



K810

Industrial Road Sweeper

User Manual



Introduction

Preface

Dear Customer,

We hope that the superior quality of the K810 series road sweeper will enhance your confidence in purchasing our products. To ensure your safe operation of the machine, please read the safety section carefully before your first use.

Your safety and that of others depend on your ability to operate the machine. Therefore, please read the entire operation manual before using the machine for the first time.

This manual contains all the important information necessary for the operation, maintenance, and care of the machine. Safety information is marked with hazard symbols; please adhere to the safety regulations outlined in the "Safety Information" section.

In addition to the guidelines in this manual, you must also follow general safety regulations and accident prevention guidelines. Even if you have used similar sweepers before, please read the manual carefully. This will help you save valuable time during future use and maintenance. Before you begin using the machine, familiarize yourself with all the attachments, controls, and their functions; this is crucial for your safety.

Please note: Any necessary maintenance and repair work must only use genuine original parts. Only genuine parts can ensure the long-term reliable operation of the equipment. We reserve the right to make technical improvements.

The products provided by the manufacturer will continue to improve based on customer feedback and market demand. However, the manufacturer is not obligated to upgrade or modify products that have already been sold. If you have any questions, please consult the after-sales service department.

It should be emphasized that any operational activities described in this manual do not support any legal claims.

This manual is effective as of April 1, 2024.

Proposed Use

The K810 serie road sweeper is designed for cleaning wet and dry surfaces in environments such as real estate properties, small to medium sanitation services, production facilities, warehouses, and industrial parks. Any use outside this scope is considered improper.

The manufacturer is not liable for damages resulting from misuse; the user assumes all risks. This machine is not intended for cleaning toxic or flammable materials.

Proper use includes adherence to the manufacturer's operation, maintenance, and repair guidelines. Only trained personnel familiar with associated risks should operate, maintain, or repair the K810 series road sweeper.

Compliance with applicable accident prevention laws and recognized health and safety standards is required. The manufacturer is not responsible for damages from

unauthorized modifications.**Packaging**

Upon arrival, carefully inspect the machine for any visible damage. If significant damage is evident, retain the original packaging to file a damage claim with the shipping company.

Upon delivery, please check that the following items are included with the machine:

- Key
- Charger
- Tool Kit
- Warranty document

Unpacking Procedure

First, remove the items inside the machine (the charger is secured to the seat, and other accessories are located in the rear waste bin). Next, remove the securing ring from the rear wheels and reverse the machine. You may slightly elevate the front of the pallet to assist in gently lowering the machine to the ground.

Warranty Notice

The terms of the sales contract also apply to the warranty. Any damage resulting from failure to adhere to maintenance and care guidelines is not covered by the warranty.

The following items are excluded from the warranty: Fuses, Normal wear and tear, Damage due to improper handling, Damage caused by overloading, Unauthorized modifications to the machine.




Additionally, any damage resulting from the assembly of spare parts without prior written consent from Mingnuo or not following maintenance instructions is not covered under warranty. If the customer modifies the K810 series road sweeper in a way that affects the approved specifications, the original certification for the machine will be void.

Safety Information

1. Safety Information

1.1 Safety and Warning Symbols

This operation manual includes the following warning symbols related to personal safety, machine safety, and environmental protection:

Symbols	Related Issue	Definition
Safety Information 	Personnel	Safety Symbols: Indicate dangerous situations resulting from failure to strictly adhere to or completely disregard specified procedures or regulations.
Attention 	Machine	Related to the handling of equipment to maintain its operational capability.
Environmental Protection 	Environment	Caused by the use of substances that pose potential health and environmental risks.

1.2 General Provisions

In addition to adhering to the provisions of this operation manual, the following general safety regulations and accident prevention guidelines must be followed

- Carefully read this manual before operating the equipment and comply with its regulations during operation.
- It is recommended to deepen your knowledge of machine safety, as comprehensive understanding can prevent operational errors and enhance machine use.
- The warning labels on the machine provide important safety information. Replace any faded or missing labels with new ones.
- Do not remove or alter the nameplate on the machine.
- For safety reasons, always use original parts.
- The K810 series road sweeper should be kept away from hazardous areas.
- Mobile phones may only be used when the equipment is stationary.

- Carrying passengers is prohibited!
- The storage and operating temperature of the machine should be between -15°C and 40°C, with humidity levels ranging from 30% to 95%.

1.3 Operational Information

Before starting the machine, always check for operational safety! Address any faults immediately!

- Operators must be thoroughly familiar with all attachments, tools, controls, and their functions before beginning work. Attempting to learn while the machine is running is too late!
 - Always wear non-slip shoes when operating the machine.
 - Use the machine only on surfaces authorized by the customer or their designated personnel.
 - Do not place containers with liquids on the machine.
 - Do not use the machine as a means of transportation.
 - Be aware of your surroundings when operating the equipment, especially the presence of children.
 - This machine is not intended for removing hazardous, flammable, or explosive dust or substances.
 - The machine cannot be used as a vacuum cleaner, as using filter elements for dust removal can pose health risks.
 - Using this machine in explosive areas is prohibited.
 - After completing work, remove the start key to prevent unauthorized operation.
 - Before starting, confirm that the machine and attachments are in safe and normal condition. Do not use if defects are found.
 - Adjust the driver's seat before operating to ensure full visibility of the cleaning area.
 - Ensure all operational controls are in the off position before starting.
 - Before any maintenance or repairs, turn the start switch to the off position and remove the key from the main power switch.
 - Avoid allowing the brushes to continue rotating when the machine is not moving to prevent floor damage.
 - All starting, running, and stopping of the machine should be done solely by the operator inside the sweeper.
 - Ensure good ventilation when cleaning rooms filled with dust and flammable gases; otherwise, there is a risk of poisoning.
 - Adjust driving speed according to environmental conditions and load.
 - The three-wheeled machine has weaker driving capabilities compared to four-wheeled vehicles.
- Thus,



sharp turns at high speeds may cause tipping over.
Avoid turning on slopes, and do not turn while going uphill or downhill.
There is a risk of tipping over when driving on slopes.

- The machine may only be used on slopes with an incline of less than 15%.
- Do not exceed the vehicle's load capacity or axle load limits.
- After each job, operators should check and clean the debris from the waste bin.
- Avoid colliding with shelves that may cause items to fall.
- Adjust the machine's driving speed according to the ground's traction.
- Before opening the waste bin, ensure the operating area is clear of people, animals, and obstacles.
- Open the waste bin only on level, hard surfaces.
- Do not perform cleaning tasks while the waste bin is open. Be cautious of onlookers when emptying the bin.
- The filter may only be vibrated when the waste bin is closed.
- This machine is suitable for general waste; do not use it to sweep ropes, belts, hot debris, standing water, or flammable or toxic substances, as this may entangle or burn the main brush and side brushes, impairing their function.
- Keep loose clothing, hair, fingers, and any body parts away from the machine's air vents and moving parts.
- Do not use the machine in heavily contaminated areas; if road debris is thick, perform two or more sweeping passes.
- Do not alter the machine's safety devices. Always adhere to maintenance procedures.
- In case of fire, use a powder extinguisher; do not use water to extinguish the fire.

