

# Operator Manual

## NB460 Walk-Behind Floor Scrubber

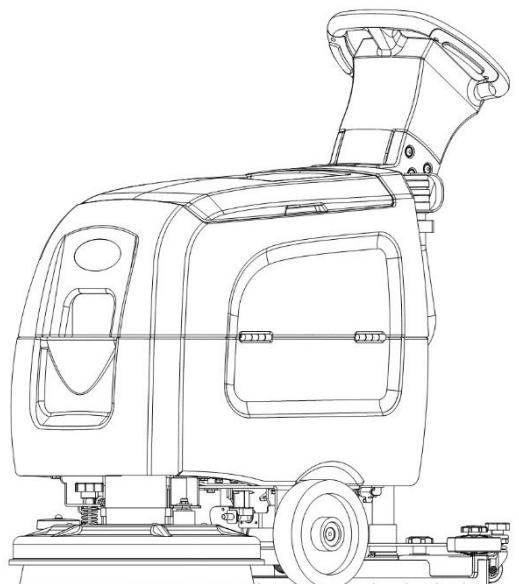


### WARNING

Do not use the scrubber before reading and understanding these operating instructions.

#### NOTE:

- Please check the designation of your present type at the last page of this document as well as on the ID-plate.
- Keep this manual for future reference.



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### Introduction



#### CAUTION

- This manual is to provide the operator with the necessary information for the correct and safe use of the machine, which includes the technical data, safety, operation, storage, maintenance, accessories and dispose of the machine.
- Before performing any operation or maintenance on this machine, the operator and the qualified technicians must read this manual carefully.
- If you have any questions about the explanation of this manual or want more related information, please contact our after-sales or agency.
- The operator is not allowed to perform the steps that must be completed by the technicians. All instructions in this manual should be seriously followed, otherwise our company shall not be liable for any losses arising therefrom.

### Intended Use

This floor scrubber can be used in commercial and industrial environments, and it is suitable for cleaning smooth and hard floors (washing and sewage collecting). It must be used in a safe environment by a qualified operator. This scrubber is not suitable for cleaning outdoors floors, carpets or rough floors.

### How to Keep this Manual

- The Manual must be kept near the machine, inside an adequate case or bag, away from liquids and other substances that can cause any damage to it.

### Declaration of Conformity

- The declaration of conformity is provided with the machine to prove that the machine complies with relevant criteria and regulations.

### Accessories and Maintenance

- All necessary operation, maintenance and repair procedures must be performed by qualified personnel or the maintenance center designated by our company. Only original spare parts and accessories are allowed to be used on the machine.
- If you need service or want to order spare parts or accessories, please contact our company's after-sales service department or the agent, and provide the model and serial number of the machine.

## Change and Improvement

- Our company is committed to the continuous improvement of the products and reserves the right to notify the improvements and changes of the products that have been sold.

## Machine Identification

- The model and serial number of this machine are marked on the identification label. The information on this label is very important, which is required to be provided when you order the accessories for the machine.

## Transport and Uncrating

- Carefully check machine for signs of damage. Report damages at once to carrier. Record the damages on paper to reserve the right for compensation.

After uncrating, check if the machine is equipped with the following items:

1. Technical documents, including operation manual;
2. Battery connecting cable.

## Reading Guide

**The following symbols and terms are used throughout this manual to alert the reader to safety issues and important information:**

SYMBOL	TERM	EXPLANATION
	<b>DANGER</b>	It indicates the danger that may cause death of the operator.
	<b>WARNING</b>	It indicates a potential hazard of injury to people and objects.
	<b>ATTENTION</b>	It indicates a caution related to important or useful functions. Pay attention to the paragraphs marked by this symbol.

## **Introduction**

	<b>NOTE</b>	It indicates notes on important matters and useful functions.
	<b>CONSULTATION</b>	It indicates the necessity to refer to the instructions of this manual before performing any procedures.

## **Safety**

### **Important Safety Instructions**

#### **Save These Instructions**

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

#### **⚠Danger:**

- This machine may only be operated by properly trained or authorized personnel and must be used in accordance with this instruction manual.
- Before performing any operations such as usage, maintenance, repairs, or part replacements, the machine must be powered off and disconnected from the battery. Additionally, ensure thorough reading of the manual.
- Do not use this machine near toxic, hazardous, flammable, or explosive dust, liquids, or vapors. This machine is not suitable for cleaning hazardous dust.
- Avoid wearing jewelry when working near electrical components.
- Do not work under raised machinery unless it is securely supported.
- When using wet storage batteries, flammable gases may be released during normal operation. Keep flames, fireworks, strong lights, and heat sources away from the battery.
- When using wet storage batteries, a small amount of hydrogen gas may be released. Ensure the charging area is well-ventilated and kept away from open flames.

