T360

Walk-Behind Floor Scrubber

Service manual

Model Part No.
TN8000533 - SCRUBBER [T360, 70CM, EMEA]
TN8000534 - SCRUBBER [T360, 70CM, NA]
TN8000535 - SCRUBBER [T360, 70CM, LATAM]
TN8000536 SCRUBBER [T360, 70CM ANZ]

For Parts Manual,visit:
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TN7100096
Rev. 01 (08-2025)

Introduction

This manual provides the necessary information on how to maintain and service machine.

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.

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Intended Use

The automatic floor scrubber is intended for commercial use, for example in hotels,schools,hospitals, factories, shops, officesand 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.

Unpacking the machine:

Carefully inspect the machine for signs of damage. Report the damage to the operator immediately. Contact your dealeror Tennant if any item is missing.

To unpack the machine, remove the tie-wraps, wheel stoppers, and transport brackets.

Carefully tip the machine off the pallet using the ramp provided. Make sure the brush head is in the raised position.

NOTE: The machine must be removed from the pallet using a ramp, otherwise it will be damaged.

PROTECTING 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.

Machine Data

Please fill out at time of installation for future reference.

Model No - _____

Serial No - _____

Installation Date- _____

North America/International:

Tennant Company

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MN 55344-2650

Telephone: (800) 553-8033

www.tennantco.com

EMEA region:

Tennant N.V.

Industrielaan 6 5405 AB

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SERIAL NUMBER LOCATION

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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: Lead-acid batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away.Keep covers open when charging.

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.

WARNING: Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to those with pacemakers or medical implants.

WARNING: Electrical Hazard.

−Disconnect Battery Cables and Charger Plug Before Servicing Machine.

−Do Not Charge Batteries with Damaged Power Supply 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.

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.

− If it is not in proper operating condition.

− With pads or accessories not supplied or approved by Tennant. The use of other pads may impair safety.

− In outdoor areas. This machine is for indoor use only.

− In areas where flammable vapors/liquids or combustible dusts are present.

− In areas that are too dark to safely see the controls.

− In areas with possible falling objects unless equipped with overhead guard.

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.

− Go slowly on inclines and slippery surfaces.

− Reduce speed when turning.

− Always be aware of surroundings while operating machine.

− Do not scrub or sweep on ramp inclines that exceed 2% grade.

− Keep children and unauthorized persons away from machine.

− Report machine damage or faulty operation immediately.

− Follow mixing, handling and disposal instructions on chemical containers.

− Follow site safety guidelines concerning wet floors.

− Do not leave machine alone when filling the water tank.

− Park machine on level surface when filling

solution tank with auto-fill

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.

− Keep work area well ventilated.

− Avoid moving parts. Do not wear loose clothing, 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 power spray or hose off machine near electrical components.

− Disconnect battery connections and charger cord before working on machine.

− Do not pull on battery charger cord to unplug. Grasp plug at outlet and pull.

− Do not use incompatible battery chargers as this may damage battery packs and potentially cause a fire.

− Inspect charger cord regularly for damage.

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

− Avoid contact with battery acid.

− Keep all metal objects off batteries.

− Use a non−conductive battery removal device.

− Use a hoist and adequate assistance when lifting batteries.

− Battery installation must be done by trained personnel.

− Follow site safety guidelines concerning battery removal.

− All repairs must be performed by a trained service mechanic.

− Do not modify the machine from its original design.

− Use Tennant supplied or approved replacement parts.

− Wear personal protective equipment as needed and where recommended in this manual.

For Safety: wear hearing protection.

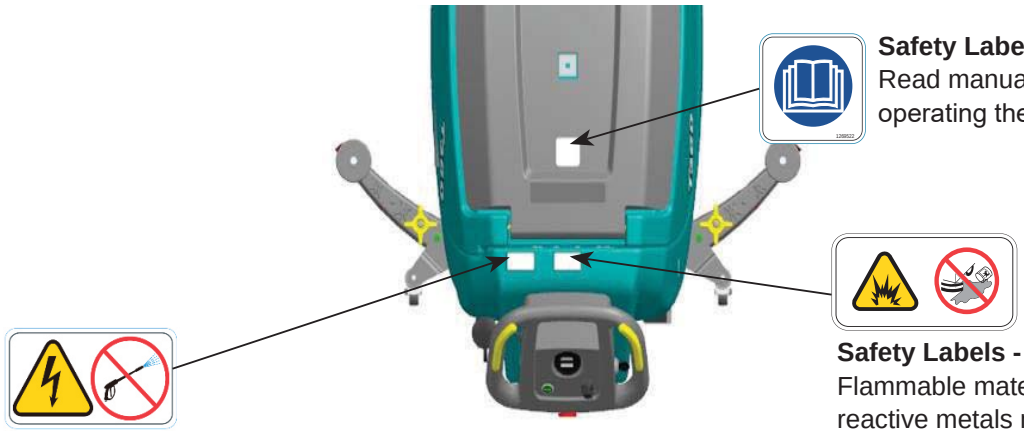
For Safety: wear protective gloves.

For Safety: wear eye protection.

For Safety: wear protective dust mask.

Safety Labels - European Labels

Safety labels appear at the positions indicated on the machine. Replace labels if lost, damaged or become illegible.

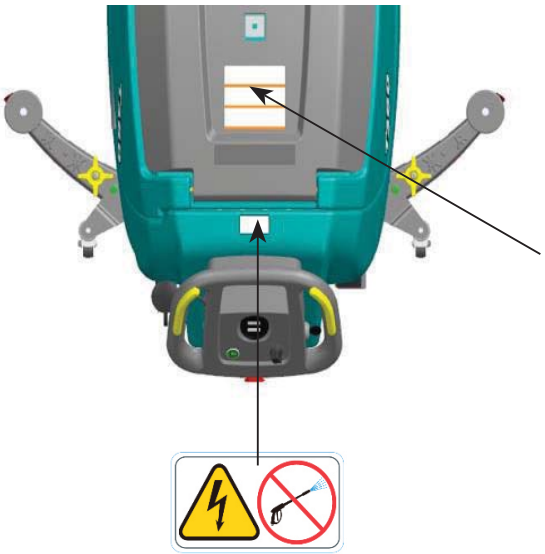


Safety Labels -
Read manual before operating the machine.

Safety Labels -
Flammable materials or reactive metals may cause explosion. Please do not pick up.

Safety Labels -
Do not power spray or hose down the machine.
This can lead to electrical system failure.

Safety Labels - North American Labels



Safety Labels -
Caution stickers

Safety Labels -
Do not power spray or hose down the machine.
This can lead to electrical system failure.

Security Labels - General Foreign Trade Labels

Safety labels appear at the positions indicated on the machine. Replace labels if lost, damaged or become illegible.

Warning Labels -

Flammable materials may cause explosion or fire.

Do not use flammable materials in the tank.

Safety Labels
Do not step on.

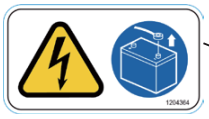
Warning Labels -
Spinning brush. Keep hands off.

Warning Labels -
Magnetic field hazard. Magnetic needle holders/ brushes can interfere with the proper functioning of pacemakers or other medical implants.

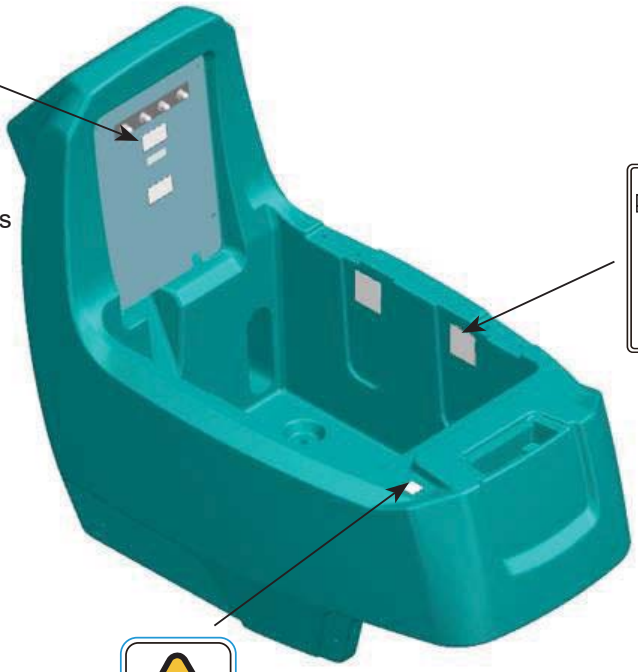
Safety Labels - European Labels

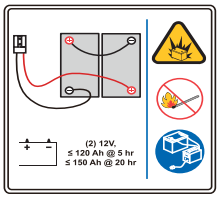
Safety labels appear at the positions indicated on the machine. Replace labels if lost, damaged or become illegible.

