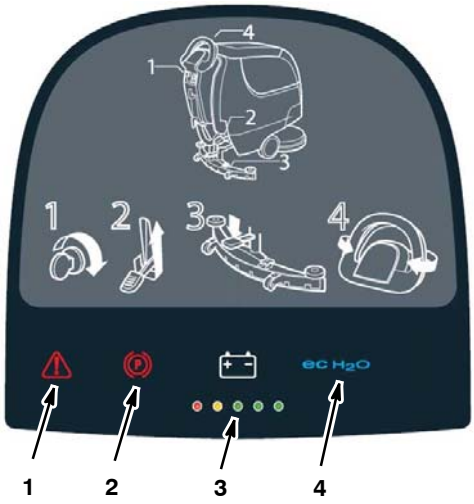
Water temperature (ec-H2O option)

Solution flow

No Solution flow

Circuit breaker

CONTROL PANEL COMPONENTS



1. **Service indicator** - Lights up when a machine or charger fault is detected.
2. **Parking brake indicator (option)** - Lights up when parking brake lever is engaged. To turn off indicator, disengage parking brake lever near left rear wheel.
3. **Battery discharge indicator (BDI)** - The battery discharge indicator serves two functions. In normal scrub mode it displays the charge level of the batteries. It also, in conjunction when the service indicator is flashing, provides specific LED codes when a machine or charger fault is detected.
4. **ec-H2O indicator (Option)** - Lights up blue when ec-H2O system is activated and operating normally.

INSTALLING BATTERIES

⚠ WARNING: Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.

FOR SAFETY: When servicing machine, wear appropriate personal protection equipment as needed. Avoid contact with battery acid.

BATTERY SPECIFICATIONS

Two 12 volt deep-cycle batteries.

Contact distributor or Tennant for battery recommendations.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

1. Lift the recovery tank to access the battery compartment (Figure 1).



FIG. 1

2. With adequate assistance, carefully install the batteries into the battery compartment. Arrange the batteries as shown (Figure 2).

FOR SAFETY: When servicing machine, use a hoist or adequate assistance when lifting batteries.

3. Using the supplied battery post boots, connect the cables to the battery posts as shown (Figure 2). Connect the machine's black (-) battery cable last. Use insulated tools when working near batteries.

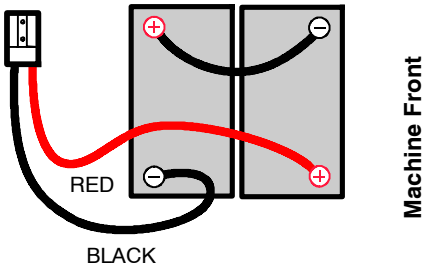


FIG. 2

IMPORTANT: Make sure that the machine's battery charger is properly set before charging. See BATTERY CHARGER SETTINGS.

BATTERY PACK LIFT-OUT TRAY (Option)

Models equipped with the optional battery lift-out tray for quick or frequent battery pack exchange.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

⚠ WARNING: Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.

1. Disconnect the battery cable connection at machine (Figure 3).



FIG. 3

FOR SAFETY: When servicing machine, wear appropriate personal protection equipment as needed. Avoid contact with battery acid.

2. Using an approved lift strap that supports the weight of battery pack, connect the strap to the two lift brackets as shown. Using a lift hoist rated to handle the weight of the battery pack, carefully lift the battery packs to and from machine. Keep one hand on the battery lift-out tray when lifting for stability (Figure 4).

   Before lifting battery pack, make sure the batteries are secured to the battery lift-out tray with the supplied battery strap as shown (Figure 4).



FIG. 4

3. Reconnect the battery cable connection after installing battery pack.

HOW THE MACHINE WORKS

Conventional scrubbing:
When using the conventional scrubbing mode, water and detergent mixture from the solution tank flows to the floor and the rotating brush(es)/pad(s) scrub the floor clean. As the machine moves forward, the squeegee with vacuum suction picks up the dirty solution from the floor into the recovery tank.

ec-H2O NanoClean Technology (option):
When using the ec-H2O NanoClean technology, normal water passes through a module where it is electrically converted into a cleaning solution. The electrically converted water attacks the dirt, allowing the machine to easily scrub away the suspended soil. The converted water then returns to normal water in the recovery tank.

BRUSH AND PAD INFORMATION

For best cleaning results use the appropriate brush or pad for your cleaning application. Listed below are brushes and pads and the applications for which each is best suited.

NOTE: The amount and type of soilage play an important role in determining the type of brush or pad to use. Contact a Tennant representative for specific recommendations.

Soft nylon bristle scrub brush (White) -
Recommended for cleaning coated floors without removing finish. Cleans without scuffing.

Polypropylene bristle scrub brush (Black) -
This general purpose polypropylene bristle scrub brush is used for scrubbing lightly compacted soilage. This brush works well for maintaining concrete, wood and grouted tile floors.

Super abrasive bristle scrub brush (Gray) -
Nylon fiber impregnated with abrasive grit to remove stains and soilage. Strong action on any surface. Performs well on buildup, grease, or tire marks.

Polishing pad (White) -
Used to maintain highly polished or burnished floors.

Buffing pad (Red) - Used for light duty scrubbing without removing floor finish.

Scrubbing pad (Blue) - Used for medium to heavy-duty scrubbing. Removes dirt, spills, and scuffs and leaves surface clean ready for recoating.

Stripping pad (Brown) - Used for stripping of floor finish to prepare the floor for recoating.

Heavy duty stripping pad (Black) - Used for aggressive stripping of heavy finishes/sealers, or very heavy duty scrubbing.

Surface preparation pad (Maroon) - Used for very aggressive chemical free removal of floor finish to prepare the floor for re-coating

MACHINE SETUP

ATTACHING SQUEEGEE ASSEMBLY

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

1. Lift the squeegee mount bracket to the raised position. Place toe under pedal to lift (Figure 5).



FIG. 5

2. Mount the squeegee assembly to the squeegee mount bracket (Figure 6). Tighten knobs to secure squeegee assembly to bracket.

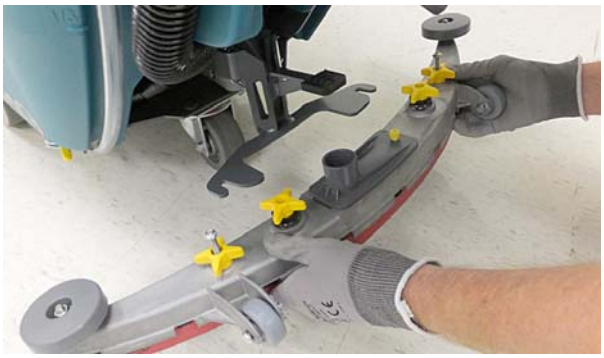


FIG. 6

3. Connect the vacuum hose to the squeegee assembly (Figure 7).

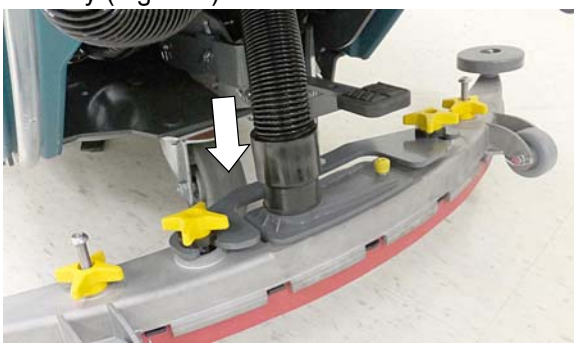


FIG. 7

INSTALLING BRUSH/PAD - 3 Lug Disk

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

1. Step down on the scrub head lift pedal to raise the scrub head off the floor (Figure 8).



FIG. 8

2. Attach the pad to the pad driver before installing the disk (Figure 9). Secure pad with centerlock.

FOR SAFETY: Do not operate machine with pads or accessories not supplied or approved by Tennant. The use of other pads may impair safety.

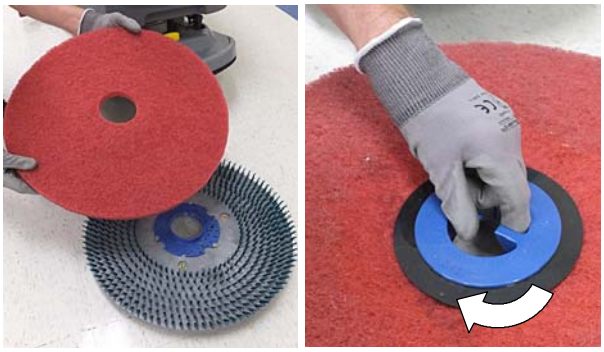


FIG. 9

3. Single disk model - Position the three lugs into the motor hub slots and give the pad driver/brush a quick counter-clockwise turn to engage hub (Figure 10). View through the scrub head window to align lugs.

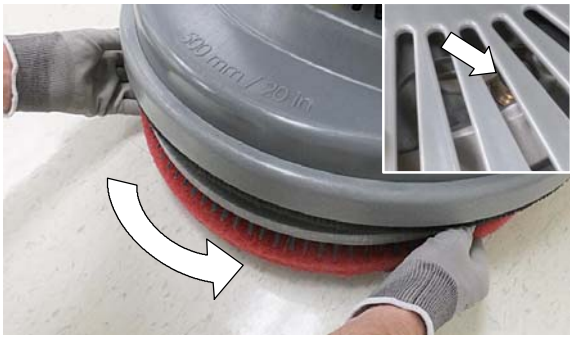


FIG. 10

Dual disk model - Turn the brush motor hub until the lug slot with spring clip is visible. Position the three lugs into the motor hub slots and give the pad driver/brush a quick turn towards the spring clip (Figure 11). View through the scrub head window to align lugs.

NOTE: *The left and right disks engage the hubs in opposite directions.*

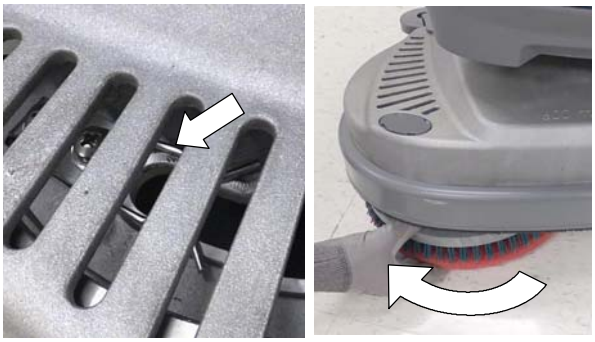


FIG. 11

4. Single disk model - To remove the pad driver/brush, grip the disk and give it a quick turn in the direction as shown (Figure 12).



FIG. 12

Dual disk model - To remove the pad driver/brush, grip the disk and give it a quick turn in the direction as shown (Figure 13).

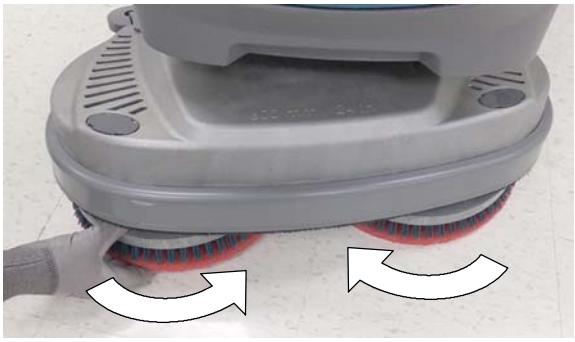


FIG. 13

INSTALLING BRUSH/PAD - Insta-Click Magnetic Disk (Option)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

⚠ WARNING: Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

1. Step down on the scrub head lift pedal to raise the scrub head off the floor (Figure 14).



FIG. 14

2. Attach the pad to the pad driver before installing the driver (Figure 15). Secure pad with centerlock.

FOR SAFETY: Do not operate machine with pads or accessories not supplied or approved by Tennant. The use of other pads may impair safety.

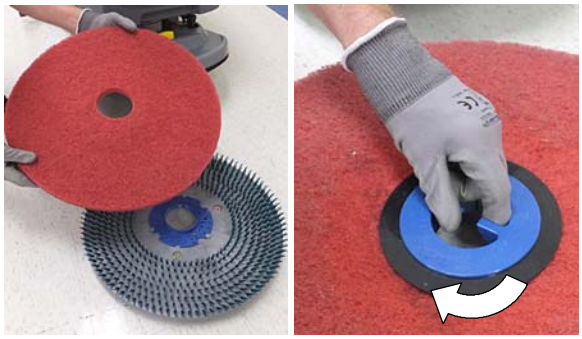


FIG. 15

3. Place the pad driver/brush under the scrub head and lift into position. The Insta-Click pad driver/brush will automatically click into position (Figure 16).



FIG. 16

4. To remove the pad driver(s)/brush(es), raise the scrub head and press the yellow plunger button with foot or hand (Figure 17). Pad will drop to floor.