1.4 Maintenance Information

Operators must complete daily and weekly maintenance tasks. Other maintenance should be performed at the local Mingnuo service center.

- Adhere to the maintenance tasks and schedules specified in the operation manual.
- Use appropriate tools for cleaning, maintenance, and repair tasks.
- A qualified technician must check the machine's operational safety, following applicable accident prevention laws at reasonable intervals (recommended at least once a year) and complying with modification or repair regulations.
- Accessories must meet the manufacturer's technical specifications; only original parts can ensure compliance.
- The use of unapproved brushes or air filters is prohibited, as they can impact safety.
- Before inspections and repairs, turn off the motor and remove the ignition key.
- Regularly clean the waste bin to prevent bacteria buildup.
- This machine is splash-proof (IPX3); high-pressure cleaning equipment or steam cleaners must not be used.
- When transporting the equipment, ensure the motor is off.
- Provide adequate support when lifting the K810 series road sweeper with a forklift.
- No one should sit on the sweeper while it is being lifted.
- Use wedge blocks to prevent movement when changing wheels, which should be done on level, hard surfaces.
- Do not dismantle, install, or repair wheels at the roadside; contact a tire service provider with qualified personnel and appropriate safety tools.

- Welding, drilling, or grinding on the sweeper's frame is prohibited; only authorized service personnel may replace damaged parts.
- Only use original fuses, as using thicker fuses can damage the electrical system and pose a fire risk.
- Disconnect the battery's negative terminal when servicing the electrical system.
- The battery should not be left discharged for extended periods; charge it promptly.
- This machine features a Lithium battery pack.
- Be cautious of pinching and cutting hazards when installing, removing, or replacing batteries.
- Regularly inspect the braking system; only authorized Mingnuo service workshops or designated brake system centers should adjust or repair it.
- If operational issues arise, first verify they are not due to a lack of regular maintenance. If problems persist, seek help from the Mingnuo after-sales service center.
- For parts replacement, always purchase original spare parts from Mingnuo or its authorized dealers.
- To ensure safe and proper operation, maintenance personnel or service providers must follow the maintenance sections outlined in this manual.

1.5 Special Hazards

Safety Measures

The K810 sweeper must not be operated without all safety protective measures in place (including all external components of the machine).

Charging

Exercise extreme caution while charging to prevent fire hazards! Charging near open flames or sparks is strictly prohibited. Smoking is also forbidden in the vicinity while charging. Always turn off the motor and remove the ignition key. Engage the parking brake before charging. Do not charge in enclosed spaces.

Electrical System

- Only use original fuses specified for the connected load.
- If a fault occurs in the electrical system, turn off the machine immediately and resolve the issue.
- Only qualified electrical technicians who comply with electrical engineering regulations may operate electrical equipment.
- The machine's electrical components must be regularly inspected. Loose connections and damaged cables must be corrected immediately.

Battery

- This machine uses a Lithium Iron Phosphate battery.
- Follow the operating instructions provided by the battery manufacturer.
- Open flames are prohibited when handling or disposing of batteries.
- Do not place metal objects (e.g., tools) on the battery to prevent short circuits.
- To avoid electrical leakage, keep the battery dry and clean, particularly free from contaminants like metal dust.

- Connecting or disconnecting the battery is prohibited when the ignition key switch is in the ON position.
- Before disconnecting the battery, always remove the negative (-) terminal first, followed by the positive (+) terminal. When reconnecting, ensure correct polarity, as incorrect connections can damage electrical components.
- Avoid direct contact between the positive and negative terminals, as this can cause a high-current short circuit, resulting in excessive heat and potential fire hazards.
- Recharge the battery promptly if it is in a low-voltage state to prevent shortening its lifespan.
- Charging should be done in a well-ventilated area, keeping the seat cover open to prevent overheating and the risk of spontaneous combustion.

1.6 Environmental Protection

- When using substances that may be harmful to health and the environment, ensure you have appropriate practical expertise.
- All tools used during maintenance should be stored in suitable containers. Dispose of waste according to applicable waste disposal laws and regulations regarding used oil.
- Prevent leaking oil, lubricants, or other substances from contaminating the soil to avoid groundwater pollution. Clean up any spills and handle them according to relevant regulations.
- Depending on the nature of the filtered materials, used filters are often classified as special waste and should be disposed of in accordance with applicable regulations.
- Batteries contain highly corrosive sulfuric acid; therefore, handle them with care. Used batteries should be treated as special waste and disposed of according to relevant regulations.
- Waste batteries marked for recycling contain recyclable materials. Batteries marked with a crossed-out trash can symbol must not be disposed of with regular waste. Recycling of batteries must comply with national and local laws and regulations.
- Even when disassembling the machine for disposal, ensure someone is present to oversee the process, as some hazardous materials (e.g., batteries, waste oil) must still be handled according to local laws and disposed of at designated waste centers.

Main Components



Figure 1

Figure 1

- 1-Front Side Brush
- 2-Rear Side Brush
- 3-Main Brush & Side Rubber
- 4-Headlight
- 5-Toplight
- 6-Warning Beacon
- 7-Windshield Wiper
- 8-Rearview Mirror
- 9-Lower windshield
- 10-Upper windshield
- 11-Left upper window
- 12-Left lower window
- 13-Left rear window
- 14-Left side door
- 15-Water tank
- 16-Bumper



Figure 2

Figure 2

- 1-Tailight
- 2-Right upper window
- 3-Right lower window
- 4-Right Rear window
- 5-Left side door
- 6-Filter cover
- 7-Vacuum motor air outlet
- 8-Waste Hopper
- 9-Storage rack
- 10-Hose reel
- 11-Fog Cannon (Optional)

Initial Operation

2. Initial Operation

The sweeper must be operated by trained personnel on relatively flat surfaces such as concrete or asphalt for cleaning (sweeping) dirt or light debris.

2.1 Guidance

Before the first operation, proper guidance is required. Only qualified personnel dispatched by the local distributor can provide instruction for initial machine operation. The distributor will contact you to schedule the guidance date after receiving the delivery notification from the manufacturer.

Unpacking Process

1. Remove all accompanying items from the machine (the charger is secured to the seat, and other accessories are placed in the waste bin at the back of the machine).
2. Remove the securing ring from the rear wheels, then back the machine up. You may lift the front of the pallet slightly to allow the machine to easily roll to the ground.

2.2 Initial Battery Charging



Before the first operation, charge the battery according to the initial charging procedure, the charger user manual, and the instructions provided by the battery manufacturer. The manufacturer is not liable for any damage caused by incorrect initial battery charging.

2.3 Pre-Operation Checks

Before operating the machine, perform the following checks:

1. Inspect the parking area for any signs of leaks. Ensure hoses, lines, and the tank are leak-free and undamaged.
2. Open the seat cover.
3. Check the battery and connection cables.
4. Inspect the motor and drive chain.

2.4 Starting the Machine



Before starting the machine, read and follow the operating regulations in the "Safety Information" section!