Warning Labels -
Batteries emit hydrogen.
This may cause explosion or fire.
Keep away from sparks and open flames when charging.



Warning Labels -
Electric shock hazard.
Disconnect battery cords before servicing the machine.

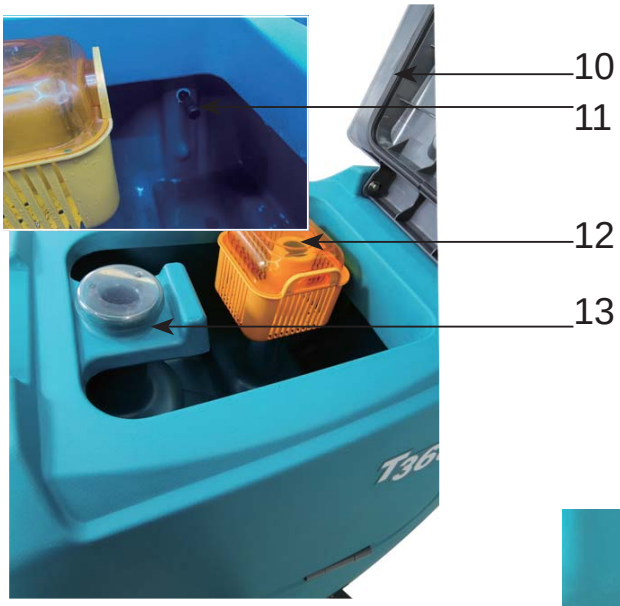


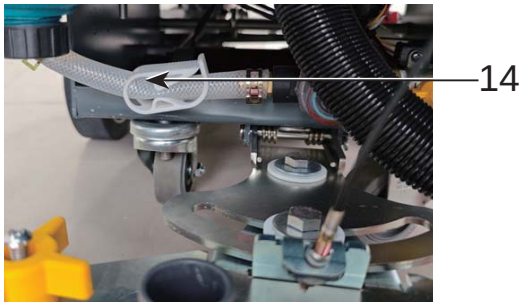


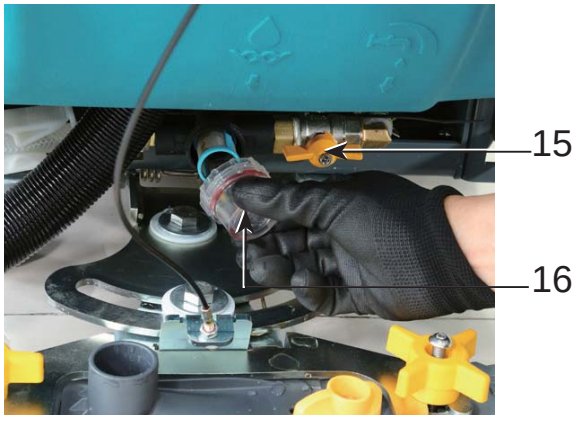
Warning Labels -
Batteries emit hydrogen.
This may cause explosion or fire.
Keep away from sparks and open flames when charging.

Safety Labels - Watch Your Hands.

Machine Components







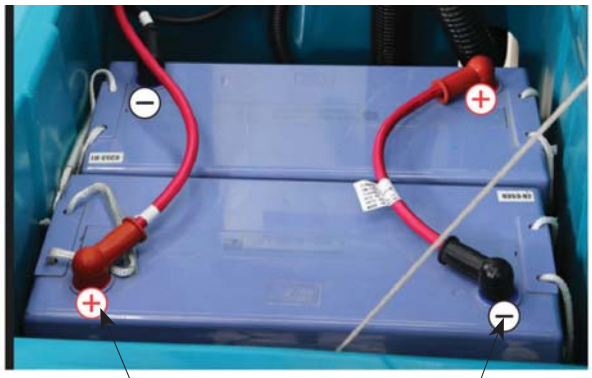
1.Console
2.Recovery tank
3.Water tank
4.Water tank level tube
5.Squeegee assembly
6.Brush plate skirt
7.Scrub head
8.Water tank fill port
9.Recovery tank cover
10.Sewage cover sealing strip
11.Recovery tank sensor
12.Recovery tank filtering basket
13.Motor waterproof cover
14.Water hose buckle
15.Water valve switch
16.Water filter mesh

Machine Components

17. Emergency stop button
18.Charging socket
19.Squeegee lift handle
20. Recovery tank drain pipe
21.Brush plate lift foot pedal
22.Squeegee vacuum hose

Operation panel/control and instrument

1. Drive button
2.Disk brush button
3. Power gauge
4.Speed knob
5.Forward and reverse switch
6.Main power switch

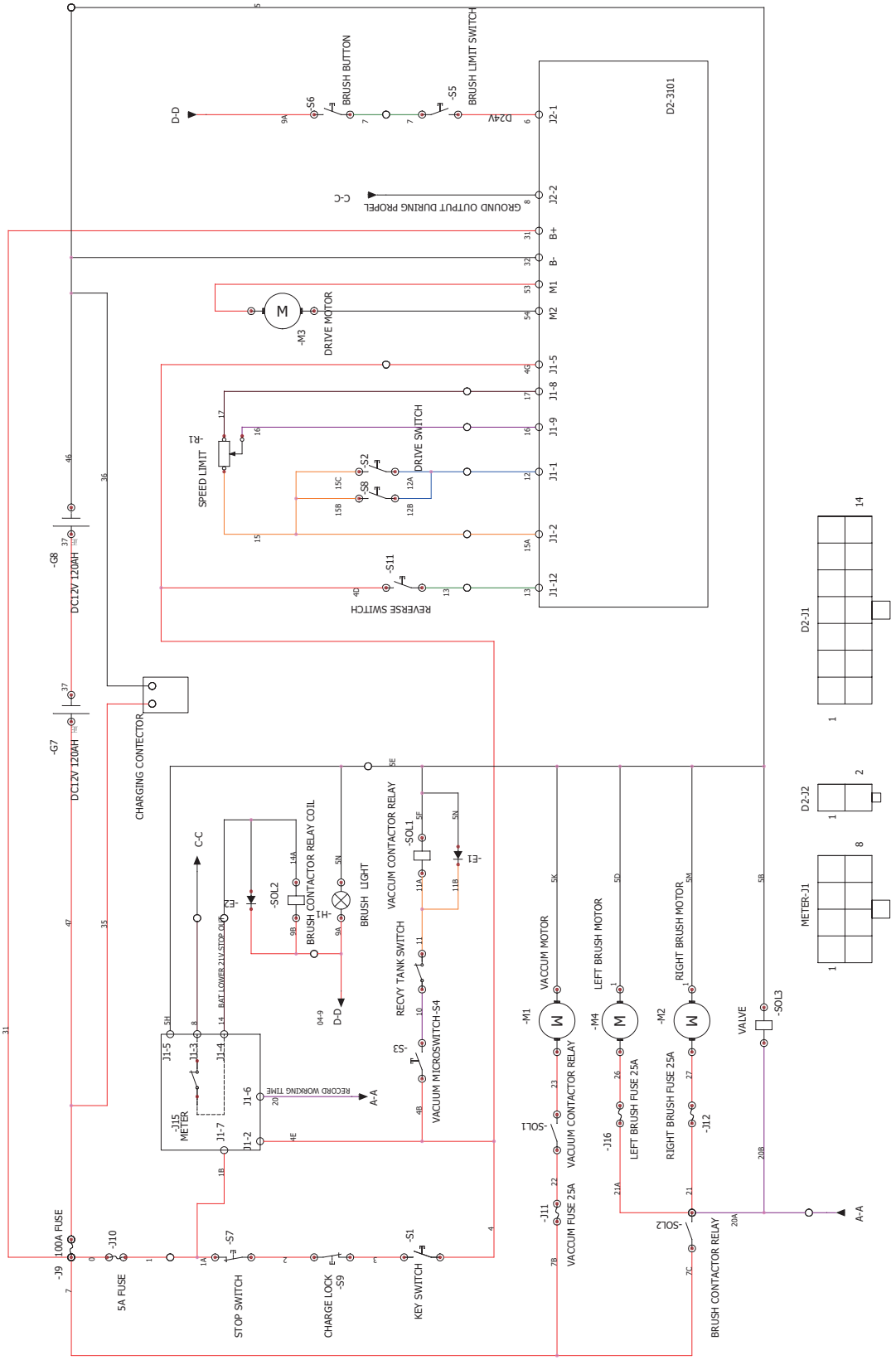


Battery wire positive (red)