#### **⚠WARNING:**

- Before each use, carefully inspect the machine to ensure all parts are properly installed, otherwise it may cause harm to people or property.
- Before charging with the battery charger, ensure that the power frequency and voltage match those indicated on the machine's serial code sticker.
- Do not pull the charger cord to move the machine, do not run the cord through a closed door, or wrap it around objects with sharp edges or corners. Avoid running the machine over the cord. Keep the charger cord away from hot surfaces.
- To prevent fire, electric shock, or personal injury, ensure the machine is powered off when the user is away from it.
- This machine is not suitable for outdoor use, only for indoor use. When not in use, store it in a dry indoor environment.
- The storage and operating temperature of the machine must be between 0°C and +40°C, with ambient humidity maintained at 30%~95%.
- Please do not use this machine on slopes exceeding the specified gradient.
- When using floor cleaning fluid, please follow the instructions on the cleaning solution bottle and wear appropriate gloves or other protective gear for the user.

## **Safety**

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- Please use the brush disc and needle seat provided with the machine, as well as the parts specified in the user manual. Using other brush discs and needle seats may reduce safety.
- When the machine malfunctions, please confirm that it is not caused by lack of maintenance. If it is due to other reasons, seek assistance from authorized personnel or a repair center.
- Take all necessary precautions to avoid hazards such as hair, jewelry, and loose clothing being caught in the moving parts of the machine.
- Do not use this machine in areas with excessive dust accumulation.
- Do not rinse the machine directly with water or high-pressure water jets, and avoid using corrosive substances for cleaning.
- Avoid colliding with surrounding objects when using the machine, especially when the collision may pose a risk of falling objects.
- When the machine is stationary, stop using the brush disc or needle seat to prevent damage to the floor.
- In case of machine fire, use a dry powder extinguisher and do not use a liquid extinguisher.
- Do not remove or alter the stickers on the machine.
- Do not attempt to alter the machine's safety protections; always follow the maintenance guidelines.
- Special care must be taken when transporting the machine at temperatures below 0°C, as water in the tank and pipes may freeze and cause severe damage to the machine.
- If replacement parts are needed, please obtain genuine parts from authorized dealers or agents.
- If the machine fails to operate due to damage, being left outdoors, or falling into water, please send it to a repair center.
- To ensure the safe and correct use of the machine, have authorized personnel or service centers perform regular maintenance according to the schedule in the relevant sections of the manual.
- This machine must be properly disposed of as it contains toxic and hazardous materials (such as batteries), which must be handled by designated centers in compliance with relevant regulations (refer to the disposal section).
- Regulatory requirements mandate that these materials be processed by specific centers (see the destruction section).
- This machine is only to be used as a cleaning tool and not for any other purposes.
- Please keep the work area clear and do not use the machine if the passage is blocked. Ensure that the air passage is not obstructed by dust, hair, or any objects that may hinder air circulation.
- Please use the machine in a well-lit area.
- This machine should only be operated by properly trained or authorized personnel, and must not be used by children or unqualified individuals. Extra caution must be taken when children are nearby during machine operation. Ensure children do not play with the machine to prevent accidents.
- Avoid causing harm to people or objects when operating the machine.