To start the machine, operate the following control elements in order:

1. Set all operational switches to the "Initial Position."
2. Confirm that the waste bin is securely closed.
3. Ensure the side brushes and main brush are raised.
4. Turn the ignition key to the "ON" position.
5. Check the battery level and voltage gauge.
6. Move the forward/reverse switch to the forward position, press the accelerator pedal, and the sweeper will begin to move forward.



Do not start the machine in temperatures below -15°C.



The machine cannot be started when the accelerator pedal is in a locked position.



To restart the machine after the motor has shut off, turn the ignition key to the "OFF" position before attempting to restart.



When restarting, allow a 10-second interval between attempts to conserve battery power.

2.5 Sweeping Operation

To operate the machine, follow these steps:

1. Inspect the machine (refer to the "Pre-Operation Checks" section).
2. Start the sweeper (refer to section 2.4).
3. Adjust the travel speed.
4. Press the main brush and side brush buttons to lower them for automatic sweeping.
5. Press the drive pedal until the desired angle is reached.
6. For large debris (e.g., sticks, cigarette boxes), press the large debris pedal and drive slowly to the area that needs cleaning. The main brush can sweep large debris into the waste bin.
7. Regularly check the waste bin and empty it as needed.

2.6 Parking and Braking

1. Release the drive pedal; the sweeper will decelerate and come to a stop.
2. Raise the main brush and side brushes.
3. Turn off the switch and remove the key.



When the machine is unattended, always remove the key to prevent unauthorized use.



Obstacles up to 5 cm in height can be safely passed. Before driving over obstacles, press the large debris pedal and raise the main brush and side brushes. For obstacles taller than 5 cm, a ramp must be used for passage.

2.7 Post-Use Maintenance

1. Drive the sweeper to an appropriate location for cleaning.
2. Turn off the machine and raise the main brush and side brushes.
3. Activate the vibration program.
4. Empty the waste bin (see section 3.2.4).
5. Clean the machine.



Do not use high-pressure cleaning equipment on electrical components.

3. Operation

3.1 Workflow

Function Description

The K810 series sweeper is designed for cleaning both wet and dry surfaces in areas such as real estate properties, small to medium-sized sanitation services, and small to medium-sized manufacturing plants, warehouses, and industrial parks.

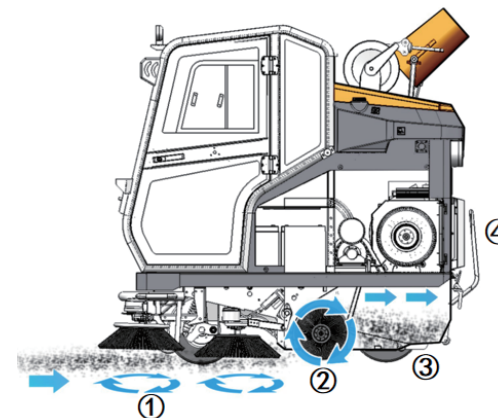


Figure 3

The side brush (Fig. 3/1) is used for cleaning corners and edges, as well as increasing the working width to enhance cleaning efficiency over larger areas.

The main brush (Fig. 3/2) sweeps debris into the waste container (Fig. 3/3). Fine dust in the waste container is removed by the suction fan and separated by the filtration system (Fig. 3/4).

After opening the waste container, you can directly remove the trash bag and dispose of it in a standard waste collection bin.

3.1.1 Main Brush

The main brush (Fig. 3/2) consists of V-shaped bristles. It has a width of 790mm and a diameter of 350 mm. The operator can raise or lower the main brush using the main brush switch (Fig. 4/2).

3.1.2 Side Brush

Standard Configuration: The machine has four side brushes in two rows. The front side brushes, located on the left and right (Fig. 3-1), are raised or lowered by the side brush switch (Fig. 4-1). The rear side brushes, positioned beside the main brush, move up and down with it, controlled by the main brush button (Fig. 4-2).



Figure 4

3.1.3 Dust Filtration System

The filtration system is installed inside the filter box (Fig. 3-4), located directly above the dustbin (Fig. 3-3). The suction motor directs fine dust swept by the main brush into the filter mesh (Fig. 3-4), where it is separated. Fine dust particles accumulate on the outer surface of the filter blades.

▲ When sweeping larger debris, the filter mesh (Fig. 3-4) should be checked and cleaned regularly.

3.1.4 Filter Shaking System

Due to the built-in dust-shaking system, some of the dust collected in the filter mesh (Fig. 3-4) falls into the dustbin (Fig. 3-3). To maintain optimal dust control, it is necessary to regularly activate the dust-shaking system.

3.1.5 Braking and Drive System

Braking System (Figure 5-1)

K810 sweepers are equipped with a braking system (Fig. 5-1). The black pedal is for braking, and the red one is for parking brake. The drum brake pads are installed on the rear wheels and controlled via the brake cable.

Driving Pedal (Figure 5-2)

Using the forward/reverse button on the dashboard (Fig. 7-10), the drive pedal (Fig. 5-2) controls the sweeper's forward and reverse movement. The driving speed varies with the pedal's angle. When the driver releases the pedal, it returns to its original position, and the machine slows down until it stops.

▲ The forward/reverse shifting function requires pressing the brake pedal to activate.

Flap Pedal (Figure 5-3)

The front rubber flap, which can be opened or closed, allows larger debris to enter the waste intake.

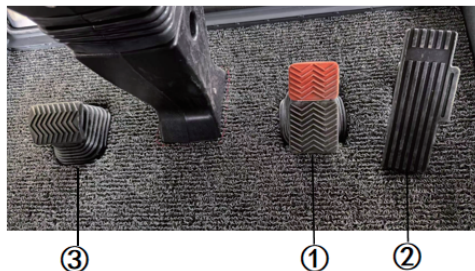


Figure 5

3.1.6 Transmission Assembly

The K810 sweepers are equipped with a chain-drive transmission system.

3.1.7 Waste Hopper

To dump the waste hopper (Figure 6), lift the handle to release the hopper latch, then pull the waste hopper out backward.



Figure 6

3.2 Operating Principle

3.2.1 Control Panel (Figure 7)

- 1)Key
- 2)Windshield Wiper
- 3)GPRS (The display shows the current battery voltage and current. Please recharge the battery when the voltage drops below 42V.)
- 4)Headlight Switch

- 6)Filter Shaker
- 7)Water Spray Switch
- 8)One-button Start
- 9)Front Side Brush
- 10)Forward/Reverse
- 11)Electromagnetic brake release button (press and hold for 10 seconds)



Figure 7

3.2.2 Filling Water (For Dust Control)

Open the water tank cap and fill the tank with water (Fig. 8).

Important Note: When the temperature is below 0°C, make sure to drain the water from the tank after use (Fig. 8).



Figure 8

3.2.3 Emptying the Waste Hopper

Follow these steps to empty the waste hopper:

- Raise and close the side brushes and main brush.
- Activate the filter shaking system and run for 1 minute.
- Open the lock and pull out the hopper.
- Remove the disposable garbage bag and dispose of it in the local designated waste collection bin.
- Replace with a new garbage bag.
- Reinsert the waste hopper and lock it.
- Restart the sweeper.

△ When moving the waste hopper, the main brush cannot be activated.

△ During the emptying process, do not move the sweeper.

△ Regularly clean the waste hopper.

