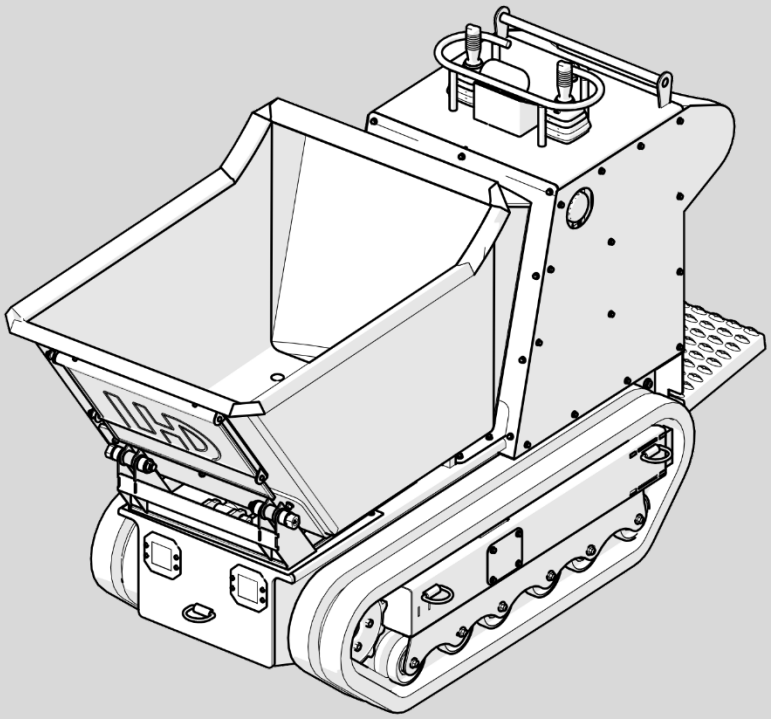
BETTER BUGGIES.

6500 ETB

ELECTRIC TRACKED BUGGY

SIDE DUMP

Owner's Manual



This manual should be kept on hand at all times so that it can be immediately referenced. It should be saved for the entire life of the machine.

© 2025 - The entire or partial reproduction and/or divulging of this document is prohibited in any form without the written consent of the illustrations, and the paginations were completed by "LHD Machinery, LLC." The illustrations and technical data included in this manual are non binding: **the *manufacturer reserves the right to carry out eventual changes to its machine without notice.***

For software v2026.10.23.1751 and later

Ed. 4 – 10/23/26

LHD Machinery, LLC
1-888-LHD-7472
LHDmachinery.com

Email / Faxes to:
info@lhdmachinery.com

Find the latest edition of this Owner's Manual at:
lhdmachinery.com/library

Contents

Part A - The machine

A1. Registration and machine identification
A2. Preface
A3. Warranty
A4. Safety
A5. Safety labels
A6. Technical data
A7. Start-up and initial use
A8. Operation
A9. Maintenance
A10. Mechanical troubleshooting

Part B - Display and software (Operator Software Guide)

1. Starting and stopping the machine
2. Main screen
3. Operator Lockout
4. Side bar and tabs
5. Settings
6. PIN to drive (anti-theft)
7. Alarms and warnings
8. Battery
9. Charging
10. Hydraulics while charging
11. Motors
12. Inputs and Outputs
13. Daily E-stop test
14. Router (telematics) tab
15. Service pages
16. What changed from Ed. 3
17. Troubleshooting the display

Part A - The machine

A1. Registration and machine identification

> **Please register your machine online at LHDmachinery.com.** All LHD machines must be registered online after purchase with a serial number and date of purchase. Warranty may be voided without registration.

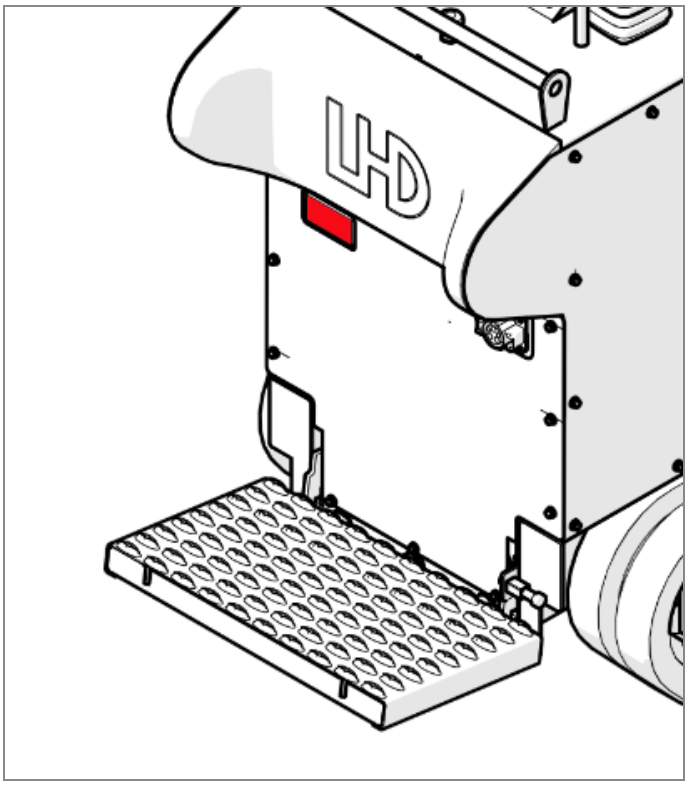
To register your machine:

1. Go to LHDmachinery.com.
2. Find the **Support** link in the menu and click **Warranty Registration**.
3. Enter your information, read and confirm that you understand and agree to the terms of the warranty, then submit the form.

Your warranty period begins on the date of sale and continues for 1 year or 1000 hours.

Machine identification

Serial number of machine	
Purchase date	
Purchased from	
Dealer contact	



Location of the serial number plate



Serial number plate

The LHD serial number is on the machine's serial number plate. The software version is shown on the display under Settings > About this machine (Part B, section 5).

A2. Preface

Congratulations on your purchase of an LHD 6500ETB Tracked Buggy!

This manual contains the guidelines for operation and maintenance of the LHD Tracked Buggy series, and the safety recommendations that go with them. Please read the entire manual before operation, to keep yourself safe and get the best performance from the machine.

The manual guides the operator through the rules and precautions needed to operate and maintain the machine safely. Incorrect operation, inspection or maintenance can cause personal injury or even death. Pay close attention to items marked with the warning symbol: it marks a safety concern and gives directions for proper use. Hazards associated with this equipment are referenced throughout the manual together with the safety symbols.

Reading and using this manual will help prevent accidents during operation; however, we cannot predict every kind of danger in all circumstances. The user of the machine is always responsible for paying attention to the machine and its surroundings during operation. Knowledge of this manual and common sense are fundamental to safe use of the machine.

Note: Our design and manufacturing technology keep improving, so small changes made to the machine may not yet appear in this manual. Contact LHD for any information or questions about the machine (contact details on the cover and at LHDmachinery.com).

A3. Warranty

LHD Machinery, LLC ("LHD") warrants that each machine will be free from defects in material and workmanship under normal use for which it was intended for 1 year or 1000 hours. The warranty period begins on the first day of purchase by the end user, or the first day of purchase by a dealer if the machine is intended for rental. The warranty is based on the following limited warranty terms and conditions. It is the responsibility of the user to understand the responsibilities related to the warranty, service and proper operation of the machine.

1. LHD's obligation and liability under this warranty is expressly limited to replacing or repairing parts if there is determined to be a defect in workmanship or breakage in material. LHD reserves the choice to repair or replace. Parts such as engines, motors, pumps, valves, etc. furnished by us but not manufactured by us will only carry the warranty of their original manufacturer except in special situations as decided upon by the officers of LHD.
2. This warranty does not apply to any failures resulting from: (i) abuse or misuse or improper or unauthorized repair, alteration, maintenance or operation; (ii) accident, natural disaster or act of nature; or (iii) handling, shipping or storage.
3. If LHD chooses to replace the part, it will be at no cost to the customer and will be made available to the LHD Dealer, or Rental Center, from whom the end user purchased the machine or the nearest professional repair center. Warranty claims should be reported immediately. Use of the machine after a failure could result in damage and wear not covered under the warranty terms.
4. Replacement or repair parts, installed in the machine, are warranted only for the remainder of the warranty period of the machine, as though they were the original parts.
5. LHD's warranty does not cover the normal maintenance of machines or their components (such as engine tune-ups and oil & filter changes). The warranty also does not cover normal wear and tear items (such as consumables) or ground contact items (such as treads and shovel, if equipped) except in special situations as decided upon by the officers of LHD.
6. LHD does not warranty engines. Engine warranty claims should be made directly to an authorized service center for the particular engine manufacturer.
7. LHD's warranty will be void if it is determined that the defect resulted from operator abuse, impact damage, failure to perform normal maintenance, modification, alterations or repairs made to the machine without written approval of LHD.
8. LHD will pay shop labor on warranty items at the LHD Shop Labor Rate in existence on the date of the warranty claim. LHD will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.
9. LHD will pay shipping on warranty replacement parts at standard ground rates. No warranty replacement parts will be shipped at any other shipping type or speed at the expense of LHD.
10. LHD'S WARRANTY POLICY WILL NOT COVER THE FOLLOWING: TAXES, SHOP SUPPLIES, ENVIRONMENTAL SURCHARGES, AIR FREIGHT, TRAVEL TIME, LOSS OF TIME, INCONVENIENCE, LOSS OF RENTAL REVENUE, RENTAL COSTS OF EQUIPMENT USED TO REPLACE THE MACHINE BEING REPAIRED, LOSS OF USE OF THE MACHINE, PROPERTY DAMAGE, COMMERCIAL LOSS OR ANY OTHER CHARGES WHATSOEVER OR ANY LIABILITIES FOR DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE OR DELAY.
11. LHD MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THERE ARE NO OTHER WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THIS DOCUMENT.
12. No LHD employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of LHD.

A4. Safety



General cautions

Read, understand, and follow the instructions in this owner's manual before using the machine.

1. Keep hands, feet and clothing away from all moving parts.
2. Allow only responsible adults who are familiar with the machine and its operation to use the machine.
3. Do not allow any passengers on any part of the machine, including the bucket and operating platform.
4. Do not operate any of the controls unless you are standing with both feet on the platform and firmly holding the grip handles.
5. Always wear long pants, substantial shoes, gloves, eye and hearing protection when using the machine. Avoid wearing jewelry or loose fitting clothing.
6. Do not place feet under the platform. Always stand on the platform or to the side of the machine.
7. Watch where you are driving. Always look down and behind, before and while reversing.
8. Always power off the machine before leaving the operator's platform.
9. Never jerk the controls. Use a steady motion. Slow down before turning.
10. Power off the machine before making any adjustments to the machine or any attachments.
11. Never operate the machine in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe bodily harm or death.
12. Look out for ditches, holes, etc. and beware of traffic when near roads.
13. Do not allow any person or animal close to the machine or its attachments while in operation. Stop the machine if any person or animal comes close.
14. Operate only in daylight or good artificial lighting.
15. Do not operate the machine while fatigued or ill or under the influence of alcohol or drugs.
16. Use extra care while loading or unloading the machine onto a trailer or truck.
17. Do not touch equipment or attachment parts that may be hot from operation. Allow them to cool before attempting to maintain, adjust or service.
18. Do not allow children near the machine.
19. Do not use the equipment for any purpose or application other than its intended purposes.
20. Replace operation and safety decals when they become difficult to read (contact LHD for replacements).
21. LHD does not assume responsibility for any accidents due to equipment modifications. Unauthorized modifications will void the warranty.
22. Never use accessories or attachments that are not recommended by LHD for this equipment. Damage to the equipment and/or injury to the user may result.
23. Always know the location of the nearest fire extinguisher.
24. Always know the location of the nearest first aid kit.
25. Always know the location of the nearest phone, or keep a phone on the jobsite so that calls can be made quickly in case of emergency.

Cautions during operation

1. All slopes require extra caution. Do not operate on slopes exceeding 10°. If a slope is greater than 10°, only go vertically (not horizontally).
2. Always have the heavy end of the machine uphill. Weight distribution changes the tipping point: an empty bucket makes the rear of the machine heaviest, a loaded bucket makes the front heaviest. The same rules apply when loading and unloading the machine onto a trailer or truck.
3. Avoid turning on slopes. If you must turn, turn slowly, keeping the heavy end of the machine uphill.
4. Do not operate near ditches or embankments.
5. Do not operate on wet grass. Reduced traction could cause slippage.
6. Remove obstacles such as rocks and tree limbs from the work area. Watch for ruts or bumps, as uneven terrain could overturn the machine. Tall grass can also hide obstacles.
7. If the machine becomes unstable, jump clear. Never try to stabilize the machine yourself.
8. Never use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgeable physician immediately or severe injury or death can occur.
9. Always turn the machine off when not in use.
10. Never disconnect any emergency or safety devices. These devices are intended for operator safety. Disconnecting them can cause severe injury, bodily harm or even death, and voids all warranties.
11. Never approach power lines with any part of the buggy unless all local, state/provincial and federal (OSHA) required safety precautions have been taken. Use extreme caution near high-voltage power lines.
12. Do not operate the machine at excessive speeds. Reckless operation may cause accidents and severe injury. Slow down when approaching people and wet areas, and when going up and down grades. The operator is responsible for adjusting speed to the conditions of the road or path.
13. Allow extra time to stop when operating on wet surfaces or loosely graded materials.
14. Do not dump materials that are large, chunky or sticky. They may shift, causing the machine to tip and throw the operator off. The machine is intended for dumping free-flowing, loose materials such as dry soil, slag and wet concrete.
15. Do not dump materials from the bucket while the machine is moving.
16. For walk-behind operation, the operator platform must be stowed and locked in the UP position. Reduce speed to 3 mph (4.8 km/h) or slower; use Speed limit or Eco mode on the display (Part B, section 5).
17. Always make sure the machine's brakes are working properly. Never operate the machine with a defective braking system.
18. Ensure the brakes are applied when leaving the machine unattended or when it is on a slope. When parking on a slope, position the machine at a right angle to the slope.
19. When filling or dumping, do not exceed the payload capacity of the machine.
20. Do not stand in front of, or alongside, the machine when discharging a load.
21. To prevent unexpected loss of control, do not power on the machine on a sloping surface.
22. Never operate the machine with damaged or worn tracks. Always replace defective tracks with new ones.
23. Always make sure the hydraulic dumping mechanism of the bucket is working properly.
24. Avoid sudden stops, starts and changes in direction. Operate the controls smoothly. Do not jerk the steering or any other controls.
25. Never attempt to work the controls except from the operator's position.
26. Never drive or tow the machine in traffic or on public roads.
27. Always keep the machine in proper running condition.

28. Fix damage to the machine and replace any broken parts immediately.
29. Clean the entire machine after every use. Make sure there is no buildup of concrete, grease, oil or debris on the machine.
30. Always store equipment properly when it is not being used, in a clean, dry location out of the reach of children and unauthorized personnel.

Battery safety

The machine has two kinds of battery: the **48 V traction battery** (four lithium-ion packs) that powers the drives and the pump, and a **12 V sealed lead-acid (SLA) battery** for the controls and lights.