# Know your Machine

## Overview of Appearance

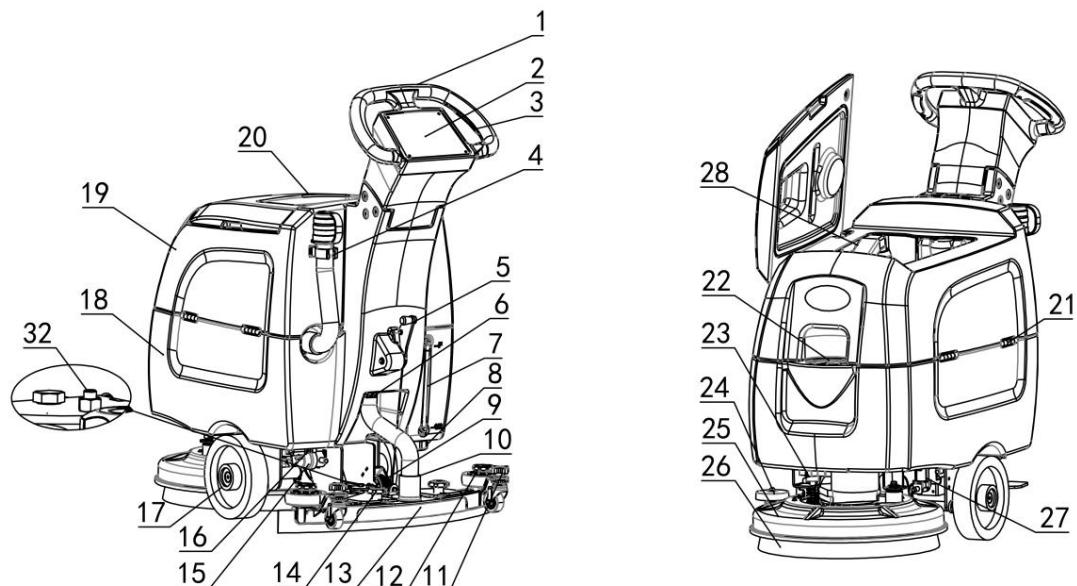


Figure 1

- 1. Handle
- 2. Control Panel
- 3. Handle Brush Switch
- 4. Drain Pipe
- 5. Water Scraper Handle
- 6. Charging Port
- 7. Clean Water Tank Level Tube
- 8. Clean Water Tank Drain Cover
- 9. Rear Wheel
- 10. Suction Hose
- 11. Water Scraper Height Adjustment Knob
- 12. Water Scraper Anti-collision Wheel Fixing Handle
- 13. Water Scraper
- 14. Water Scraper Fixing Knob
- 15. Filter
- 16. Water Outlet Valve
- 17. Walking Wheel
- 18. Clean Water Tank
- 19. Waste Water Tank
- 20. Waste Water Tank Cover
- 21. Hinge
- 22. Water Inlet
- 23. Brush Angle Adjustment Knob
- 24. Anti-collision Wheel
- 25. Brush Cover
- 26. Brush/Dial Plate
- 27. Water Solenoid Valve
- 28. Float Cage

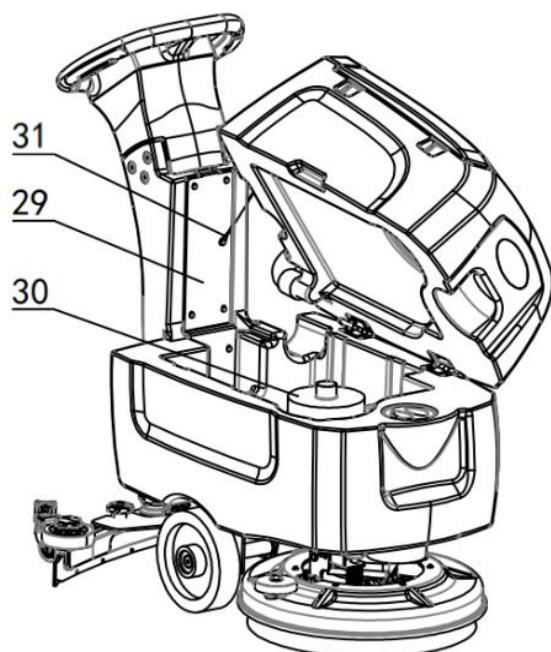


Figure 2

- 29. Electronic Control Cover
- 30. Suction Motor
- 31. Water Tank Pull Rope
- 32. Water Scraper Adjustment Screw

### Button Function



Figure 3

1. Water Volume Adjustment Button	9. Battery Type and Power Level Display
2. Brush Motor Button	10. Clean Water Level Display
3. Power Button	11. Water Suction Motor Operation Indicator
4. Water Suction Motor Button	12. Brush Motor Operation Indicator
5. ECO Mode Button	13. Handle Brush Switch Indicator
6. Card Reader	14. Sewage Full Alert
7. Working Hours Display	15. Voltage Value Display
8. ECO Mode Display	

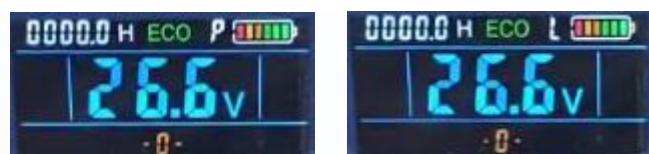


Figure 4 (a) Lead-acid battery display mode (b) Li-battery display mode

Switching between lead-acid and Li-battery modes: Press and hold the ECO button for 5 seconds, where P corresponds to lead-acid batteries and L corresponds to Li-batteries.

# Operation

## New Machine Battery Installation

The main purpose of this chapter is to provide the necessary operating instructions for the operators.

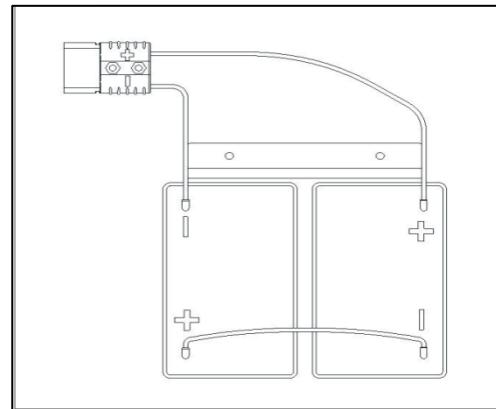
**Note:** This machine requires two 12V batteries or one 24V lithium battery.

### **⚠️WARNING:**

If the battery is installed incorrectly or wired improperly, the electrical components of the machine may be severely damaged. Batteries should only be installed by qualified personnel. Set the charger according to the model of battery used. Check for battery damage before installation, disconnect the battery charging cable, and exercise caution during operation.

### **Battery Installation**

1. Open the sewage tank and place the battery into the battery compartment.
2. Connect the battery cable correctly according to the diagram and secure it to the battery with screws.
3. Insert the connector on the battery cable into the machine's battery connector.
4. Close the sewage tank lid, being careful not to pinch the battery cable.