△ When leaving, ensure that the waste hopper is returned to its working position to avoid the risk of damage!

3.3 Starting the Machine

3.3.1 Driving Mode

- 1) Ensure that the side brushes and main brush are in the raised position.
- 2) Insert the key and turn it to the ON position (turn to the lighting position if you need to activate the front lights).
- 3) Switch the forward/reverse control to the forward position, press the accelerator pedal, and the sweeper will start moving forward.

3.3.2 Sweeping Mode

- 1) Press the main brush and side brush buttons to automatically lower them for sweeping.
- 2) Once sweeping is complete, press the main brush and side brush buttons again to raise them and stop their rotation.
- 3) Press the brake pedal, switch the forward/reverse control to the forward position, and press the accelerator pedal to begin sweeping the ground.
- 4) If you need to sweep large debris (like sticks or cigarette butts), press the large debris pedal and drive slowly to the area to sweep them into the waste hopper.
- 5) If the work environment is particularly dirty, stop the machine after a certain interval to activate the filter shaking system (hold the filter shaking button).
- 6) Regularly check the amount of garbage in the bin and empty it as needed.

3.3.3 Navigating Obstacles

1. Obstacles up to 5 cm in height can be safely passed. Before moving, press the large debris pedal and raise the main brush and side brushes.
2. For obstacles greater than 5 cm, approach them via a ramp.

△ Operational Considerations

1. During operation, decide whether to temporarily activate the vibration system based on the amount of debris on the ground.
2. If the filter is blocked or the garbage bin is full, the machine will be unable to collect debris. The bin must be emptied after every use and once it is full.
3. Every 45 minutes of operation, stop the machine to activate the dust vibration for 1 minute and empty the garbage bin.

3.3.4 Emptying the Waste Hopper

1. Release the pedal to stop the machine.
2. Open the waste hopper latch.
3. Pull down the waste hopper and drag it out to dump the debris.
4. Place the waste hopper back into the machine and secure the latch.
5. The machine is now ready for operation again.

3.3.5 After Using the Machine

Before leaving the machine after work, please perform the following actions:

- Press the stop button to raise the main and side brushes.
- Press the filter shaker button to shake the filter.
- Empty the waste hopper.
- Remove the key from the power switch.



Attention When the machine is not in operation, the brushes must be raised to prevent deformation.

3.3.6 Pushing/Towing the Machine

Warning: When the machine is powered off and needs to be pushed or towed (or in case of a malfunction), ensure that the speed does not exceed 5 km/h and that the electromagnetic brake is released in advance.

- 1) If the machine is powered on and the electromagnetic brake and controller are functioning properly, you can unlock the electromagnetic brake by pressing the unlock button located to the left of the ignition switch. Hold the button (Figure 7-11) for 10 seconds to unlock.
- 2) When the machine is powered off and the brake and controller aren't working, manually unlock the axle brake to push or tow. Use a tool to loosen the hex nut at the end of the axle motor, then turn the hex screw to release the brake fully. Return the screw and nut to their original positions when done (see Fig. 9).



Figure 9

3.3.7 Machine Storage and Maintenance



Warning Perform maintenance operations only when the machine is stopped (remove the ignition key). If necessary, remove the battery. Please read the safety section of the manual carefully before proceeding.

If the Machine Will Not Be Used for 30 Days, follow these steps for storage and maintenance:

1. Store the machine in a clean and dry location.
2. Disconnect the battery connector.

3.3.8 Post-First Use Check

After the first 8 hours of operation, it's necessary to check the following:

1. Inspect connections and fastened areas for any signs of looseness.
2. Check visible components for completeness and damage.

Maintenance and Repair

4 Maintenance and Repair

4.1 Installation and removal of the front side brush (see Fig. 10).

- 1) Open the sweeper's waste hopper and remove the front side brush.
- 2) Loosen the star-shaped nut on the lower guard plate (see Fig. 10).
- 3) Open the lower guard plate.
- 4) Position the corresponding front side brush in place.
- 5) Remove the pin from the end of the front brush rod as shown.
- 6) Place the front side brush in the correct position.
- 7) Reinstall the pin and retaining ring.
- 8) Connect the motor's wiring terminal.
- 9) Remove the R-pin and flat washer from the small shaft.
- 10) Attach the push rod buffer to the small shaft, then reinstall the flat washer and R-pin.
- 11) Close the lower guard plate, tighten the star-shaped nut, and the installation is complete. The installation procedure is the same for both the left and right front brushes.

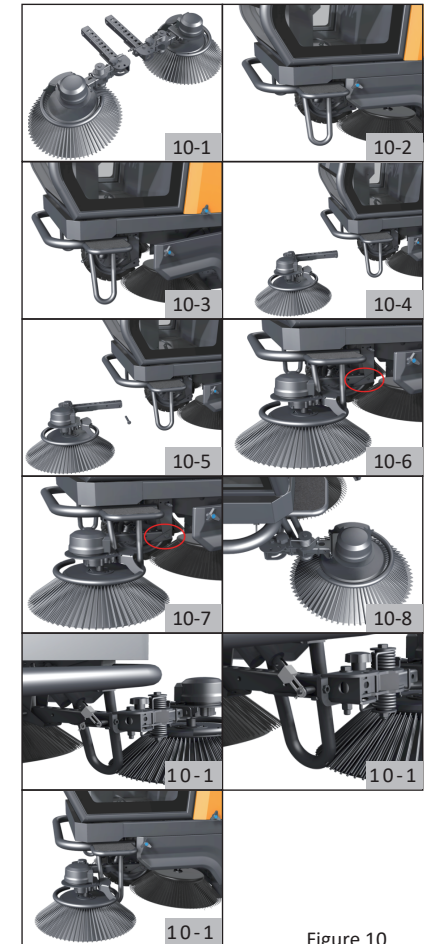


Figure 10



Attention!

Before installing the front side brush, turn on the key switch and press the side brush sweeping button. Then turn off the key switch and proceed with the following installation steps. This will make it easier to align the end rod bearing with the mounting lug.

4.2 Checking Main Brush Ground Pressure

1. Verify that the main brush is positioned correctly off the ground by following these steps:
 - Use the machine on a flat surface.
 - Keep the main brush stationary for a few seconds, then rotate it.
 - Check the brush marks along its length; they should be 2 to 4 cm wide.
 - If the brush marks do not meet this specification, adjust the pressure between the brush and the ground.
2. If the brush is excessively worn and cannot be adjusted, it should be replaced (follow the instructions in the next section).

! Careful (Figure 11)

If the main brush marks exceed 5 cm, it will adversely affect the normal operation of the machine and may cause the components to overheat, thereby reducing the machine's lifespan. Exercise caution when performing the checks mentioned above, and ensure the machine is used only under the specified conditions.

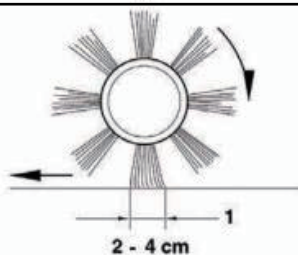


Figure 11

4.3 Installing and Removing Main Brushes

- Unscrew the star-shaped nut and open the guard (Fig. 12-1).
- Remove screw 1 and rotate screw 2 (Fig. 12-2).
- Detach the rocker arm.
- Remove the left guard.
- Pull out the main brush (Fig. 12-3).
- Replace with a new main brush.