All batteries:

1. Stay clear of moving components.
2. Power down before servicing.
3. Avoid contact with damaged wiring or components. Do not touch exposed wires, connectors or damaged electrical components. High voltage can cause serious injury or death.
4. Keep the battery system clean. Keep compartments free of debris to prevent electrical faults.
5. Use proper charging procedures only. Charge the 48 V battery only with the machine's own charger. Do not use damaged charging cables or connectors.
6. Do not operate with a damaged battery. If a battery shows signs of swelling, overheating, leaking, or physical damage, stop using the machine and have it serviced.
7. Avoid overheating and fire risk. Never expose a battery to open flame, sparks, or excessive heat. Allow the system to cool before servicing if it has been under heavy load.
8. Do not modify electrical or control systems.
9. Do not drop or strike a battery.
10. Always keep battery cables in good working condition. Repair or replace all worn cables.

12 V sealed lead-acid battery:

1. Do not expose the battery to open flames, sparks or cigarettes. A lead-acid battery can give off flammable gas, especially when overcharged.
2. Always wear safety glasses and well-insulated gloves when handling the battery. It contains acid that can injure eyes and skin.
3. Do not charge the battery if it is frozen; it can burst. Warm it to at least 61 °F (16 °C) first.
4. Charge it only with a charger made for 12 V SLA (sealed lead-acid / AGM) batteries, in a well-ventilated place.
5. If battery acid gets on skin or clothing, rinse immediately with plenty of water. If it gets in the eyes, rinse immediately with plenty of water and get medical attention.
6. Always disconnect the negative (-) terminal of the 12 V battery before servicing the electrical system.

Electrical safety



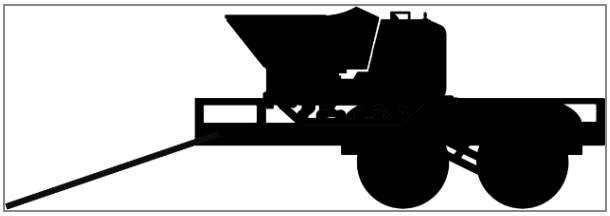
1. Do not power on the machine near spilled fuel or combustible fluids. Combustible liquids, vapors and dust could ignite from sparks.
2. Exercise caution around energized systems and when working around batteries and electrical components, especially when the system is energized.
3. Never charge the battery or perform maintenance while the machine is being operated.
4. Use only the machine's charger and follow the charging instructions (Part B, section 9). Improper chargers can lead to overheating, fire, or battery damage.
5. Never use electrical components for unintended purposes. Do not use electrical components to operate unauthorized devices or as a substitute for proper tools.
6. Inspect charging equipment regularly. Do not use damaged chargers, cords, or connectors. Replace any worn or defective components immediately.

Lifting and maintenance safety

1. Never allow any person or animal to stand underneath the equipment while lifting.
2. When the machine must be lifted, use a properly rated forklift.
3. Never tip the machine to extreme angles during lifting.
4. Never lift the machine to unnecessary heights.
5. Never lift the equipment while the machine is powered on.

Transporting safety

1. Always use ramps capable of supporting the weight of the machine and the operator to load and unload the machine.
2. Always shut down the machine before transporting.
3. Place the machine on a flatbed truck, flatbed trailer or equivalent and tie it down securely.
4. Always make sure all tie-downs and blocks are in place and the bucket is completely lowered in the flat (horizontal) position.
5. Place chock blocks under the machine to prevent rolling.
6. When transporting the machine on a truck or trailer, know the overall height to avoid overhead obstructions such as bridges and power lines. Check the truck and ramp capacities.



Bucket safety bar

The machine has a bucket safety bar that stops the bucket lowering under its own weight while repairs are carried out. To engage the safety bar:

1. With the machine on, raise the bucket.
2. Rotate the safety bar into place (Fig. 1).
3. With no one under the bucket and all hands free, very slowly lower the bucket until the safety bar is locked into place.
4. Turn the machine off.
5. Reverse these steps to remove the safety bar when done.

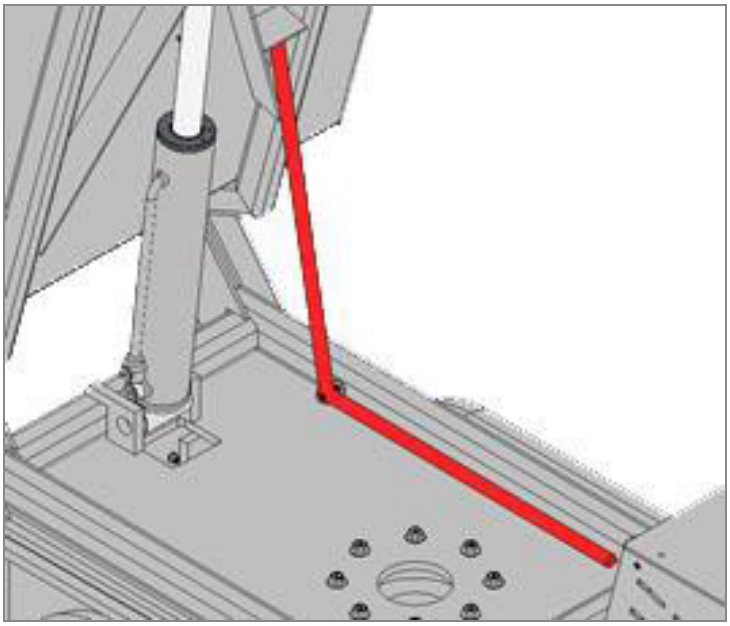
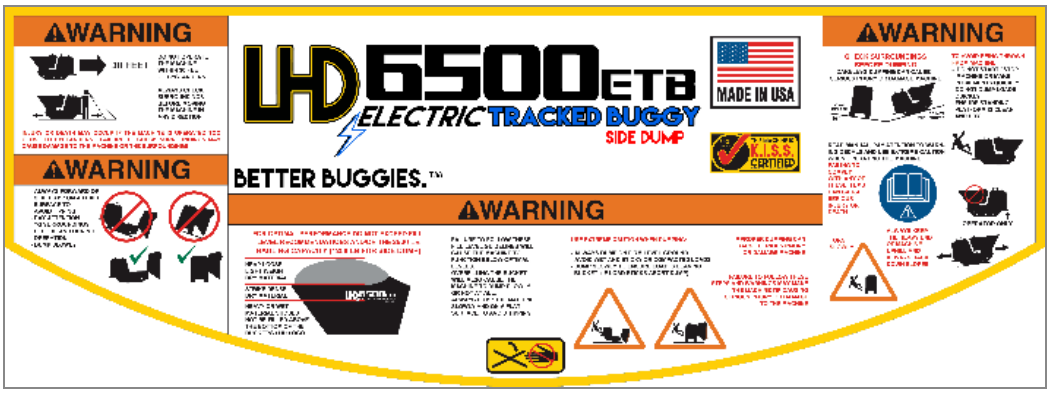


Fig. 1 - Bucket safety bar

Remember - safety is your responsibility.

A5. Safety labels

The machine carries signs and labels that give safety information. Keep all safety labels clean and legible, and replace any that become hard to read (contact LHD).



Decal A - operating warnings (below)



Decal B - safety bar warning



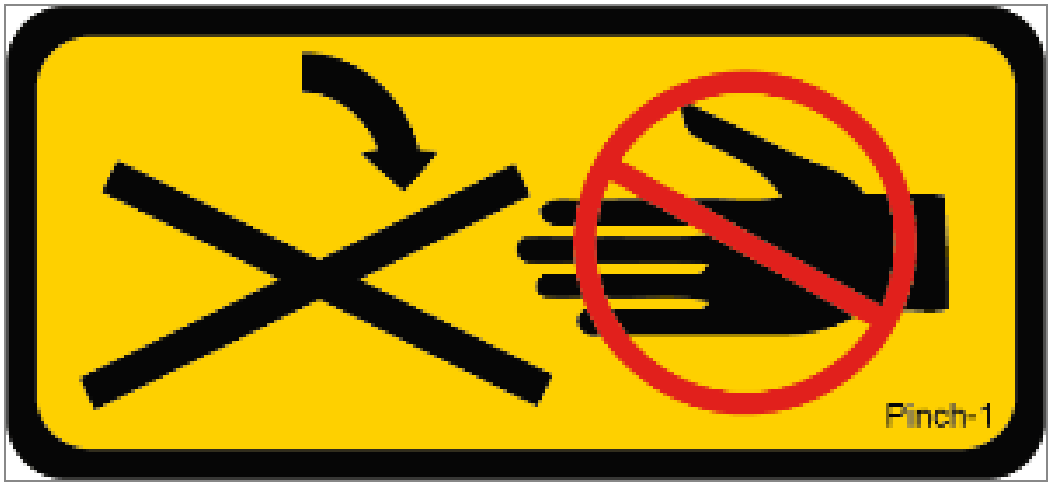
Decal C - risk of electric shock



Decal D - grease each lubrication point every 10 hours of use



Decal E - caution, hot, do not touch



Decal F - danger of pinching



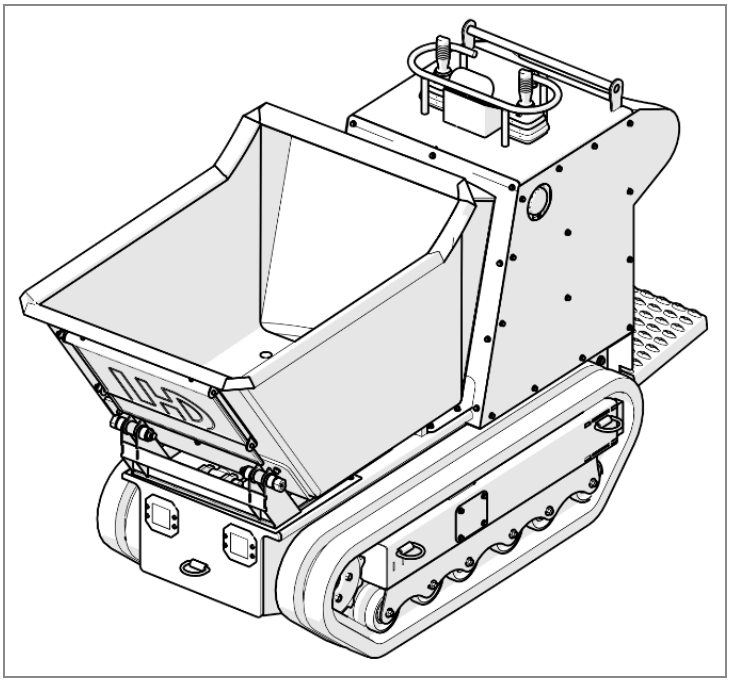
Decal G - hydraulic fluid only (no other fluids)

Decal A

- Do not operate the machine within 30 ft of bystanders.
- Visibility hazard: look before backing up.
- Use extreme caution when dumping. Always dump or side dump on level ground, avoid wet and sticky loads, and dump slowly to make sure the load is leaving the bucket (if the load sticks, abort the dump).
- For optimal performance, follow the fill level recommendations.
- Do not run the machine on slopes of more than 10 degrees, up and down or across.
- Always keep the heavy end of the machine uphill, and back down slopes.
- No persons allowed in the bucket (operator only).

- Do not start or stop the machine quickly or dump loads too quickly. Make sure the platform is clean and dry, or the user may be thrown from the machine.
- Turn slowly to avoid being thrown from the machine.

A6. Technical data

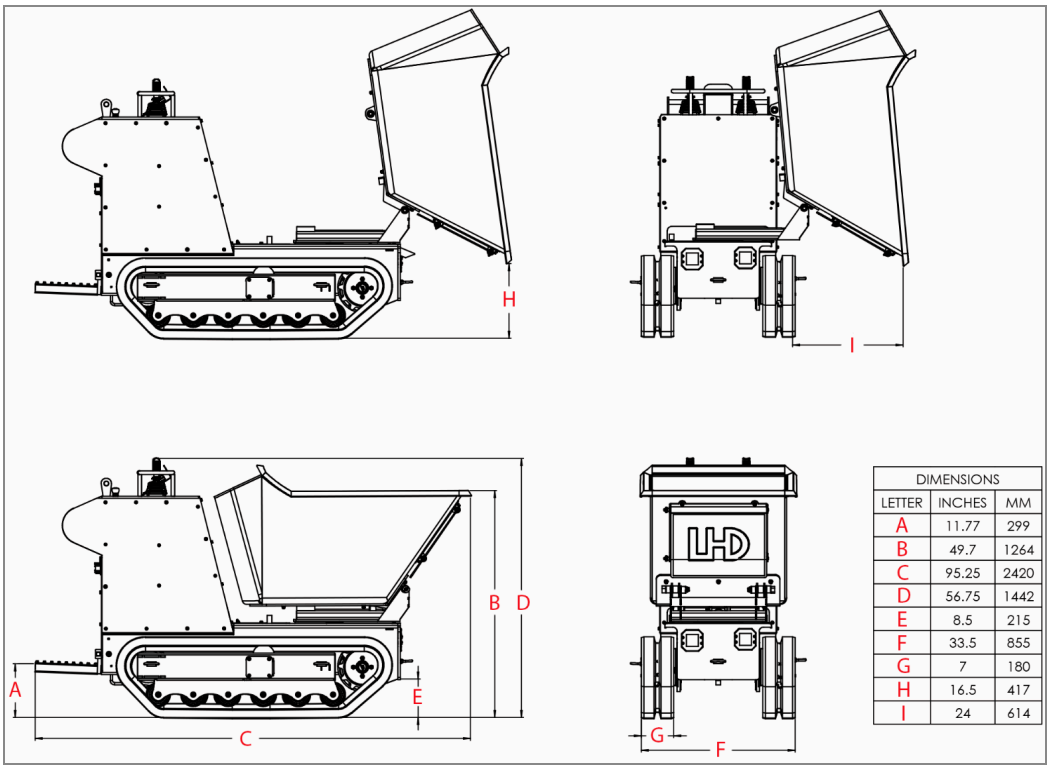


The LHD 6500ETB Tracked Buggy is a universal material hauler for transporting any bulk material. It is also designed for many other construction and landscaping uses, such as job site cleanup and supply transport.

The poly bucket holds 16 cubic feet (0.6 yd^3), so you move more material in fewer trips. The 16 in dump height and wide 8 in (200 mm) tracks let you work on almost any terrain, and the machine is balanced with a low center of gravity for safety.

This battery-powered 48 V machine works for up to 8 hours without interruption. The maximum load capacity is 2,500 lb (1,133 kg), and the machine passes through a standard 36 in door. The controls are within reach of the safety handlebar so the operator keeps both hands on the machine. Multiple lift and tie-down points are provided.

Item	Value
Battery power	10 kW / 13 hp
System voltage	48 V traction battery (four lithium-ion packs); 12 V sealed lead-acid battery for controls and lights
Charge time	5 hours at 220 V; 8 hours at 110 V
Battery life	8 hours
Start	Key switch
Top speed	About 5 mph at the maximum motor speed of 6000 rpm; Eco mode limits the motors to 3000 rpm
Bucket capacity	16 cu ft
Payload	2,500 lb
Dump angle	85°
Weight	2,140 lb (970.7 kg)



Dimensions

Important caution: read this manual fully before operating or maintaining the machine. Pay special attention to the warning stickers on the machine. Follow all warnings and instructions in this manual and on the stickers. Always use common sense for maintenance and use; otherwise property damage, personal injury or death may occur.

A7. Start-up and initial use

Read the entire manual, including the warning labels on the machine, before putting the machine into use. Any operation that goes against these instructions or warnings may result in personal injury.

Check that the surroundings of the machine are safe and that there are no objects or foreign matter between moving parts. Starting the machine under such conditions may damage it or cause injury.