## Installation and Disassembly of the Brush Disc/Needle Seat

**ℹ️ Note:** Select the appropriate brush disc or needle seat based on the surface to be cleaned.

### **⚠️CAUTION:**

Before manually installing or removing the brush disc or needle seat, ensure all switches on the machine are turned off. Wear protective gloves during operation to avoid injury from debris.

1. Tilt the front side of the machine upwards.
2. Align the brush disc/needle seat with the central shaft, and use your hand to rotate counterclockwise the brush disc/needle seat to install it. To remove, rotate it in the opposite direction, then it can be detached.

### **⚠️WARNING**

Do not operate the machine until the brush disc/needle seat is properly installed.

### Install Squeegee Assembly

1. Loosen the two handles on the squeegee assembly (Figure 1-14), insert the squeegee assembly securely into the squeegee bracket's mounting slot.
2. Tighten the handles on the squeegee assembly (Figure 1-14), and connect the suction hose connector to the squeegee assembly.

### Squeegee Adjust

When the ground is wet due to the first use and the rubber wear, the height of the water scraper wheel must be adjusted to ensure the cleaning effect.

1. Install the water scraper according to the installation steps. Turn the height knob (Figure 1-11) counterclockwise to loosen it
2. Run the machine and observe the angle between the rubber and the ground, as well as whether the water scraper is on the ground on both wheels
3. Rotate the anti-collision wheel bolt to adjust the height of the auxiliary wheels on both sides to be consistent and on the ground, push the machine, and the angle between the water scraper strip and the ground is about 45. After completion, rotate the knob clockwise to fix the height of the auxiliary wheels

### Brush Angle Adjust

After long use, the brush will gradually wear out, and the machine will not move forward without assistance or cannot move straight when it swings from side to side. Please deal with it according to the following methods:

1. Use (Figure 1-5) Water scraper handle to lift the water scraper and install the brush
2. Use the key to open the machine, press the (Figure 3-2) brush motor button, press the (Figure 1-3) handle button switch, and observe the condition of the machine
3. Rotate the Brush angle adjustment knob (Figure 1-23). When the machine swings to the left, turn the knob to the right; when the machine swings to the right, turn the knob to the left until the brush disk is balanced and the machine can move straight.

### Solution/Clean Water Tank Filling

1. Rotate to open the machine front clean water tank cover (Figure 1-22).
2. Fill the machine with clean water or a suitable cleaning solution for floor washing. The temperature of the water or solution must not exceed +104°F (+40°C).

#### **WARNING:**

Only use low-foam, flame-retardant detergents that are suitable for scrubber drier use.

### Machine Start and Stop



Figure 5

1. Prepare the machine as described previously. Place the accompanying card reader on the card reading area (Figure 3-6) with the machine powered on. If the battery level icon (Figure 3-9) shows green, it indicates the battery is fully charged and ready for use; if the battery level icon (Figure 3-9) shows red, it means the battery needs charging. Press the power button to turn off the machine and fully charge the battery. (Refer to the Maintenance chapter)
2. Based on cleaning needs, adjust the water flow output using the "Water Flow Adjustment Button" (Figure 3-1) on the control panel, which has two settings. The water level indicator icon (Figure 3-10) shows the current water flow status. When the water level indicator icon (Figure 3-10) displays two bars, it indicates maximum water flow.
3. Press the "Brush Motor Button" (Figure 3-2) and "Suction Pump Button" (Figure 3-2). The indicator icons (Figure 3-12) (Figure 3-11) will illuminate, activating the suction pump and brush motor. Use the handle (Figure 1-5) to place the squeegee assembly on the ground. Press the brush motor handle switch (Figure 1-3) to begin cleaning.
4. After completing work, press the "Brush Motor Button" (Figure 3-2) and "Suction Pump Button" (Figure 3-2) again. The brush motor will turn off immediately, while the suction pump will shut down after five seconds. Tilt the machine upward to remove residual wastewater (Figure 5). After cleaning, use the handle (Figure 1-5) to lift the squeegee assembly.
5. Ensure the machine has completely stopped, then press the power button (Figure 3-3) to turn off the machine.

#### **⚠ CAUTION:**

To avoid damaging the floor, stop the scrubbing operation when the machine remains stationary in one area.

**ℹ Note: Do not use the machine when the battery is low to avoid damaging the battery and shortening its lifespan.**

### Waste Tank Full Water and Waste Tank Drainage

1. When the waste tank is filled with water, the float ball in the waste tank (Figure 1-28) will activate to block the suction pump inlet, preventing the floor from drying, please stop operation immediately.
2. Turn off the brush disc and suction pump system, then lift up the brush disc and squeegee.
3. Push the machine to the designated drainage area.
4. Via the drainage pipe (Figure 1-4) to drain the sewage from the sewage tank, then rinse the inside of the sewage tank with clean water.

#### **WARNING:**

When the sewage tank is full, stop working immediately to prevent sewage from entering the suction pump.

