LUCID BOTS

LAVO BOT™

OPERATOR'S MANUAL

lucidbots.com

TABLE OF CONTENTS

Before You Begin

IMPORTANT:

NOZZLES INSTALLED ON SURFACE CLEANER MUST BE RATED FOR THE FLOW RATE OF YOUR PUMP.

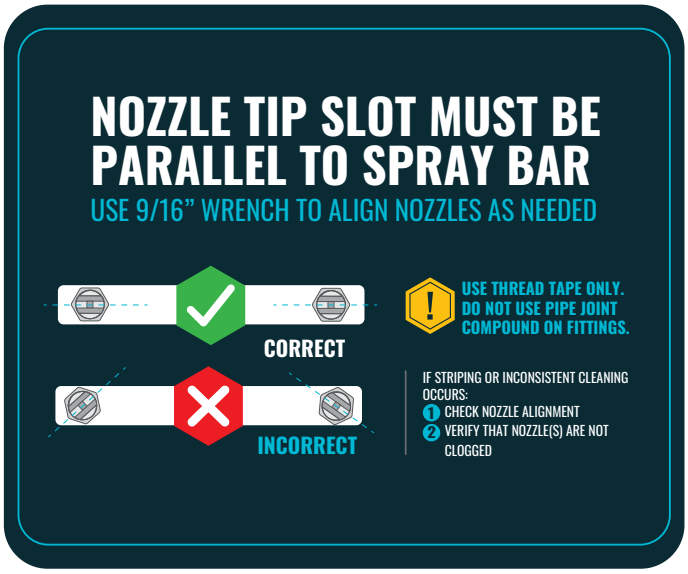
USING THE WRONG NOZZLES MAY CAUSE DAMAGE TO THE LAVO BOT, THE SURFACE TO BE CLEANED, AND/OR THE CONNECTED PUMP.

Quick Start

1. Check to confirm surface cleaner nozzles are appropriately matched to the pump flow rate.
2. Install the inlet plumbing and valve assembly by mating the quick-connect fittings.
3. Connect the black wires and twist the threaded nut to seat the waterproof connector fully.
4. To turn on the controller, tap the power button once, then press and hold until all blue lights illuminate and you hear the startup chime.
5. Install the battery onto the Lavo Bot. Battery must “click” into place.
6. Wait up to 60 seconds until the red light at the top of the controller turns solid green.
7. Place the center sliding switch above the screen into the “Normal” position.
8. Ensure the top right “Spray” switch is in the “Off” position.
9. Connect pressure washing hose to Lavo Bot.
10. Lay out the hose in a series of “S-shaped” loops.
11. Start pressure washer pump.
12. Turn on the spray while Lavo Bot is in motion.
13. Turn off the spray while Lavo Bot is not in motion.
14. Turn off the pressure washer and water supply, then open the valve (spray ON) to relieve pressure from the hose before disconnecting from Lavo Bot.
15. To turn off the controller, press and briefly hold the power button. An on-screen menu will appear. Select “Power Off.”

Operating Modes

1. **Normal:** Used for normal cleaning.
2. **Slow:** Used for excessively dirty projects.
3. **Cruise:** Used to maintain consistent speed.
    a. Detail how to engage it and how to turn it off.



Batteries and Charging

Batteries

NEVER LEAVE THE BATTERY INSTALLED ON THE LAVO BOT WHILE NOT IN USE, DURING TRANSPORTATION, OR STORAGE.

If you experience a battery-related issue, please contact us for support and troubleshooting.

The Lavo Bot is designed to operate with 56V Lithium batteries ranging from 2Ah to 12Ah capacity. Each battery’s amp-hour (Ah) rating indicates the runtime you can expect. The higher the amp-hour rating, the longer the battery will power the Lavo Bot on a single charge.

Runtimes will vary based on usage and operator-specific variables. We recommend operators have 2 (two) 7.5Ah batteries for non-stop operations. Depending on operating variables, operators can expect between 3–6 hours of runtime per 7.5Ah battery, with recharge times of roughly 1 hour per battery.

Charging

Risk of fire and burns. Do not recharge, disassemble, heat above 212 °F (100 °C), or incinerate. Keep out of reach of children. Dispose of used batteries according to local regulations.