To keep the machine in good working order, check these items **every day**:

- Battery charge level
- Function of the controls and the E-stop (the daily E-stop test on the display, Part B, section 13)
- Track tension and the condition of each wheel
- Lubrication points (replenish grease if needed)
- Tightness of bolts

To turn the machine on, turn the key clockwise to ON. To turn it off, turn the key back to OFF. What the display shows during start-up is described in Part B, section 1.



Key switch: OFF and ON

Initial use (first 10 hours)

All machines are tested and inspected before sale. During the first 10 hours of use, pay close attention to the following to make sure the machine runs well and safely; running it improperly shortens its life and reduces its efficiency.

- Avoid using full speed to drive the machine.
- Never start or accelerate the machine hastily; avoid unnecessary emergency stops or abrupt turns.

A8. Operation

1. Slopes

> Always avoid site conditions with slopes greater than shown in Fig. 2, or with loose soil. The machine could overturn, causing serious injury or death. In every case, and especially on slopes, the ground must be solid and stable.

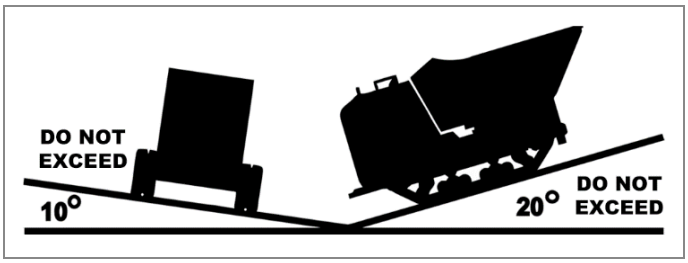


Fig. 2 - Do not exceed 10° across or 20° up and down

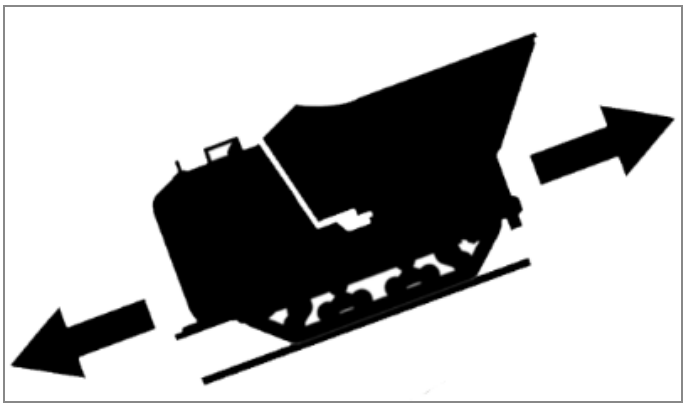


Fig. 3 - Keep the heavy end uphill; back down slopes

Caution: always keep the heavy end of the machine uphill and always back down slopes (Fig. 3). Never dump on a slope or on soft soil (Fig. 4).

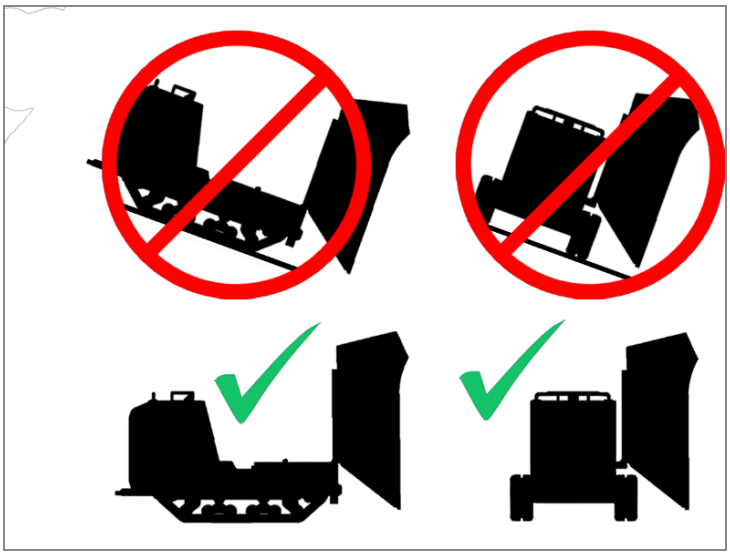


Fig. 4 - Never dump on a slope or soft soil

2. Loading the bucket

For safety and the best performance, do not exceed the fill level recommendations (Fig. 5) or the 2,500 lb payload.

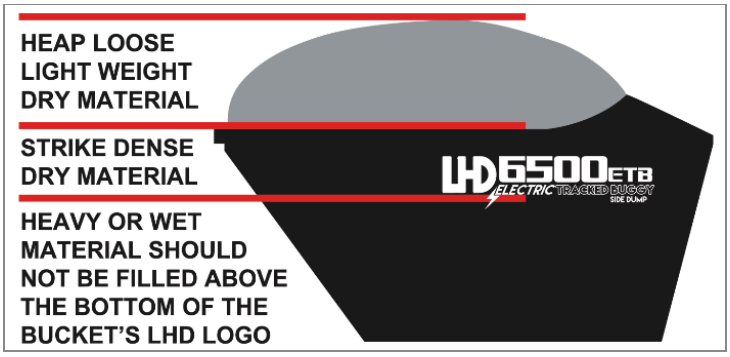


Fig. 5 - Fill levels

3. Traveling

The horn is the top button of the drive joystick. With the machine ready (display band *Idle - Ready for Operation*), use the drive joystick as shown in Fig. 6. Push forward to move forward and pull back to reverse; the further you push, the faster the machine goes. To turn while stopped, push the joystick slowly to the right to turn right, or to the left to turn left. To turn while driving, push the joystick in the direction you want to travel.

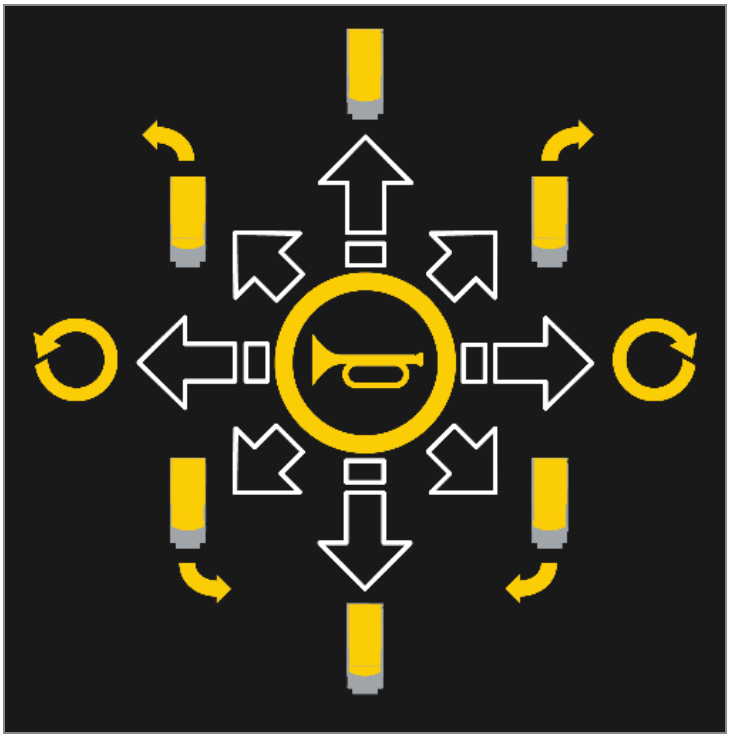


Fig. 6 - Drive joystick (horn in the center)

> Never drive or turn too quickly; the operator can be thrown off, causing injury or death. Never steer on a slope or on unstable ground: the machine could overturn. Take care when traveling across a slope; always move parallel with the slope.

4. Unloading the bucket

Use the hydraulic joystick as shown in Fig. 7. Push the joystick forward slowly to dump the bucket; pull it back slowly to return the bucket to its original position. Drive the filled machine to the discharge area and dump the

bucket **slowly**. Driving backward after dumping may help empty the bucket.

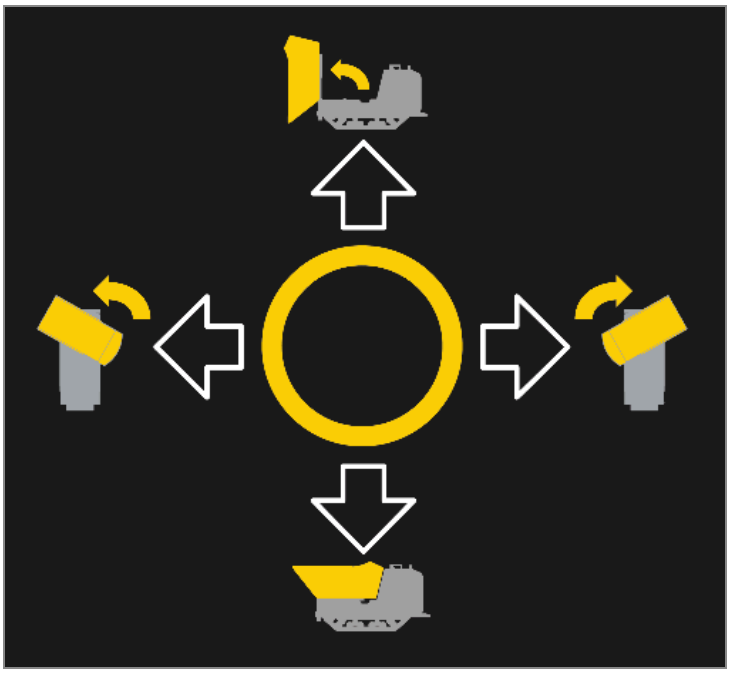


Fig. 7 - Hydraulic joystick

5. Rotating the bucket and side dumping

Push the hydraulic joystick (Fig. 7) to the right to rotate the bucket right, or to the left to rotate it left. Re-center the bucket to dump straight forward again. The display shows which function is in use (Part B, section 2).

> When side dumping or dumping straight, a sticky load (such as wet soil) may need help leaving the bucket. Turn off the machine and check the surroundings before you help unload. Dump slowly to make sure the load is leaving the bucket; if the load sticks, abort the dump.



Fig. 8 - Side dumping

> Take the utmost care when side dumping (Fig. 8). Keep everyone at least 30 ft away. Only side dump 2,500 lb or less of loose, easily removed material. Never dump on a declining slope. Look for barriers when dumping.

> Always operate the machine at an appropriate speed. Too high a speed can throw the operator off or tip the machine over.

6. Transporting the machine

Loading and unloading from a vehicle or trailer: always load and unload on a level surface; always use ramps that are strong, wide and long enough for the machine; make sure the hauling surface and ramps are clean and not slippery. Never steer on ramps.

Transporting: secure the machine to the vehicle or trailer tightly using fastening devices and the 6 tie-down points (Figs. 9, 10 and 11; Fig. 11 shows the tie-down location under the rear of the machine). Make sure the machine cannot roll or shift on its own.