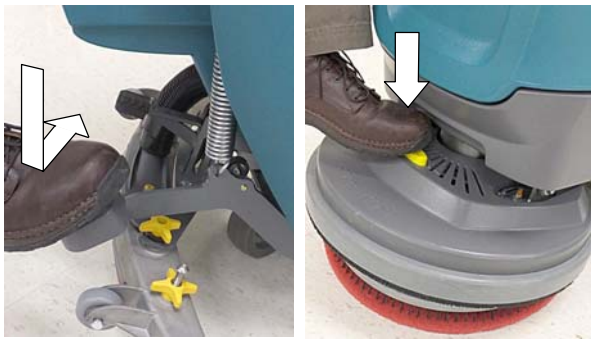


FIG. 17

INSTALLING PAD - Orbital

For best cleaning performance and to avoid damaging the pad driver plate or floor surface, always use backer pad with work pads (Figure 18).

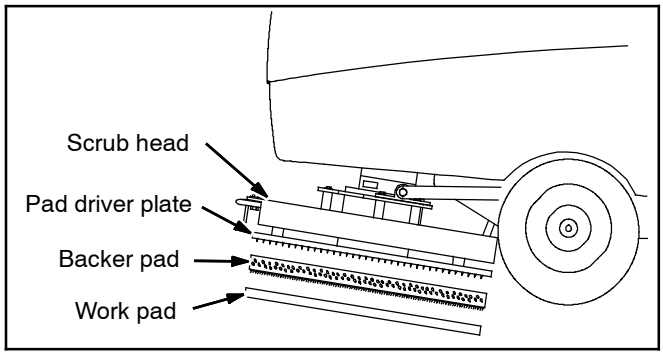


FIG. 18

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

1. Step down on the scrub head lift pedal to raise the scrub head off the floor (Figure 19).



FIG. 19

2. Install the backer pad, retaining strips facing outward, to bottom of scrub head (Figure 20). Make sure pad is centered on scrub head.

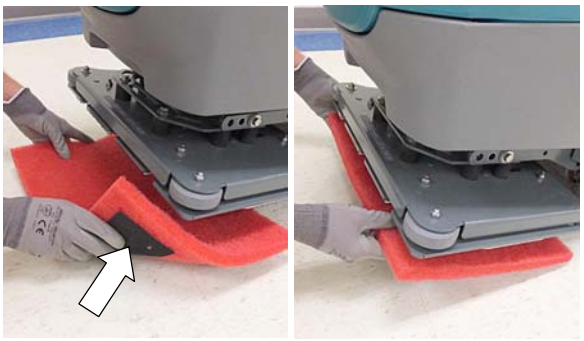


FIG. 20

3. Attach the work pad to the backer pad (Figure 21).



FIG. 21

INSTALLING CYLINDRICAL BRUSHES

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

1. Step down on the scrub head lift pedal to raise the scrub head off the floor (Figure 22).



FIG. 22

2. Remove the debris tray by sliding it out from the scrub head (Figure 23).

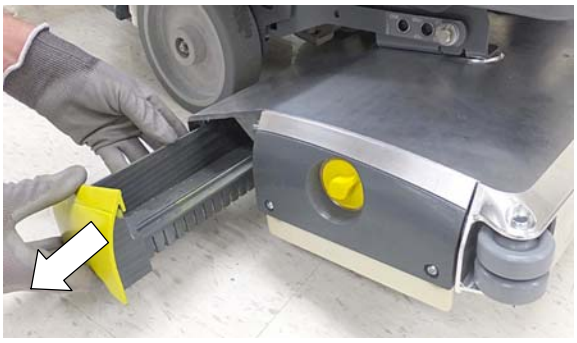


FIG. 23

3. Remove the idler plate from the scrub head by unscrewing the yellow knob (Figure 24).



FIG. 24

4. Slide the brushes into the scrub head and connect the slotted ends of each brush into the drive hubs (Figure 25).

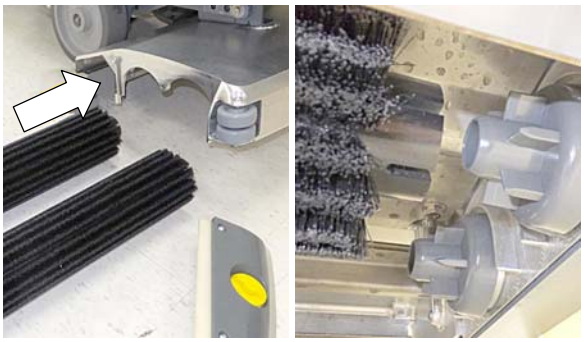


FIG. 25

5. Connect the idler plate to the brush ends and reattach the idler plate. Make sure the idler plate hooks are engaged before tightening knob (Figure 26).



FIG. 26

6. Replace debris tray.

FILLING SOLUTION TANK

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Remove the solution tank lid and fill the solution tank. Stop filling tank when the level reaches the “3/3” mark on the solution tank drain hose indicator (Figure 27).

ec-H2O Scrubbing - Fill solution tank with only cool clean water (less than 70°F/21°C). Do not add conventional floor cleaning detergents. An ec- H2O system fault will occur if cleaning detergents are added.

Conventional Scrubbing - Fill solution tank with water (not to exceed 60°C/140°F). Pour a recommended cleaning detergent into the solution tank according to mixing instructions on the container.

NOTE: Do not use the ec-H2O system when there are conventional cleaning detergents in the solution tank. Drain, rinse, and refill the solution tank with clear cool water before operating the ec-H2O system. Conventional cleaning detergents will cause an ec- H2O system fault.

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

ATTENTION: For Conventional Scrubbing, only use commercially approved cleaning detergents. Machine damage due to improper detergent usage will void the manufacturer’s warranty.



FIG. 27

The solution tank fill- port is equipped with two hose clips to hold hose while filling. The two clips are different hose diameter sizes (Figure 28).

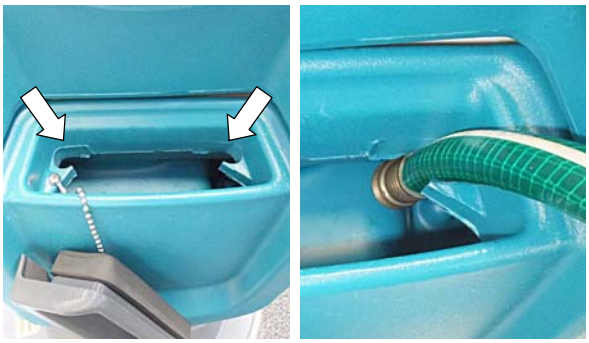


FIG. 28

ec-H2O NanoClean WATER CONDITIONING CARTRIDGE (ec-H2O model)

The ec-H2O system is equipped with a water conditioning cartridge (Figure 29). The cartridge is designed to protect the machine's plumbing system from potential scaling.

The cartridge is required to be replaced when it reaches its maximum water usage or expiration time of when the cartridge was activated, which ever comes first.

Depending on machine usage a new cartridge can last anywhere from 12 to 24 months.

The control panel will signal a code when it's time to replace cartridge. See SERVICE INDICATOR CODES for further details.



FIG. 29

All cartridges are labeled with a manufacture date. The shelf-life of an un-installed cartridge is one year from manufacture date. For new cartridge replacement, the ecH2O module timer must be reset. See ec-H2O NanoClean WATER CONDITIONING CARTRIDGE REPLACEMENT.

ATTENTION: *During first time use and after replacing the water conditioning cartridge, the ec-H2O system will automatically override the selected solution flow rate for up to 75 minutes.*

ACCESSORY RAIL

The machine is equipped with an accessory rail which also serves as the recovery tank and solution tank drain hose holder.

The accessory rail is designed to store the squeegee assembly and other accessory items (Figure 30).

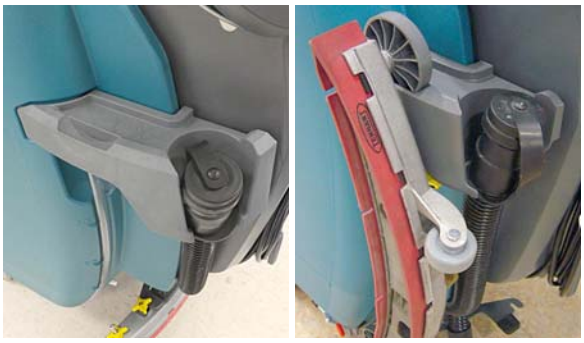


FIG. 30

Standard model - A debris bag hook is located on the left side of the control console (Figure 31).



FIG. 31

ACCESSORY CLIPS (Option) - If model is equipped with the optional accessory clips, the clips easily clip on and off the rail for additional accessory storage (Figure 32).

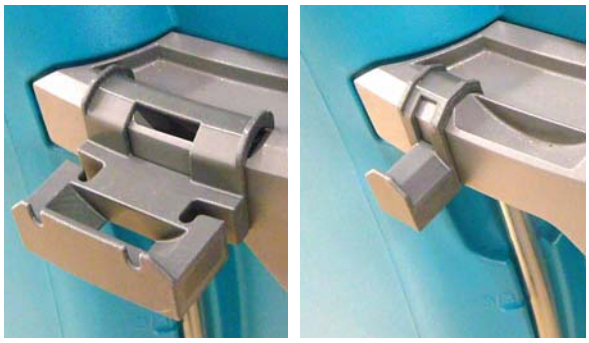


FIG. 32

To install the accessory clips, hook the clip over the rail and push downward until it snaps into position. To remove the accessory clip, reach under the clip and carefully pull the latch tab downward to release from rail. (Figure 33)

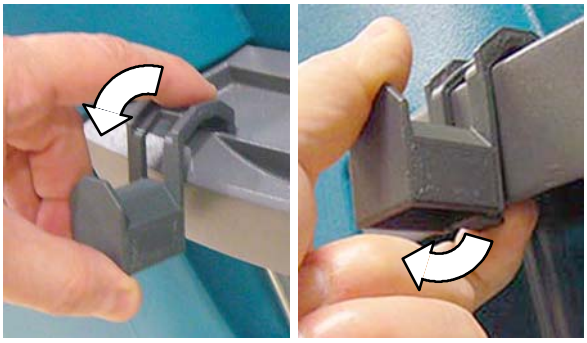


FIG. 33

The optional accessory clips allow for storage of wet floor signs, spray bottles, squeegee assembly, debris bags and other items (Figure 34).



FIG. 34

ATTENTION: Do not use the accessory rails to lift machine, damage may occur.

ATTENTION: Do not step on accessory rails, damage may occur.

MACHINE OPERATION

FOR SAFETY: Do not operate machine unless operator manual is read and understood.

PRE-OPERATION CHECK LIST

- ❑ Sweep area and remove any obstructions.
- ❑ Check brushes/pads for wear and damage.
- ❑ Check squeegee blades for wear and damage.
- ❑ Confirm recovery tank empty and screen and debris tray is clean.
- ❑ Check scrub head skirt for wear and damage.
- ❑ Cylindrical brush model - confirm scrub head debris tray is empty and clean.
- ❑ ec-H2O Scrubbing: Confirm solution tank is filled with clear cool water only.
- ❑ ec-H2O Scrubbing: Ensure all conventional cleaning agents/restorers are drained and rinsed from solution tank.
- ❑ Check machine for proper operation.

OPERATING MACHINE

1. Release the parking brake lever, if equipped (Figure 35)
2. Turn the key to the on (I) position (Figure 35).

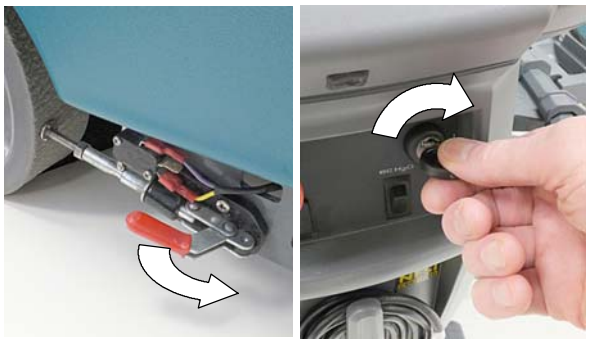


FIG. 35

3. ec-H2O models - The ec-H2O system will automatically turn on at start up. To turn off the ec-H2O system, press the ec-H2O switch located below the key switch (Figure 36).

ATTENTION: *During first time use and after replacing the water conditioning cartridge, the ec-H2O system will automatically override the selected solution flow rate for up to 75 minutes.*

ATTENTION: *If cleaning detergent is accidentally cycled through ec-H2O system, immediately turn the ec-H2O system off. Drain solution tank, refill with cool water and operate the ec-H2O system to flush out detergent.*



FIG. 36

ec-H2O INDICATOR	CONDITION
Solid blue	Normal operation
Blinking blue/red	Water conditioning cartridge expired. Replace cartridge.
Solid or blinking red	See Service Indicator Codes.