图12

! Attention

You can choose a hard or soft brush based on the floor conditions. When replacing the main brush, it's best to wear gloves to avoid potential injury from the bristles.

! Careful

The main brush's rotation direction is shown in Fig. 12-4. Ensure the main brush is installed as shown, and check the brush's pressure against the floor as described in the relevant section.

4.4 Installation and Removal of the Rear Side Brush

The primary function of the second-row side brush is to use its rotation to gather debris from both sides toward the center, allowing the main brush to collect it into the waste bin. The side brush is effective for sweeping debris from edges and corners, increasing the cleaning area.

1、Adjusting the Side Brush Height

In normal operating conditions, the brush should be positioned as shown in Fig. 13-1. If the brush is set too low, it will increase friction with the ground, accelerating wear. Once the bristles wear down, they won't make proper contact with the floor, significantly reducing cleaning effectiveness. Adjust the support bolt 1 (Fig. 13-2) to lower the side brush to the appropriate position.

2、Replacing the Side Brush

Remove screw 2 (Fig. 13-3) to detach the side brush. Then, unscrew screw 3 (Fig. 13-3) to replace the brush. Reinstall the brush by reversing these steps.



Figure 13

! Attention

Do not use water or cleaning agents to clean the filter, as this could damage it.
If possible, check the condition of the rubber seal on the frame filter. If necessary, replace it, and then reinstall the filter in the reverse order.

4.5 Filter Inspection and Cleaning

- Remove the waste hopper and detach the filter box cover (see Fig. 15-1).
- Pull out the terminal (see Fig. 15-2).
- Unscrew the star-shaped nut and remove the filter (see Fig. 15-3).

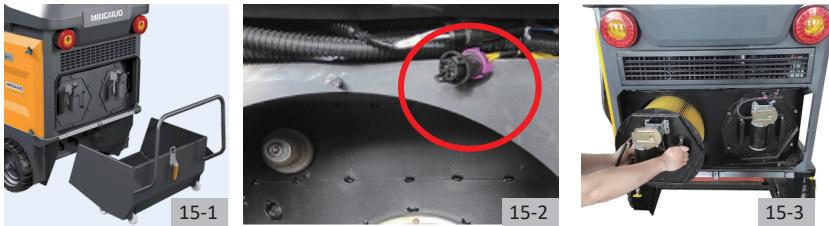


Figure 15

4.6 Checking the position of the rubbers

1. Turn the machine's key to the "OFF" position.
2. Place the machine on a level surface suitable for checking rubber height.

Side Rubber Check:

1. Remove the left and right guards.
2. Inspect the side rubbers for integrity. Replace if gaps exceed 10 mm or cracks exceed 10 mm.
3. Check the height of the side rubber from the ground; it should be between 0–3 mm. Adjust if necessary.
4. Reinstall in reverse order.

4.7 Battery Charging (Charging Port in Fig. 16)



Careful

Charge the battery after each use when the warning light illuminates to extend battery life.



Attention

To stop charging, disconnect the DC plug after turning off the AC socket switch. Only then can you remove the DC plug.



Danger

Avoid touching the battery terminals and DC plug pins.



Figure 16

4.8 Charger Instructions

4.8.1 Safety Information

1) AC Input, Charging Output, Connection Cable Precautions:

- Use a 16A or larger compliant three-prong socket for AC input. The copper wire gauge for the AC line should be $\geq 2.5 \text{ mm}^2$, or a larger compliant flame-retardant wire based on total length. Grounding: Do not disconnect the ground wire from the charger socket. The grounding terminal of the charger plug connects to the charger casing. Failure to follow these requirements poses a risk of electric shock.
 - Ensure that the connection from the charger to the battery meets the output current safety requirements with a copper wire gauge of 6 mm^2 . A smaller gauge may lead to voltage drops, affecting charging performance and potentially causing fires.
 - Regularly check for poor connections or damage to AC and DC plugs and sockets. Replace immediately if found faulty to avoid operational issues or fire hazards.
 - Inspect the AC and DC charging wires for aging or damage. Replace if found to prevent electric shock or fire incidents.
- 2) Never use the charger inside the vehicle. Keep the charger and all connections away from flammable materials like clothing, paper, and gasoline during charging, as aging or poor connections can cause overheating and fire.
 - 3) Users are not allowed to modify wiring or functionality without our company consent.
 - 4) Disconnect the charger during thunderstorms to prevent damage.
 - 5) Do not open the machine; it contains high voltage and should not be accessed by non-professionals.
 - 6) This charger is portable and not intended for in-vehicle use. Avoid carrying it in the vehicle for extended periods.
 - 7) Follow the operating instructions strictly; users are responsible for consequences due to improper use.

4.8.2 Usage Guidelines and Methods

1. Charger and AC Power Grid Compatibility:

Before using the charger, ensure the AC voltage and frequency are within the specified range (Input Voltage: $220\text{V} \pm 15\%$, Input Frequency: $50 \pm 5\text{Hz}$). Low voltage (below 90V) may reduce charging current or activate shutdown protection, affecting battery performance. High voltage can damage the charger.

2. AC Power Cable and DC Charging Cable Polarity:

- a) The AC input line is located at the rear of the charger (fan side). The input plug is marked with L, N, and Ground. Ensure correct connections to the socket. A secure ground connection is essential to avoid electric shock or static electricity hazards.
- b) The charging output line is at the front of the charger (indicator side). The positive and negative polarity can be identified by wire color: "Red" or "Brown" for battery "+" and "Blue" or "Black" for battery "-" (confirm special requirements with the customer).

The connection method for the charger plug's "+" and "-" may vary by plug, socket, and user requirements. Ensure the charging socket polarity matches the charger plug to enable charging.

3. Charging Method:

First, securely connect the charger's output plug to the battery, then connect the AC plug to the AC socket. If connections are normal, the charger will enter charging mode with a flashing charge indicator. Once fully charged, the green light will stay on. After charging, first disconnect the charger's AC input, then the DC output.



Warning

Avoid parking the machine for extended periods to prevent deformation of the solid tires, which can affect driving comfort.

4.8.3 Troubleshooting

1) LED Indicator Status

Indicator Labels		
Battery Indicator	Red light flashing: Battery level < 80% Yellow light flashing: Battery level > 80% Green light flashing: Battery level 100%	Charging: Red light flashing Fully Charged: Green light steady on
None Load Indicator	Red and Green lights flashing alternately:	
Fault Indicator ("-" represents a 1-second pause)	Overvoltage (flow) fault:	RED-GREEN-RED- - -
	Environment temperature too high or too low※:	RED-GREEN-RED-GREEN- -
	Charger overheating:	GREEN-RED- -
	Output undervoltage:	RED-GREEN- -
	Abnormal input AC voltage:	RED-GREEN-RED-GREEN-RED- -
	General error:	GREEN-RED-GREEN- - -
Fully Charged Indicator	Green light steady on:	

NOTE: 1. "※": Charging products with communication; this issue is classified as a "communication fault."