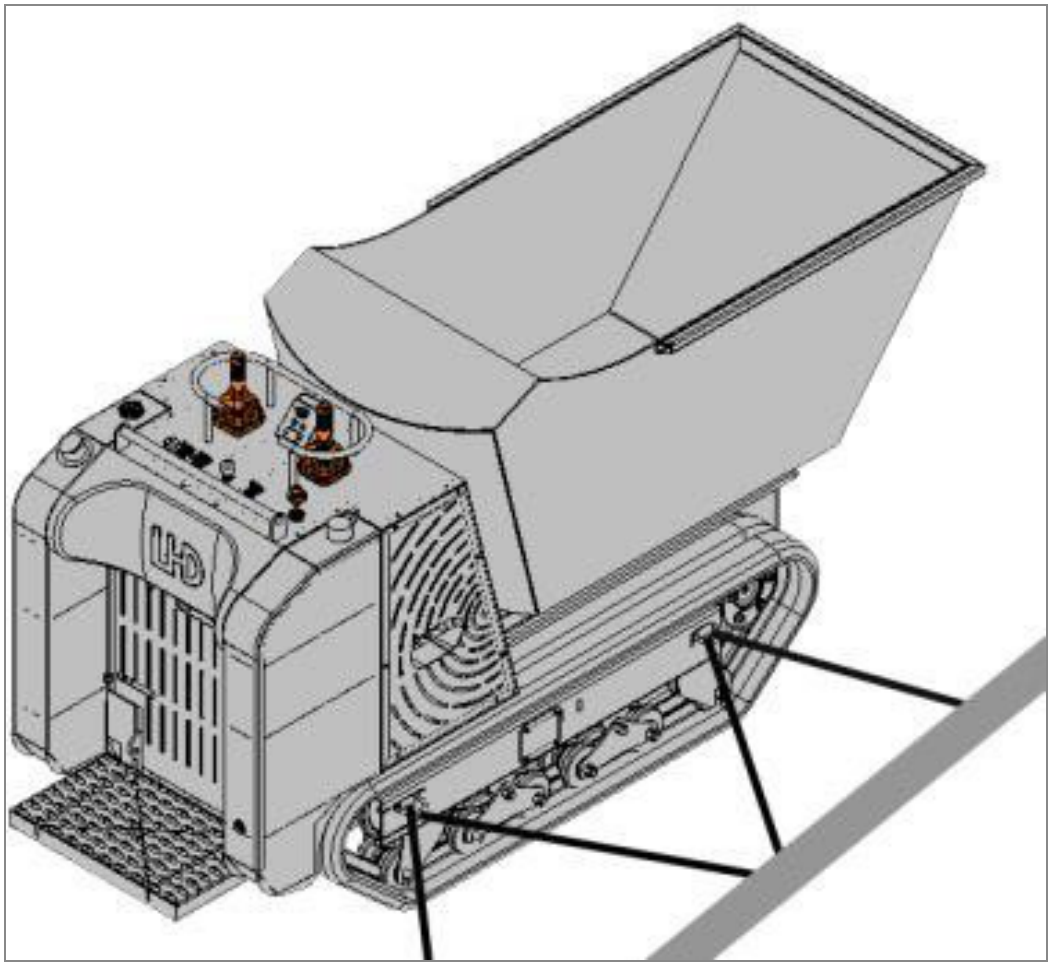


Fig. 9

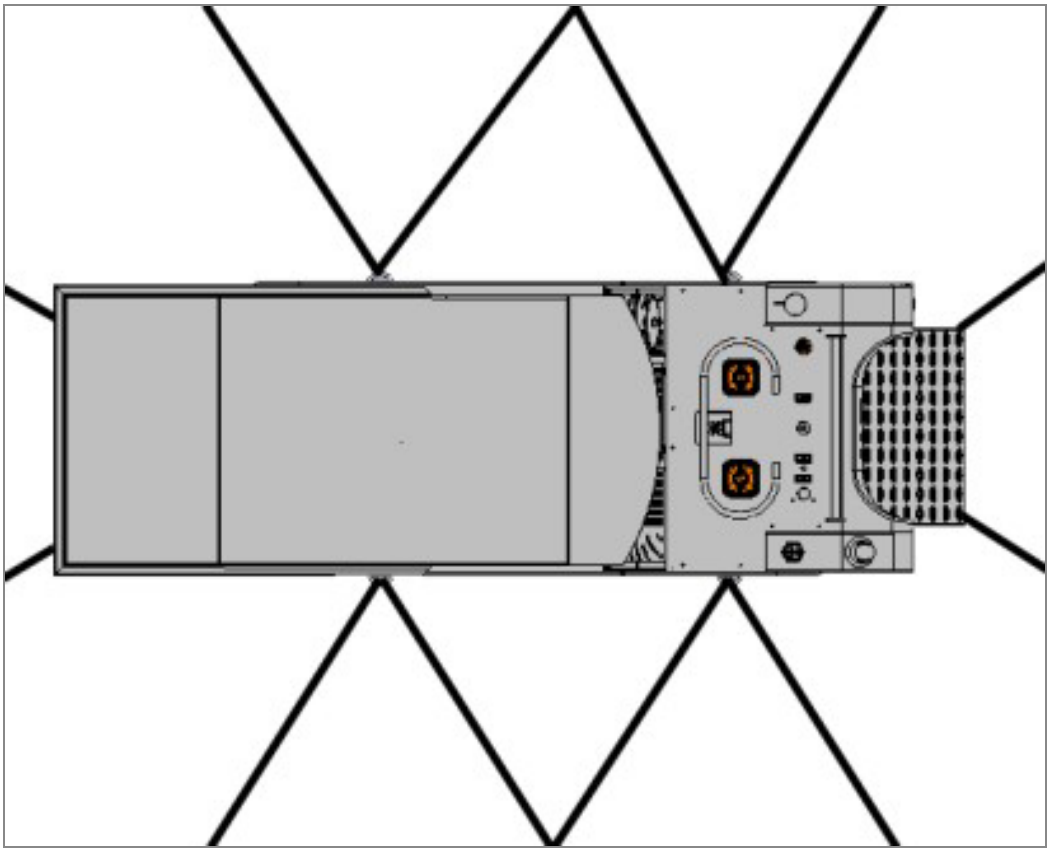


Fig. 10

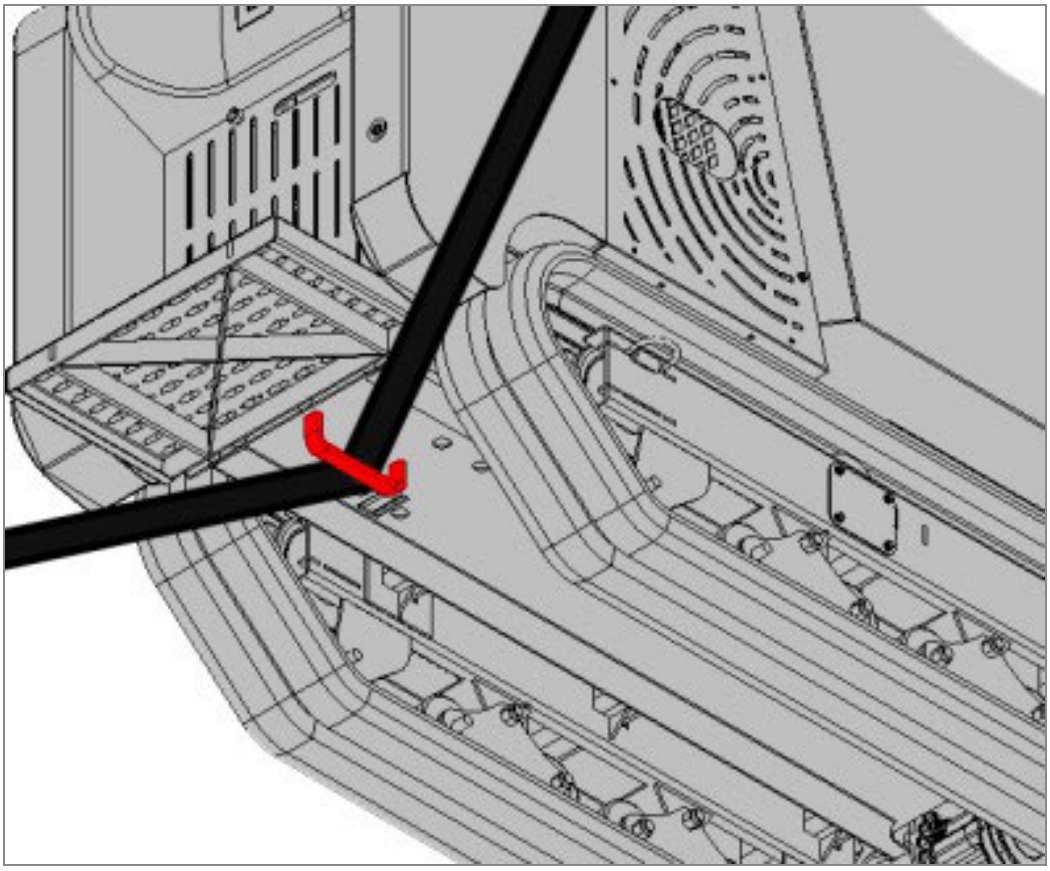


Fig. 11 - Rear tie-down point

> Never transport the machine unless it is securely fastened to the transport vehicle. Before leaving the machine unattended, always turn it off. Check that all locking devices are in the correct position.

7. Automatic parking brakes

Each track has an electric brake that holds the machine when it is not driving. The brakes release when you move the drive joystick and set again when the machine stops; with the key OFF they are always set. This stops the machine moving by accident when no operator is present.

> Park the machine on a flat, level and stable surface. If parking on an uneven surface cannot be avoided, turn the bucket straight, and block the tracks at the lower end of the machine. Without a load, park with the operator's step uphill; with a load, park with the operator's step downhill. Never park sideways on a slope.

8. Towing

Empty the bucket first. The brakes must be released before towing:

- **Machine powered:** service staff release both brakes from the display (Motors tab, page 2 > Release brakes; Service Software Guide, section 4.9). This feature is available on software v2026.10.26.51 and later.
- **No power, or older software:** use the mechanical brake release.

Connect a strong tow strap to the D-ring on the front bumper (Fig. 13). Tow slowly, below 2 mph; above about 2.5 mph the motors charge the battery uncontrolled.

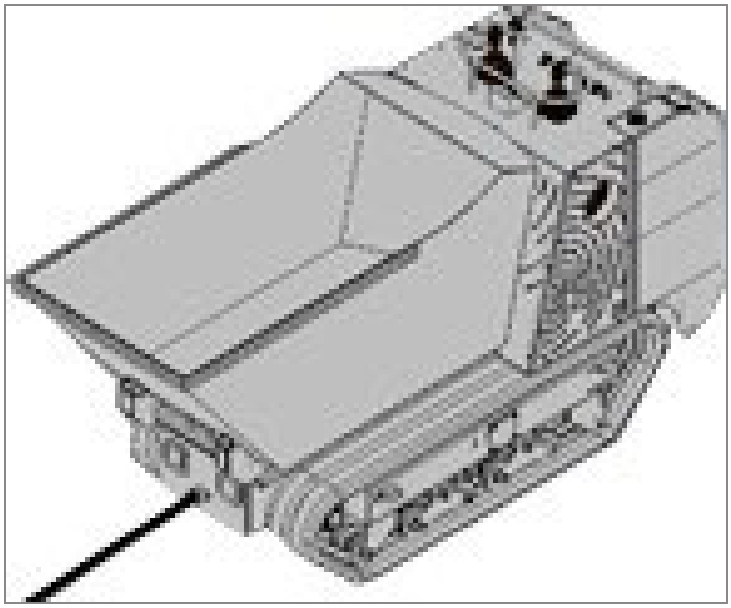


Fig. 13 - Towing from the front D-ring

9. Lifting with a crane

The machine has 4 D-rings for lifting. Make sure the bucket is empty and no person is near the machine while lifting (Fig. 14).

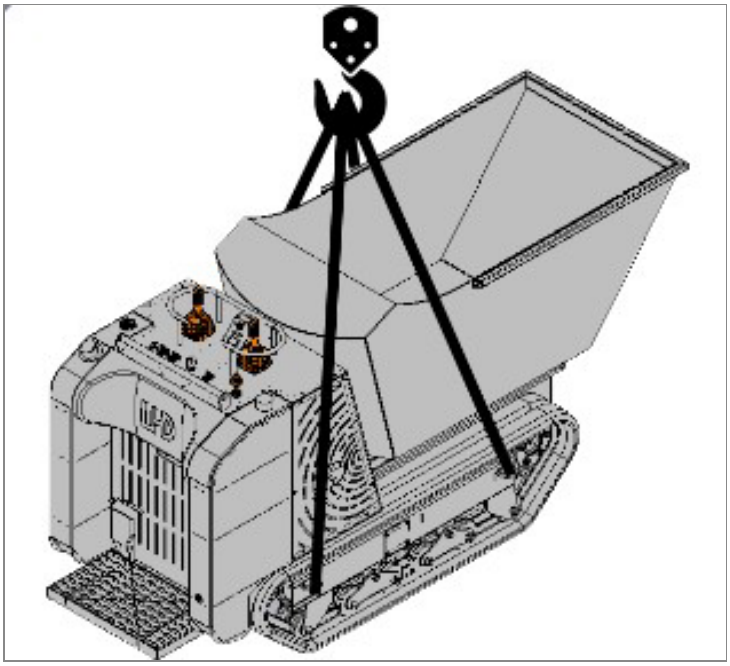


Fig. 14 - Lifting points

10. Lifting with a forklift

The machine can be lifted with a forklift from the rear or the sides, not from the front. To lift from the rear, set the forks 16 5/8 in apart (outside to outside) and raise the rear platform of the machine. Take care not to damage the battery compartment as the forklift approaches. To lift from the side, put the forks through the frame (Fig. 15) with the forks 33 in apart (outside to outside), and make sure the forks reach through the other side before lifting. With both methods, keep bystanders clear, move slowly and keep the machine as close to the ground as possible.

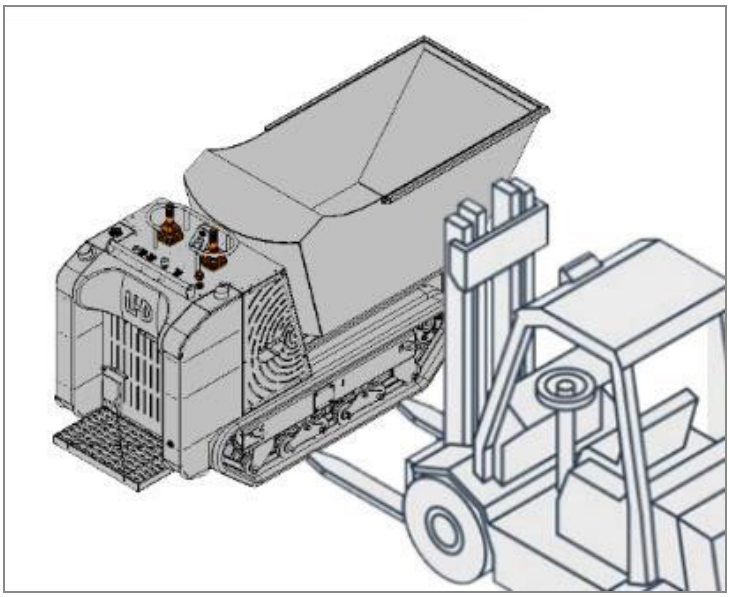


Fig. 15 - Side forklift lift

11. Standing platform

To lower the standing platform, pull the pin at the bottom right side of the platform out towards the right side of the machine (Fig. 16). When lowered it locks into place but still has some movement. To raise the platform, pull the pin towards the right side of the machine and raise it; it locks into place once raised all the way.

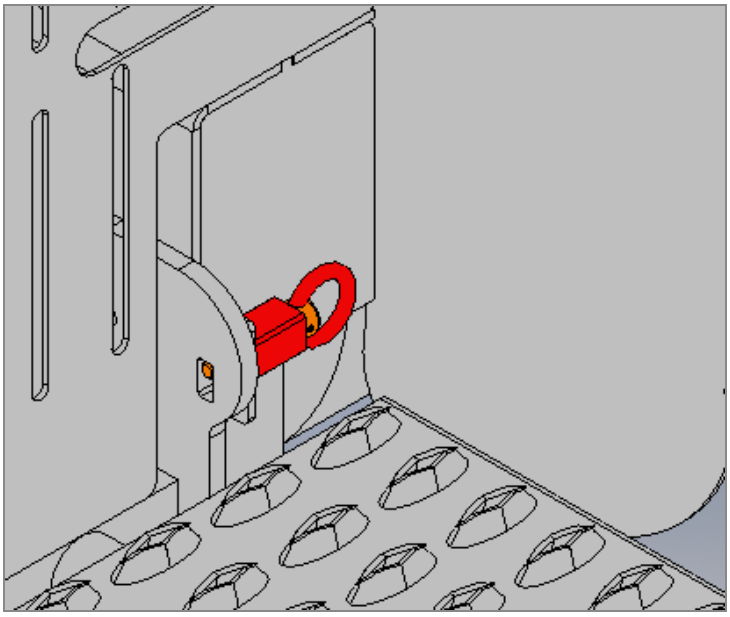


Fig. 16 - Platform pin

> Hard or sharp objects may scrape the tracks and reduce their life. Corrosive fluid may also damage the tracks; if it is spilled onto them or driven over, clean the tracks immediately.

> If the machine will not be used for 3 months or more, store it where the tracks are out of direct sunlight and weather. Set the charge limit to 50 % for storage (Part B, section 9).

A9. Maintenance

Regular maintenance is essential for a long machine life. Below is a general overview of the maintenance schedule. Maintenance work can be dangerous if it is not done safely; anyone working on the machine must understand all hazards and follow safety procedures. Before any maintenance work, turn the machine OFF and block it to prevent any movement that could cause harm.

Item	Maintenance requirement	Weekly	Every 50 h	Every 1000 h
Tracks	Check for loose fasteners; check the tension. The track is tightened by adjusting the tensioning bolt.	X	X	
Grease points	Keep all grease points lubricated (every 10 hours of use, Decal D).	X		
Batteries	Replace batteries.			X

> Always keep the machine clean. Remove any dirt or grease and never leave anything flammable in the working area of the machine.

> If there is any abnormal sound while the machine is in use, stop it immediately for inspection or maintenance. Always shut down the machine before maintenance.

1. Batteries

48 V traction battery (lithium-ion packs). Keep the packs clean and charged. Check the battery state and each pack on the display's Battery tab (Part B, section 8). For storage, set the charge limit to 50 % and charge fully at least once a month (Part B, section 9). If the packs were put to sleep (Ship mode or Shut down), wake them as shown on the Battery tab.

12 V sealed lead-acid (SLA) battery. Keep the battery clean and charged. Use a paper towel to clean the case. If the terminals are corroded, clean them with a solution of four parts water and one part baking soda, then apply a light coat of grease to the terminals to reduce corrosion. The 12 V battery is sealed: never open it or add water. The machine keeps it charged while the key is on and while the charger is plugged in. If it goes flat (for example after long storage), charge it with an external charger made for 12 V SLA batteries.

2. Cleaning and long-term storage

1. Lower and center the bucket and turn the key to OFF. Remove the key.
2. Remove dirt and grime from the outside of the machine. **Important:** you can wash the machine with mild detergent and water. Avoid excess water, especially near the control panel and the display.
3. Check the condition of the tracks and tighten if necessary (see Tracks below).
4. Charge the battery to the storage level (50 %).
5. Check and tighten all bolts, nuts and screws. Repair or replace any part that is damaged or defective.

6. Store the machine in a clean, dry garage or storage area. Keep the key in a memorable place. Cover the machine to protect it and keep it clean.

3. Tracks

- Adjust the track tension weekly to keep it tight enough.
- Too little tension wears out the tracks quickly.
- Too much tension causes resistance, which can cause excessive wear or breakage.