### After using the machine

After cleaning is completed, please follow these steps before leaving the machine unattended:

1. Remove the brush disc/needle seat according to the instructions in the previous chapter.
2. Empty the clean water tank and wastewater tank following the steps described earlier.
3. Complete the daily maintenance steps (refer to the Maintenance Chapter)
4. Lift or remove the water scraper, and store the machine in a dry and clean place.

### When the machine is not used for an extended period

If the machine will not be used for more than 30 days, please handle it as follows:

1. Complete all steps under "After Using the Machine".
2. Open the battery compartment, disconnect the battery connector.

### First Use

After the first 8 hours of use, check whether the machine's fasteners and connections are loose, and inspect for any visible damage or leaks.

## Maintenance

The service life and maximum operational safety of the machine are guaranteed by correct and regular maintenance. The following checklist provides a general maintenance schedule for the machine. The maintenance interval depends on the working condition of the machine, which should be set by the person in charge of maintenance.

### **⚠️WARNING:**

These steps must be performed after turning off the machine's power and disconnecting it from the battery. Before performing any maintenance procedures, carefully read the safety section in the instruction manual.

Items marked (1) must be performed after the machine has been in operation for 8 hours. The maintenance steps for items marked (2) must be completed by an authorized service center.

### Regular Maintenance Checklist

Items	Daily use	Weekly	Every Six Months	Annually
Battery charging				
Squeegee Cleaning				
Brush Roller/Polishing Pad Cleaning				
Water Tank Cleaning				
Water Tank Seal Inspection				
Inspection and Replacement of Squeegee Blades				
Cleaning of the Clean Water Filter				
Tightness Inspection of Screws and Nuts			1	
Brush Disc/Needle Seat Inspection or Replacement				2

## Charging Battery

### **⚠️WARNING:**

When the screen battery icon turns red, it is necessary to charge the battery, or recharge it after each use.

**i Note:** If the battery is low on power, charge it as soon as possible to avoid shortening its lifespan. Check the battery level at least once a week.

1. Select the appropriate charger based on the battery model used to charge the battery.
2. Connect the charger plug to the charging port at the bottom of the machine, then plug the charger power plug into the power source.
3. After the battery is fully charged, disconnect the charger plug from the machine's charging port.

## Brush Disc/Needle Holder and Polishing Pad Cleaning

### **⚠ Caution:**

When cleaning the brush disc/needle holder and polishing pad, it is recommended to wear protective gloves as they may contain sharp fragments that could cause hand injuries.

1. Remove the brush disc/needle seat from the machine as described in the previous sections.
2. Clean the brush disc/needle seat and polishing pad using cleaning solution and water.
3. Inspect the wear condition of the bristles on the brush disc and the polishing pad on the needle seat. Replace the brush disc/polishing pad if excessive wear is present.

## Water Tank Filter Cleaning

1. Turn the clean water tank outlet's water inlet valve to the closed position.
2. Rotate and remove the filter water cap, take out the filter screen for cleaning, then reinstall them back onto the filter housing.
3. Open the water inlet valve, and check if the filter is properly installed.

## Squeegee Cleaning and Storage

### **⚠ Caution:**

It is recommended to wear protective gloves when cleaning the squeegee, as it may contain sharp fragments that could cause hand injuries.

Note: To ensure optimal water absorption, the squeegee must be kept clean and the squeegee blade must remain in good condition.

1. Twist opens the squeegee fixing knob and detach the connected suction hose.
2. Clean the water wiper frame. Pay special attention to thoroughly remove dirt and debris from the fixed grooves and suction pipes. Check whether the front and rear wiper blades are intact, and look for any gaps or cracks. Replace them if necessary.
3. Install the water wiper in the reverse order of the above disassembly steps.

## Inspection and Replacement of Wiper Blades

1. Check if the front and rear wiper blades are intact, and look for any gaps or cracks. If they are worn but the upper edge remains intact, they can be flipped upside down during installation; if the upper edge is also worn, follow these steps to replace them.
2. Remove the anti-collision wheel fixing handles on both sides of the water scraper, detach the aluminum upper covers on both sides, disassemble the clamp strip, take out the front and rear scraper blades, and reverse the installation order when installing new blades.

### **Cleaning of the Sewage Tank and Inspection of the Seal Strip**

1. Drain the water from the sewage tank through the drainage pipe.
2. Lift the sewage tank cover open, rinse with clean water to clean the sewage tank cover and the sewage tank.
3. Check whether the bearing surface of the seal ring on the wastewater tank covers intact and sufficiently sealed. If necessary, remove and replace the seal ring.
4. Reinstall the drainage pipe and securely close the wastewater tank cover.