2. The indicator light status in the table above reflects the default setting from the manufacturer. If the customer specifies a different indicator status, the declaration on the label attached to the charger's casing shall prevail.

2) Common Faults and Solutions

Indicator Light Status ("-" represents a 1-second pause)		Fault Indicator	Solutions
1	RED-GREEN-RED-GREEN-RED-GREEN- - -	No load	Check if the charger and battery are properly connected and if the battery voltage is too low.
2	RED-GREEN-RED	Overvoltage (flow) fault	If the issue occurs again after restarting, return the unit for repair.
3	RED-GREEN-RED-GREEN- -	Environment temperature too high or too low※	Check the external temperature of the charger and the environment temperature at the probe.
4	GREEN-RED- - - -	Charger overheating	Check if the charger's environment temperature is too high.
5	RED-GREEN- - - -	Output undervoltage	Return the unit for repair.
6	RED-GREEN-RED-GREEN-RED- -	Abnormal input AC voltage	Check if the input voltage meets the requirements and if the plug is properly connected.
7	GREEN-RED-GREEN- - -	After any of the above 5 errors occurs 5 times, the resulting error status	Power on again, observe the indicator light, and check which of the 1-5 error statuses it corresponds to, then follow the corresponding solution.

NOTE: 1. "※": For charger products with communication, check the communication connection lines.

4.9 Sweeper Fault Quick Reference Table

Issues		Potential Causes		Suggested Solutions	
No display on Dashboard when power is on		Blown fuse		Replace Fuses	
		Battery lack of voltage output		Charge; Change battery (charge every two months if not in use)	
Driving Motor Malfunction	Machine does not move properly	Damaged differential	Driving motor doesn't work	Driving motor works	Replace Transmission gears
				Motor burnout	Replace Motor
				Blown fuse	Replace Fuse
				Worn carbon brushes	Replace carbon brushes
				Loose wiring	Checking wiring
				Faulty controller or throttle	Replace controller or throttle
				Faulty brake travel switch	Replace brake travel switch
				Faulty gear switch	Replace gear switch
	Cannot move in one direction (Forward or Backward)	Faulty gear switch		Replace gear switch	
		Faulty throttle		Replace throttle	
		Faulty controller		Replace controller	
	Brush doesn't work		Faulty driving switch		Replace driving switch
Faulty linear actuator			Replace linear actuator		
Faulty brush disc			Replace brush disc		
Damaged brush motor belt			RReplace brush motor belt		
Faulty "Brush" button			Replace "Brush" button		
Blown fuse			Replace fuse		
Damaged relay		Replace relay			

Issues	Potential Causes			Suggested Solutions
Inadequate Cleaning	Worn Brushes			Replace Brushes
	Worn Rubbers			Replace Rubbers
	Brush Not Lowering Properly: Steel cable may be stuck			Inspect for Jams
	Filter Malfunction	Filter clogged		Filter shake for 2-10mins
		Fan Motor Not Work	Loose wiring	Check wiring
			Burnt Motor	Replace Motor
			Worn Carbon Brushes	Replace Carbon Brushes
Too Fast Cleaning Speed			Reduce Cleaning Speed	
Large Leaves or Debris Particles Are Being Missed	Too Fast Cleaning Speed			Reduce Cleaning Speed
	Too Light Brush Pressure			Adjust Brush Pressure
	Brush Bristles Deformed or Tangled			Clear any strings or wires
Dust Left on Floor or Escaping from Side Dust Guard	Clogged Filter			Clean the Filter
	Damaged Dust Guard			Inspect Dust Guard; replace if damaged
Leaving Paper Scraps, Leaves, or Other Debris	Dust Guard Lift Mechanism Malfunction			Repair the Dust Guard Lift Mechanism
Debris Moves Forward	Damaged Flap			Replace Flap
Flap Lifted by Main Brush	Damaged Flap			Replace Flap
Brushes Wearing Out Quickly	Brush Pressure Too High			Reduce Brush Pressure
	Rough Floor Surface			
Excessive Noise from Main Brush	Brush Entangled with Wires			Remove Debris
Brush Not Rotating During Operation	Damaged Drive Belt			Replace Drive Belt

Issues	Potential Causes	Suggested Solutions
Brush and Fan Motor Not Operating	Blown Fuse	Replace Fuse
Trash Bin Leaking Debris	Damaged Trash Bin Seal	Replace Seal
	Overfilled Trash Bin	Empty the Bin
Drive Motor Operates but Vehicle Doesn't Move Forward or Reverse	Disconnected Drive Motor Cable	Inspect Wiring
	Faulty Pedal Adjuster	Repair Adjuster
	Broken Control Switch	Replace Switch
	Blown Fuse	Replace Fuse
Battery Won't Charge	Damaged Battery	Replace Battery
	Charger Malfunction	Inspect Charger
	Loose Battery Terminal	Tighten Connections
	Over-voltage	Reduce pressure
Battery Drains Too Quickly	Insufficient Charging Time	Increase Charging Time
	Damaged Battery	Replace Battery

4.9 Maintenance

To ensure the machine's lifespan and operational safety, regular and proper maintenance is essential. The maintenance intervals may be adjusted based on appropriate working conditions, as determined by qualified maintenance personnel. The standard maintenance requirements are listed in the table below.



Warning

Maintenance operations should be performed with the machine turned off (key removed) and, if necessary, with the battery disconnected. Please carefully read the safety sections in this manual before proceeding.

4.9.1 Operating Conditions:

- Ambient Temperature: -10°C to 40°C
- Relative Humidity: 5% to 70%
- Environment: No conductive dust, no risk of explosion
- Atmosphere: Free of metal-corrosive gases or vapors
- Indoor Use: Ensure a well-ventilated, vibration-free environment with at least 300mm of space around the machine



Attention

Additional maintenance procedures are outlined in the maintenance schedule.

4.9.2 Warranty Exclusions

The following situations are not covered by the warranty:

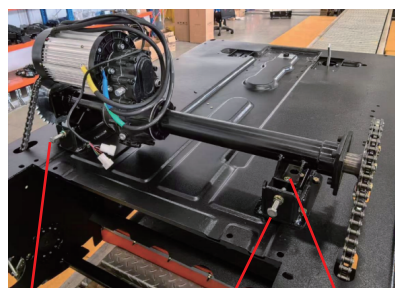
- Machine damage or malfunction due to neglecting maintenance as specified in the manual
- Visible damage to the machine's appearance or structure due to improper operation
- Unauthorized disassembly or modifications not approved by the manufacturer
- Damage caused by weather or other uncontrollable external factors
- Wear-and-tear parts (main brush, side brush, belts, pulleys, skirts, filters, etc.)
- Use beyond 1 year or exceeding 1500 operating hours

4.9.3 Chain Maintenance

1. Regular Cleaning: Clean the chain periodically using a specialized chain cleaner and brush to remove dust and debris.
2. Regular Lubrication: Apply appropriate lubricant to the inner side of the chain in moderation to reduce friction with the gears and extend the chain's life. Lubricate before each shift; inadequate lubrication can reduce chain life to 50% of normal.
3. Regular Replacement: Replace the chain when it reaches its adjustment limit (when the axle is at its highest position and the chain is still loose) or after 2000 hours of use (or 1 year, whichever comes first).
4. Water Avoidance: Keep the chain dry to prevent rust. If it does come in contact with water, promptly clean and lubricate it.
5. Weekly Inspection: Inspect the drive chain weekly (or every 100 hours max) for tension, locked clips, and wear on the chain and sprockets.
6. Checking Chain Tension:
 - 1) Park the machine on a flat surface and lift the red seat cover;
 - 2) Mark the initial position as "A" on the chain (see Fig. 17);
 - 3) Push the chain left until fully taut and mark as "B." Measure distance AB as "f."
 - Optimal tension is at 0.5cm–1cm;
 - adjust tension if "f" reaches 2cm;
 - If "f" reaches 3cm, it's unsafe.