To prevent damage to rubber tracks, avoid working on extremely rough terrain and using aggressive movements.

Tensioning the tracks:

1. Remove the tensioner access plate on the side of the tracks (Fig. 17).
2. Use a grease gun to pump grease into the tensioner.
3. Tighten the nut.

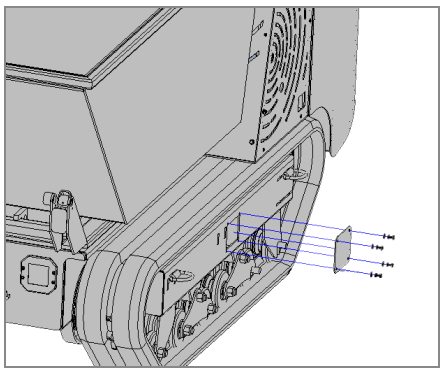


Fig. 17 - Track tensioner

4. Grease points

Check the grease points every 10 hours of use. There are 33 in total: the track rollers have 24, the dump cylinder 2, the slew drive 5 and the bucket pivot 2. General locations are shown in Fig. 18.

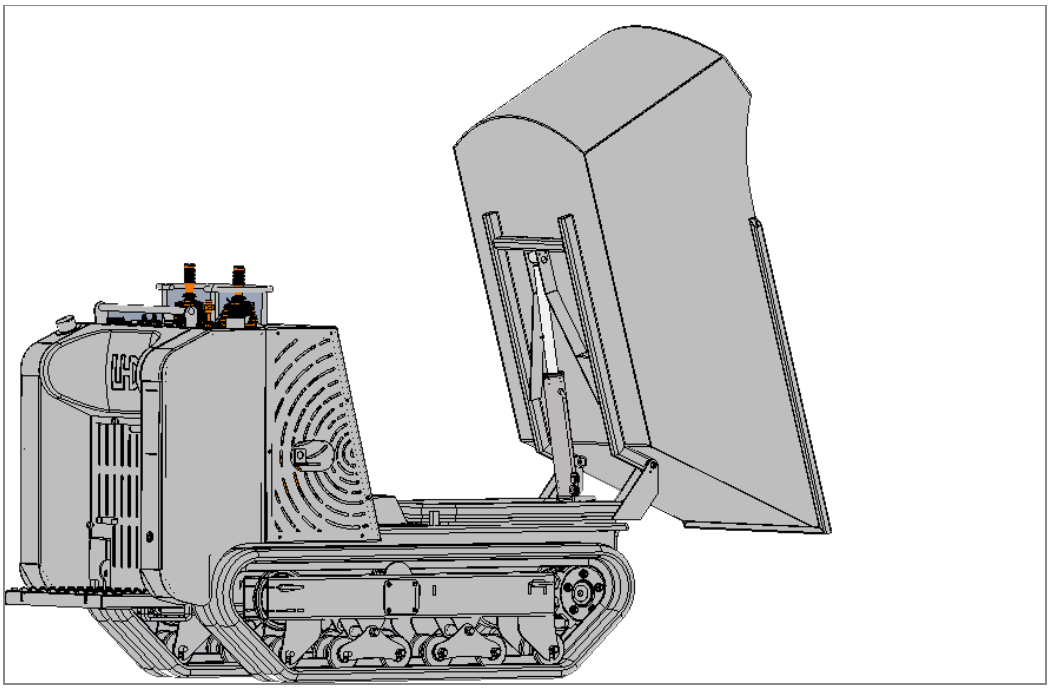


Fig. 18 - Grease point locations

A10. Mechanical troubleshooting

For messages on the display, use the Alerts screen (Part B, section 7) and the display troubleshooting table (Part B, section 17).

Problem	Check the tracks	Grease points	E-stop pressed
Will not start			X
Stops suddenly			X
Lacks power		X	
Bucket is slow		X	
Excessive noise from the tracks	X	X	
Excessive noise from the bucket		X	
Machine will not move	X	X	

Part B - Display and software

This part is the Operator Software Guide. It explains the touch screen and the electric drive system: how to start, drive, charge and read the machine, and what every operator screen shows. Settings locked behind a Service or Admin login are in the separate *Service Software Guide*. Section numbers in Part B refer to Part B.

How to use the screen

- The display is a 4.3 in touch screen. Tap keys and rows firmly with a finger or gloved finger. Set **Touch mode** to suit gloves or a wet screen (section 5).
- Some actions need a **press-and-hold**: keep your finger on the key until the bar under it fills. Letting go early cancels the action.
- Some actions open a **confirm box**: tap Confirm to go ahead, or Cancel (or Back) to leave without changing anything.

1. Starting and stopping the machine

Starting

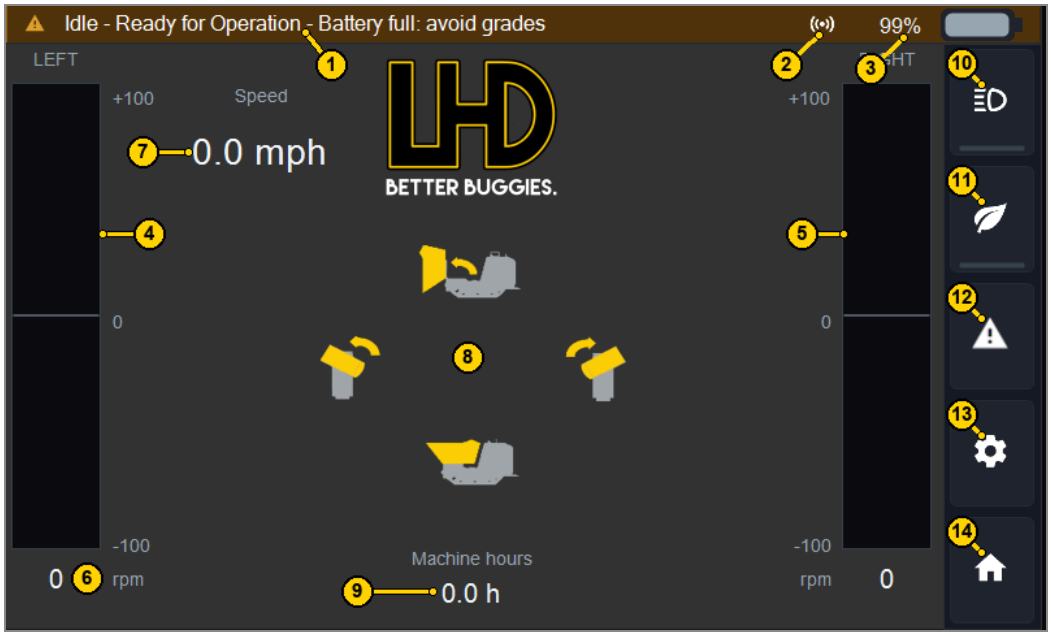
1. Do the daily checks from the Owner's Manual: charge level, function of controls, track tension, grease points, tightness of bolts. Check the E-stop button is released (pulled out).
2. Stand on the platform with both joysticks in neutral. Turn the key clockwise to ON.
3. The display shows the LHD logo, then the main screen. The top band shows the start-up in words:
    - **Starting up**: the controller checks the IO module, joysticks, battery packs and drives.
    - **Transition to discharge**: the batteries connect and the drive bus pre-charges; the main contactor closes when the bus is up.
    - **Idle - Ready for Operation**: the machine accepts joystick commands.
4. If the daily E-stop test is due, its page opens first (section 13). Do the test or skip it.
5. Every message the band can show is listed under *All machine states* in section 2.
6. There is no park brake to release: the brakes release automatically when you move the joystick, and set again when the machine stops.

Stopping

1. Return both joysticks to neutral. The tracks ramp to a stop and the brakes set.
2. Lower the bucket fully.
3. Turn the key to OFF. The automatic park brake stays set while the power is off.

> The machine drives only when both traction drives are online and the 48 V bus is pre-charged. If the band stays on **Starting up** or shows a fault, open the Alerts screen (section 7) and read the active alarm.

2. Main screen

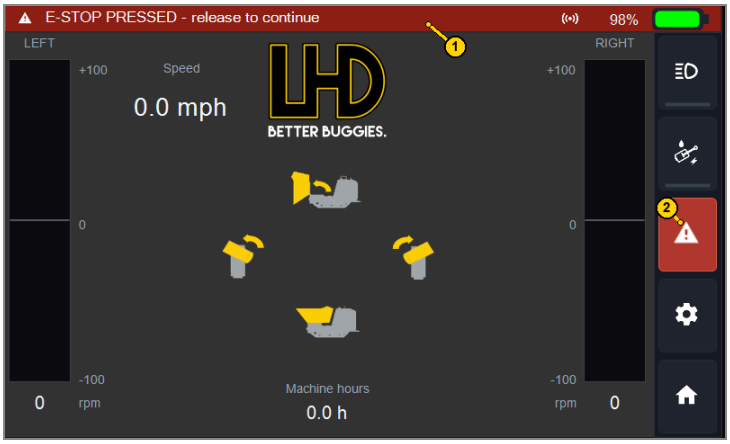


Main screen, idle, battery full

1. **Top band.** What the machine is doing, in words, for example *Idle - Ready for Operation*, *Running - Bucket Lower*, *Charging - Hydraulics on*, *E-STOP PRESSED - release to continue*. A note may follow after a dash (see the table below). The band is dark in normal work, amber with a warning sign when it carries a warning note, and red while the E-stop is pressed.
2. **Network icon.** How the telematics unit is connected: WiFi, mobile (bars), or the service hotspot. Tap it to open the Router tab (section 14).
3. **Battery.** State of charge in % and a battery icon. Green = charging; grey = discharging above 20 %; orange = below 20 %; red = below 10 %; red with ! = battery fault. Tap the battery icon to switch the readout between state of charge (%) and remaining run time; tap again to switch back.
4. **Left track bar.** Speed of the left track from -100 % (full reverse) to +100 % (full forward).
5. **Right track bar.** The same for the right track. Left and right are as seen by the operator on the platform.
6. **Track rpm.** Motor speed of each track in rpm, under each bar.
7. **Speed.** Ground speed in mph, worked out from the track speed.
8. **Hydraulic functions.** The four bucket functions: dump forward (top), rotate left and right (sides) and return (bottom). The function in use is highlighted. If the joysticks have been flipped in Settings, a label says so.
9. **Machine hours.** Counts while the traction motors or the hydraulic pump are enabled.
10. **Lights key.** Turns the work lights on and off. A green bar under the key shows the lights are on.
11. **Eco key.** Turns Eco mode on and off. Eco limits each track motor to 3000 rpm (normal maximum 6000 rpm) to make the battery last longer. While the charge cable is plugged in, this key becomes the Hydraulics key (section 10).
12. **Alerts key.** Opens the alarm list (section 7). It turns red while an alarm or the E-stop is active.
13. **Settings key.** Opens the Settings and information tabs.
14. **Home key.** Returns to this screen from anywhere.

Notes in the top band

Band note	Meaning and what to do
Battery full: avoid grades	Normal. When the battery is full (or cold) it can take back little energy from braking, so electric braking (regen) is limited, above all at high speed. The machine relies more on the mechanical brakes. Avoid long downhill runs until some charge has been used. Example: "Idle - Ready for Operation - Battery full: avoid grades".
Pump dump: NN A regen	Normal. At a high state of charge the hydraulic pump runs against its relief valve to absorb braking energy the battery cannot take (up to 40 A as delivered); NN is the amps absorbed, for example " - Pump dump: 40 A regen". You may hear the pump run while braking.
Brake: no regen	Regenerative braking is not available right now; stops use the mechanical brakes.



E-stop pressed

1. **Red band.** "E-STOP PRESSED - release to continue". If the machine was moving, the drives first ramp it down and the band shows the stop in progress; then the brakes set and power to the drives is removed.
2. **Alerts key in red.** The E-stop is also listed as an active alarm. Release the E-stop (pull it out) to continue; the machine starts up again by itself.

All machine states

The top band always says what the machine is doing. Its colour shows how urgent it is: dark = normal, amber = needs attention (the machine may still work), red = stopped by an E-stop or a fault.

The band pictures were captured in the simulator (software v2026.10.26.51), so the network icon and battery level in them are not real. Rows with the text in a coloured box are states the simulator cannot produce; the text is exactly what the band shows.

The bucket part of a message names the function being commanded: *Bucket Raise*, *Bucket Lower*, *Bucket CW*, *Bucket CCW*, *Raise + Rotate CW*, *Raise + Rotate CCW*, *Lower + Rotate CW* or *Lower + Rotate CCW*.

Starting up

Band	Meaning and what to do
	Normal start-up checks, about 2 seconds.
	The IO module or the battery packs have not answered yet. If they do not answer within 30 seconds the machine goes to Error.
	The IO module is still starting; the E-stop stays applied until it is up. Normal for a moment after key-on.
	Let the drive joystick return to neutral; the checks start when it does.

Idle (ready, not moving)

Band	Meaning and what to do
	Ready. Move a joystick to work.
	Ready, with Eco mode on.
	The bucket can be used; the traction drives are not ready yet (for example still pre-charging). Driving starts when they are.
	The drive bus is taking longer than normal to charge up. If it stays, check the Motors tab and Alerts.
	Return both joysticks to neutral before working again (after a stop, a fault or a re-start).
	The battery packs are switching to discharge. Wait a moment.
	The charge cable is in. Unplug it to drive, or use Hydraulics while charging (section 10).
	The controller has the machine switched off. Turn the key off and on again; call service if it stays.
	A joystick is offline or faulty. Check the IO tab (joystick values) and Alerts.
	The controller lost contact with the battery packs. Driving is blocked. Check Alerts; turn the key off and on.
	The charger has not answered. Driving is blocked until it does.
	The control program paused and the outputs were stopped for safety. Service staff clear it with Reset IO stop.
	The charger stopped answering while the machine was plugged in. Unplug the cable, then tap the band on the main screen to confirm.
	The charger is not answering. The machine can still be moved, but it cannot charge. Park it and call service.
	The battery is nearly empty and speed is cut to a crawl. Drive to the charger now.

	The battery is low; top speed is being reduced. Also added to Running.
	A fault needs a reset. Read Alerts, fix the cause, then press and hold Reset drives on the Motors tab, page 2.

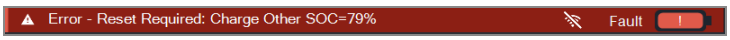
Running (working)

Band	Meaning and what to do
	The machine is working: tracks or bucket in use.
	Working with Eco mode on.
	Working, with the bucket function being commanded.
	The bucket works but the traction drives are not ready; the tracks will not move.

Plugged in and charging

Band	Meaning and what to do
	Cable in; the charger is starting up.
Starting charge - waiting for the battery	The battery packs are switching to charge mode.
Starting charge - battery reports a fault	The packs will not accept charge. Check Alerts and the Battery tab.
	No power is reaching the charger. Push the plug fully home; check the outlet or charging station.
	Charging: battery current and time to the charge limit.
	Charging slower because of temperature (charger or battery).
	Charging waits until the battery is back in its temperature range (also "battery is hot").
	The battery reached the charge limit. Safe to unplug.
Charge fault - (charger message)	The charger stopped with a fault. Unplug, plug in again; call service if it stays.
	Hydraulics while charging is on (section 10); a bucket function in use is added, for example "- Bucket Lower".
	Hydraulics while charging was requested; return the hydraulic stick to neutral to start it.
	As above, after the charge has finished with the cable still in ("Plugged in - Hydraulics: centre the stick" likewise).