### Troubleshooting

Fault	Possible Causes	Solutions
The machine is not working, the LCD screen is not lit	The battery connection cable is not properly connected	Connect the battery cable
	The battery is completely drained	Charge the battery
The machine is not working, battery indicator shows red	Low battery	Charge the battery
The brush motor is not working	Control circuit board or relay is damaged	Replace the control circuit board or relay
	Brush motor overload	Replace the soft-bristle brush head to suit the surface being cleaned
	The carbon brushes of the brush motor are worn out	Clean Brush Plate Buckle
	Other objects obstructing the rotation of the brush head	Other objects obstructing the rotation of the brush head
Suction motor not working	Suction motor damaged	Check suction motor
	Control circuit board damaged	Replace control circuit board
Insufficient suction, sewage cannot be drawn in	Sewage tank full, float ball activated	Empty the sewage tank
	Poor connection between the suction hose and squeegee assembly or suction motor	Reconnect the suction hose to the squeegee assembly or suction motor
	Dirty squeegee or damaged squeegee blade	Inspect and clean the water scraper component
	The dirty water tank lid is not properly closed, the seal is damaged, or the elbow pipe is clogged	Properly close the dirty water tank lid, replace the tank lid seal, and clean the elbow pipe
Insufficient clean water supply to the brush disc	Water filter clogged	Clean the filter screen
	Water tank too dirty or pipes clogged	Clean the water tank and pipes
Water leaves marks after scraping	Debris and other sundries under the water scraper	Remove debris and other sundries
	The water scraper blade is worn, cracked, or brittle	Replace the wiper blade

### **Disposal**

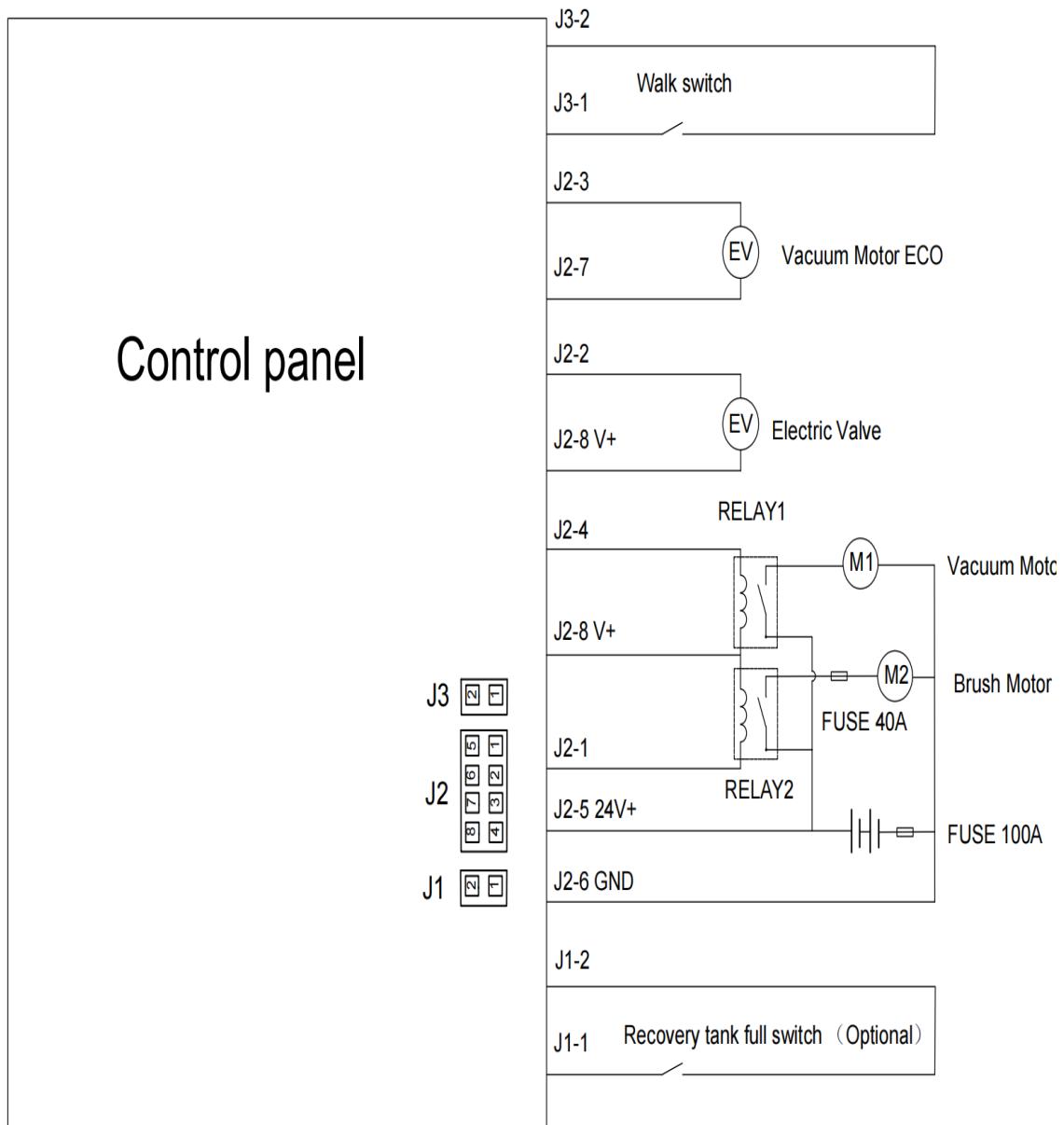
1. Have qualified waste disposal agencies handle and destroy the machine.
2. Before destroying the machine, remove and isolate the following materials, which must be properly disposed of in accordance with relevant laws and regulations.
3. Battery, brush disc/needle base, plastic hose and plastic components, electrical and electronic components.