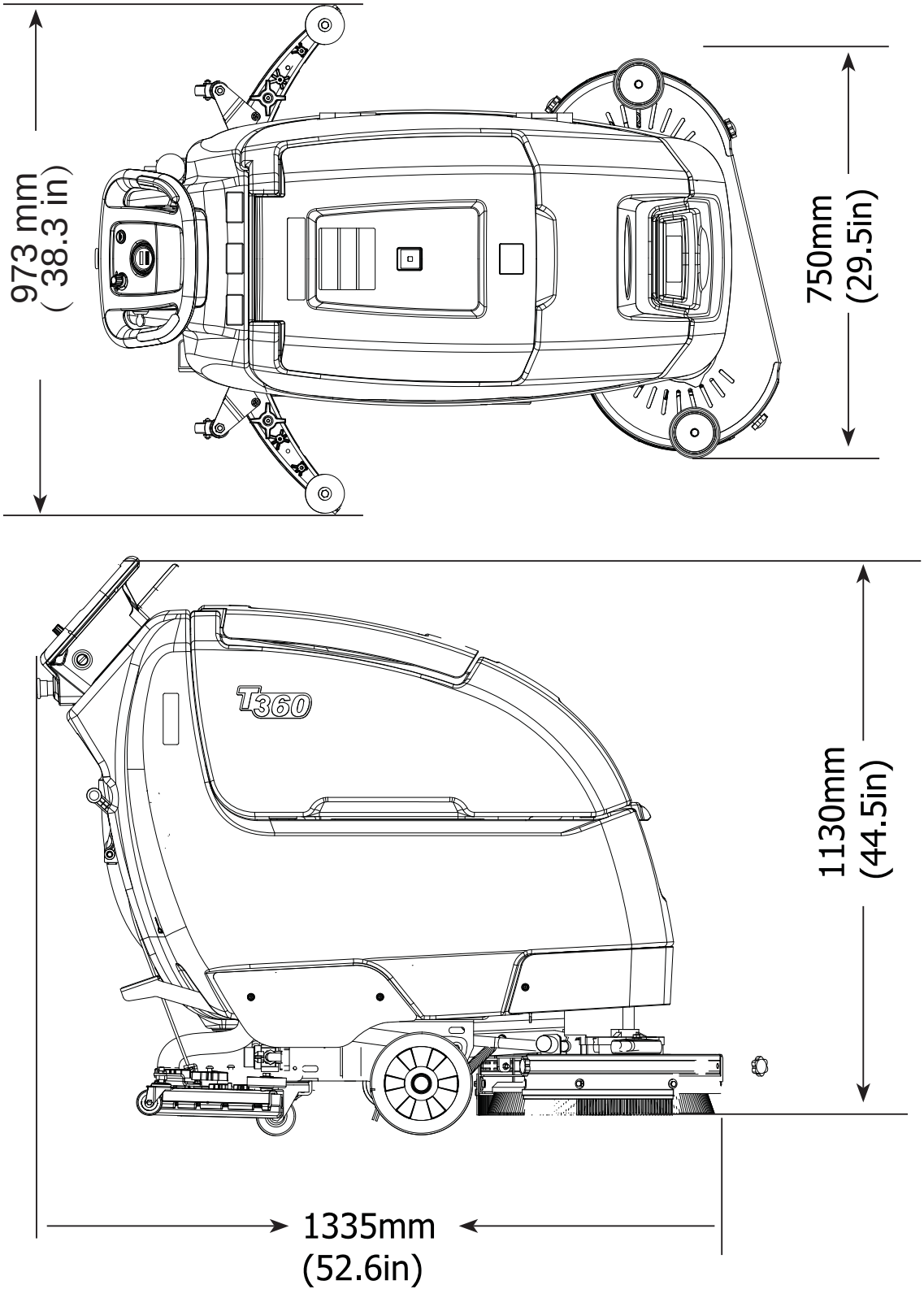
Battery wire negative (black)

Circuit break	Rating	Circuit protection
CB1	5 amps	Main
CB2	25 amps	Vacuum motor
CB3	25 amps	Brush motor
CB4	25 amps	Brush motor

ELECTRICAL DIAGRAM T360 1OF1



Machine Size



These machines are equipped with a traction motor with a parallel axis differential gear device (the axle is arranged parallel to the motor shaft), with a rated power of 400W at DC24 V DC. The reduction ratio between the motor shaft and the axle is 20:1, and the axle speed is 250 0r/min. The dustproof and waterproof rating of the shell is IP44. Carbon brushes and terminals should be inspected for wear every 800 hours of operation. The motor power cord is equipped with a ferrite core. The differential and gearbox are filled with lubricating oil.

Check the current of the differential gear motor

1. Ensure that the charging voltage of the machine's battery is DC24V ± 1V.
2. Purchase a current clamp with a range of at least 100A.
3. Transport the machine to the maintenance area and empty the detergent solution and recovery tank.
4. Place the machine on a dry, flat, and level floor.
5. Ensure that there is sufficient space around for safe disassembly operations.
6. Loosen the four (4) side screws on the decorative panel covering the motor and remove the front screw.
7. Tilt the water tank upwards to the maximum angle and support the brush plate with a support frame to lift the wheels off the ground. As shown in the figure 1.
8. Cut off the binding wire tie and remove the drive motor connector.
9. Find the positive wire (red) connecting the differential gear motor and clamp the clamp gauge on it. As shown in the figure 2.
10. If the measurement results are as shown below, restore the machine to normal operation; If not, replace the carbon brush component in the figure 3 and 4.

Current consumption	Minimum	Maximum
No load current (wheel lifted state)	3.8A	5.0A

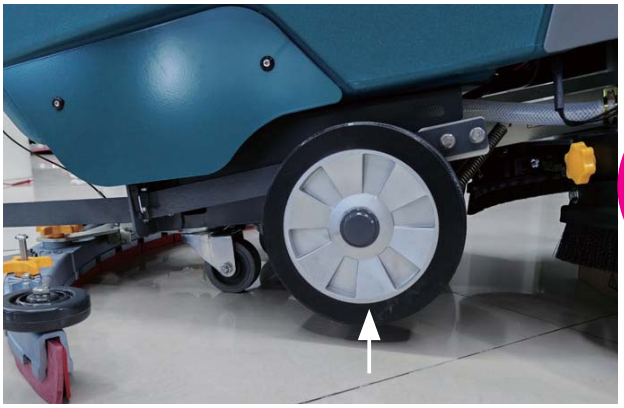
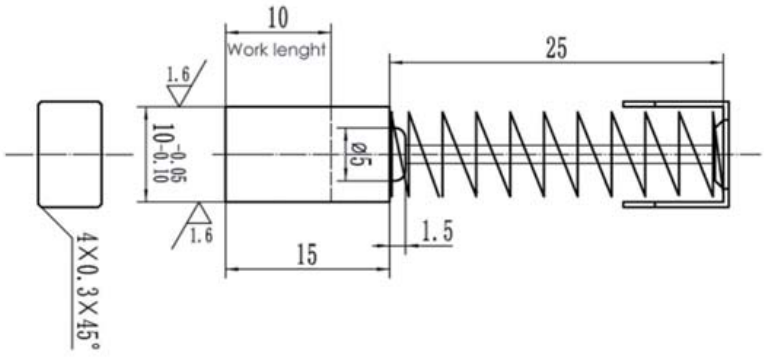


Figure 1 Measurement of Drive Motor - Machine Status

Figure 2 Measurement of no-load drive motor current

Figure 3 Disassembling the carbon brush of the drive motor

Figure 4 Drive motor carbon brush



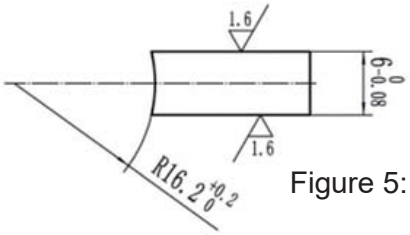


Figure 5: Dimensions of Carbon Brush for Drive Motor

Replace the carbon brush of the drive motor

1. Move the machine to the service area and empty the solution tank and recovery tank.
2. Place the machine on a dry, flat, and level floor.
3. Ensure that there is sufficient space around for safe disassembly operations. Safe.
4. Remove the wiper and vacuum hose from the machine.
5. Tilt the solution tank upwards as much as possible.
6. Disconnect the battery and remove it from the compartment, then remove the plastic battery container.
7. Disconnect the 50A connector of the drive motor.
8. Put down the solution tank again and place the machine flat on its left side. It is recommended to remove the brush head.
9. Find the four fixing bolts of the differential gear motor.
10. For the convenience of operation, the traction wheel needs to be removed from the shaft.
11. Loosen the four bolts. The bolts located behind the wheels need to be disassembled from the inside using a No. 5 hex wrench.
12. Adjust the distance between the fuel tank and the machine frame to a sufficient distance so that the bolts can be removed with a wrench.
13. Loosen all four bolts completely and then remove the differential gear motor.
14. If necessary, inspect the various components of the differential gear motor or replace the entire device.