4. Lower the scrub head to the floor by stepping on the scrub head lift pedal as shown (Figure 37).



FIG. 37

5. Lower the squeegee assembly to floor by stepping on foot pad as shown (Figure 38). To raise squeegee assembly, place toe under foot pad and lift. The vacuum motor will start when squeegee assembly is lowered.

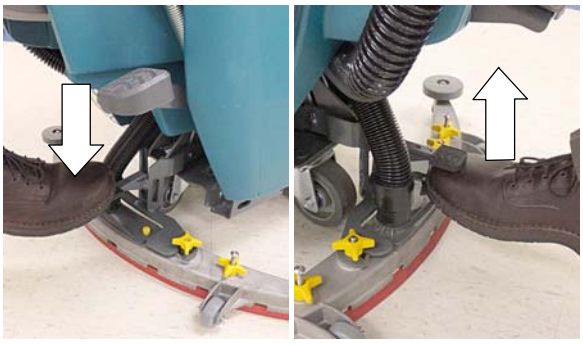


FIG. 38

6. Drive models - push the directional lever to the forward position to go forward (Figure 39). To reverse the machine pull the directional lever backwards.



FIG. 39

7. To begin scrubbing, pull the start bail (Figure 40).



FIG. 40

8. Drive models - Adjust the scrubbing speed by turning the speed dial to the desired speed (Figure 41).

   Push models - Slowly push the machine forward. The rotating brush(es) will help assist the machine forward.



FIG. 41

9. ec-H2O model: To adjust the solution flow rate when ec-H2O scrubbing, press the solution flow button located on the ec-H2O module (Figure 42). One LED= low, two LED's=medium, and three LED's= high.

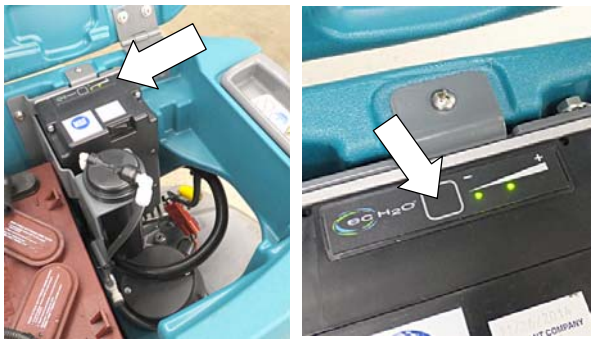


FIG. 42

10. To adjust the solution flow rate when conventional scrubbing, turn the solution flow control knob located underneath machine (Figure 43).

NOTE: The solution flow control knob is only functional when conventional scrubbing.

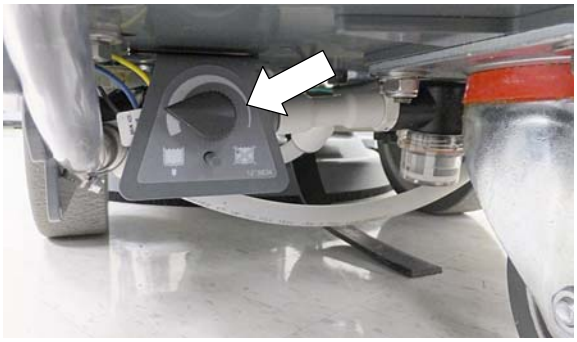


FIG. 43

11. T300e model option - When extra brush pressure is needed for heavily soiled areas lift the down pressure lever (Figure 44).

NOTE: Release the down pressure lever when raising scrub head.

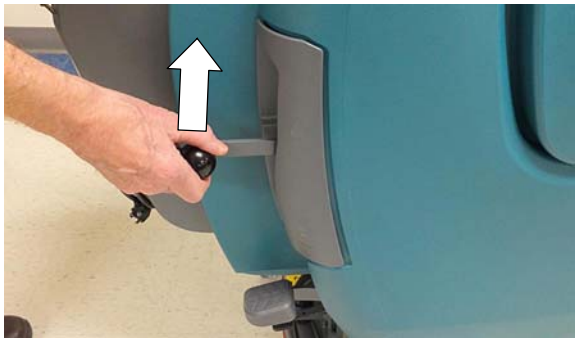


FIG. 44

12. To stop scrubbing, release the start bail and raise the scrub head and squeegee assembly off floor. Turn key off and set parking brake, if equipped.

WHILE OPERATING MACHINE

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

1. Overlap each scrub path by 2 inches (5 cm).
2. Keep machine moving to prevent damage to floor finish.
3. Wipe squeegee blades with a cloth if blades leave streaks.
4. Avoid bumping the machine into posts and walls.

FOR SAFETY: When operating machine, do not scrub on inclines that exceed 9% grade or transport on inclines that exceed 21% grade.

5. Pour a recommended foam control solution into the recovery tank if excessive foam appears.

   ATTENTION: Foam buildup will not activate the float shut-off screen, vacuum motor damage will result.

6. Use the double scrubbing method for heavily soiled areas. First scrub the area with the squeegee up, let solution set for 3-5 minutes, then scrub the area a second time with squeegee down.
7. Orbital Scrub Head Model - Use caution when working near the tile cove (Figure 45) and floor mounted fixtures such as pedestal sinks and other breakable items. Keep the metal scrub head edge away to avoid possible damage.

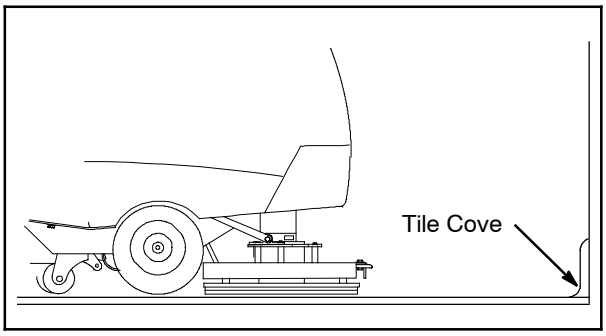


FIG. 45

8. When leaving the machine unattended, remove the key and set the parking brake, if equipped.
9. Do not operate machine in areas where the ambient temperature is above 110°F/43°C or below freezing 32°F/0°C.

EMERGENCY SHUT-OFF BUTTON (Drive models)

Push the emergency shut-off button in the event of an emergency (Figure 46). This red button shuts off all power to machine. To regain power, turn the button clockwise and restart the key.

Only use this button in the event of an emergency. It is not intended for routine machine shutdown.



FIG. 46

BATTERY DISCHARGE INDICATOR

The battery discharge indicator (BDI) displays the charge level of the batteries while the machine is operating. When the batteries are fully charged, all five indicators are lit (Figure 47). When the discharge level reaches the red light, stop scrubbing and recharge the batteries. If the red light begins to flash, the scrubbing function will automatically shut off to protect the batteries from total discharge. Drive Model: The machine will still propel when the red light is flashing, this will allow user to transport machine to charging station.



FIG. 47

CIRCUIT BREAKER PANEL

The machine is equipped with resettable circuit breakers to protect the machine from a current overload. If a circuit breaker trips, disconnect the battery cable connection and reset the breaker by pressing the reset button after the breaker has cooled down. Reconnect the battery cable connection. If the circuit breaker does not reset or continues to trip contact service personnel.

The circuit breaker panel is located near the battery compartment and identified as described below (Figure 48).



FIG. 48

Circuit Breaker	Rating	Circuit protected
CB1	4 A	Key switch, control board
CB2	4 A	ec-H2O module
CB3	4 A	ec-H2O pump
CB4	30 A	Propel
CB5	37 A	Brush motor
CB6	20 A	Vacuum motor

FOR SAFETY: When servicing machine, all repairs must be performed by trained personnel.

The circuit breaker panel is protected by a splash guard. To access the circuit breaker panel when the recovery tank is in the down position lift the splash guard as shown (Figure 49).



FIG. 49

HOUR METER

The hour meter records the number of hours the machine has been operated. Use the hour meter to perform specific maintenance procedures and to record service history (Figure 50).



FIG. 50

DRAINING TANKS

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

DRAINING RECOVERY TANK

Drain and clean the recovery tank daily and between solution tank refills.

1. Transport the machine to drain area.
2. For models equipped with drain hose caps, hold the hose upward, remove cap then slowly lower hose to drain. For models equipped with flow control valve drain hose, lower hose and slowly open valve to drain (Figure 51).



FIG. 51

NOTE: *When using a bucket to drain the machine, do not use the same bucket to fill the solution tank.*

3. Remove and clean the float shut-off screen (Figure 52).

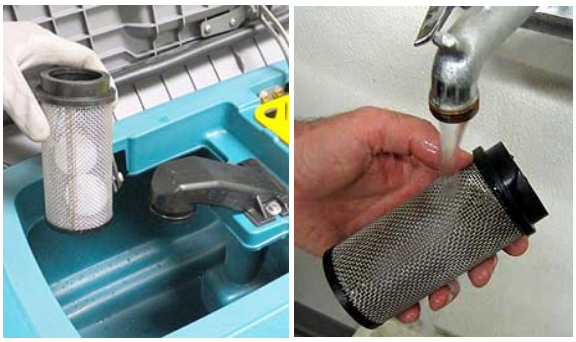


FIG. 52

4. Remove the debris tray and empty (Figure 53).



FIG. 53

5. Rinse out the recovery tank with clean water and wipe clean of any soil residue (Figure 54).

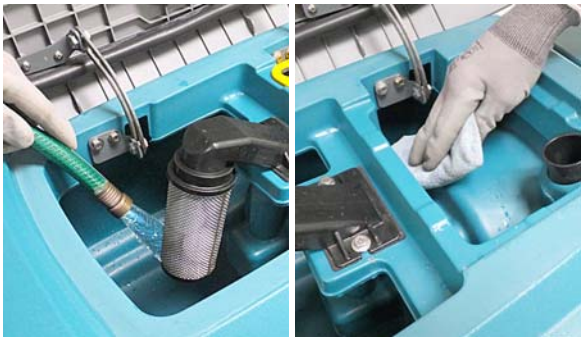


FIG. 54

DRAINING SOLUTION TANK

Drain the solution tank daily.

1. Transport the machine to drain area.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

2. To drain remaining water from solution tank, pull the solution hose from the accessory rail (Figure 55).



FIG. 55

Firmly reconnect the solution hose to accessory rail after draining tank.

3. Rinse out solution tank with clean water (Figure 56).



FIG. 56

4. Remove the solution tank filter and clean screen after every 50 hours of use (Figure 57). Solution filter is located under machine at rear. Drain solution tank before removing filter.

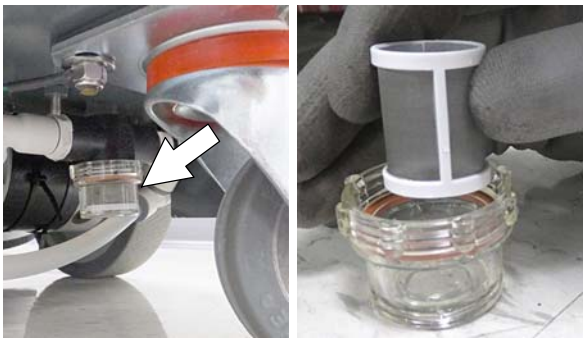
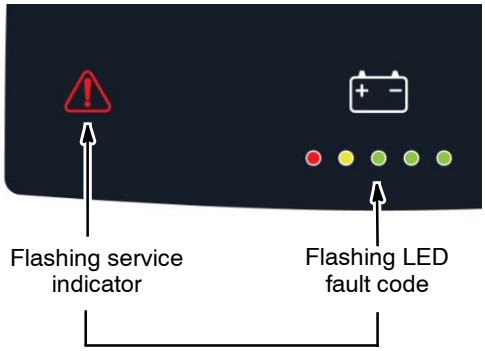


FIG. 57

SERVICE INDICATOR CODES

When the machine or battery charger detects a fault, the service indicator will flash. A fault code will be provided to determine problem as described below.

T300e Control Panel



LED Fault Code ✳ = Flashing	CAUSE	SOLUTION
✳ ✳ ✳ ✳ ✳	Emergency stop button activated.	Release emergency stop button and restart machine.
• • • ✳ ✳	Brush motor wiring, connector or control board problem.	Contact service.
• • ✳ • •	Vacuum motor wiring, connector or control board problem.	Contact service.
• • ✳ ✳ •	Propel circuit breaker tripped.	Disconnect battery and reset circuit breaker. If trip repeats, contact service.
• ✳ • ✳ ✳	Software load failure.	Contact service.
✳ • • • ✳	Propel I-Drive fault Propel I-Drive communication lost	Restart machine. If fault repeats, contact service.
✳ • • ✳ •	Propel motor shorted fault	Contact service.
✳ • • ✳ ✳	Brush motor over current	Contact service.