Figure 17



Adjusting Bolt(2) Lock Nut(2) Fixing Bolt(4)

Figure 18

7. Chain Adjustment (Fig. 18):

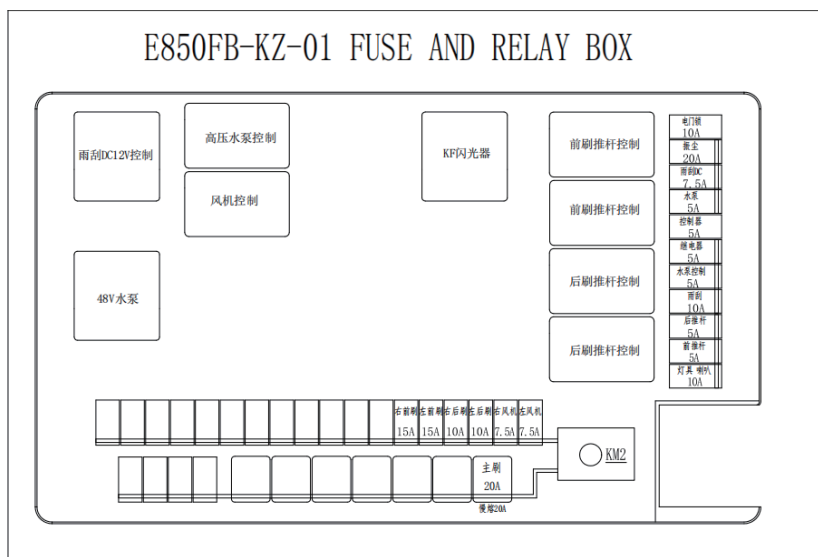
- 1) Park on flat ground, turn off the machine, and open the side panel;
- 2) Loosen the screws connecting the drive axle bracket and axle;
- 3) Adjust the tension screw to set "F" between 0.5cm–1cm, then tighten the locking nut;
- 4) Retighten the screws connecting the drive axle bracket and axle.

8. Be Alert to Risks: If the chain slips or jumps during operation (indicated by unusual noises), this is a warning sign of potential chain detachment. Stop the machine immediately and inspect the chain.

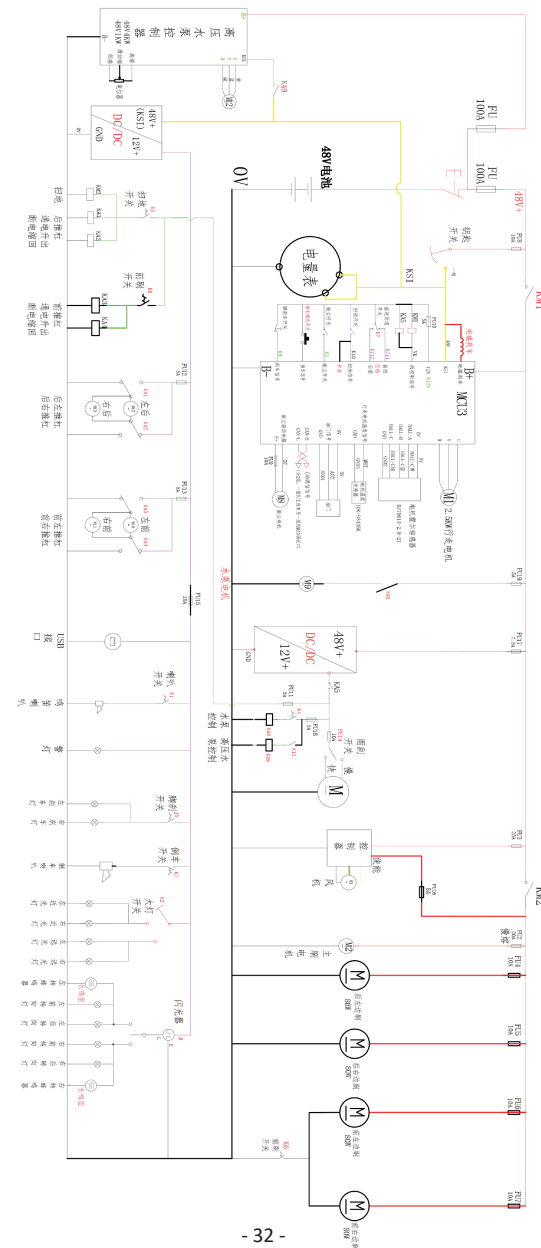
4.9.4 Maintenance Schedule

Work Description	Maintenance Interval				
	1 day	1 week	Every 250h	Every 500h	Every 10000h
Check battery level; charge if necessary	●				
Empty the waste container	●				
Clean the vacuum filter	●				
Remove any entangled materials from the roller brush	●				
Clear entangled materials from the side brush unit	●				
Remove debris from the machine and clean the exterior	●				
Inspect roller brush performance and wear		●	●	●	●
Check the suction power of the dust control fan		●	●	●	●
Inspect side brushes' angle and proper ground pressure		●	●	●	●
Check the watering dust control system for blockages		●	●	●	●
Inspect the clean water tank filter for blockages		●	●	●	●
Inspect batteries and charging equipment		●	●	●	●
Inspect battery brackets and terminal connections		●	●	●	●
Check steering mechanism for flexibility and gaps		●	●	●	●
Inspect the steering pinion and gear for damage		●	●	●	●
Check the drive chain; adjust tension and lubricate		●	●	●	●
Test and inspect brake performance; adjust if necessary		●	●	●	●
Conduct trial operation and functional testing		●	●	●	●
Inspect wipers and wiper blades			●	●	●
Check tire condition			●	●	●
Inspect front wheel support components			●	●	●
Check front and rear wheel bearings for abnormalities			●	●	●
Inspect electrical equipment (lighting, fuses, relays)			●	●	●
Clean dust and debris from the ventilation grilles			●	●	●
Inspect belt and bearings of the roller brush driver			●	●	●
Check sweeping belt driver and brush lifting mechanism			●	●	●
Inspect the front collision protection device			●	●	●
Check drive motor performance				●	●
Inspect the sweeping motor, water spraying system				●	●
Check the suction turbine and dust shaking motor				●	●
Inspect the main brush motor and side brush motor for carbon powder; check carbon brush operation for flexibility and wear; replace if necessary					●