Note：Both carbon brushes in the motor need to be replaced at the same time.

Brush Plate Motor

T360 is a dual brush model, with a brush plate motor power supply of 24V DC, a rated current of 15A, and a rated output power of 360W.

The motor is equipped with a reduction gear unit with a reduction ratio of 10:1, which reduces the speed of the output shaft to 180 revolutions per minute. The maximum rated torque of the brush plate motor is 14Nm. The motor casing has an IP00 protection level, so they are particularly sensitive to external conditions, especially liquids. These motors can rotate in any direction, clockwise or counterclockwise; Be careful and correctly connect the positive and negative poles.

Carbon brushes and terminals should be inspected for wear every 1000 hours of operation.

Check the traction current of the brush plate motor

1. Check the motor current traction to ensure that the machine battery is at 24V ± 1V.

2. Purchase a current clamp with a reading capacity of at least 100A (amperes).

3. Choose a less rough cement surface to ensure correct reading of the current drawing.

4. Ensure that there is sufficient space around to conduct the experiment in a safe manner.

5. Check if the machine is equipped with standard brushes.

6. Find the red wire of the brush plate motor and clip the clamp shaped meter onto the wire, allowing the red wire to pass through the clamp.

7. Using pedal control, lower the brush head and press the green brush plate button to rotate the brush head. 7/A Use pedal control to maximize the pressure on the brush plate to the ground, and presses the green brush plate button to rotate the brush head.

8. The first test was conducted with a brush, and the second test was conducted without a brush to measure the current under no-load conditions.

9. Compare the reading with the values in the table.

10. If the reading is within the numerical range shown in the table, remove the clamp gauge.

11. If the reading does not match the values in the table, perform the following checks.If the value given by the brushless test is higher than the normal value, check that the motor carbon brush may be worn.

12. If the value given by the brush test is higher than the normal value, check if the brush is rubbing or rubbing against a certain area.

13. If the brush head rotates freely without any interference, check whether the brush plate motor gearbox produces abnormal noise.

14. Check if the carbon brush is worn, and replace it with a new one if necessary.

Perform the above test while the machine is stationary.Note If the test is conducted while the machine is in motion (forward drive), it may increase current consumption.

Note If the test is conducted while the machine is in motion (forward drive), it may increase current consumption.

Note Tests as normal washing operations, that is, use detergent solution.

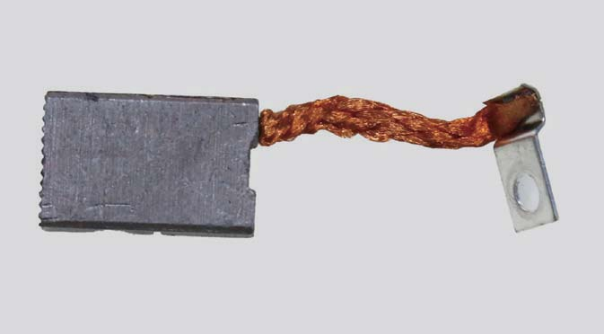
Single motor current consumption	Minimum	Maximum
No load current (without brush)	2.6A	4.5A
Load current (with brush)	8A	15A

Replace the carbon brush of the brush plate motor

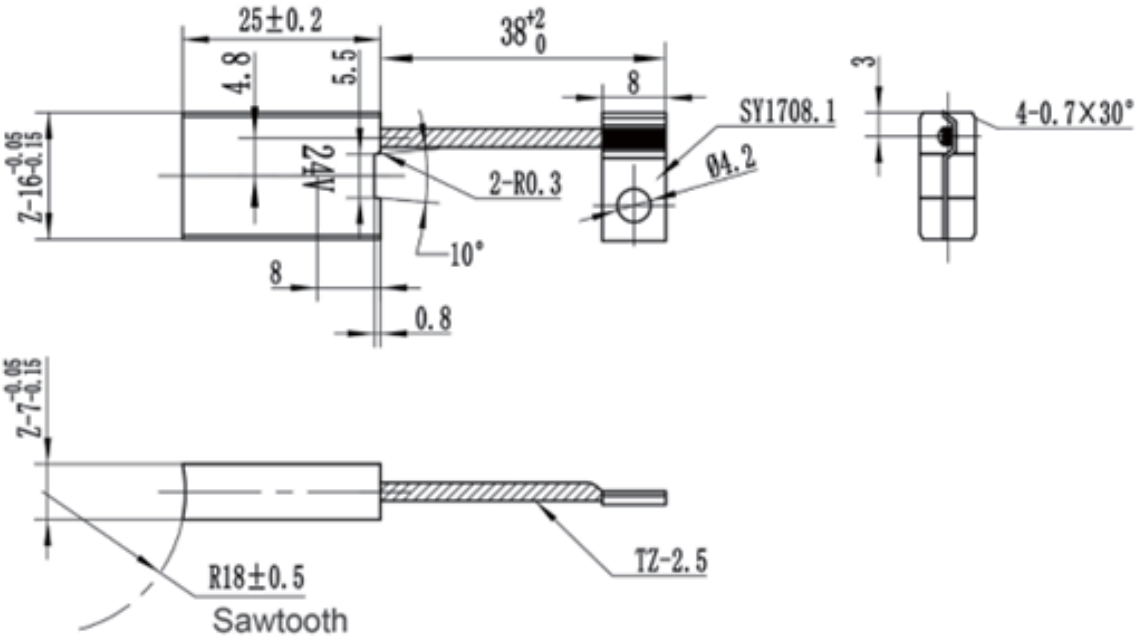
1. Take the machine to the service area and empty the recovery tank
2. Place on a dry, flat, and level floor.
3. Ensure that there is sufficient space around for safe disassembly operations.
4. For ease of operation, please lower the brush head.
5. Turn off the machine and remove the power key.
6. Tilt the solution tank, locate the 50A connector of the brush plate motor, and unplug the plug.
7. Find the screw that secures the metal protective strap and loosen it.
8. Position and disconnect the carbon brush clip, pull up the fixing spring, and then remove the carbon brush.
9. Now measure the length of the carbon brush, it should be between 19mm and 8mm.
10. Check if all four carbon brushes have the same length.
11. If one of the carbon brushes is less than 8mm in length, it needs to be replaced completely.
12. Check whether the new carbon brush is consistent with the old carbon brush, and ensure that the carbon brush slides freely in the groove.
13. Check that there are no obvious marks or excessive wear on the surface of the commutator where the carbon brush is engaged.
14. Clean the area of the carbon brush with compressed air.

Note: All four carbon brushes in the motor need to be replaced at the same time

Replace the carbon brush of the brush plate motor



Carbon brush size



Vacuum motor

The vacuum motor is a two-stage tangential centrifugal type, with a working power supply of 24VDC.

Turn on/off the vacuum motor by lowering and lifting the vacuum motor lever.

The maximum rated power is 450 W, and the suction force of the vacuum motor is 1353.82 mmH2O (53.3 in.H2O).

It is recommended to measure the current to check the overall condition of the vacuum motor and check the carbon brushes, as they may need to be replaced.

Carbon brushes should be inspected for wear every 1200-1500 hours of operation.

Check the current of the vacuum motor

1. Check the motor current traction to ensure that the machine battery is at 24V ± 1V.

2. Purchase a current clamp with a reading capacity of at least 100A (amperes).

3. Take the machine to the service area and empty the recovery tank.

4. Place the machine on a dry, flat, and level floor.

5. Ensure that there is sufficient space around to conduct the experiment in a safe manner.

6. Cover the recovery tank lid properly.

7. Open the solution tank and find the power cord of the vacuum motor.

8. Clamp the clamp watch onto one wire of the power cord.

9. Turn on the machine, lower the vacuum motor lever, turn on the vacuum motor, and read the current value.

If the instrument reading matches the value in the table, it will restore the machine to normal operation.If the instrument reading does not match the values in the table, perform the following checks;

10. Check whether the carbon brush of the brushed motor is worn, or the carbon brush wear is not abnormal.Check if the bearings of the impeller are stuck, which is determined by the abnormal noise emitted by the impeller.