SERVICE INDICATOR CODES - Continued

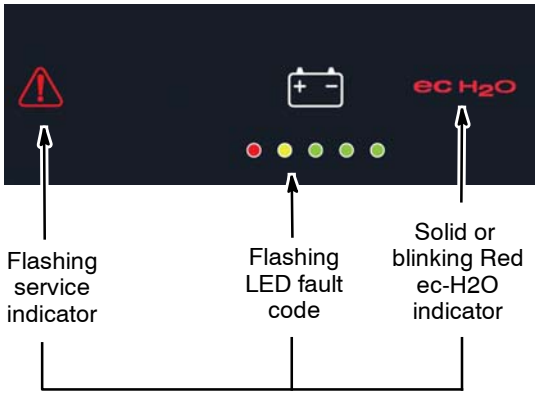
LED Fault Code ✳ = Flashing	CAUSE	SOLUTION
✳ • ✳ • ✳	Start bail is pulled or obstructed before turning machine on.	Release start bail or remove bail obstruction before turning machine on.
✳ • ✳ ✳ •	Brush motor control board fault Vacuum motor control board fault	Disconnect battery cable connection and contact service to replace control board.
✳ • ✳ ✳ ✳	Vacuum motor over current.	Contact service.
✳ ✳ • • •	Vacuum motor shorted fault.	Contact service.
✳ ✳ ✳ • ✳	Brush motor shorted fault.	Contact service.
• ✳ ✳ ✳ •	Charger communication fault Scrub control board comm. fault ec-H2O system comm. fault	Restart. If fault code persists, contact service.

ON-BOARD BATTERY CHARGER SERVICE INDICATOR CODES

LED Fault Code ✳ = Flashing	CAUSE	SOLUTION
✳ ✳ ✳ • •	Charger error condition.	Contact service.
• ✳ ✳ • •	Charger is not connected to battery pack.	Check cable connections.
• ✳ • • •	Charger overheated.	Let charger cool. Move to well ventilated area. Charge batteries in areas with temperatures 80°F/27°C or less. If fault persists, contact service.
• ✳ ✳ ✳ •	Charger communication fault	Restart charger. If fault code persists, contact service.
• ✳ ✳ • ✳	Charger timer exceeded maximum charging time. Interrupts charging cycle.	Replace Batteries.

ec-H2O SYSTEM SERVICE INDICATOR CODES - OPTION

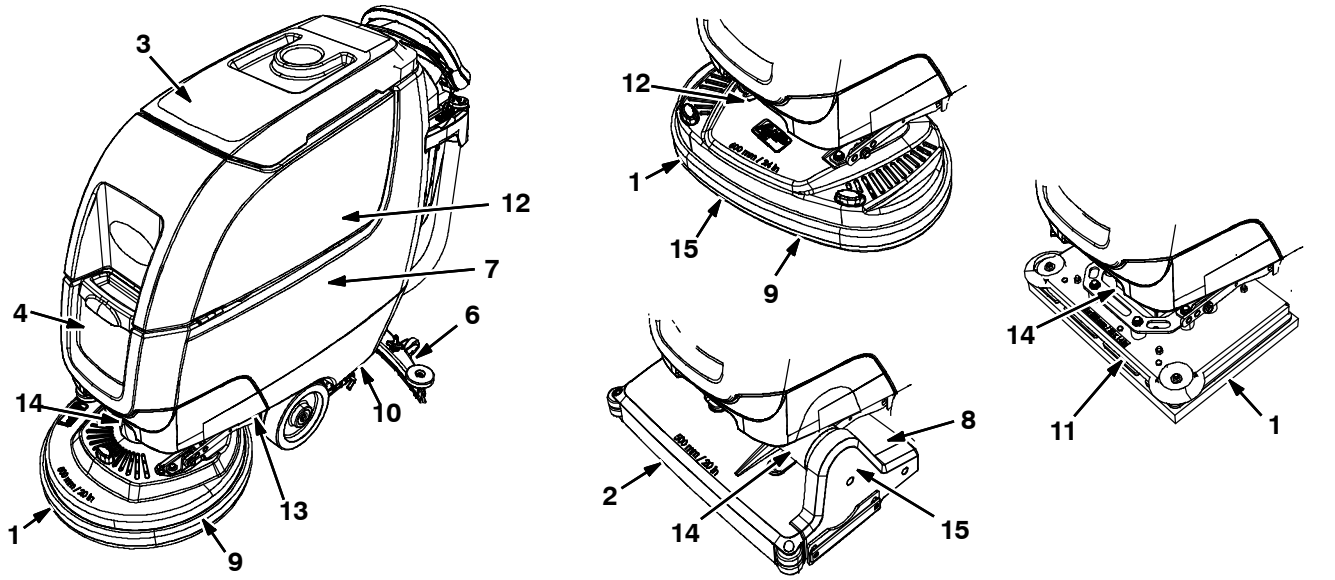
T300e Control Panel



LED Fault Code ✳ = Flashing	CAUSE	SOLUTION
• ✳ ✳ ✳ •	ec-H2O system comm. fault	Restart. If fault code persists, contact service.
• ✳ • ✳ •	ec-H2O pump wiring, connector or control board problem.	Contact service.
• ✳ ✳ ✳ ✳	ec-H2O pump over current	Contact service.
✳ • • • •	ec-H2O pump shorted fault	Contact service.
✳ • ✳ • •	ec-H2O system breaker tripped ec-H2O pump breaker tripped	Reset circuit breaker. If trip repeats, contact service.
ecH2O indicator solid red	ec-H2O pump shorted fault ec-H2O control board fault Water conditioning pump open Water conditioning pump fault	Contact service.
ecH2O indicator blinking red*	ec-H2O pressure switch trip ec-H2O system over regulation No ec-H2O cell current ec-H2O cell over current ec-H2O cell shorted fault	Contact service.
ecH2O indicator blinking blue/red	Water conditioning cartridge expired	Replace water conditioning cartridge.

*Verify if cleaning detergent was added to solution tank. If ec-H2O system was operated with cleaning detergent, drain solution tank, add clear water and operate the ec-H2O system until the fault code clears.

MAINTENANCE CHART



Interval	Person Resp.	Key	Description	Procedure
Daily	O	1	Pad(s)	Check, flip or replace
	O	1	Brush(es)	Check, clean
	O	2	Cylindrical Brushes	Check, clean
	O	3	Recovery tank	Drain, rinse, clean float shut-off screen and debris tray if equipped
	O	4	Solution tank	Drain, rinse
	O	6	Squeegee	Clean, check for damage and wear
	O	7	Batteries	Charge if necessary
	O	8	Debris trough	Clean
	O	9	Scrub head skirt	Check for damage and wear
Weekly	O	7	Battery cells	Check electrolyte level
	O	6	Squeegee assembly drip trap reservoir	Check, clean
50 Hours	O	2	Cylindrical brushes.	Rotate brushes. Check for wear
	O	2	Cylindrical scrub head	Clean underside of scrub head
	O	3	Recovery tank lid seal	Check for wear.
	O	10	Solution tank filter	Clean
100 Hours	O	7	Battery watering system (option)	Check hoses for damage and wear
200 Hours	O	7	Batteries, terminals and cables	Check and clean
500 Hours	T	11	Lower orbital isolators	Replace (4 qty)
750 Hours	T	12	Vacuum motor	Replace carbon brushes
1250 Hours	T	13	Propel motor	Replace carbon brushes
	T	14	Brush motor	Replace carbon brushes
	T	15	Brush belt	Replace belt

O = Operator T = Trained Personnel

MACHINE MAINTENANCE

To keep the machine in good working condition, simply perform the following maintenance procedures.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

FOR SAFETY: When servicing machine wear personal protection equipment as needed. All repairs must be performed by trained personnel

AFTER DAILY USE

1. Drain and rinse out the recovery tank (Figure 58). See DRAINING TANKS.



FIG. 58

2. Remove the debris tray and empty (Figure 59).



FIG. 59

3. Remove and clean the float shut-off screen (Figure 60).

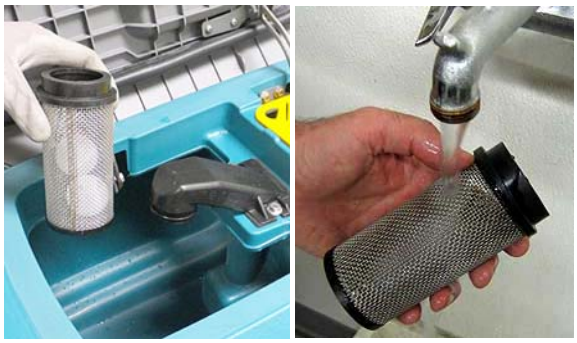


FIG. 60

4. Drain and rinse out the solution tank (Figure 61).

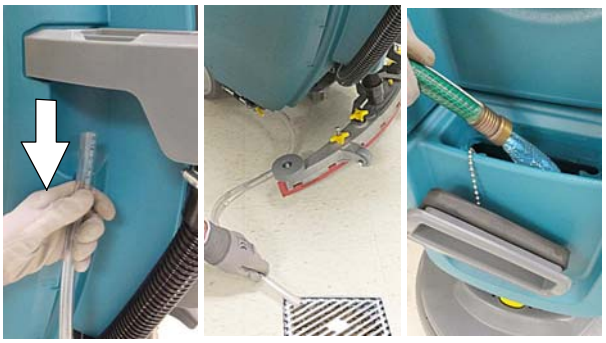


FIG. 61

5. Disk scrub head - Turn pad over or replace when worn (Figure 62).

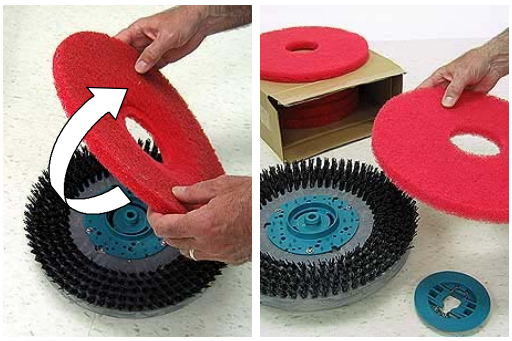


FIG. 62

Orbital scrub head - Turn the work pad over or replace when worn (Figure 63).



FIG. 63

6. Insta-Click pad driver/brushes - clean any debris buildup from hub connection area (Figure 64).



FIG. 64

7. Wipe the squeegee blades clean. Inspect blades for wear and damage (Figure 65). Rotate blade if worn. See SQUEEGEE BLADE REPLACEMENT.



FIG. 65

8. Check the scrub head skirt for wear or damage (Figure 66). Replace if worn or damaged.



FIG. 66

9. Clean the outside surface of the machine with an all purpose cleaner and damp cloth (Figure 67).



FIG. 67

10. Cylindrical scrub head - Remove and clean debris trough (Figure 68).



FIG. 68

11. Charge batteries (Figure 69). See BATTERIES.



FIG. 69

AFTER WEEKLY USE

1. Check the electrolyte level in all batteries (Figure 70). See BATTERIES.

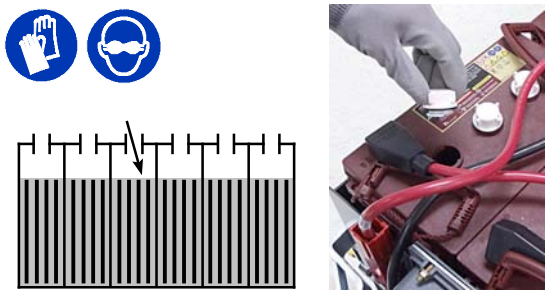


FIG. 70

2. Remove the drip trap cover from the squeegee assembly and clean reservoir (Figure 71).

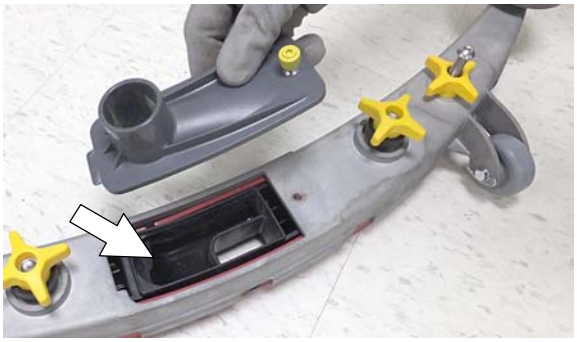


FIG. 71

AFTER EVERY 50 HOURS OF USE

1. Remove the solution tank filter and clean screen (Figure 72). Turn the filter bowl counter-clockwise to remove. Make sure to drain solution tank before removing filter.

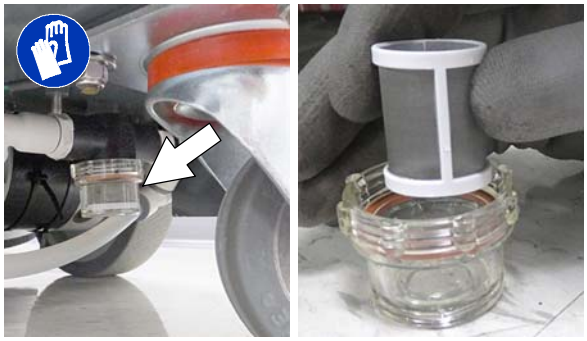


FIG. 72

2. Cylindrical brushes - Rotate brushes from front to rear (Figure 73). Replace brushes when they no longer clean effectively.