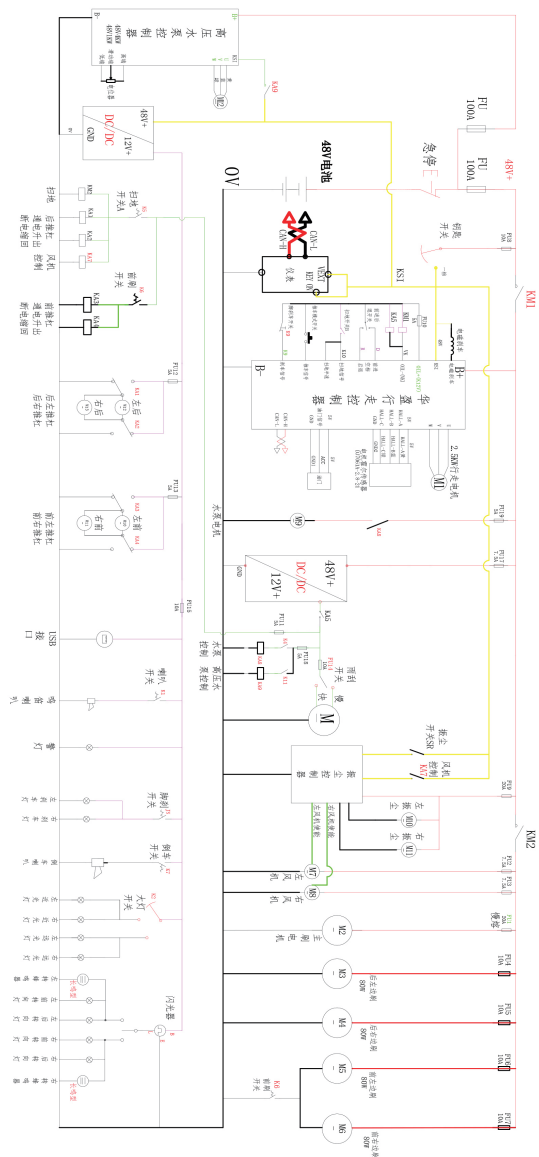
4.12 Fuse Box



4.13 Electrical Schematic Diagram



Electrical Schematic Diagram



Safety Guidelines for Ascending and Descending Slopes

Appendix 1

Safety Guidelines for Ascending and Descending Slopes with the K810 Series Floor Sweeper
To ensure operational safety, it is recommended that the K810 series floor sweeper be used, stored, and charged on level surfaces. This minimizes the frequency of ascending and descending slopes. If it is necessary to perform these operations outside of work paths, select areas with gentle inclines. Ascending and descending slopes should be executed only by specially trained personnel.

Maximum Slope Guidelines

- The maximum slope for the K810 series is 15% when unloaded.
- Continuous operation on this slope should not exceed 1 minute.

1. Operator Requirements:

- Training and Licensing: Operators should be young, licensed drivers who have successfully completed Mingnuo training.
- Team Operation: At least two people must perform slope operations:
 - One person acts as a safety coordinator (e.g., directing, clearing obstacles).
 - The other operates the K810 series.

2. Pre-Operation Checks:

Before operating the K810 series floor sweeper on slopes, it is crucial to perform thorough pre-operation checks to ensure safety and functionality (such as Brake, Battery, Charger Level, Chain tension, Chain Locks, Tires, Front Wheel Support Assembly, etc.)

- Always wear the safety belt while operating the sweeper. Ensure that the safety belt is reliable and functions properly;
- Check the water tank level, ensuring it is below 1/4 full. It is prohibited to operate the sweeper on slopes with a full water tank;
- Before ascending, inspect the drive chain's tension and ensure that the chain locks are secure. Adjust tension as necessary and apply lubricant if needed. This prevents chain slippage or damage that could lead to chain detachment;
- Make sure that the battery charge level indicator displays more than half of the total capacity. Do not operate on slopes if the battery is old or has a history of sudden power drops;
- Prior to slope operations, check for tire wear and ensure that the brake system is functioning correctly;
- Ensure the ramp or slope is dry and non-slip. Avoid operating on slopes that may be wet, icy, or otherwise slippery;
- Confirm that any barriers (such as gate arms) are raised and that the slope area is clear of obstacles like speed bumps, potholes, or debris;
- Ensure that there are no vehicles or pedestrians nearby. Maintain a safe distance from all surrounding individuals and equipment;

3. During Slope Operations

- No Stopping: Do not stop on the slope.
- No Lateral Movement: Do not drive sideways on the slope.
- Maintain Direction: Do not make sharp turns; keep a straight line while driving.
- No Operations: Do not perform any operations while on the slope.
- Avoid Edges: Do not drive where there are height differences on either side.
- Power Off: Do not turn off the K810 series power while on the slope.
- Throttle Control: Do not release the accelerator pedal while ascending; maintain a steady speed.
- No Reversing: Do not reverse while going uphill, especially while pressing the accelerator (high risk).
- Safety Positioning: Team members must not stand behind the K810 series while ascending, or in front while descending.
slow, steady descent.

- Brake Activation: Activate the brake system when nearing the bottom of the slope and maintain a
- In Case of Slipping: If the vehicle starts to slide, press the brake hard and maintain control of the steering without jerking the wheel.

- Emergency Stop: Do not use the red emergency stop button while ascending or descending slopes.
- These safety guidelines are provided by Mingnuo as professional recommendations. Adhering strictly to these guidelines can enhance operational safety but does not guarantee absolute safety. Users must conduct thorough assessments of their specific operational environments while following these guidelines.

Appendix 2

Transfer Safety Regulations

Mingnuo K810 Series Sweeper Transfer Safety Regulations

From the perspective of the design functionality of the sweeper, in order to ensure operational safety, it is recommended to minimize the frequency of transfers. If transfer operations are indeed required for a project, they must be performed by designated operators. It is essential to strictly adhere to the regulations outlined in the operation manual (Page 13 - Safety Information) during transfers.

The following regulations must be followed during the transfer of the K810 series, including but not limited to:

- It is recommended that only designated operators who hold a valid driver's license, are relatively young, and have successfully completed Mingnuo training be allowed to operate during transfers.
- If transfer operations involve ascending or descending slopes, the guidelines in the Mingnuo K810 Series Sweeper Uphill and Downhill Safety Regulations document must be strictly followed.
- Operators must wear reflective clothing during transfers and should plan their route in advance. If necessary, other vehicles may assist with guidance or follow for safety assurance.
- During transfers, it is prohibited to enter motor vehicle lanes; speed limits must be adhered to and should not exceed the safety speed specified for the K810 series.
- Transfers should only occur on flat road surfaces, with care taken for driving safety. When passing over speed bumps or uneven road surfaces, speed should be reduced to a crawl; do not proceed quickly.
- It is strictly prohibited to drive on municipal roads during transfers (in accordance with traffic regulations).
- While driving, operators should be vigilant about surrounding vehicles and pedestrians, and travel on the right side of the road.

These safety regulations are intended as professional guidance provided by Mingnuo. Adhering strictly to them can enhance operational safety, but they do not guarantee absolute safety. Operators must conduct a thorough assessment of their operations while following these guidelines.