E-stop, lockout and errors

Band	Meaning and what to do
	The E-stop was pressed while moving: the drives are ramping the machine down (shown while a track still turns).
	The controlled stop is finishing: the brakes set and power is removed.
	The E-stop is pressed and the machine is at rest. Pull the button out to continue.
	The IO module that reads the E-stop stopped answering, so the machine stopped. Check its power and CAN connection; call service.
	The E-stop signal from the IO module was lost (not a pressed button). Call service.
	The machine was left unused. Press and hold the lockout box for 1 second (section 3).
	A battery fault stopped the machine; the band shows the battery's own message. Read Alerts and the Battery tab, then reset.
	The drive control found a fault. Read Alerts, then reset.
	The IO module or battery did not answer within 30 seconds of start-up. Check Devices and Alerts; reset to try again.
	Internal error. Reset; call service if it comes back.

On v2026.10.26.51 and later

> This feature is available on software v2026.10.26.51 and later.

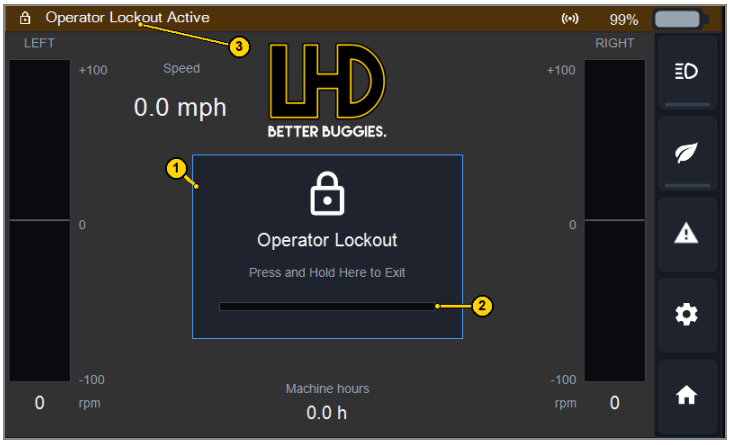
Band	Meaning and what to do
	PIN to drive is on and the machine has not been unlocked since key-on. Enter the drive PIN (see section 6, PIN to drive).
	Short notice after PIN to drive was switched on.
	The brakes are released for towing by service staff. The machine can roll.
	Towing faster than about 2 mph. Slow down: above about 2.5 mph the motors charge the battery uncontrolled.
	Shown after tapping a key that is not allowed now; the text says why.

Notes added to the band

Band	Meaning and what to do
	See "Notes in the top band" above.
	See above. Normal.
	Electric braking is not available; stops use the mechanical brakes.
	The drives hold the machine still until the brakes report applied. If it stays, call service.

To reset an error: fix the cause shown in Alerts, then on the Motors tab, page 2, press and hold **Reset drives**.

3. Operator Lockout



Operator Lockout

1. **Lockout box.** Appears over the main screen when the machine has been left unused. The machine is in a safe state and cannot move.
2. **Hold bar.** Press and hold the box; the bar fills. When it is full (1 second as delivered) the lockout ends.
3. **Band.** Reads "Operator Lockout Active" on every screen while the lockout is on.

The lockout starts when the traction motors, hydraulic pump, joysticks and touch screen have all been unused for the lockout time (60 s as delivered). Touching the screen counts as activity. Lockout stays on through an E-stop and through plugging in the charger; only the press-and-hold on the box ends it.

> Operator Lockout is a safety device that stops the machine moving if a joystick is knocked while nobody is working. Switching it off in Settings asks for confirmation; do it only if you accept that risk.

4. Side bar and tabs

The side bar on the right has five key positions. What each key does depends on the page you are on and, on the main screen, on whether the charge cable is plugged in; the icon on the key always shows its current function. A position that is not used on a page stays empty.

Screen	Keys (top to bottom)
Main	Lights · Eco (Hydraulics while plugged in) · Alerts · Settings · Home
Settings, Battery, IO, Charger, Motors, Router tabs	Save · Rental mode · Login / Logout · Back · Home
Detail pages	page keys (page up / down and similar) · Back · Home

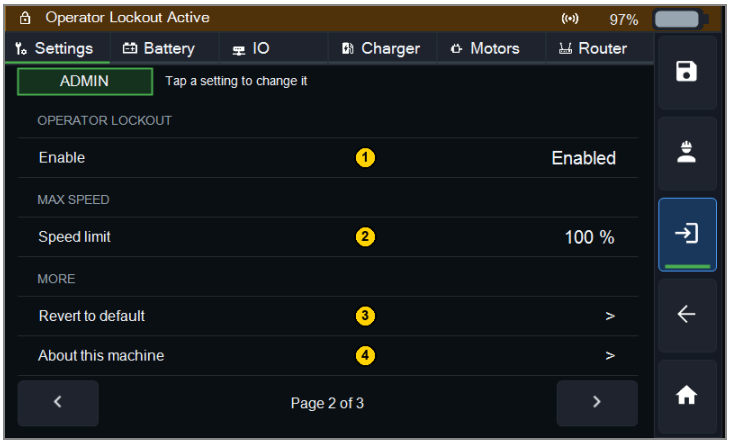
The six tabs at the top of the information screens are tapped, not swiped. A long page has a page bar at the bottom ("Page n of N") with left and right arrow keys.

5. Settings



Settings, page 1 (shown during an Admin login)

1. **Tabs.** Settings, Battery, IO, Charger, Motors and Router. The open tab is underlined in green.
2. **Access chip.** Who is logged in: OPERATOR (no login), SERVICE or ADMIN. Next to it, a short message shows the result of the last change.
3. **Group caption.** Rows are grouped under grey captions (DISPLAY + JOYSTICK, CHARGING, and so on).
4. **Setting row.** Tap a row to change it. A number opens the keypad; an On/Off or list setting changes with each tap.
5. **Value.** The current value. A grey value means you may not change it now; the message says why (for example "locked in rental mode").
6. **Page bar.** Moves between the pages of the list.
7. **Save.** Keeps the changes marked "Press Save" (see the table below) after the machine is switched off. A confirm box asks first.
8. **Rental mode** (hard-hat key). Locks the operator settings for rental use. Entering it asks for a rental code; leaving it needs that code or a Service/Admin PIN.
9. **Login / Logout** (arrow-into-door key). For service staff. The green bar shows a login is active; the login ends by itself after 10 minutes without use.
10. **Back.** Returns to the previous page.
11. **Home.** Returns to the main screen.



Settings, page 2

1. **Operator lockout - Enable.** Turns the lockout on or off (section 3). Turning it off asks for confirmation.
2. **Speed limit.** Limits the top track speed to a percentage, in both directions.
3. **Revert to default.** Returns the settings to their defaults (press-and-hold). Joystick flip and the joystick and valve inversions are kept.
4. **About this machine.** Opens the software and machine information page.

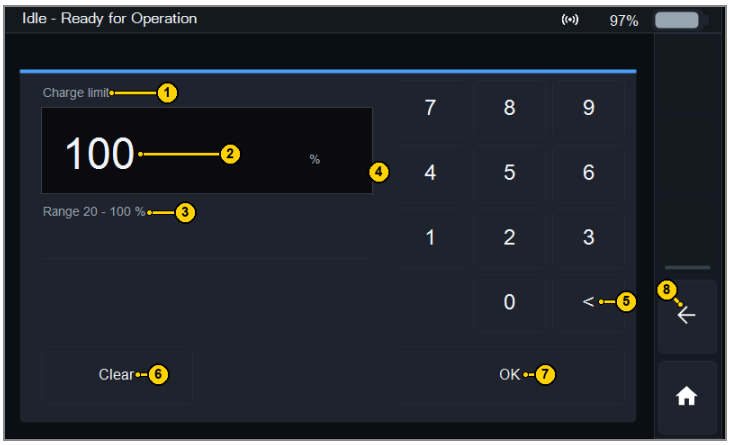
A third page with **Tools** and **Engineering** appears only during a Service or Admin login.

Operator settings reference

Setting	Default	Range (step)	Rental	Kept	What it does
Brightness	100 %	10 - 100 % (5)	Open	Saved at once	Display backlight brightness.
Touch mode	Gloves	Normal / Wet / Gloves	Open	Saved at once	Touch response for bare fingers, a wet screen, or gloves. Applies at once.
Flip joysticks	Off	Off / On	Open	Press Save	Swaps the left and right joystick functions. Machine must be stopped.
Charge limit	100 %	20 - 100 % (5)	Locked	Saved at once	Highest charge level (section 9).
AC input limit	Auto	Auto, or 1 A up to the supply limit (max 40 A)	Locked	Saved at once	Caps the current the charger draws from the outlet. Auto lets the charging station decide; the setting can only lower it. Use it on a weak or shared circuit.
Operator lockout - Enable	Enabled	Disabled / Enabled	Locked	Press Save	Section 3.
Speed limit	100 %	10 - 100 % (5)	Locked	Press Save	Top speed as a percentage.

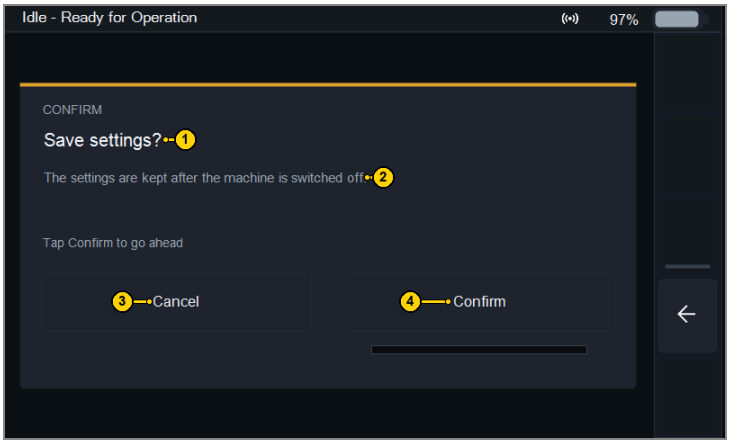
Kept: *Saved at once* values survive a power cycle as soon as they are changed. *Press Save* values take effect at once but go back at the next start unless you press the Save key.

Keypad and confirm boxes



Keypad (changing Charge limit)

1. **Setting name.**
2. **New value** as you type it, with its unit.
3. **Allowed range.** A value outside it is refused.
4. **Digit keys.**
5. **Backspace.** Removes the last digit.
6. **Clear.** Empties the value.
7. **OK.** Applies the value.
8. **Back.** Leaves without changing anything.



Confirm box (Save settings)

1. **Question.** What is about to happen.
2. **Explanation.** The effect of going ahead.
3. **Cancel.** Leaves without doing it.
4. **Confirm.** Goes ahead. For actions that cannot be undone (Revert to default, Reset drives) the key says "Hold to confirm": keep pressing until the bar fills.



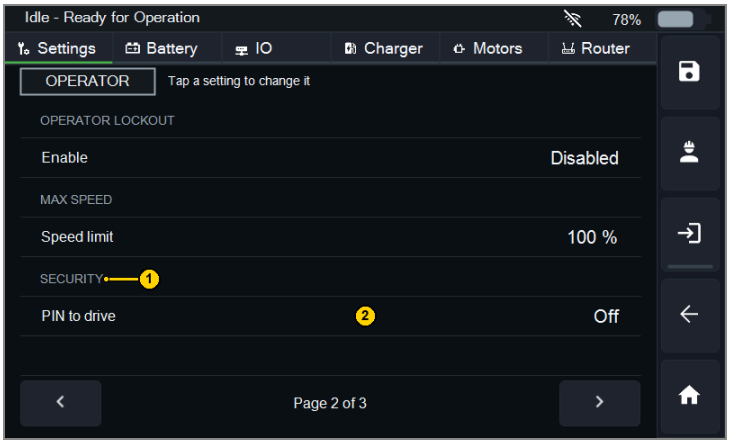
About this machine

1. **Software version** (Year.Month.Day.24-hour time) and build date. Quote it when you call LHD.
2. **Drive firmware** of the right and left traction drives.
3. **Serial number** of the machine.
4. **Machine hours.**
5. **Charger serial** number.

6. PIN to drive (anti-theft)

> This feature is available on software v2026.10.26.51 and later.

With PIN to drive on, the machine is locked at every key-on until the drive PIN is entered. While locked there is no driving and no hydraulics (including hydraulics while charging); charging, the screens and the lights still work.

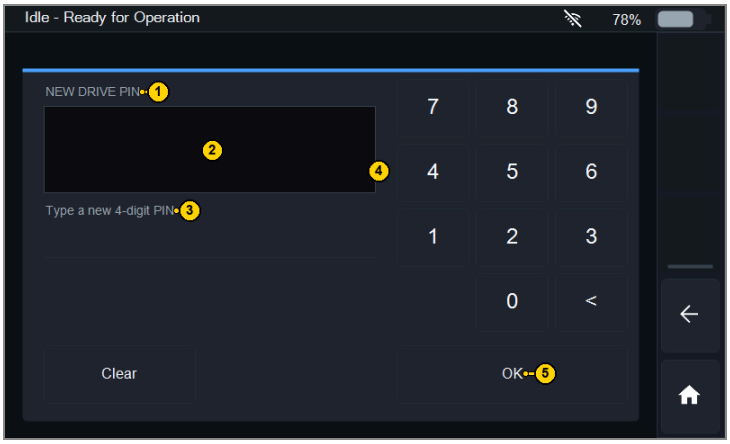


Settings, page 2: SECURITY

1. **SECURITY** group on Settings page 2.
2. **PIN to drive:** Off or On. Can be changed by anyone except in Rental mode, with the machine stopped.

Switching PIN to drive on

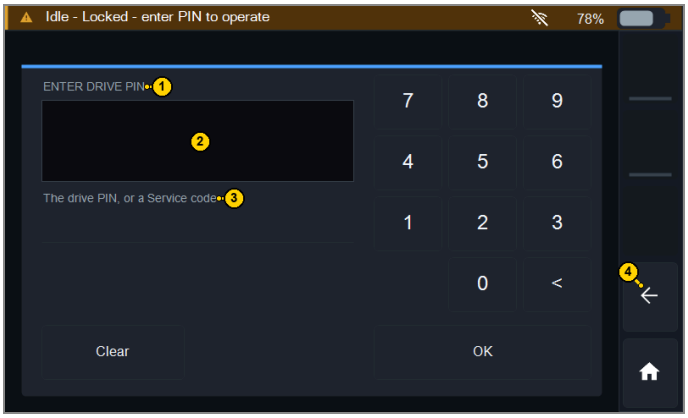
1. Stop the machine. Open Settings, page 2, and tap **PIN to drive**.
2. The box **NEW DRIVE PIN** opens. Type a 4-digit PIN and tap OK. It may not be 0000 or the same as a Service or Admin code; if it is, the box says "Not allowed - choose another PIN".
3. The box **REPEAT DRIVE PIN** opens. Type the same PIN again and tap OK. The band briefly shows "PIN to drive is on" and the row reads On.