11. Replace the vacuum motor with a new component of the same model.

Current consumption	Minimum	Maximum
No load current (lift the squeegee)	15A	20A

12. If the carbon brush wear of the vacuum motor is detected, disassemble the motor according to the instructions in the next section.

13. Remove the plastic end cover from the vacuum motor and loosen the two screws that secure the carbon brush.

14. Measure the total length of the carbon brush, but do not separate it from the wires.

15. Referring to the following pictures, the length of the carbon brush must be greater than the minimum value of 5mm.

16. If the length of the carbon brush drops to 5mm, replace it immediately or plan for its replacement in the near future.

Note:Both carbon brushes in the motor need to be replaced at the same time.

Vacuum motor carbon brush

Liquid level sensor

1 The level sensor of the recovery tank is used to disconnect the contactor coil of the vacuum motor and stop the vacuum motor from working. At this point, the sewage in the recovery tank is full, and it is necessary to continue cleaning after the sewage in the recovery tank has been discharged.

Sewage level sensor

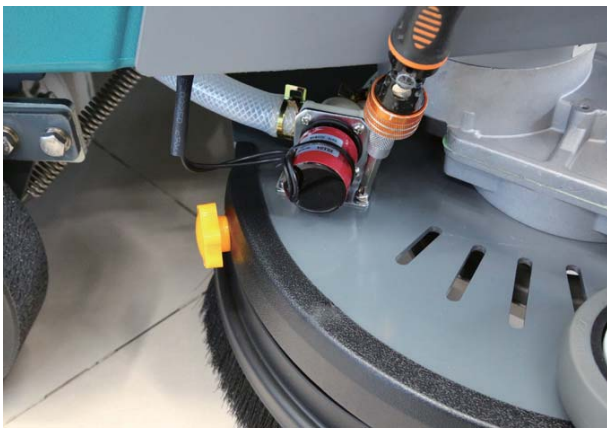
Solenoid Valve

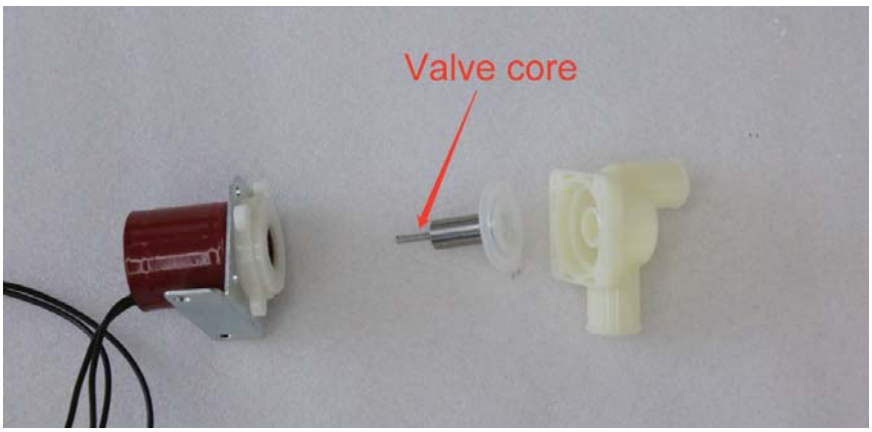
The principle of an electromagnetic valve is to use electromagnetic principles to control the valve body of a fluid system, which mainly consists of a coil, valve core, and valve body. After the coil is energized, magnetic force acts on the valve core and generates movement. Under the interaction of electromagnetic force and spring force, the relative position of the valve core and valve body changes, thereby changing the direction of fluid flow inside the valve body. The electromagnetic valve in the machine is used to control the water output or shutdown of the machine. Ensure that when the brush plate motor is working, the machine will water out, when the brush plate motor stops working and the machine will stop water out.

When the machine stops working, and the water still comes out slowly from the machine, the following checks need to be taken.

Check Solenoid Valve below

1. Take the machine to the service area and empty the recovery tank.
2. Place the machine on a dry, flat, and level floor.
3. Ensure that there is sufficient space around to conduct the experiment in a safe manner.
4. Empty the solution tank with clean water.
5. Remove the fixing screws of the solenoid valve, pull off the clamps of the water outlet and inlet, and take out the solenoid valve.
6. Pay attention to the outlet and inlet of the solenoid valve, and install the water pipe correctly.
7. Remove the 4 fixing screws from the solenoid valve body and slowly open the valve core.
8. Remove foreign objects from the valve body.
9. Or replace with a new solenoid valve of the same model.



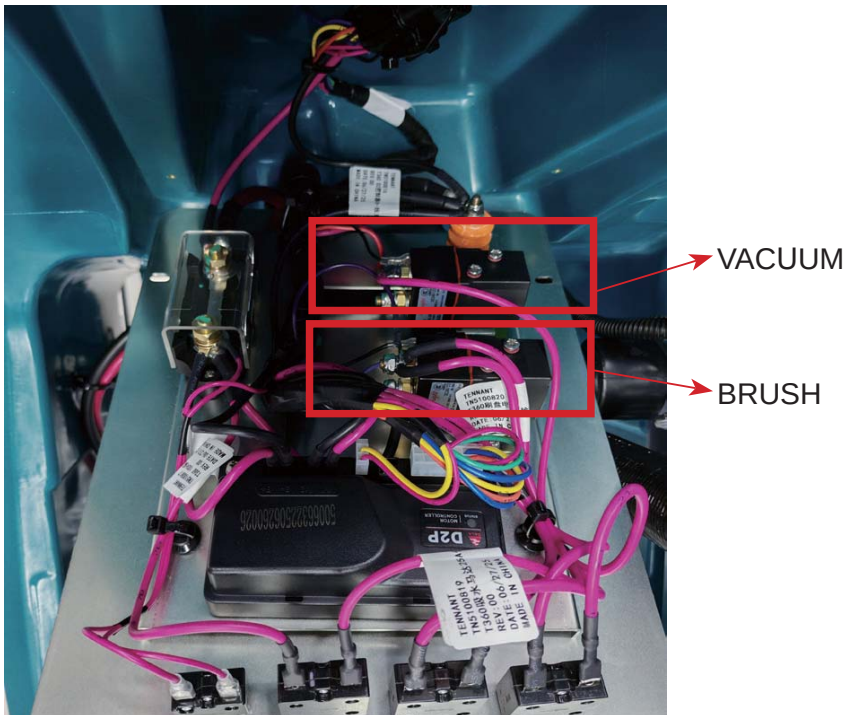


Contactors

There are two contactors inside the electrical installation board, one to control the operation of the vacuum motor and the other to control the operation of the brush plate motor.

Check the contactor

1. Purchase a resistance measurement and on/off instrument.
2. Take the machine to the service area and empty the recovery tank.
3. Place the machine on a dry, flat, and level floor.
4. Ensure that there is sufficient space around to conduct the experiment in a safe manner.
5. Turn off the key switch and remove the battery power cord.
6. Open the electrical installation board cover.
7. Remove all cables from the contactor pile head.
8. Set the instrument to the on/off position and use a red and black gauge to measure the two main contacts (with M6 nut pile heads). If the two main contacts are connected, replace them with a new contactor.
9. Set the instrument to the resistance position and measure the resistance of the two inserts of the coil using a red and black gauge. If the resistance is zero, replace the contactor with a new one.
10. Replace the contactor and remove the two M4 screws that fix the contactor.



Brush Plate Limit Switch

The upper limit switch of the brush plate is a paddle type micro switch, and its waterproof rating is IP66, so they have good protection against liquids and dust. The upper limit switch controls the lifting of the brush plate to limit its operation.

Check the upper limit micro switch of the brush plate

1. Take the machine to the service area and empty the recovery tank.

2. Place the machine on a dry, flat, and level floor.

3. Power on the machine, use the brush plate button switch to activate the brush plate, lift the brush plate with a foot pedal, and monitor whether the brush plate continues to work.

3A If continuing to work, check whether the paddle of the limit switch is deformed.If it is deformed, replace the limit switch.

3B Check if the installation bolts of the limit switch are loose or detached.

3C Or replace with a new upper limit micro switch.

Vacuum Motor Micro Switch

The vacuum motor micro switch is a roller paddle type micro switch with a waterproof rating of IPX, so they are particularly sensitive to external conditions, especially liquids. The micro switch of the vacuum motor is to control the vacuum motor work and stop.

Check the micro switch of the vacuum motor

1. Take the machine to the service area and empty the recovery tank.

2. Place the machine on a dry, flat, and level floor.

3. Power on the machine and lower the vacuum motor lever to activate the vacuum motor. If not working;

3A If not working, check whether the paddle of the limit switch is deformed.If it is deformed, replace the limit switch.

3B Check if the installation bolts of the limit switch are loose or detached.