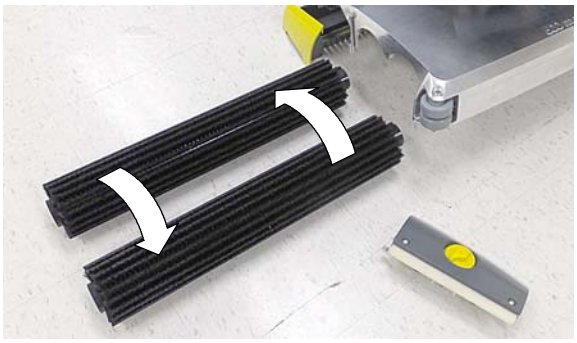


FIG. 73

3. Cylindrical scrub head - Remove debris buildup from underside of scrub head (Figure 74).



FIG. 74

4. Inspect and clean the seal on the recovery tank lid (Figure 75). Replace seal if damaged.



FIG. 75

AFTER EVERY 100 HOURS OF USE

If machine is equipped with the optional battery watering system, check the watering hoses and connections for damage and wear (Figure 76). Replace system if damaged.

FOR SAFETY: When servicing batteries, wear personal protection equipment as needed. Avoid contact with battery acid.



FIG. 76

ELECTRIC MOTORS

Replace motor carbon brushes as indicated. Contact trained personnel for carbon brush replacement.

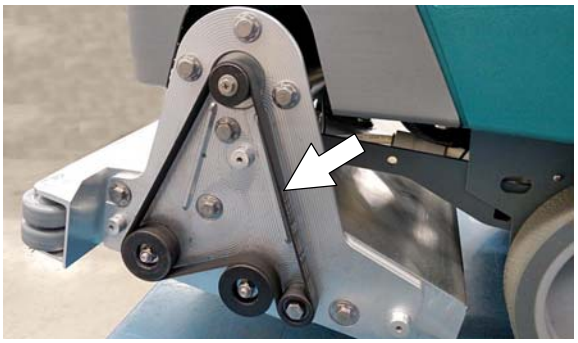
Carbon Brush Replacement	Hours
Vacuum motor	750
Propel motor (drive model)	1250
Disk brush motor	1250
Cylindrical brush motor	1250
Orbital brush motor	1250

BELTS

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Replace belts every 1250 hours. Contact trained personnel for belt replacement (Figure 77).

Cylindrical Brush Drive Belt



Dual Disk Brush Drive Belt

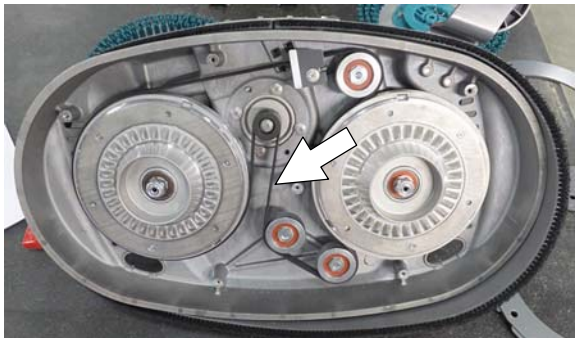


FIG. 77

ORBITAL SCRUB HEAD ISOLATORS

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Replace the four lower vibration isolators every 500 hours. The lower isolators (hidden) are located between the deck plate the driver plate. Contact trained personnel for isolator replacement (Figure 78).



FIG. 78

BATTERIES

FOR SAFETY: Before servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

The lifetime of the batteries depends on their proper maintenance. To get the most life from the batteries;

- Do not charge the batteries more than once a day and only after running the machine for a minimum of 15 minutes.
- Do not leave the batteries partially discharged for long period of time.
- Only charge the batteries in a well-ventilated area to prevent gas build up. Charge batteries in areas with ambient temperatures 80°F / 27°C or less.
- Allow the charger to complete charging the batteries before re-using the machine.
- Maintain the proper electrolyte levels of flooded (wet) batteries by checking levels weekly.

Your machine is equipped with either flooded (wet) lead-acid or maintenance-free batteries supplied by Tennant.

FOR SAFETY: When servicing machine, keep all metal objects off batteries. Avoid contact with battery acid.

MAINTENANCE-FREE BATTERIES

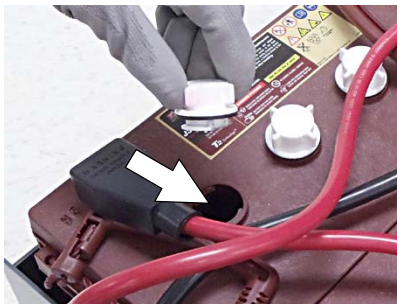
Maintenance-free (Sealed AGM) batteries do not require watering. Cleaning and other routine maintenance is still required.

FLOODED (WET) LEAD-ACID BATTERIES

The flooded (wet) lead-acid batteries require routine watering as described below. Check the battery electrolyte level weekly.

*NOTE: **Do Not** check the electrolyte level if the machine is equipped with the optional battery watering system. Proceed to the BATTERY WATERING SYSTEM.*

The electrolyte level should be slightly above the battery plates as shown before charging (Figure 79). Add distilled water if low. DO NOT OVERFILL. The electrolyte will expand and may overflow when charging. After charging, distilled water can be added up to about 3 mm (0.12 in) below the sight tubes.



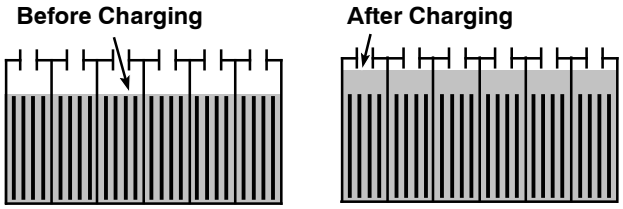


FIG. 79

NOTE: Make sure the battery caps are in place while charging. There may be a sulfur smell after charging batteries. This is normal.

CHECKING CONNECTIONS / CLEANING

After every 200 hours of use, check for loose battery connections and clean the surface of the batteries, including terminals and cable clamps to prevent battery corrosion. Use a scrub brush with a strong mixture of baking soda and water (Figure 80). Do not remove battery caps when cleaning batteries.



FIG. 80

CHARGING BATTERIES

The charging instructions in this manual are intended for the battery charger supplied with your machine. The use of other battery chargers that are not supplied and approved by Tennant are prohibited.

If your machine is equipped with an off-board battery charger refer to the charger's owners manual for operating instructions. Contact distributor or Tennant for battery charger recommendations if machine is not equipped with charger.

FOR SAFETY: The use of incompatible battery chargers may damage battery packs and potentially cause a fire hazard.

IMPORTANT NOTICE: The battery charger is set to charge the battery type supplied with your machine. If you choose to change to a different battery type or capacity (i.e. flooded (wet) lead-acid, maintenance-free, sealed, AGM batteries, etc.), the charger's charging profile must be changed to prevent battery damage. See BATTERY CHARGER SETTINGS.

1. Transport the machine to a well-ventilated area.

⚠ WARNING: Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.

2. Park the machine on a flat, dry surface, turn off machine and remove key.

FOR SAFETY: When servicing batteries, stop on level surface, turn off machine, remove key and set parking brake if equipped.

3. If the machine is equipped with flooded (wet) lead-acid batteries check the battery electrolyte level weekly before charging. *See FLOODED (WET) LEAD-ACID BATTERIES.*
4. For models equipped with on-board chargers, remove the charger's power cord from the storage hooks and plug power cord into a properly grounded wall outlet (Figure 81).



FIG. 81

For models equipped with off-board chargers, first connect the charger's DC cord into the machine's battery charge receptacle then plug the AC power supply cord into a properly grounded wall outlet (Figure 82). Refer to the off-board battery charger's owner manual for operating instructions.

FOR SAFETY: Do not disconnect the off-board charger's DC cord from the machine's receptacle when the charger is operating. Arcing may result. If the charger must be interrupted during charging, disconnect the AC power supply cord first.

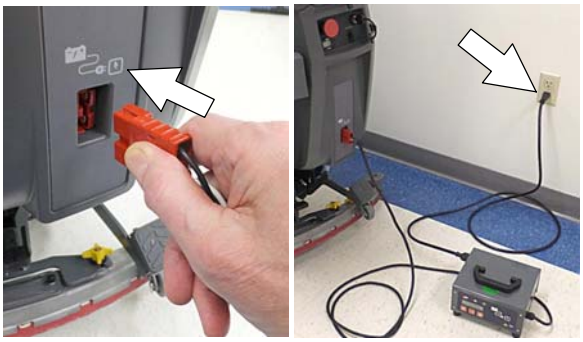


FIG. 82

5. The charger will automatically begin charging and and shut off when fully charged. The maximum charging cycle may take up to 6- 12 hours depending on battery type.

   On-board battery charger: The battery discharge indicator lights will ripple back and forth during the charging cycle. When all five lights repeatedly flash two times, the charging cycle is complete (Figure 83).

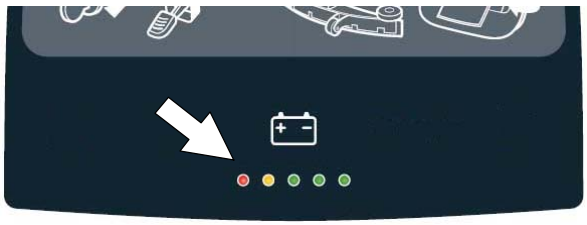


FIG. 83

6. After charging batteries unplug the power supply cord and wrap cord around the cord hooks (Figure 84).

   For models equipped with an off-board charger, always disconnect the AC power supply cord first before disconnecting charger from machine.



FIG. 84

BATTERY CHARGER SETTINGS

The battery charger is set to charge the battery type supplied with your machine. If you choose to change to a different battery type or capacity, the charger's charging profile must be changed to prevent battery damage.

The machine's battery discharge indicator (BDI) must also be reprogrammed to match battery type to prevent battery damage and/or short run- time.

NOTE: For machines shipped without batteries, the battery discharge indicator and the on- board battery charger are set for GEL batteries as the default. If you choose to use a different battery type, the settings must be changed as described as below.

NOTE: For machines shipped without batteries and supplied with an Off- Board Charger, the off- board battery charger is set for wet lead- acid batteries from the factory. The machine's battery discharge indicator is set for GEL batteries as the default. The machine's battery discharge indicator must be reprogrammed to match charger settings (See OFF-BOARD BATTERY CHARGER below).

OFF- BOARD BATTERY CHARGER:

To change the off- board battery charger settings, refer to the off-board charger's owner manual.

To reprogram the machine's battery discharge indicator (BDI) service application software is required, contact service.

ON- BOARD BATTERY CHARGER:

To change the on- board battery charger settings, service application software is required, contact service. As an alternative, the charger settings may be manually changed as describe below. The battery discharge indicator will automatically reprogram to match battery type when the battery charger profile is changed.

CHANGING ON- BOARD BATTERY CHARGER SETTINGS

To manually change the on-board battery charger settings for a different battery type, carefully follow instructions as described below :

NOTE: The manual method is only an alternative if unable to change setting by use of the Service Application Software performed by Service.

1. Disconnect battery cables (Figure 85).

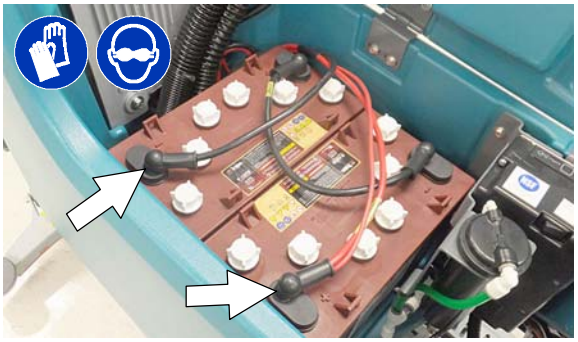


FIG. 85

2. Unwrap the battery charger power cord from the cord hooks.
3. Using a T25 star screwdriver, remove the two screws located at the bottom of the control console to access battery charger (Figure 86).

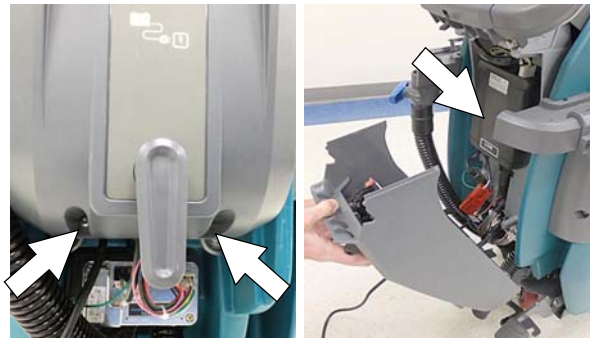


FIG. 86

4. Disconnect the battery cable, power cord and wire harness from charger. Using a T25 star screwdriver, remove the four screws that mount charger to machine (Figure 87). Remove charger from machine.