Battery Use and Care:

- Disconnect battery before adjustments or storage.
- Do not modify or repair the battery.
- Do not use damaged or altered batteries; they may cause fire or injury.
- Recharge only with manufacturer-specified chargers.
- Keep battery away from metal objects to avoid short-circuiting.
- If battery leaks, avoid contact. If liquid contacts skin, wash with soap and water, then neutralize with lemon juice or vinegar. For eye contact, flush with water for at least 10 minutes and seek immediate medical attention.

Specific Safety Rules:

- Do not expose batteries to fire or high temperatures.
- Do not dispose of batteries in fire; they may explode.
- Do not crush or drop batteries; dispose of damaged batteries properly.
- Avoid using the product near open flames; batteries can explode.
- Charge only in dry locations within the specified temperature range (41°F - 104°F / 5°C - 40°C).
- Avoid battery contact with gasoline, oils, or petroleum-based products; these can damage plastic parts.

In-Field Charging:

Lucid Bots recommends using power sources from the property for charging. However, in cases where no power source is available or nearby, some automobiles have built-in power inverters and/or may be used with a separate power inverter.

Charging the Controller:

- The controller can ONLY BE CHARGED using the supplied cable and power block.
    - Attempting to charge with alternative chargers could make it appear that the controller is being charged, but is not.
- The controller can only be charged when it is turned off.
    - **IMPORTANT:** A blank/black screen does not necessarily mean the controller is off. It could be idle/asleep.
- When charging, ensure that a red light is displayed beside the USB-C charging port on the bottom of the controller.
    - **Red Light:** Charging
    - **Green Light:** Fully charged OR not charging

Turning Controller on/off:

- **To turn the controller ON:** Tap the power button briefly, then press and hold the button until the blue lights illuminate and you hear the controller play a series of tones.
- **To turn the controller OFF**: Press and hold the power button and a menu will appear. Tap “power off”. The controller will play a series of tones indicating it has turned off.
- **IMPORTANT:** The controller also has a “sleep” function where the screen is not illuminated, but the controller is not off.
    - If the screen is off but the lights on the power button and on the top of the controller are on, the controller is NOT off and will NOT charge.
    - While in “sleep” mode, the controller will still consume battery.
    - The controller will NOT charge while powered on OR while in sleep mode.
- **To put the controller to sleep:** Tap the power button.
- **To wake the controller up:** Tap the power button again.

Hoses and Hose Management

Hose management is a critical part of Lavo Bot operations. It is important to lay out the hose properly before cleaning operations begin to ensure that it remains out of the robot’s way.

Hose Recommendations:

The Lavo Bot can pull ⅜” and ½” hose. We recommend using ⅜” hose unless ½” is required for high flow rates. Select a non-marring, flexible, lightweight pressure washing hose for best results. The more flexible and lightweight the hose, the less the operator needs to adjust it while cleaning.

Operating Guidelines

For Best Results:

- 6gpm - 10gpm PRESSURE WASHER AT 2,700psi - 3,500psi
- USE ⅜" HOSE FOR BEST RESULTS
- MAX TEMP: 212°F
- USE ¼" THREAD NOZZLES ONLY
- DO NOT EXCEED 4,500psi

FAILURE TO USE CORRECT NOZZLES MAY CAUSE SURFACE DAMAGE

CAUTION:

NOT ALL SURFACES ARE CREATED EQUALLY. DIFFERENT MIXTURES OF CONCRETE, ASPHALT, AND OTHER SURFACE MATERIALS CAN RESPOND DIFFERENTLY WHEN SUBJECTED TO HIGH-PRESSURE CLEANING PRACTICES. ALWAYS TEST IN AN INCONSPICUOUS LOCATION BEFORE COMPLETING A FULL PROJECT TO ENSURE THE PRESSURE AND NOZZLES USED DO NOT DAMAGE THE SURFACE.

Routine Maintenance

Routine maintenance should be performed after every project to maximize the lifetime of your Lavo Bot and reduce the frequency of repairs.