3C Or replace with a new upper limit micro switch.

Resettable Circuit Breaker Switches

There are four thermal reset switches in the entire machine, namely circuit reset switch, vacuum motor reset switch, and brush plate motor reset switch. When the working current exceeds the overload current of the reset switch, the reset switch will trip. These are to protect the safety of the entire machine circuit. When the reset switch

trips, it is necessary to identify the cause of the overload trip and press the red button of the reset switch. The machine can be used normally.

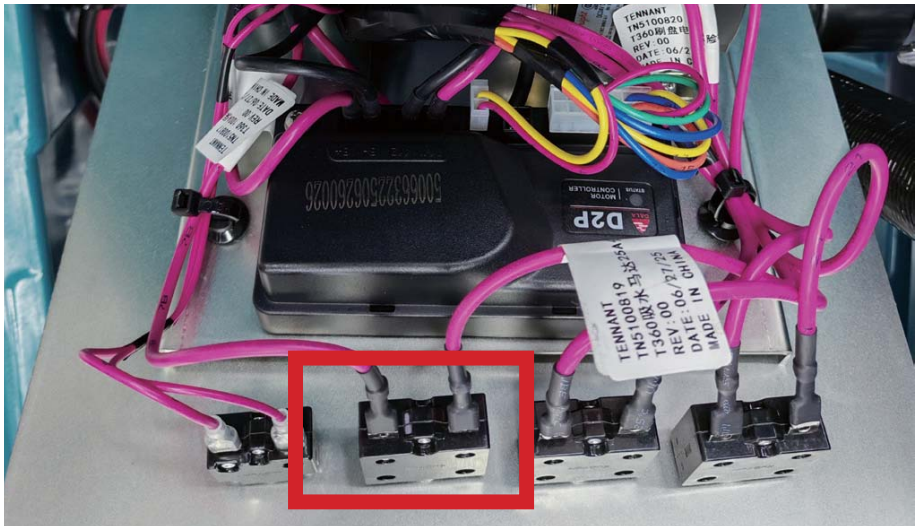
Circuit break	Rating	Circuit protection
CB1	5 amps	Main
CB2	25 amps	Vacuum motor
CB3	25 amps	Brush motor
CB4	25 amps	Brush motor

Check the circuit reset switch for overload

1. Take the machine to the service area and empty the recovery tank.
2. Place the machine on a dry, flat, and level floor.
3. Open the cover plate of the electrical installation board.
4. Open the cover plate on the steering wheel
5. Carefully inspect the entire machine's wiring for any damaged cables that come into contact with each other, and check for any positive and negative poles cables that come into contact.
6. Check if the circuit reset switch spring is loose and in poor contact.
7. Eliminate damage to the reset switch.7A Replace the reset switch.
8. After eliminating the cause of overload, press the red button on the reset switch.

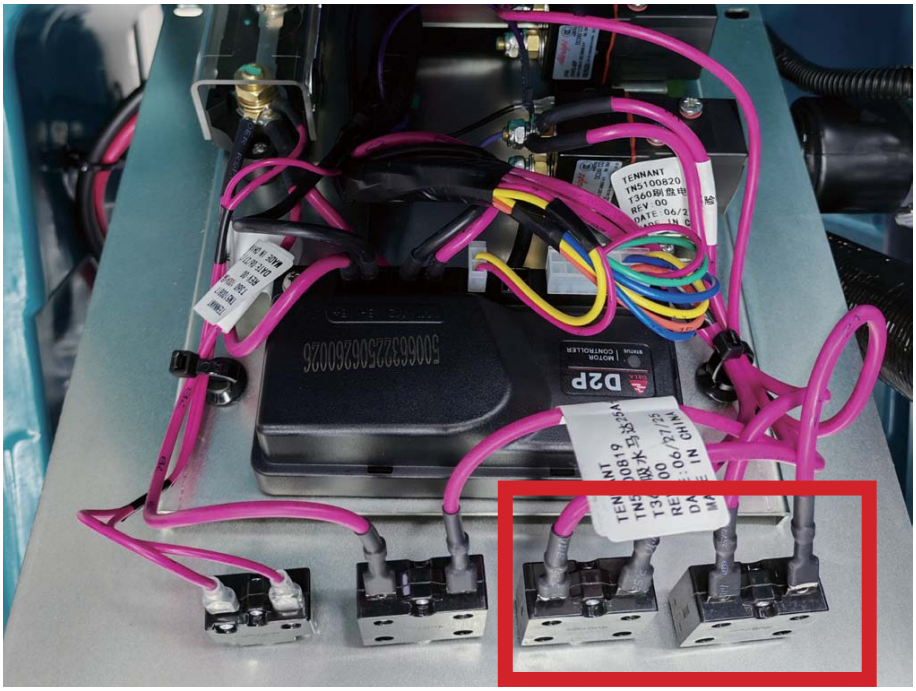
Check the overload of the vacuum motor reset switch

1. Ensure that the machine battery is at 24V ± 1V.
2. Purchase a current clamp with a reading capacity of at least 100A (amperes)
3. Take the machine to the service area and empty the recovery tank.
4. Place the machine on a dry, flat, and level floor.
5. Open the cover plate of the electrical installation board.
6. Check if the spring of the vacuum motor reset switch is loose and in poor contact.
7. Measure the working current of the vacuum motor using a current clamp to see if it exceeds the overload current of the vacuum motor reset switch (overload current 25A).
8. Eliminate the damage to the reset switch.8A Replace the reset switch.
9. After eliminating the cause of overload, press the red button on the reset switch.



Check the overload of the brush plate motor reset switch

1. Ensure that the machine battery is at 24V ± 1V.
2. Purchase a current clamp with a reading capacity of at least 100A (amperes)
3. Take the machine to the service area and empty the recovery tank.
4. Place the machine on a dry, flat, and level floor.
5. Open the cover plate of the electrical installation board.
6. Check if the spring of the reset switch of the brush plate motor is loose and in poor contact.
7. Measure the working current of the brush plate motor using a current clamp to see if it exceeds the overload current of the brush plate motor reset switch (overload current of 25A).
8. Eliminate the damage to the reset switch.8A Replace the reset switch.
9. After eliminating the cause of overload, press the red button on the reset switch.



Maintenance of the Machine

To keep the machine in good working order, simply follow the maintenance procedures below.

To ensure safety: Before leaving or servicing the machine, park the machine on a level surface, turn off the machine, remove the key and set parking brake.

Wear necessary personal protective equipment when servicing the machine.

Yellow contact points

This machine has easy-to-find yellow contact points for convenient access to service items. No tools are required for these maintenance operations.

1. Replace pads when turned over or if worn.

2. Replace brushes when they do not effectively clean.

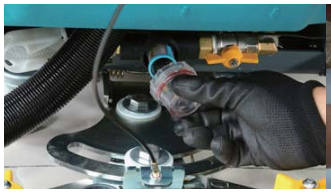
3. Wipe the squeegee blade clean. Inspect the blade for wear and damage. If worn, align the ends of the blade.

4. Clean brush head skirt and inspect for wear or damage. Replace if worn or damaged.

5. Drain and clean the recovery tank.

6. Remove the debris on the tray and empty it.

7. Remove and clean the float cage screen



8. Drain and rinse the water tank.

9. Charge the batteries.

Note: Do not disconnect the battery cords when the charger is plugged into an outlet as this may damage the circuit board.

10. Clean the exterior of the machine with all-purpose cleaner and a damp cloth.

Battery charging

Do not use other battery chargers not supplied and approved by Tennant.

Irefer to the charger user manual for operating instructions. If the machine is not equipped with batteries, contact your dealer or Tennant for battery charger recommendations.

To ensure safety: Do not use incompatible battery chargers, which may cause battery damage and potential fire.

1. Move the machine to a well-ventilated place.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, and remove key.

2. The charger will start charging automatically and will automatically turn off when the batteries are full. The maximum charging period is 6-12 hours, depending on the battery type.