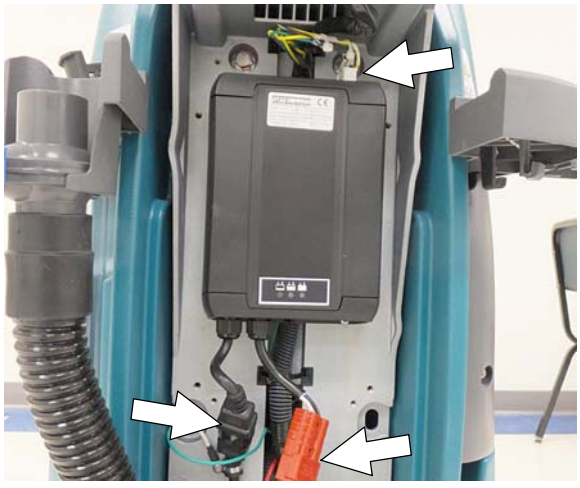


FIG. 87

5. Remove the black cap from bottom side of charger to access the profile dial (Figure 88)

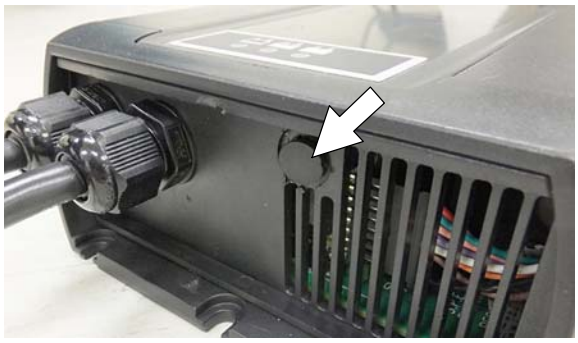


FIG. 88

6. Using a small standard screwdriver, turn the dial to the appropriate battery type according to the following chart (Figure 89).

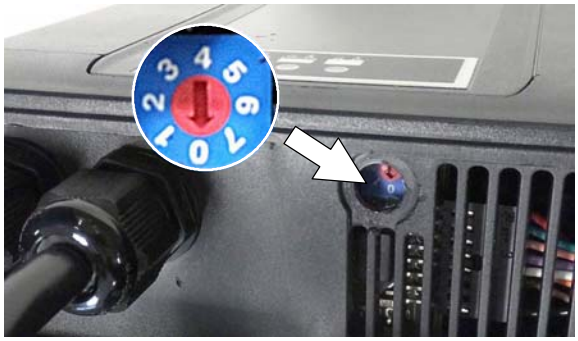


FIG. 89

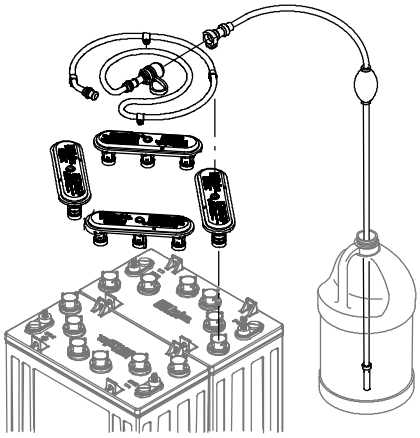
Dial Position	Battery Description Settings with AH Ranges
0	CAN- BUS setting*
1	Wet, Trojan 105- 155 AH
2	Wet, Enersys/Tab 105- 155 AH
3	AGM, Discover 80- 150 AH
4	AGM, Fullriver 80- 150 AH
5	AGM, TPPL, Enersys 20- 40 AH
6	Gel, Sonnenschein 80- 150 AH

** The CAN-BUS setting, dial position "0", is the software setting that is programmed to match battery type supplied with machine. When the dial is manually changed to a different setting, it should not be reset back to "0" otherwise battery damage may result. Service Application Software is required to reset dial back to "0". Contact Service.*

7. Replace the black cap on charger, reinstall battery charger and replace control console.
8. Reconnect the battery cable connection.
9. To set the BDI for the new battery type, plug the on- board battery charger cord into an electrical outlet. The machine's software will automatically reprogram the BDI to the new battery type.

HYDROLINK® BATTERY WATERING SYSTEM (Trojan 150AH Battery Option)

The following instructions are for models equipped with the HydroLINK battery watering system option.



The optional HydroLINK battery watering system provides a safe and easy way to maintain the proper electrolyte levels in your batteries. It is designed exclusively for Trojan® flooded (wet) lead-acid batteries.

FOR SAFETY: When servicing machine, wear personal protection equipment as needed. Avoid contact with battery acid.

Before using the battery watering system check hoses and connections for damage or wear.

1. Fully charge batteries prior to using the battery watering system. Do not add water to batteries before charging, the electrolyte level will expand and may overflow when charging.
2. After charging batteries, check the battery electrolyte level indicators located on the battery covers (Figure 90). If the level indicator is white add water as described in the following instructions. If the level indicators are black the electrolyte is at the correct level, no water is required.

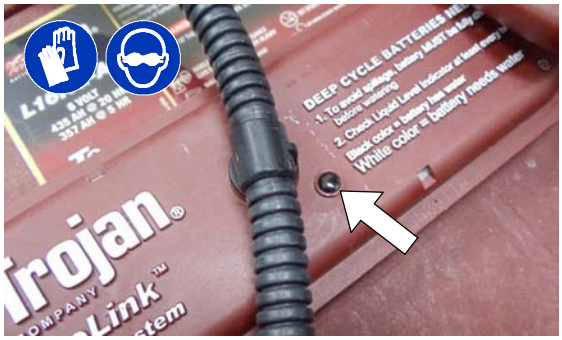


FIG. 90

3. Locate the battery fill hose coupler inside the battery compartment. Remove the dust cap and connect the hand pump hose (Figure 91).

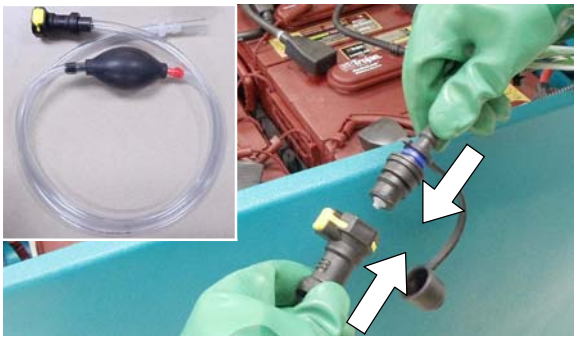


FIG. 91

4. Submerge the other end of the hand pump hose into a bottle of distilled water (Figure 92).



FIG. 92

5. Squeeze the bulb on the hand pump hose until firm (Figure 93). The level indicators will turn black when full.



FIG. 93

6. After adding water, replace the dust cap on the battery fill hose and store the hand pump hose inside the machine's battery compartment for future use.

SQUEEGEE BLADE REPLACEMENT

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Each squeegee blade has four wiping edges. When the blades become worn, simply rotate the blades end-for-end or top-to-bottom for a new wiping edge. Replace blade if all four edges are worn.

1. Remove the squeegee assembly from the machine.
2. Fully loosen the two outside knobs on squeegee assembly. This will separate the spring loaded blade retainer from squeegee frame (Figure 94). To loosen the knobs quickly, squeeze the blade retainer and squeegee frame together.

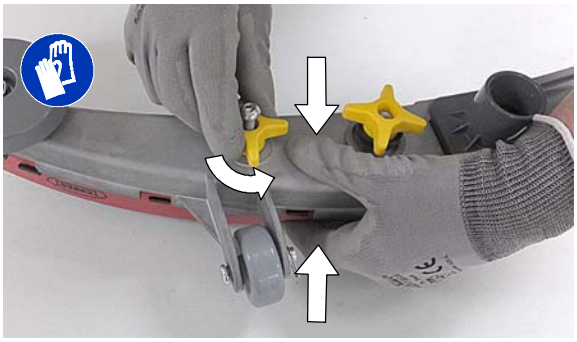


FIG. 94

3. Remove worn blade(s) from the blade retainer (Figure 95).

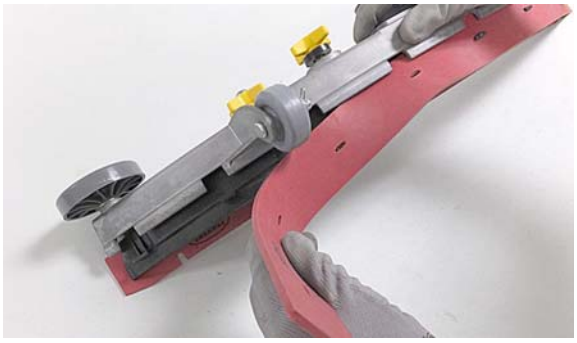


FIG. 95

4. Rotate the rear blade to a new wiping edge (Figure 96). Make sure to align the slots in the blade with retainer tabs.

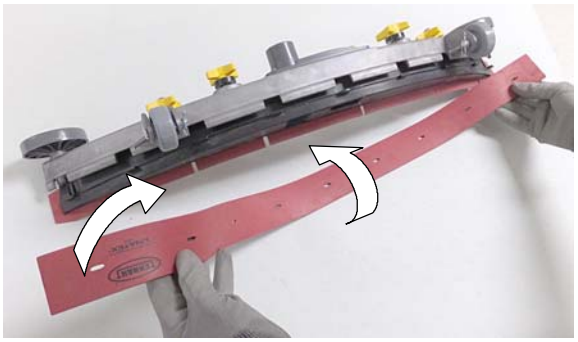


FIG. 96

5. Squeeze the squeegee frame and blade retainer together and re-tighten the two outside knobs (Figure 97).

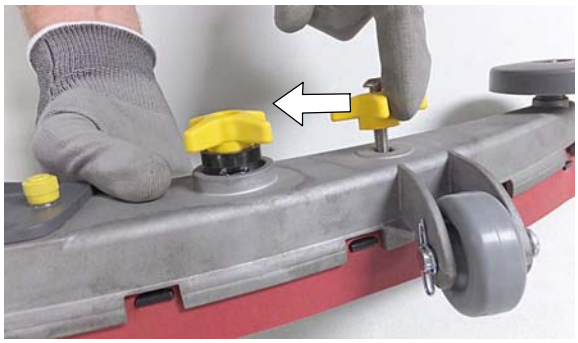


FIG. 97

ec-H2O NanoClean WATER CONDITIONING CARTRIDGE REPLACEMENT

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

The water conditioning cartridge is required to be replaced when it reaches its maximum water usage or expiration time of when the cartridge was activated, which ever comes first. The control panel will signal a code when it's time to replace cartridge. See CONTROL PANEL OPERATION for further details.

Depending on machine usage, on average, a new cartridge can last anywhere from 12 months for heavy machine usage to 24 months for light machine usage.

ATTENTION: *During first time use and after replacing the water conditioning cartridge, the ec-H2O system will automatically override the selected solution flow rate for up to 75 minutes.*

1. Park the machine on a level surface, remove the key and set parking brake, if equipped.
2. Lift the recovery tank to access the ec-H2O water conditioning cartridge (Figure 98). Drain recovery tank before lifting tank.



FIG. 98

3. Disconnect the two hose connectors from the top of the cartridge by pressing the gray collars inward and pulling the connectors outward (Figure 99). Lift cartridge to remove.



FIG. 99

4. Fill in the installation date on the new cartridge label (Figure 100).



FIG. 100

5. Install the new cartridge and reconnect the two hoses. Make sure the hose connectors are fully inserted into the cartridge.
6. Reset timer for new cartridge.

   Carefully read and understand all steps first before performing procedure.

   a. Turn key on.

   b. Press and hold the service switch, located on the ec-H2O module, for 10 seconds. After releasing service switch, the three solution flow indicator lights will begin to (ripple) move back and forth (Figure 101).

   c. Within 5 seconds after releasing the service switch, while the three indicator lights are moving back and forth, quickly press and release the solution flow button located on ec-H2O module (Figure 101).

      The three indicator lights will then blink three times to indicate timer has been reset.

      Repeat process if the three indicator lights do not blink three times.