After Every 100 Hours of Use:

1. Remove the Battery from Lavo Bot.
2. Spray down Lavo Bot with a garden hose. Never use high pressure at close range to clean the robot.
    - Spray down each wheel to flush debris from rollers.
3. Remove the inlet spray bar and valve assembly.
4. Flip the robot on its side and clean the underside of the surface cleaner, spray bar, and nozzles.
5. Verify that the nozzles on the spray bar are oriented such that the fan pattern is parallel to the spray bar.
6. Allow Lavo Bot to dry before storing.
    - Never store Lavo Bot in a damp, poorly ventilated area or inside a case for extended periods while wet. Failing to allow the Lavo Bot to dry before storage will accelerate corrosion and substantially reduce the lifespan of the robot's components.

After Every Use:

1. Inspect all fittings for leaks. Replace PTFE thread tape as needed and tighten fittings.
2. With the spray on and the pump running, inspect the green housing on the surface cleaner for signs of water coming from a small hole in the green aluminum housing.
    - If the threaded housing is tight and water is coming from the weep hole, this means it is time to change the swivel cartridge (inside the green aluminum housing).

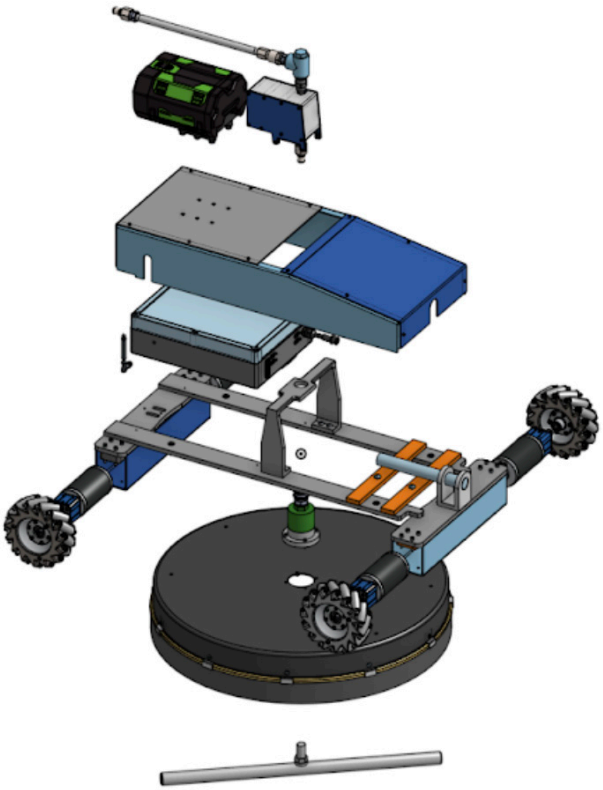
3. Remove the cover and inspect all visible wires for signs of damage.
4. Inspect all connectors for signs of corrosion.
    - If corrosion is found, use a small wire brush and DeoxIT cleaner to lightly remove the corrosion from the metal contacts.
5. Inspect wheels and rollers.
    - It is time to replace a wheel when the gray material on the wheel rollers has worn and the nylon axle becomes visible.
    - Inspect wheel rollers to ensure they spin freely.
    - Inspect wheel rollers for flat areas.

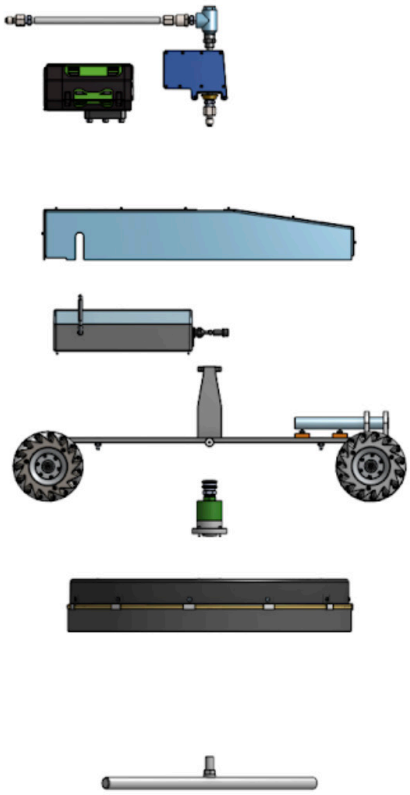
6. Operate the robot without a hose or pump connected and listen for abnormal noises from the gearbox or motors.
7. Inspect the brushes around the circumference of the surface cleaner for signs of uneven wear.
8. Inspect the spray bar for damage. The leading edge of the spray bar is expected to wear over time.
    - If damage to the spray bar causes it to become imbalanced, as indicated by increased vibration, replacement is required.