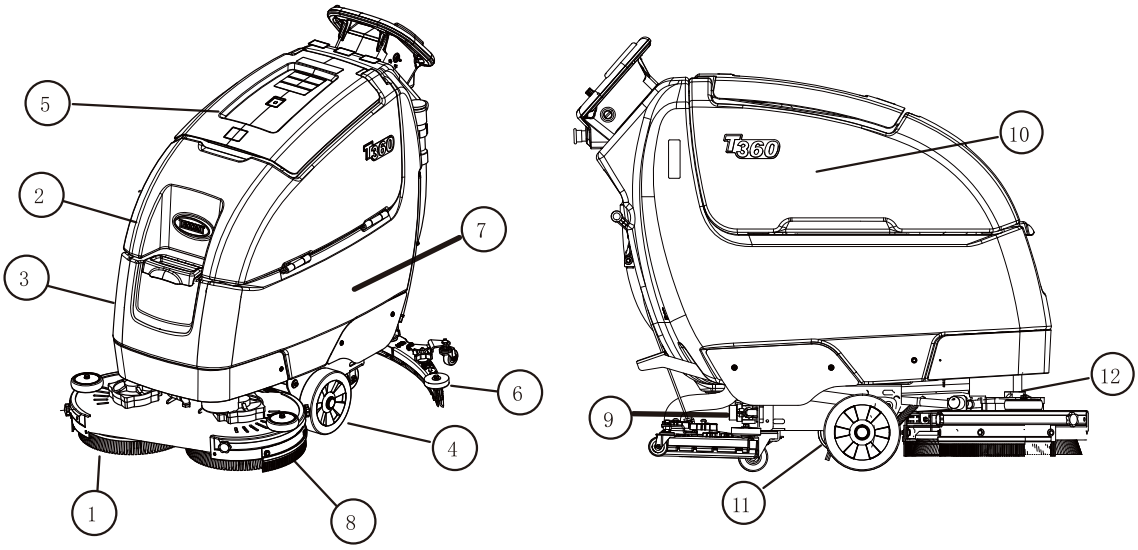
FOR SAFETY: Do not disconnect the external charger's DC power cord from the machine's outlet while the charger is running. Arc discharge may occur. If charging must be suspended during charging, unplug the AC power cord first.

Maintenance Chart

The table below identifies the persons responsible for each procedure.

O = Operator.

T = Trained person.



Interval	Person Resp.	Key	Description	Procedure
Daily	O	1	Pads	Check, flip or replace
	O	1	Brushes	Check, clean
	O	6	Squeegee	Clean, check for damage and wear
	O	8	Scrub head skirt	Check for damage and wear
	O	2	Recovery tank	Drain, rinse, clean float shut-off screen and debris tray
	O	3	4 Solution tank	Drain, rinse
	O	7	Batteries	Charge if necessary
50 Hours	O	5	Recovery tank lid seal	Check for wear.
	O	9	Solution tank filter	Remove and clean
200 Hours	O	7	Batteries, terminals and cables	Check and clean
500 Hours	T	4	Wheels	Check for Damage and Wear
800 Hours	T	11	Propel motor	Replace carbon brushes
1000 Hours	T	10	Vacuum motor	Replace carbon brushes
	T	12	Brush motor	Replace carbon brushes

Squeegee Blade Replacement

Each squeegee blade has four sides. When the blade is worn, you only need to exchange the two ends of the blade and use the other intact surface. If all four edges are worn, replace the blade.

1. Remove the squeegee assembly from the machine. Loosen the two outside knobs, this will allow you to remove blades from squeegee frame.

2.Rotate the rear blade to a new wiping edge and reinstall blade. If all four edges are worn, replace with new blade.

3.After replacing the blades, tighten the yellow knobs at both ends.

4. Install the squeegee back onto the squeegee bracket and reconnect the vacuum hose.

Move the Machine

PUSHING OR TOWING THE MACHINE

FOR SAFETY: When servicing the machine, do not push or tow the machine without operator control.

If the machine is deactivated, it can be pushed from the front or the rear, but can only be towed from the front.

Do not push or tow the machine at long distances or high speeds.

Note: DO NOT push or tow the machine over long distances as this can cause damage to the driving system.

TRANSPORTING THE MACHINE

When using a trailer or truck to transport the machine, carefully observe the following loading and tie-down procedures:

1.Drain the tanks, lift up the brush head,

and remove the squeegee assembly.

2.Carefully load the machine onto a trailer or truck.

FOR SAFETY: When loading/unloading, use a ramp that support the weight of the machine and the driver to load the machine. Do not turn on slopes or ramps. Do not drive on slippery ramps.

FOR SAFETY: When loading/unloading, do not operate the machine on ramp incline exceeds 2%. A winch must be used when the ramp incline exceeds 2%.

3.Once loaded, position the front of the machine against the front of the trailer or truck. Lower the brush head and turn off the key.

4.Place a stop behind each wheel.

5.Use tie-wraps to secure the machine to the four tie-down brackets on the machine frame. It may be necessary to mount the tie-down brackets to the floor of the trailer or truck.

NOTE: When transporting the machine with an open truck or trailer, make sure the recovery tank cover is closed tightly.

NOTE: The console area or replacement part storage track is not intended to be tied down as damage may result.

Store the Machine

1.Charge the batteries before storing machine to extend battery life. Recharge the batteries once a month.

2.Disconnect the batteries before storing.

3. Drain and clean the recovery and water tanks.

4.Store the machine in a dry area with the squeegee and brush head in the up position.

NOTE: Do not expose the machine to rain, it should be stored indoors.

5.Open the recovery tank cover to allow air to circulate.

6.If the machine is stored at freezing temperatures, see “Antifreeze Protection” .

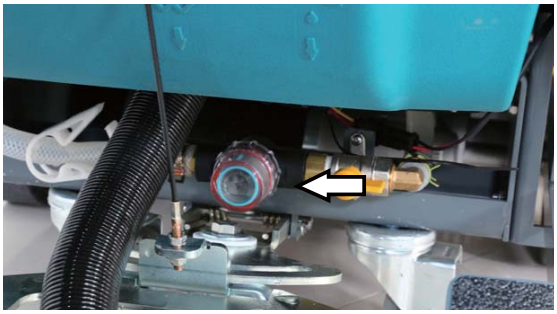
Note: To prevent possible damage to the machine, store the machine in an environment free of rodents and insects.

ANTIFREEZE PROTECTION

Storing machine in freezing temperatures.

1.Drain all water from the solution tank and recovery tank.

2.Empty the water from the solution tank filter located under the machine. Replace the filter.



TROUBLESHOOTING

PROBLEM	Reason	SOLUTION
Machine will not operate	Emergency shutoff button is activated	Turn button to reset
	Batteries dead	Charge batteries
	Battery cables loose	Tighten loose cables
	Battery fault	Replace battery
	Key switch fault	Replace the key switch
	Yellow handle button fault	Replace the handle switch
	Circuit breaker tripped	Reset circuit breaker
Battery charger not working	Plug not connected to power source	Check plug connection
	Battery over discharged	Replace battery
	Charger fault	Replace charger
	Power cord fault	Replace power cord
Machine will not propel	Propel fault detected	Refer to Drive Controller – Fault Codes
	Propel motor or wiring fault	Replace the drive motor or wiring harness
	Motor carbon brushes worn	Replace the carbon brush
	Handle micro switch issue	1. The micro switch on the handle cannot be triggered 2. The micro switch of the handle is damaged
Scrub brush motor not working	Brush motor or wiring fault	Replace the motor or wire harness
	Motor carbon brushes worn	Replace the motor carbon brush
	Circuit breaker tripped	Reset circuit breaker
	Scrub head/scrub brush not level. Contact service	Put down the brush plate motor to the ground
	The micro switch of the brush plate motor handle is damaged	Replace the micro switch of the handle
	Check the upper limit micro switch of the brush plate	Check the upper limit micro switch of the brush plate
	Check if the battery voltage is ≤ 21V	Charge or replace the battery

PROBLEM	Reason	SOLUTION
Vacuum motor not working	Squeegee assembly lifted off floor	Lower squeegee assembly to floor
	Faulty vacuum motor or wiring	Replace the motor or wire harness
	Circuit breaker tripped	Reset circuit breaker
	The recovery tank is full of sewage	Empty the recovery tank
Poor scrubbing performance	Debris in scrub/brush pad	Replace scrub brush/pad
	Worn scrub/brush pad	Replace the water valve
	Wrong scrub brush pressure	Adjust scrub brush pressure
	Wrong scrub/brush pad type	Use correct scrub brush/pad type
	Battery charge low	Charge battery
	Uneven scrub brush pressure	Scrub head/scrub brush not level.
Water trailing	Recovery tank full or excessive foaming	Drain recovery tank
	Loosen drain cap	Replace cap
	Worn squeegee blades	Rotate or replace squeegee blades
	Condensate trap clogged (squeegee assembly)	Remove cap and clean
	Squeegee assembly clogged	Clean squeegee assembly
	Loose vacuum hose connector	Tighten vacuum hose connector
	Clogged vacuum hose	Flush vacuum hose
	Damaged vacuum hose	Replace vacuum hose
	Clogged float cage screen in recovery tank	Clean screen
	Recovery tank cap not fully closed	Check cap for clogs
	Defective seal on recovery tank cap	Replace seal

PROBLEM	Reason	SOLUTION
Little or no solution flow	Empty solution tank	Refill solution tank
	Solution flow rate set low	Increase solution flow rate
	Solution tank filter clogged	Clean filter
	Solution supply line clogged	Flush solution supply line
Shortened operating time	Low battery	Charge the battery
	Battery requires maintenance	See “Battery”
	Battery fault or has reached the end of its service life	Replace battery
	Charger fault	Replace the battery charger
	Brush pressure set too high	Reduce brush pressure

Drive Controller – Fault Codes

1.Open the Recovery tank

2.Remove the fixing screws of the electrical installation panel

3.Controller location

4.Fault indicator light location

Diagnostics and troubleshooting

Led diagnostics
During normal operation, with no faults present, the status LED is steadily on. If the controller detects one or multiple fault/s, the status LED flashes a 2-digit fault identi cation code continuously until the fault is corrected. LED indicates one fault code at a time. When multiple faults are detected, it indicates the highest priority fault codes until it is solved.