# Specifications

## NB460 Specifications

Technical Parameters	Technical Parameter Values
Rated Power(W)	700
Brush Motor Power(W)	450
Brushless Suction Motor Power (W)	220/150(ECO)
Suction Power, Negative Pressure (kPa)	>10.5 / 9(ECO)
Battery voltage, nominal capacity(V/Ah)	(2x12V) 24V 100Ah
Noise Level (dB)	65±3
Machine Dimensions (L x W x H) (mm)	990×450×1050
Brush Disk Motor Speed (RPM)	180
Clean/Dirty Water Tank Capacity (L)	25/25
Working Width (mm)	460
Working Efficiency (m <sup>2</sup> /h)	1840
Brush disc/Needle seat diameter (mm)	460/460
Machine net weight (excluding battery, empty water tank) (Kg)	54
Working time (maximum H) 12V100AH battery * 2	5-6h
Battery box dimensions (L x W x H) (mm)	365×350×220
Machine gross weight (including battery) (Kg)	120
Number and Type of Brush Discs	1 Disc

## Electrical Wiring Diagram



### Lithium Battery



Temperature range for using the battery is from +5°C to +40°C. Low temperatures reduce the effective battery capacity, high temperatures reduce the battery's life time. The temperature difference between the two sides of the battery shall not exceed 5°C. Only approved battery chargers must be used to charge the lithium battery. Do not try to make any repairs or servicing of lithium batteries. Replacement of parts is not assumed.



#### **Risk of electric shock and burning**

The battery's charging and discharging connectors have open terminals, avoid any body contacts, contamination or direct contacts with objects which can cause short circuit connection of terminals. Use necessary pre-cautions and protective caps to secure the open terminals. The connectors should be maintained in clean and dry conditions.



#### **Use only batteries designed and approved by the manufacturer for the truck.**

Do not try to modify or alter the battery.



#### **Any damage or defects to the charger can result in accidents. Use only charger approved by the manufacturer of the truck, which is suitable for used battery.**

In case charger has any damages or defects, exclude the charger from operation and contact your service provider. Do not modify or try to repair the charger.



Improper use of charger or use of wrong charger can cause damages to a battery or charger. Follow the required charger specifications; If the operation voltage of the charger is out of the applicable voltage range, the charger or battery may be damaged causing serious safety risks. The charger in use must be approved by the battery (truck) manufacturer.

Reversed connection of charging plug is prohibited. Follow the instruction for correct connection. For disconnection of charging plug use dedicated grip and never pull out the plug by means of cable.

Stop charging immediately if any abnormalities are detected, e.g. severe temperature increase, deformation of battery case, smoke, noise etc.



#### **Intermediate charging**

Lithium batteries support so called opportunity charging. The lithium battery, which is not fully discharged can be charged in any time. However, frequent opportunity charging not to the full charging state and stop of charging process before the appearance of corresponding indication of charger may result in dis-balance voltage of cells which increases the battery BMS calculation error. In order to effectively deal with this phenomenon, charge the battery in full allowing the automotive balancing process to be completed at least once a week.



## Do not charge a fully charged battery

Note that in order to prevent the battery from continuing restart of charging under fully charged condition causing reduction of battery lifetime, the BMS has a protection function that prohibits recharging of fully charged battery.

## Potential hazards

If equipment is used according to its design purpose, following the correct operations procedures, there are no hazards anticipated.

The following hazards can arise in the event of improper use:

- Physical damage to the battery in case a battery falls or is deformed through impacts. Mechanical damages can cause leakages of harmful materials, fire or battery explosion.
- Short circuits may be caused by short connection of battery terminals, for instance, by water or other intentional/unintentional short connections.
- Temperature damages caused by placing of batteries in overheated environment conditions or being exposed to impact of fire, open sunlight etc. can cause leakages of harmful materials, fire or battery explosion.

In order to avoid fire, explosion and/or leakage of harmful materials, a safe place for storing non-functional or damaged batteries until the service arrives on site must satisfy the following criteria:

- Do not store in places where personnel is located.
- Do not store in places with valuable objects and close to valuable objects.
- A Class D fire extinguisher must be available on demand.
- There should not be any fire or smoke detectors in the storage area in order to ensure that an automatic fire detection system is only activated in the event of actual danger (e.g. flames).
- No ventilation intake pipes should be in the facility to exclude spreading of discharged content within a building.

Examples of where to store a non-functional battery:

- Roofed outdoor position.
- Ventilated container.
- Covered fire resistant box with pressure and smoke discharge option.