Repairs

Most components on the Lavo Bot can be repaired or replaced in the field. If detailed instructions are required, please contact our Customer Success department.

Please visit our website to order replacement parts.

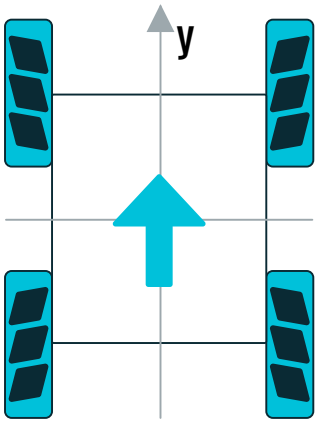




Wheel Orientation

The Lavo Bot uses mecanum wheels that allow for omnidirectional movement. To maintain proper directional control, replacing a wheel with a matching wheel is critical.

To determine proper orientation, reference the diagram to the right.



1. Troubleshooting

1. Lavo Bot inlet quick connect does not fit my pressure washer hose:

a. The Lavo Bot comes stock with a ⅜” Male Quick Connect inlet fitting.

b. If you prefer another fitting size or type, simply remove the fitting from the Lavo Bot and replace it with the fitting of your choice.

c. OR, you may choose to create a Female <> Female Quick Connect adapter fitting.

2. Lavo Bot flow rate or pressure seems low:

a. Check to confirm the water source is providing adequate flow rate (equal to or greater than pressure washer)

b. Check that the 3-position switch on the controller (spray on/off) is in the furthest position forward. If the switch is in the middle position, it may limit the flow rate.

c. Verify spray nozzles are not clogged.

3. Lavo Bot will not move:

a. Check that the battery is fully seated. Remove the battery and reinstall, pushing with moderate force. You will hear a “click” indicating that the battery is fully seated.

b. Check that the switch (slider) in the middle of the controller is in the far right position.

c. Confirm no other buttons labeled “A, B, C, D” on the controller are illuminated. If so, tap the illuminated button to turn it off.

d. Verify that the wire from the battery receiver to the “brain” of the Lavo Bot is installed in the vertical port and fully seated.

e. Confirm that the battery is fully charged. Press the button in the center of the battery once, and make sure all the lights around the button illuminate green.

4. Lavo Bot no longer travels straight:

a. Similar to a car, wheel alignment may be required periodically.

b. To check and straighten the front axle, first, remove the fasteners securing the front cover to the Lavo Bot frame.

c. Check the bolts that attach the body frame to the front axle to ensure that the bushings are not loose. If they are loose, simply realign the bushing brackets so that the front axle is straight relative to the body frame, tighten the bolts, and replace the cover.

d. If this does not resolve the problem, check that each wheel is vertical (vs. leaning slightly inward). Over time, it is possible for the bolts securing the gearbox to the frame may need to be tightened and over time, the bolts securing the gearbox to the frame may loosen and require retightening. Loctate should be reapplied to these bolts after retightening.

5. Lavo Bot is not spraying:

a. Check that the pressure washer is on.

b. Check that the water source to the pressure washer is on.

c. Check that the 3-position switch in the upper right corner of the controller is all the way in the forward (on) position.

d. Check that the cable coming from the black box-shaped riser is plugged into the receiving end of the wire coming from the “brain” of the robot.

6. One or more wheels are not spinning:

a. Determine which wheel(s) are not spinning.

b. Trace the wire from the wheel to the “brain” of the robot. Check that the plug from the motor is securely seated in the panel-mounted connector port.

c. Verify that corrosion is not present on the metal contacts of the motor connectors.