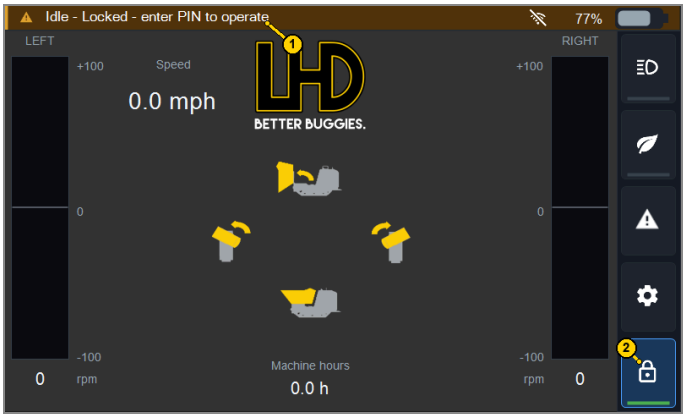
New drive PIN

1. **Box title:** NEW DRIVE PIN, then REPEAT DRIVE PIN.
2. **Entry:** one star per digit.
3. **Hint** or the reason a PIN is refused.
4. **Digit keys.**
5. **OK.**

Unlocking at key-on



Enter drive PIN at key-on



Main screen while locked

1. **ENTER DRIVE PIN** box. It opens by itself once after key-on.
2. **Entry.**
3. The drive PIN unlocks the machine. A Service or Admin code also unlocks it and starts that login.
4. **Back** closes the box; the machine stays locked.

1. **Band:** "Idle - Locked - enter PIN to operate".
2. **Lock key** (fifth key on the main side bar while locked): opens the PIN box again.

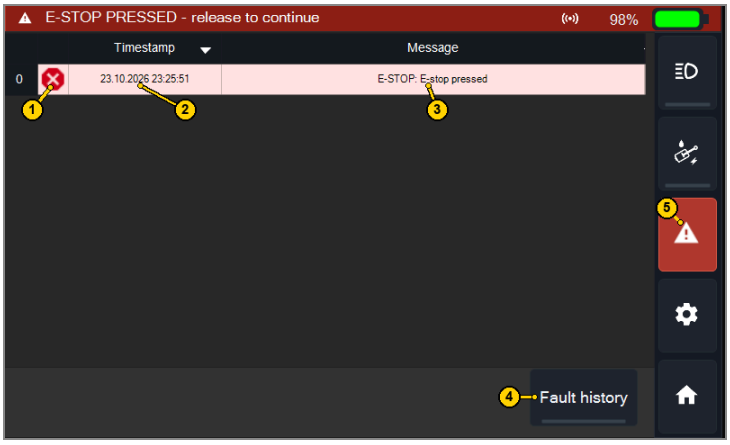
After 5 wrong entries the box says **Too many tries - wait 5 min**; no code (including Service and Admin codes) is accepted until the time is up.

Switching it off or changing the PIN

Tap **PIN to drive** (it reads On). The box **DRIVE PIN TO REMOVE** opens: enter the drive PIN, or a Service or Admin code. To change the PIN, switch it off and then on again with the new PIN.

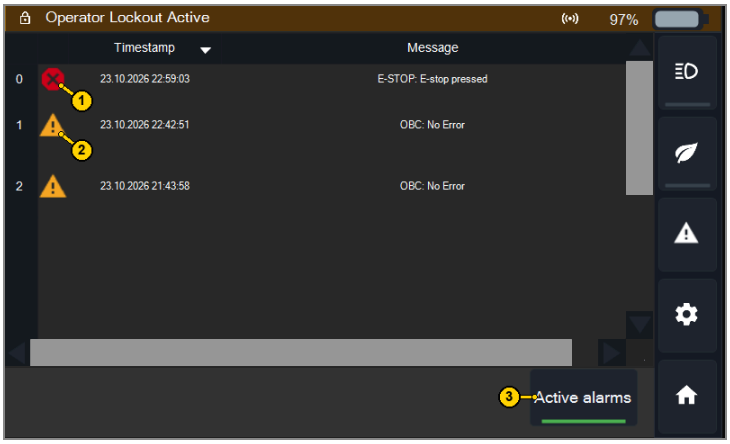
> If the drive PIN is lost, service staff can unlock the machine and remove the PIN with their Service code.

7. Alarms and warnings



Alerts screen with an active alarm

1. **Severity.** A red cross is an alarm: a critical condition that stops the machine. An amber triangle is a warning: the machine can still work, take care.
2. **Date and time** the alarm started.
3. **Message.** Starts with the part of the machine (MTR drives, 48V battery, OBC charger, E-STOP, IO module, joystick, CAN bus) and says what is wrong.
4. **Fault history.** Opens the list of past alarms and warnings.
5. **Alerts key**, red while an alarm is active.



Fault history

1. **Past alarm** with date and time.
2. **Past warning.** (An "OBC: No Error" line is the charger reporting it has cleared.)
3. **Active alarms.** Returns to the list of current alarms.

Examples of alarms: E-stop pressed, IO module offline, joystick lost, battery pack communication lost, charger offline, drive offline, CAN bus off, output fault. Most clear by themselves when the cause is removed. Note the message before calling for service.

8. Battery



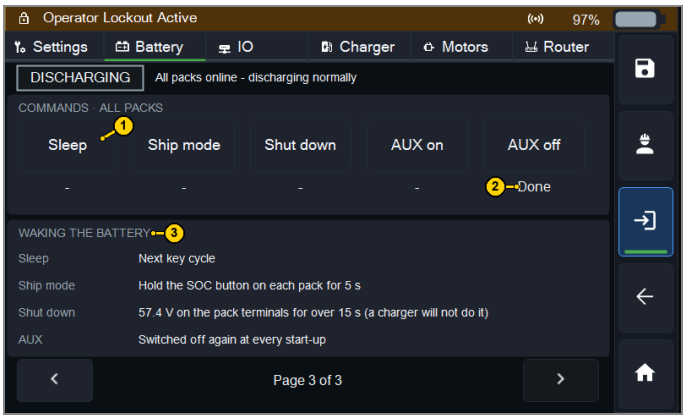
Battery, page 1

1. **Battery state** in one word: DISCHARGING, CHARGING, and so on.
2. **Status text,** for example "All packs online - discharging normally".
3. **State of charge ring.**
4. **Voltage, current, remaining capacity and run time.** Current is negative while the machine uses power, positive while charging. Run time is an estimate of hours of typical use left.
5. **Lamps:** DISCHARGE OK (the packs allow driving), CHARGE (the packs accept charge), CONTACTOR (the battery is connected).
6. **One row per pack** with charge bar, SOC, voltage, current and temperature. Tap a row for the pack detail.
7. **Pack flag:** OK, or the pack's fault.
8. **Page bar.**



Battery, page 2

1. **Limits** the battery allows: discharge, regen (braking) and charge current, charge voltage and cut-off current.
2. **Pack system:** packs online and faulted, state of health, contactor.
3. **Warning lamps:** Over temp, Low SOC, Cell imbalance, Aux off. A lit lamp is active.



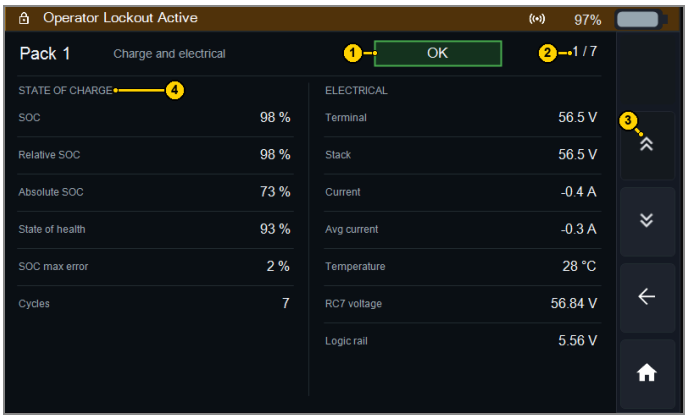
Battery, page 3

1. **Commands for all packs:** Sleep, Ship mode, Shut down, AUX on, AUX off.
2. **Result** of the last command.
3. **How to wake the battery** after each command.

> Ship mode and Shut down put the packs to sleep and the machine will not start. Wake them as shown on page 3: after Ship mode, hold the SOC button on each pack for 5 s. Use these commands only for storage or shipping.

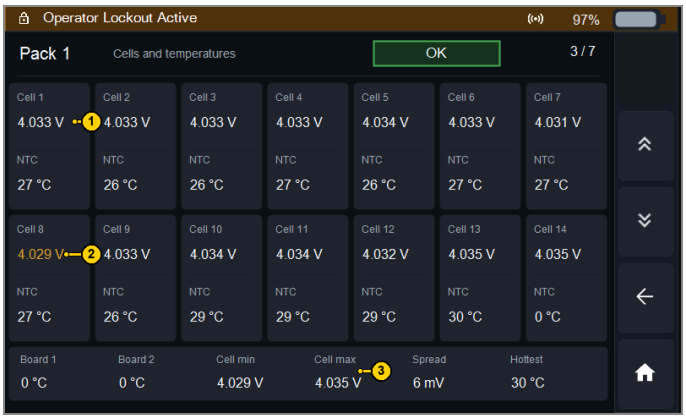
Pack detail

Tapping a pack row opens seven pages for that pack: charge and electrical, capacity and identity, cells and temperatures, health, lifetime, learning and balancing, and pack commands.



Pack detail, page 1

1. **Pack state:** OK or the fault.
2. **Page** of the pack detail (1 of 7).
3. **Page up / down** keys.
4. **State of charge** group: SOC, state of health, cycles.



Pack detail, page 3

1. **Cell tile:** cell voltage and its temperature sensor (NTC).
2. **The lowest cell** is shown in amber.
3. **Summary:** lowest and highest cell, spread between them, hottest sensor.

9. Charging

Choosing the charge limit

Use	Set Charge limit to
Normal daily work	**80 %**: extends battery life.
Long working days	**100 %**.
Storage (machine not used for weeks)	**50 %**.

The machine is delivered at 100 %. Charge to 100 % at least once a month so the battery management system stays calibrated. Change the limit in Settings (section 5) or on the Charger tab, page 4 > Charge settings.

How to charge

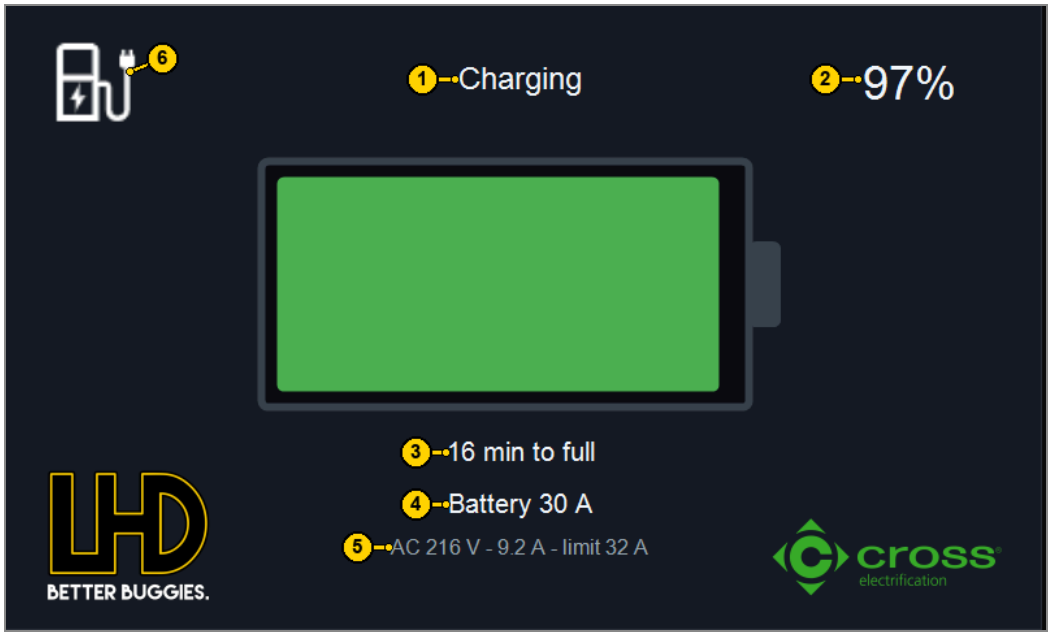
1. Park on level ground, lower the bucket and turn the machine off.
2. Plug the charger cable into a grounded 110 V or 220 V supply, then into the machine.
3. The charge screen opens and charging starts. Driving is blocked while the cable is in.
4. When done, unplug the cable. The machine returns to the main screen.

Key switch and the charge cable

Action	Key switch	The machine
Plug in	OFF	Turns on: the charger wakes the controller so it can manage the charge and show the charge screen.
Unplug	OFF	Turns off.
Unplug	ON	Stays on and returns to normal operation.

Hydraulics while charging (section 10) always switches off when the cable is unplugged, whatever the key switch position.

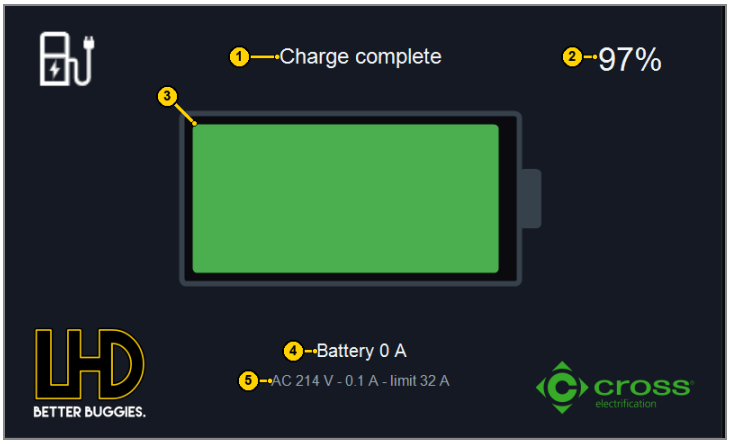
> Never charge with a damaged cable or plug. Never charge while the machine is being operated. Charging outdoors is fine.



Charge screen while charging

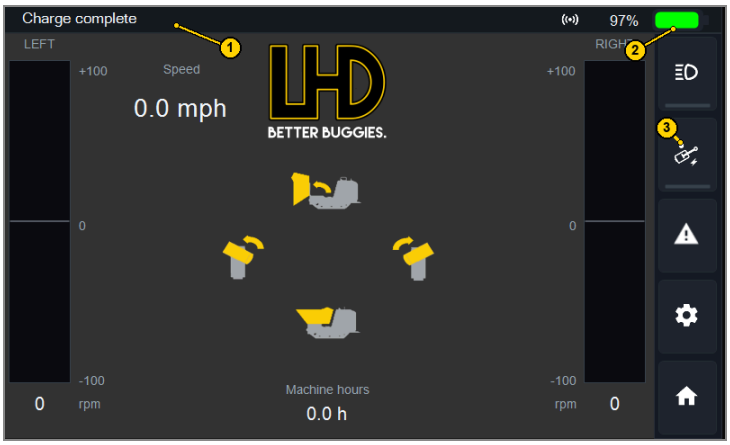
1. **Charge state** in words (see the table below).
2. **State of charge.**
3. **Time to full** (to the charge limit), estimated from what the charger and supply can deliver.
4. **Battery current:** the amps going into the battery.
5. **AC supply:** outlet voltage, current drawn, and the current limit of the charging station.
6. The charge screen stays up while plugged in. Touch anywhere to return to the normal pages.

Charge state	Meaning and what to do
Check plug	The cable is seen but no power comes through. Push the plug fully home; check the outlet or charging station is on.
Starting charge	The charger is starting up.
Charging	Current is flowing into the battery.
Charging (reduced)	The charger or the supply is limiting the current (for example a weak outlet, heat, or the AC input limit).
Charge complete	The battery has reached the charge limit. It is safe to unplug.
Charge fault	Charging stopped. Read the alarm; unplug and plug in again; call for service if it stays.