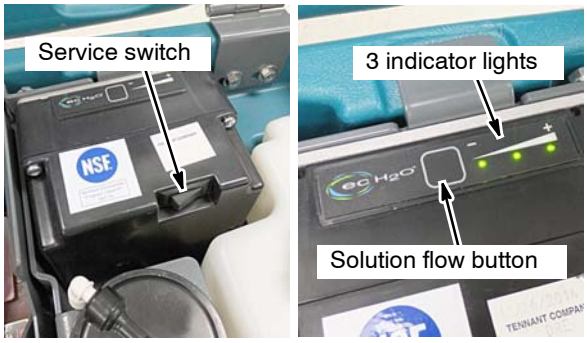


FIG. 101

LOADING/UNLOADING MACHINE FOR TRANSPORTING

When transporting the machine by use of trailer or truck, carefully follow the loading and tie-down procedure:

1. Raise the scrub head and remove squeegee assembly.
2. Use a ramp that can support the machine weight and operator and carefully load machine. Do not operate the machine on a ramp incline that exceeds a 21% grade level (Figure 102). A winch must be used when ramp incline exceeds a 21% grade level.

FOR SAFETY: When loading/unloading machine onto/off truck or trailer, use a ramp that can support the machine weight and operator.

FOR SAFETY: Do not operate the machine on a ramp incline that exceeds a 21% grade level.

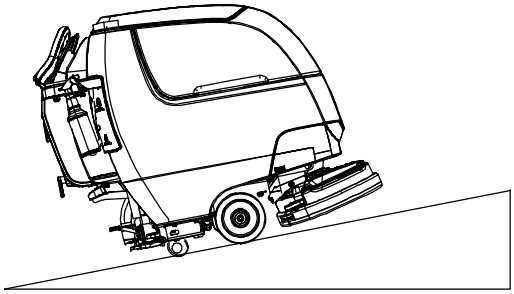


FIG. 102

3. Once loaded, position the front of the machine up against the front of the trailer or truck. Lower the scrub head, turn key off and set parking brake, if equipped (Figure 103).
4. Place a block behind each wheel (Figure 103).
5. Using tie-down straps, secure the machine using the four tie-down brackets located on the machine frame (Figure 103). It may be necessary to install tie-down brackets to the floor of your trailer or truck.

   ATTENTION: Do not use control console area or accessory storage rails for tie-down locations, damage may occur.

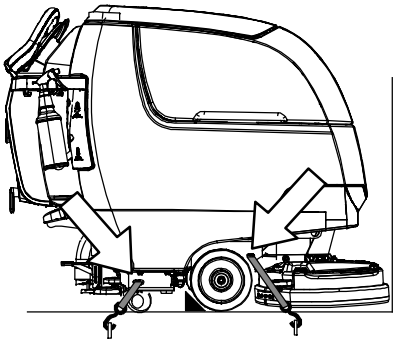


FIG. 103

STORING MACHINE

The following steps should be taken when storing the machine for extended periods of time.

1. Charge the batteries before storing machine to prolong the life of the batteries. Recharge batteries once a month.
2. Disconnect batteries before storing.
3. Drain and rinse recovery tank and solution tank.
4. Store the machine in a dry area with squeegee and scrub head in the up position.

ATTENTION: Do not expose machine to rain, store indoors.

5. Open the recovery tank lid to promote air circulation.

NOTE: To prevent potential machine damage store machine in a rodent and insect free environment.

FREEZE PROTECTION

Storing machine in freezing temperatures.

1. Completely drain solution tank and recovery tank.
2. Empty the water from the solution tank filter located under machine. Replace filter.
3. Pour 1 gallon / 4 liters of propylene glycol based recreational vehicle (RV) antifreeze into the solution tank.
4. Turn machine on and operate the solution flow system. Turn the machine off when the antifreeze is visible on floor.

   Models equipped with ec-H2O option - Operate ec-H2O scrubbing to cycle antifreeze through system.
5. After storing machine in freezing temperatures, drain any remaining antifreeze from the solution tank. Add clean water to solution tank and operate the machine to flush system.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Service indicator icon is blinking	Machine or on-board battery charger fault has been detected	See SERVICE INDICATOR CODES
ec-H2o indicator icon is red or blinking red	ec-H2O system fault has been detected	See SERVICE INDICATOR CODES
Machine will not operate	Emergency stop button activated	Turn button to reset
	Machine fault detected	See SERVICE INDICATOR CODES
	Batteries discharged	Recharge batteries
	Loose battery cable(s)	Tighten loose cables
	Faulty battery(s)	Replace battery(s)
	Faulty key switch	Contact service
	Faulty start bail switch	Contact service
	Circuit breaker tripped	Reset circuit breaker
	Faulty control board	Contact service
On-board battery charger will not operate	Plug not connected to power supply	Check plug connection
	Batteries over discharged	Replace batteries
	Battery charger fault detected	See SERVICE INDICATOR CODES
	Faulty charger	Replace charger
Machine will not propel (Drive Model)	Propel fault has been detected.	See SERVICE INDICATOR CODES
	Circuit breaker tripped	Reset circuit breaker
	Faulty propel motor or wiring	Contact service
	Worn carbon brushes in motor	Contact service
Brush motor will not operate	Brush motor fault has been detected.	See SERVICE INDICATOR CODES
	Faulty pad motor or wiring	Contact service
	Circuit breaker tripped	Reset circuit breaker
	Worn carbon brushes in motor	Contact service
	Broken or loose belt (dual disk/cylindrical models)	Contact service
Vacuum motor will not operate	Squeegee assembly is raised off floor	Lower squeegee assembly to floor
	Vacuum motor fault has been detected	See SERVICE INDICATOR CODES
	Faulty vacuum motor or wiring	Contact service
	Circuit breaker tripped	Reset circuit breaker
Poor scrubbing performance	Debris caught in brush/pad	Remove debris
	Worn brush/pad	Replace brushes/pad
	Incorrect brush pressure	Adjust brush pressure
	Wrong brush/pad type	Use correct brush/pad for application
	Low battery charge	Recharge batteries

TROUBLESHOOTING - Continued

PROBLEM	CAUSE	SOLUTION
Trailing water - poor or not water pickup	Full recovery tank or excessive foam buildup	Drain recovery tank
	Loose drain hose cap or flow control valve is open	Replace cap or close flow control valve on drain hose
	Worn squeegee blades	Rotate or replace squeegee blades
	Clogged drip trap (Squeegee assembly)	Remove cover and clean
	Clogged squeegee assembly	Clean squeegee assembly
	Loose vacuum hose connection	Secure vacuum hose connection
	Clogged vacuum hose	Flush vacuum hose
	Clogged vacuum hose	Flush vacuum hose
	Damaged vacuum hose	Replace vacuum hose
	Clogged float shut-off screen in recovery tank	Clean screen
	Recovery tank lid not completely closed	Check lid for obstructions
	Defective seals on recovery tank lid	Replaced seal
Little or no solution flow	Empty solution tank	Refill solution tank
	Low solution flow rate set	Increase solution flow rate
	Clogged solution tank filter	Clean filter
	Plugged solution supply line	Flush solution supply line
Short run time	Low battery charge	Charge batteries
	Batteries need maintenance	See BATTERIES
	Defective battery or end of battery life	Replace batteries
	Battery discharge indicator (BDI) programmed incorrectly	See CHARGING BATTERIES
	Faulty charger	Replace battery charger
	Brush pressure set too high	Lower brush pressure. Lower dual down pressure lever if equipped

GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

MODEL	17 in / 43 cm Disk (Push)	20 in / 50 cm Disk (Push)	17 in / 43 cm Disk (Drive)	20 in / 50 cm Disk (Drive)
Length	51.25 in / 1302 mm	54 in / 1372 mm	51.25 in / 1302 mm	54 in / 1372 mm
Width	20 in / 508 mm	22 in / 559 mm	20 in / 508 mm	22 in / 559 mm
Height	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm
Weight	220 lb / 98 kg	230 lb / 104 kg	230 lb / 104 kg	240 lb / 109 kg
Weight (with batteries)	366 lb / 166 kg	376 lb / 171 kg	390 lb / 177 kg	400 lb / 181 kg
GVW	457 lb / 207 kg	467 lb / 212 kg	482 lb / 219 kg	492 lb / 223 kg
Squeegee width	30.4 in / 772 mm			
Recovery tank capacity	14 gal / 53 L			
Solution tank capacity	11 gal / 42 L			
Scrubbing path width	16.9 in / 430 mm	19.9 in / 505 mm	16.9 in / 430 mm	19.9 in / 505 mm
Down pressure	47 lbs / 21.3 kg	52 lbs / 23.5 kg	47 lbs / 21.3 kg	51 lbs / 23 kg
Dual down pressure	88 lbs / 40 kg	92 lbs / 41.7 kg	86 lbs / 39 kg	90 lbs / 41 kg
Scrubbing speed	Pad assist		200 fpm / 61 mpm	
Transport speed	n/a	n/a	240 fpm / 73 mpm	
Reverse speed	n/a	n/a	144 fpm / 44 mpm	
Productivity rate - estimated actual	9,340ft^2/hr / 868m^2/hr	11,208ft^2/hr / 1041m^2/hr	12,453ft^2/hr / 1157m^2/hr	14,943ft^2/hr / 1388m^2/hr
ec-H2O productivity rate - est. actual	9,668 ft^2/hr / 898 m^2/hr	11,602ft^2/hr / 1078m^2/hr	12,891ft^2/hr / 1198m^2/hr	15,469ft^2/hr / 1437m^2/hr
Aisle turnaround width	52 in / 1321 mm	54.5 in / 1384 mm	52 in / 1321 mm	54.5 in / 1384 mm
Ramp incline for scrubbing	9% maximum			
Ramp incline for transporting	21% maximum			
Ramp incline for loading- empty tanks	21% maximum			
Solution flow rate - T300e	.5 gpm / 1.9 L/min maximum			
ec-H2O solution flow rate	Low: .12 gpm / .45 L/min, Med: .25 gpm / .94 L/min, High: .35 gpm / 1.3 L/min			
Brush motor	24 VDC, 1hp / .75kW			
Propel motor	n/a	n/a	24 VDC, .23 hp / .175 kW	
Vacuum motor	24 VDC, .5hp / .37kW			
Water lift	34.5 in / 876 mm			
ec-H2O solution pump	24 VDC, 1.0 gpm / 3.8 L/min, min open flow			
Machine voltage	24 VDC			
Battery capacity	2- 12V 105AH C/20 Wet, 2- 12V 130AH C/20 Wet, 2- 12V 150AH C/20 Wet, 2- 12V 140AH C/20 Sealed/AGM			
Total power consumption	31.5A nominal	36.5A nominal	34.5A nominal	39.5A nominal
Battery Charger - on-board	100- 240VAC, 50/60Hz, 24VDC, 13A			
Battery Charger - smart off-board	100- 240VAC, 50/60Hz, 24VDC, 13A			
Protection grade	IPX3			
Sound pressure level L_{pA}*	67 dB(A)	67 dB(A)	67 dB(A)	67 dB(A)
Sound uncertainty K_{pA}*	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)
Sound power level uncertainty L_{pA} - uncertainty K_{pA}*	84.3 dB(A)	84.3 dB(A)	84.3 dB(A)	84.3 dB(A)
Machine vibration at hand-arm*	<2.5 m/s^2			
Ambient operating temperature	Min: 32°F/0°C, Max: 110°F/43°C			

*Values per EN 60335- 2- 72. Specifications are subject to change without notice.