7. The controller does not charge:

a. The controller MUST be charged using the provided charger. Attempts to use different chargers often make the controller appear that it is charging when it is not.

b. The controller cannot be charged while powered on.

c. To tell if the controller is charging, ensure it is fully powered down and check for an indicator light next to the USB-C charging port. The indicator light will be red when the controller is charging. If the light is any other color, the controller will not charge.

8. Plumbing or fittings leaking:

a. All fitting must use Teflon tape to ensure a tight seal.

b. Do not use pipe joint compound.

c. If a leak is detected, use an appropriately sized wrench to tighten the fitting as needed.

- Always use two wrenches to tighten fittings. Hold the receiving end with one wrench and tighten the fitting with the other.

9. Lavo Bot is leaving streaks on the concrete:

a. Check that nozzles are parallel to the spray bar.

b. Check that nozzles are not clogged.

10. Lavo Bot is leaving circular marks on the concrete:

a. Check that the nozzles are parallel to the spray bar.

b. Check that the nozzles are not clogged.

c. Check that the nozzle orifice size corresponds to half of the flow rate produced by your pump.

d. Ensure the spray is not left on while the Lavo Bot is not in motion.

11. Lavo Bot does not remove stains on concrete:

a. Some stains, especially inorganic stains, require chemical treatment and cannot be removed with pressure alone.

b. For tougher stains and heavily soiled surfaces, try using a pump with a higher flow rate and/or moving more slowly over the heavily soiled area.

12. Lavo Bot moves differently than the commands sent from the controller.

a. Verify that the wires from the motors to the robot's brain are plugged into the corresponding hole. Each motor wire should match its respective port.

13. Lavo Bot damaged the concrete surface:

a. If you observe damage to the surface being cleaned at any point, first verify that you are not using a pressure washer that produces more than 4,500 PSI.

b. Next, check the orifice size of the nozzles on the spray bar to ensure they are properly matched to your pump's flow rate.

c. Note: Recently poured concrete is particularly prone to damage from pressure washers.

14. Lavo Bot stopped moving during the operation:

a. Remove the battery and replace it with a fully charged battery.

15. Lavo Bot vibrates excessively when the spray is turned on:

a. Power down the robot by removing the battery and disconnecting the hose.

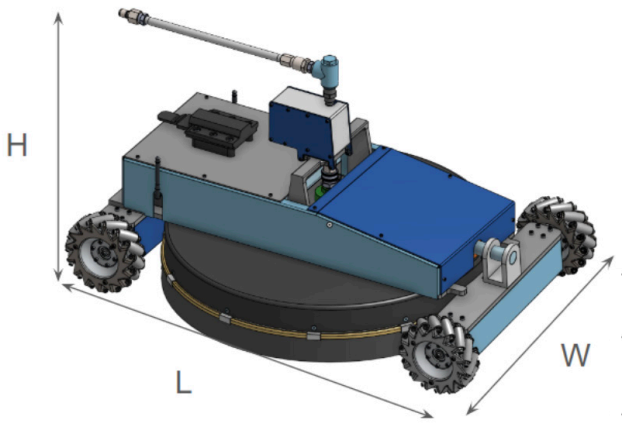
b. Inspect the spray bar on the underside of the surface cleaner for damage.

- If the spray bar contacts the ground, it can become chipped, dented, or broken and lead to excessive vibration.

16. Surface Cleaner swivel housing is ejecting water:

a. The "weep hole" in the green aluminum piece will begin emitting water as the swivel inside the housing begins to fail.

b. If you see water coming from this hole, it is time to replace the swivel on the surface cleaner.



Description	Value	Units
Length	850 33.46	mm in
Width	622.30 24.5	mm in
Height	634 24.96	mm in
Mass	w/out Battery: 32.2/71 w/ Battery: 34.9/77	kg/lbs

Nozzle Sizes Must Be Selected Based On Pump Flow Rate (gpm)

Pressure Washer Gallons Per Minute	Nozzle Size (2x)
4gpm	2502
4.5gpm	25025
5gpm	25025
5.5gpm	2503
6gpm	2503
6.5gpm	25035
7gpm	25035
7.5gpm	2504
8gpm	2504
8.5gpm	25045
9gpm	25045
9.5gpm	2505
10gpm	2505
10.5gpm	25055
11gpm	25055
11.5gpm	2506
12gpm	2506

WARNING

BATTERY MUST BE FULLY SEATED DURING OPERATION.