For example, code “1,3”—Speed Pot Fault —appears as:

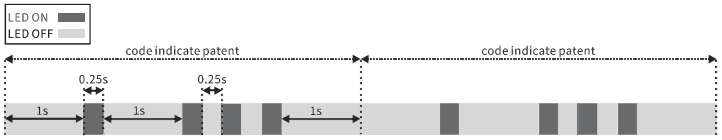


Figure-13

STATUS LED FAULT CODES		
Digit fault code	LED Fault Codes	Fault
None	LED Off	no power, LED malfunction or battery seriously over-voltage
None	LED Solid On	No faults
1,1	⊗ ⊗	Thermal Fault
1,2	⊗ ⊗⊗	Throttle Fault
1,3	⊗ ⊗⊗⊗	Speed Pot Fault
1,4	⊗ ⊗⊗⊗⊗	Undervoltage Fault
1,5	⊗ ⊗⊗⊗⊗⊗	Overvoltage Fault
2,1	⊗⊗ ⊗	Main Off Fault
2,2	⊗⊗ ⊗⊗	EMR Sequencing Fault
2,3	⊗⊗ ⊗⊗⊗	Main Fault
2,4	⊗⊗ ⊗⊗⊗⊗	Main On Fault
2,5	⊗⊗ ⊗⊗⊗⊗⊗	Pump SRO Fault
3,1	⊗⊗⊗ ⊗	Wiring Fault
3,2	⊗⊗⊗ ⊗⊗	Brake On Fault
3,3	⊗⊗⊗ ⊗⊗⊗	Precharge Fault
3,4	⊗⊗⊗ ⊗⊗⊗⊗	Brake Off Fault
3,5	⊗⊗⊗ ⊗⊗⊗⊗⊗	HPD Fault
4,1	⊗⊗⊗⊗ ⊗	Current Sense Fault
4,2	⊗⊗⊗⊗ ⊗⊗	Hardware Failsafe
4,3	⊗⊗⊗⊗ ⊗⊗⊗	EE CheckSum Fault
—	—	—
4,5	⊗⊗⊗⊗ ⊗⊗⊗⊗⊗	Battery Disconnect Fault

Troubleshooting — Continued

Drive Controller Fault Code Table

NO	LED CODE	EXPLANATION
1.1	THERMAL	1. Temperature >80°C or < -10°C 2. Excessive load on yehicle. 3. Operation in extreme environments. 4. Electromagnetic brake not releasing
1.2	THROTTLE FAULT	1. PotLow and PotWiper out of range 2. Throttle pot defective. 3. Wrong throttle type selected.
1.3	SPEED POT FAULT	1. Speed limit pot wire(s) broken or shorted 2. Broken speed limit pot.
1.4	UNDERVOLTAGE FAULT	1. Battery voltage <17 volts. 2. Bad connection at battery or controller.
1.5	OVERVOLTAGE FAULT	1. Battery voltage >31 volts. 2. Vehicle operating with charger attached 3. Intermittent battery connection.
2.1	MAIN OFF FAULT	main contactor driver Offaul
2.2	EMR SEQUENCING FAULT(NA)	Emergency reverse switch(J1-14) pressed before KSI on
2.3	MAIN FAULT(NA)	Main contactor welded or stuck open.
2.4	MAIN ON FAULT	Main contactor driver failed closed.
2.5	IMPROPER SEQUENCE OF SPEED LIMIT POT	speed limit pot (J1-9) pressed before KSI on
3.1	WIRING FAULT (HPD fault present >10 sec)	1.Improper sequence of throttle input before KSI or interlock inputs 2. Misadjusted throttle 3. Broken throttle pot or throttle mechanism.
3.2	BRAKE ON FAULT(NA)	1. Electromagnetic brake driver shorted. 2. Electromagnetic brake coil open.
3.3	PRECHARGE FAULT	1. Brush disc contactor coilshorted. 2. Precharge circuit damaged 3. MOSFET failure.
3.4	BRAKE OFF FAULT(NA)	1. Electromagnetic brake driver open 2. Electromagnetic brake coil shorted

NA = Not Applicable

3.5	HPD FAULT (High Pedal Disable)	1. Improper sequence of throttle input before KSI or interlock inputs. 2. Misadjusted throttle pot.
4.1	CURRENT SENSE FAULT	1. Short in motor or in motor wiring. 2. Controller failure.
4.2	HARDWARE FAILSAFE	1. Motor voltage does not correspond to throttle request. 2. Short in motor or in motor wiring. 3. Controller failure.
4.3	EEPROM CHECKSUM FAULT	EEPROM failure or fault.
4.4	MOTOR OPEN	Motor wiring is open.
4.5	BATTERY DISCONNECT FAULT	1. Battery not connected. 2. Poor connection to battery terminals.

General Machine Dimensions/Capacity/Performance

MODEL	28in/700mm Dual Disk
Length	1335mm /52.5 in
Width	750mm/ 29.5 in
Height	1130mm/44.4 in
Weight	106.4 KG/234 lb
Weight (with batteries)	182.4 KG/402 lb
Squeegee width	973 mm / 38.3 in
Solution tank capacity	70L/18.5 gal
Recovery tank capacity	75L/ 19.8 gal
Scrubbing path width	700 mm/27.5 in
Down pressure	30 kg / 66.1 lbs
Scrubbing speed	Max:1.22m/s Min:0.02m/s
Transport speed	1.23 m/s
Reverse speed	0.68 m/s
Productivity rate-estimated actual	2940 m2/hr
Aisle turnaround width	1120 mm / 44 in
Maximum operating gradient	2%
Solution flow rate	25%:1.46L/min，50%:3.30L/min，100%:3.66L/min
Brush motor	2x24VDC 360w
Propel motor	24VDC 400w
Vacuum motor	24VDC 450w
Machine voltage	24V DC
Battery capacity	120 Ah @ 3 hr
Battery Charger -smart off - board	110-240VAC，50/60Hz，24 VDC 15 A
Protection grade	IPX3
Sound pressure level LpA*	65.1 dBA
Machine vibration at hand -arm'	<2.5 m/s2
Ambient operating temperature	Min:36°F/2°C Max:110°F/43°C

* Values based on IEC 60335-2-72. Specifications are subject to change without notice.

T360 RECOMMENDED SPARE PARTS LIST

Part No.	Description
TN5100847	BRUSH, PLATE, 13″
1211537	FILTER, IN-LINE [80 MESH, FINE, WHITE]
1232680	BLADE, SQGE, FRONT, 1072L LINARD[650MM]
1221585	BLADE, SQGE, REAR, 1136L, LINATEX[650MM]
CN5002563	PAD, BUFF, RED ,14'
CN5003089	SENSOR, LEVEL, LIQ
CN5003686	GASKET (meter)
CN5002833	HOSE ASSY, DRAIN, 38MMD 990MML
CN5002836	HOSE, SQGE, REAR, 38MM DIA
CN5006952	SKIRT, BRUSH
CN5006246	SEAL, STRIP, 420MM X 18MM X 7MM
CN5005723	COVER, DEBRIS, TANK, RECVY
CN5005711	TRAY, DEBRIS, TANK, RECVY
TN5100894	DRIVER ASSY, PAD, 33CM, BRUSH [MAG ASST]
CN5002290	70BT die-cast aluminum alloy rear wheel
1264538	CASTER, SWIVEL, 50.8MMD, M10 X 1.50, TPR
TN4100454	CASTER TPR 3IN
CN4000730	GM230 drag wheel, GM230
222066	WHEEL, 03.0D 0.88W 0.50B

* Values based on IEC 60335-2-72. Specifications are subject to change without notice.