## Symbols - Safety and Warnings

	Used lithium-ion batteries must be treated as hazardous waste. Lithium-ion batteries marked with the recycling symbol and the sign showing a crossed-out waste bin must not be disposed of with ordinary household waste.
	Avoid fire and short circuits causing overheating. Do not ignite or locate batteries close to open flame, heat sources or sparks. Keep lithium-ion batteries away from heat sources.

	<p><b>Caution!</b> Battery short-circuit is prohibited.</p>
	<p>Protect the lithium-ion battery from solar radiation or other forms of heat radiation. Do not expose the lithium-ion battery to heat sources.</p>

## Explosion and fire hazard



Physical damage, thermal impacts or incorrect storage in the event of a defect can result in explosions or fire. The battery materials can be flammable.

## Particular hazard from combustion products

The lithium batteries may be damaged by a fire. When extinguishing a lithium battery fire, the following information must be taken into consideration.



### Contact with combustion products can be hazardous

Fire produces combustion products, which can occur in the form of smoke, through leaking fluids, escaping gases, debris as well decomposition products of certain chemicals. These combustion products are substances that enter the body through the respiratory tract and/or the skin, can produce and adverse effects such as choking.



- **Avoid contact with combustion products.**
- **Use protective equipment.**

## Special firefighting protective equipment

Use self-contained breathing apparatus.

Wear protective equipment.

## Additional firefighting instructions

To prevent secondary fires, the lithium-ion battery must be cooled from the outside.

Suitable extinguishing agents

- Carbon dioxide extinguisher (CO2)
- Water (not on mechanically opened or damaged batteries) •

Unsuitable extinguishing agents

- Foam
- Grease fire extinguishing agents
- Powder extinguishers
- Metal fire extinguishers (PM 12i extinguishers)
- Metal fire powder PL-9/78 (DIN EN 3SP-44/95)
- Dry sand

## Instructions for cooling an overheated, non-physically damaged battery

This type of damage may be caused by a short circuit inside the battery, which may result in leakage of harmful materials, fire or battery explosion.

### Material discharge

#### **Battery electrolyte fluid can be hazardous**

Electrolyte fluid can be discharged if the battery is physically damaged. Avoid its contact with skin or eyes. If the contact happened:



- Rinse the affected parts with big amount of water and request for medical assistance immediately.
- In case of skin irritation or if any substances are breathed in request the medical assistance immediately.

### Precautionary measures for personnel

- Keep personnel away, avoid any contact with smoke or discharged materials.
- Block off the affected area and ensure its reasonable ventilation.
- Wear personal protective equipment. If vapors, dust or aerosols are presented use self-contained breathing apparatus.

### Precautionary measures for the environment

Do not allow spilled fluids to enter the water system, drainage system or the underground water.

### Cleaning measures

The leaked fluid must be removed professionally following the related protocols.

### **Battery lifetime, maintenance and storage**

The lithium-ion batteries are maintenance-free.

### **Deep discharge can damage the battery**

Self-discharge without periodical recharge can lead the battery to fully discharged state. Full discharge shortens the service life of the battery and can cause deep discharge and activation of related safety protocols when battery will not be able to be charged anymore.

Before a long period of inactivity, the battery must be charged to 40%~60%.

Control the level of battery charge at least every 12 weeks and re-charge if necessary.

The temperature range for storing of the battery should be within the range of 0°C to 30°C.

If the battery is deeply discharged or if the battery temperature is below the permissible level, the battery cannot be charged. Deeply discharged batteries can never be charged. Due to the risk of condensate formation, batteries that have been stored at 0°C or below must only be charged after natural warming up to at least +5°C, forced heating is forbidden.

### **Instructions for safe handling of batteries**

- Do not modify the battery.

- Do not open, damage, drop, penetrate or deform the battery.
- Do not throw the battery into a fire.
- Protect the battery from overheating.
- Protect the battery from direct sun light.
- Follow storage and charging procedures
- Protect the battery from water damages and other impacts

Failure to comply with these safety instructions can result in fire and explosion or the leakage of harmful materials.

### **Pre-shift checks before the system is put into operation**

Check that the battery is in its normal condition, has no evidence of damages, leakages, abnormal findings, e.g. high temperature, smell, smoke etc. The surface of the battery should be clean and dry, without evidence of water damages, marks of rust on terminals and housing (if applicable). Connecting cables and plugs are in good condition.



### **Faults**

If any damage is found to the battery or battery charger contact the service provider immediately.

Do not open the battery or attempt to repair it.

### **Disposal and transport of a lithium-ion battery**

#### **Instructions for disposal**

Lithium-ion batteries must be disposed in accordance with the relevant national environmental protection regulations. Batteries must be treated as hazardous waste. Batteries must not be disposed with ordinary waste.

#### **Shipping information**

The lithium-ion battery is a hazardous material. The applicable regulations must be fulfilled during transportation.

#### **Shipping functional batteries**

Functioning batteries can be shipped in accordance with the related regulations

#### **Shipping faulty batteries**

To transport faulty lithium-ion batteries, contact the service provider. Faulty lithium batteries require following of special transporting procedures.