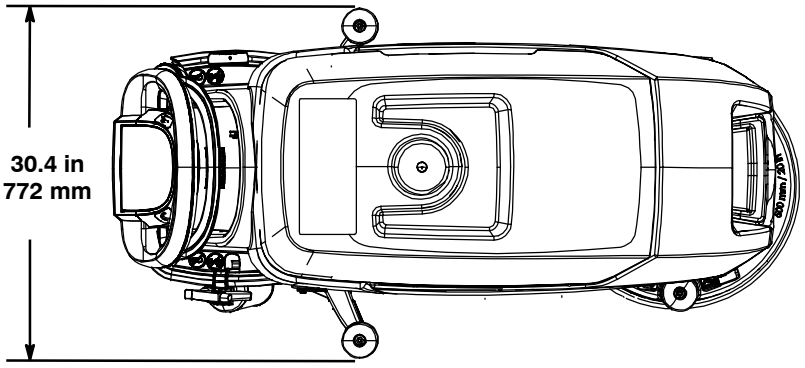
GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

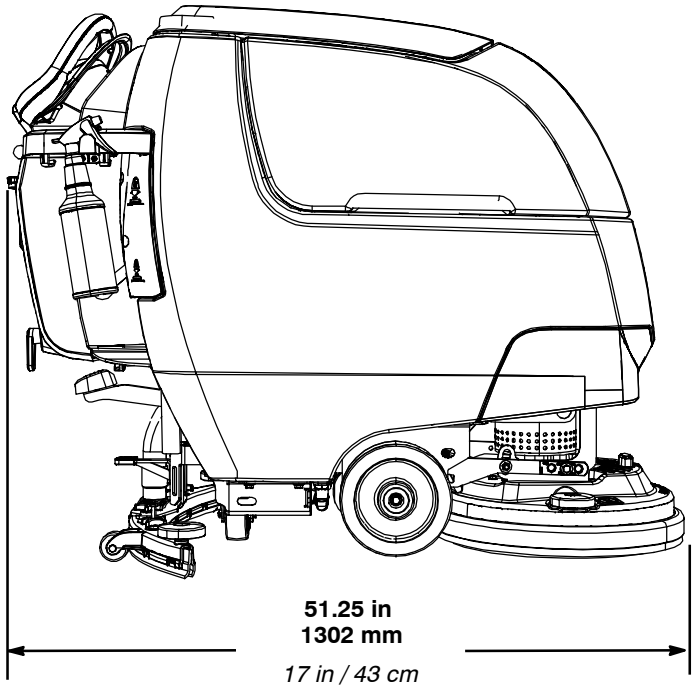
MODEL	24 in / 60 cm Dual Disk	20 in / 50 cm Cylindrical Brush	20 in / 50 cm Orbital
Length	51.75 in / 1314 mm	50.5 in / 1283 mm	49 in / 1245 mm
Width	26 in / 660 mm	25 in / 635 mm	20.5 in / 521 mm
Height	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm
Weight	250 lb / 113 kg	250 lb / 113 kg	255 lb / 116 kg
Weight (with batteries)	410 lb / 186 kg	410 lb / 186 kg	415 lb / 188 kg
GVW	502 lb / 228 kg	502 lb / 228 kg	507 lb / 230 kg
Squeegee width	30.4 in / 772 mm		
Recovery tank capacity	14 gal / 53 L		
Solution tank capacity	11 gal / 42 L		
Scrubbing path width	23.6 in / 600 mm	19.7 in / 500 mm	19.7 in / 500 mm
Down pressure	57 lbs / 26 kg	53 lbs / 24 kg	63 lbs / 28.5 kg
Dual down pressure	97 lbs / 44 kg	64 lbs / 29 kg	109 lbs / 49.5 kg
Scrubbing speed	200 fpm / 61 mpm		
Transport speed	240 fpm / 73 mpm		
Reverse speed	144 fpm / 44 mpm		
Productivity rate - estimated actual	18,264ft^2/hr / 1697m^2/hr	14,943ft^2/hr / 1388m^2/hr	14,943ft^2/hr / 1388m^2/hr
ec-H2O productivity rate - est. actual	18,906ft^2/hr / 1756m^2/hr	15,469ft^2/hr / 1437m^2/hr	15,469ft^2/hr / 1437m^2/hr
Aisle turnaround width	53.5 in / 1346 mm	52 in / 1321 mm	49 in / 1245 mm
Ramp incline for scrubbing	9% max.		
Ramp incline for transporting	21% max.		
Ramp incline for loading- empty tanks	21% max.		
Solution flow rate	.5 gpm / 1.9 L/min maximum		
ec- H2O solution flow rate	Low: .12 gpm / .45 L/min, Med: .25 gpm / .94 L/min, High: .35 gpm / 1.3 L/min		
Brush motor	24 VDC, 1hp / .75kW		
Propel motor	24 VDC, .23 hp / .175kW		
Vacuum motor	24 VDC, .5 hp / .37 kW		
Water lift	34.5 in / 876 mm		
ec- H2O solution pump	24 VDC, 1.0 gpm / 3.8 L/min, min open flow		
Machine voltage	24 VDC		
Battery capacity	2- 12V 105AH C/20 Wet, 2- 12V 130AH C/20 Wet, 2- 12V 150AH C/20 Wet, 2- 12V 140AH C/20 Sealed/AGM		
Total power consumption	36A nominal	40A nominal	30A nominal
Battery Charger - on-board	100- 240VAC, 50/60Hz, 24VDC, 13A		
Battery Charger - smart off-board	100- 240VAC, 50/60Hz, 24VDC, 13A		
Protection grade	IPX3		
Sound pressure level L_{pA}*	67.7 dB(A)	68.7 dB(A)	67.5 dB(A)
Sound uncertainty K_{pA}*	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)
Sound power level uncertainty L_{pA} - uncertainty K_{pA}*	83.8 dB(A)	84.2 dB(A)	83.5 dB(A)
Machine vibration at hand-arm*	<2.5 m/s^2		
Ambient operating temperature	Min: 32°F/0°C, Max: 110°F/43°C		

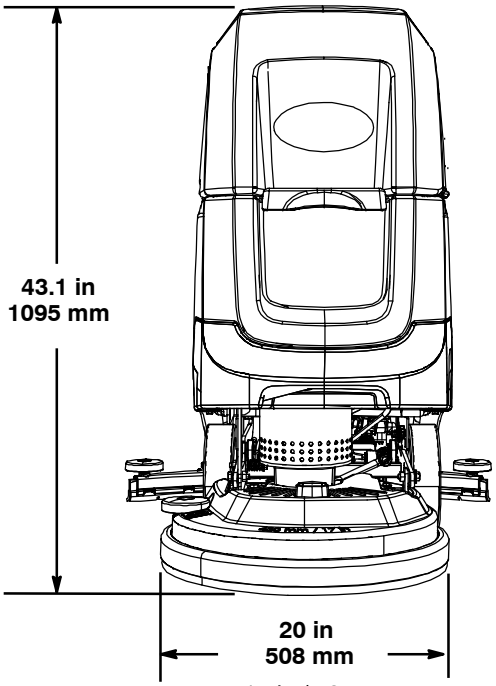
*Values per EN 60335- 2- 72. Specifications are subject to change without notice.

MACHINE DIMENSIONS

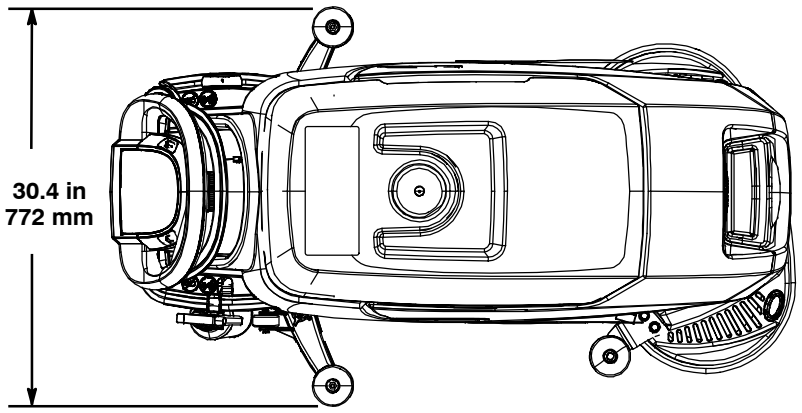
SINGLE DISK MODEL

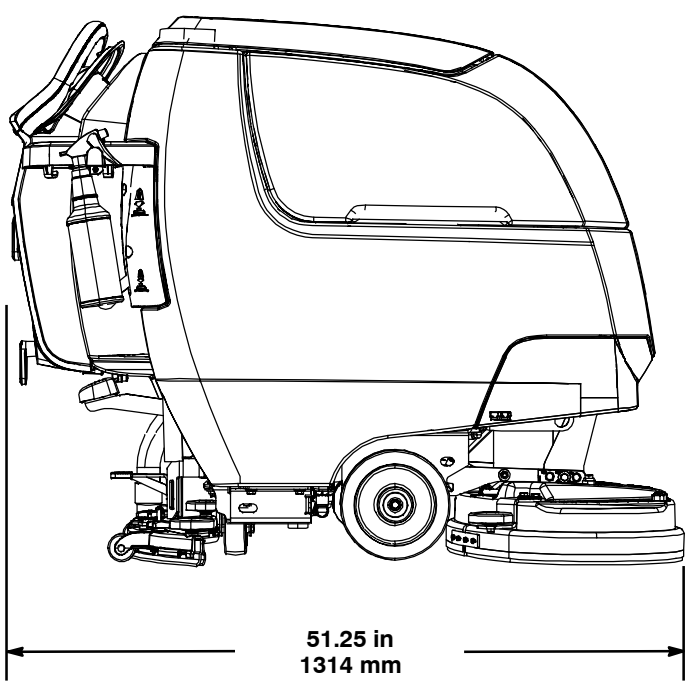


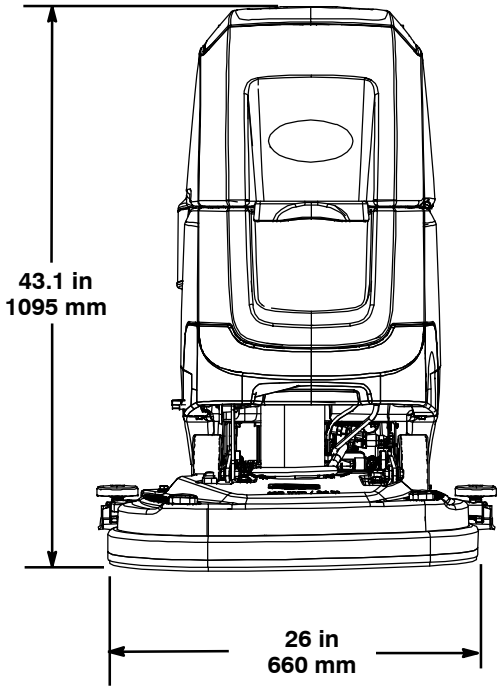




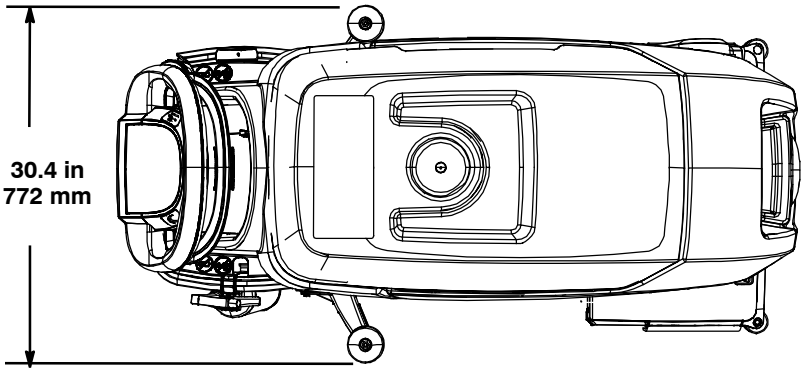
DUAL DISK MODEL

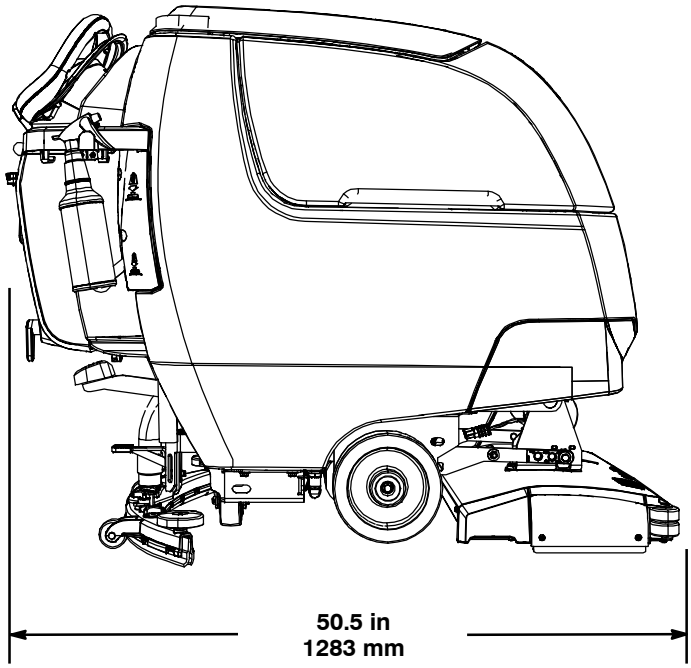


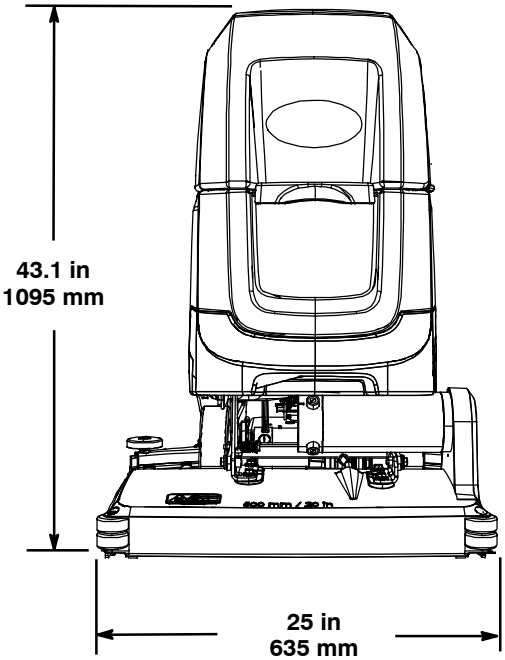




CYLINDRICAL BRUSH MODEL







ORBITAL PAD MODEL