"CLICK" = FULLY SEATED

DO NOT OPERATE ON UNEVEN SURFACES.

NEVER ALLOW SPRAY BAR TO CONTACT OBJECTS.

EXCESSIVE VIBRATION MAY INDICATE DAMAGE TO SPRAY BAR.

DO NOT SPRAY BATTERY.

RINSE LAVO BOT WITH FRESH WATER AFTER USE.

SPRAY WHEEL ROLLERS TO DISLODGE DEBRIS.

DO NOT USE PRESSURE WASHER TO CLEAN LAVO BOT.

ALLOW LAVO BOT TO DRY BEFORE STORING IN CASE.

REPLACE WHEELS WHEN WHITE NYLON INSERT(S) BECOME VISIBLE ON WHEEL ROLLERS.

Always wear hearing and eye protection during operation. Ensure the operating area is secure and clear from pedestrian and vehicle traffic. Never leave the battery installed on the Lavo Bot while it is not in use. Do not operate within 15ft of property that could be damaged by flying debris. Never remove the brush from the surface cleaner. Do not operate on slopes greater than 8 degrees. Never flip Lavo Bot over while the hose is connected and/or the pump is running. Do not attempt to lift the edge of the surface cleaner at any time during operation. A high rpm spray bar can cause major injury. Wear proper protective footwear during the operation. Always relieve pressure before disconnecting the pressure hose from Lavo Bot. Do not operate outside of line-of-sight. If the spray bar becomes damaged, replace it immediately. Do not attempt to drive Lavo Bot over curbs or downstairs. Do not allow Lavo Bot to run over the hose while the spray bar is spinning. Never mix chemicals. Only tighten fittings using the proper tools. Always sweep the surface to clear off debris before cleaning.

NEVER ATTEMPT TO EXTINGUISH A LITHIUM BATTERY FIRE WITH WATER. ONLY USE ABC OR DRY CHEMICAL FIRE EXTINGUISHER.

Product Specifications

ITEM	Specifications	Notes
Dimensions Assembled	33.5” L x 24.5” W x 25” H	
Total Product Weight (without battery)	71lbs	
Total Product Weight (with battery)	77lbs	With 7.5ah battery
Surface Cleaner	Whisper wash	
Surface Cleaner Diameter	24”	
Surface Cleaner Material	Powder-coated aluminum	
Surface Cleaner Swivel Repairable?	Yes	
Surface Cleaner Nozzles Replaceable?	Yes	
Surface Cleaner Nozzle Thread Size	¼”	
Surface Cleaner Nozzle Fan Pattern Required	25 degree	
Valve Type	316 stainless ball valve	The toggle switch on the controller turns the valve on/off
GPM Max.	12gpm	
GPM Min.	4gpm	
Pressure Max.	4500psi	
Pressure Min.	2000psi	
Inlet Hose Connection	3/8” (M) quick connect	Requires a 3/8" (F) quick connect on the hose end
Inlet Water Max. Temp	212°F	

ITEM	Specifications	Notes
Battery Voltage	56V	
Battery Type	Supports 56V lithium batteries (2.5Ah–12Ah)	
Battery Life	<6 hours with 7.5Ah battery	Dependent upon operating variables and usage
Battery Charge Time	<1 hour	Dependent on charger and battery
Batteries Available from 3rd-Party Retailer?	Yes	
Max. Speed	XXXX	Software-governed
Wheel type	Mecanum omnidirectional	
Frame Material	Powder-coated aluminum, powder-coated carbon steel	
Plumbing Material	Stainless	
Drivetrain	4WD electric motors with gearbox	
Motors Replaceable In-Field?	Yes	
Plumbing Repairable In-Field?	Yes	
Wheels Replaceable In-Field?	Yes	
Operating Frequency	5.8GHZ	
Operating Method	RC Joystick Control	
Controller Operating Range	1 mile (within an unobstructed line of sight)	
Waterproof Rating	Equivalent to IPX6	Lavo Bot can be sprayed down with a garden hose; do not spray down the battery.

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V1.2.