Charge screen: charge complete

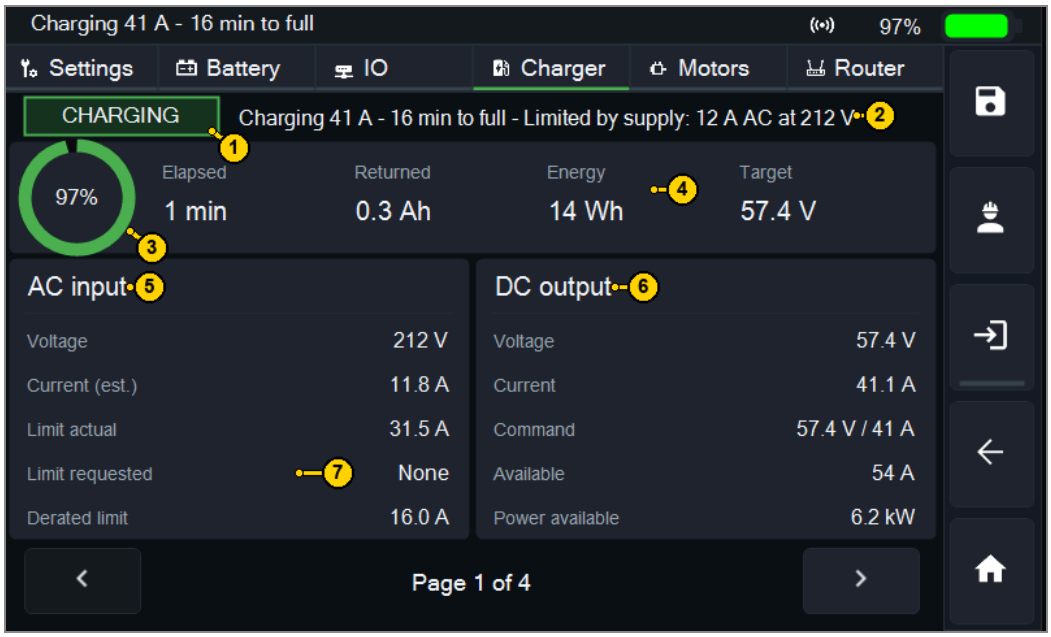
1. **Charge complete.**
2. **State of charge.** (Shown here with a 97 % reading at the limit set then.)
3. **Battery graphic,** full.
4. **Battery current** is 0 A.
5. **AC supply** with the station's limit.



Main screen while plugged in

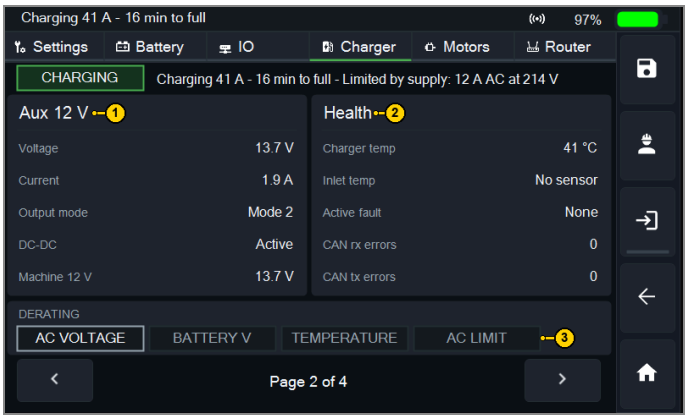
1. **Band** shows the charge state.
2. **Battery icon** is green while plugged in.
3. **Hydraulics key** replaces the Eco key (section 10).

Charger tab

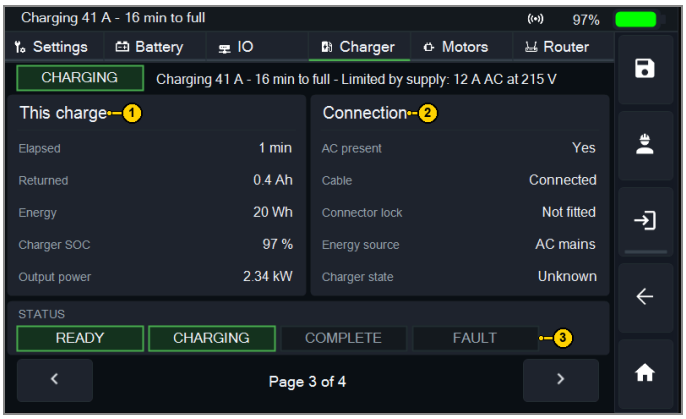


Charger, page 1, while charging

1. **Charger state:** NO AC, CHARGING, COMPLETE, FAULT.
2. **Status text,** including what limits the charge (here "Limited by supply: 12 A AC at 212 V").
3. **State of charge ring.**
4. **This charge:** elapsed time, charge returned (Ah), energy (Wh), target voltage.
5. **AC input:** outlet voltage, estimated current, and the AC limits in force.
6. **DC output:** charger voltage and current to the battery, command, available current and power.
7. **Limit requested:** the AC input limit from Settings ("None" = Auto).



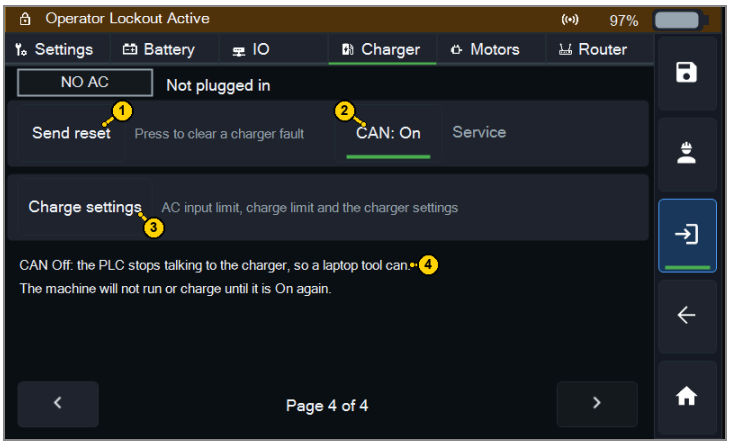
Charger, page 2



Charger, page 3

1. **Aux 12 V:** the 12 V supply for the machine's electrics, made by the charger's DC-DC converter.
2. **Health:** charger temperature, faults, communication errors.
3. **Derating lamps:** a lit lamp shows why the charger is reducing power (AC voltage, battery voltage, temperature, AC limit).

1. **This charge:** elapsed, returned, energy, charger SOC, output power.
2. **Connection:** AC present, cable, connector lock, energy source.
3. **Status lamps:** Ready, Charging, Complete, Fault.



Charger, page 4

1. **Send reset:** clears a charger fault.
2. **CAN On/Off** (Service only): Off lets a service laptop talk to the charger. The machine will not run or charge until it is On again.
3. **Charge settings:** AC input limit and Charge limit (and, for service staff, the charger settings).
4. Explanation of CAN Off.



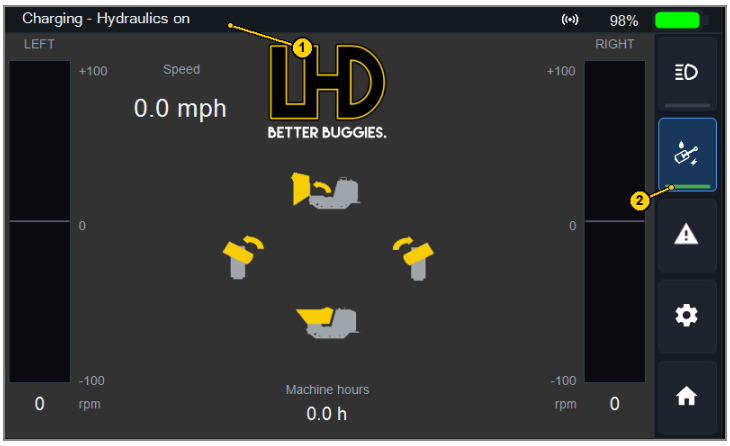
Battery tab while charging

1. **CHARGING** state and positive current into each pack.
2. **CHARGE OK** lamp lit: the packs accept charge.

Charge time from low is about 5 h on 220 V and 8 h on 110 V. If the charger drops off the bus, an alarm is raised.

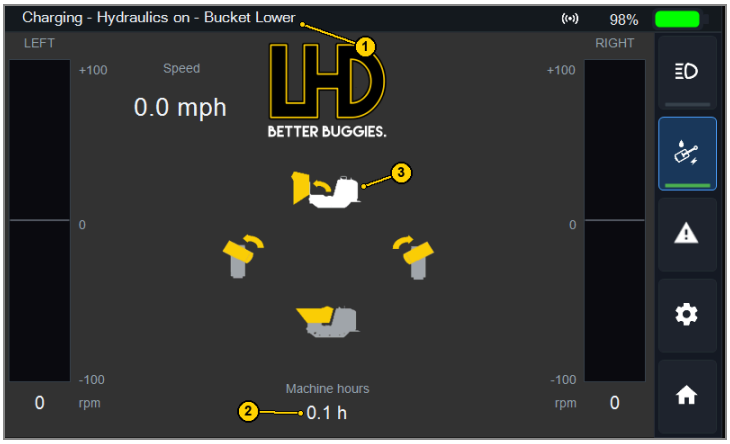
10. Hydraulics while charging

The bucket can be used while the machine is plugged in, for example to empty it. Driving stays blocked.



Hydraulics on while charging

1. **Band** reads "Charging - Hydraulics on".
2. **Hydraulics key** highlighted with a green bar.



Bucket in use while charging

1. **Band** adds the function in use ("Bucket Lower").
2. **Machine hours** count while the pump runs.
3. **The function in use** is highlighted.

Switching on

1. With the charge cable plugged in, press the **Hydraulics** key (second key on the main side bar; when unplugged the same key is Eco).
2. A confirm box asks "Hydraulics on charge? Run the hydraulics while charging? Driving stays off." Tap **Confirm**.
3. Make sure the hydraulic joystick is in neutral. The hydraulics switch on only once the stick is at neutral; if that does not happen within 10 seconds the request is cancelled and you must press the key again.

4. The band reads **Charging - Hydraulics on**. Use the hydraulic joystick as normal; the pump runs while you use it.

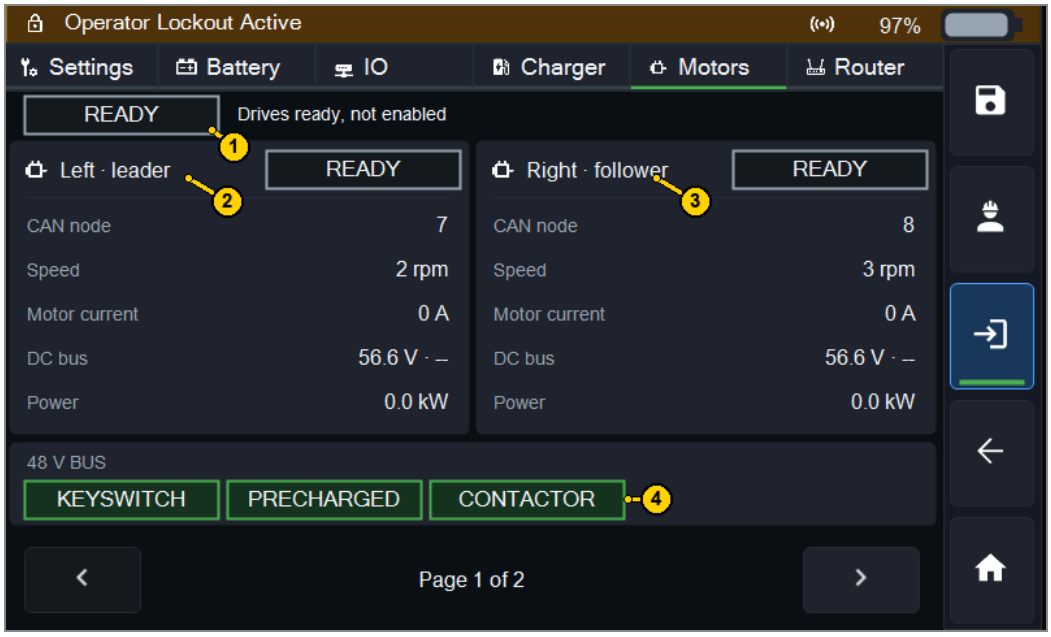
Switching off

Press the Hydraulics key again: it switches off at once, without a confirm box. It also switches off by itself when:

- the charge cable is unplugged (after about 2 seconds);
- no hydraulic function has been used for 5 minutes;
- the E-stop is pressed, a machine fault occurs, or the hydraulic joystick goes offline or faulty;
- the battery leaves its normal charge or discharge state.

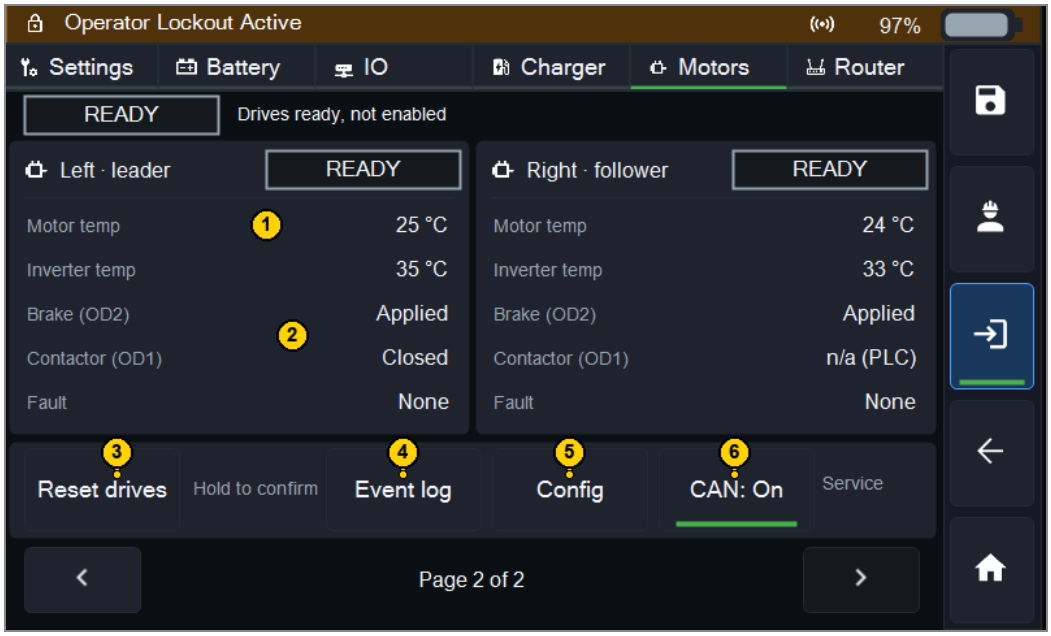
It stays on after charging finishes at the charge limit, as long as the cable is plugged in; the band then reads **Plugged in - Hydraulics on**. Driving stays off the whole time.

11. Motors



Motors, page 1

1. **Drive state** for both drives: READY, RUNNING, FAULT, OFFLINE, with a status text.
2. **Left drive (leader, CAN node 7):** its own state, speed, motor current, DC bus voltage and power.
3. **Right drive (follower, CAN node 8).**
4. **48 V bus lamps:** KEYSWITCH (drive power on), PRECHARGED (bus charged up), CONTACTOR (main contactor closed). All three are lit when the machine is ready.



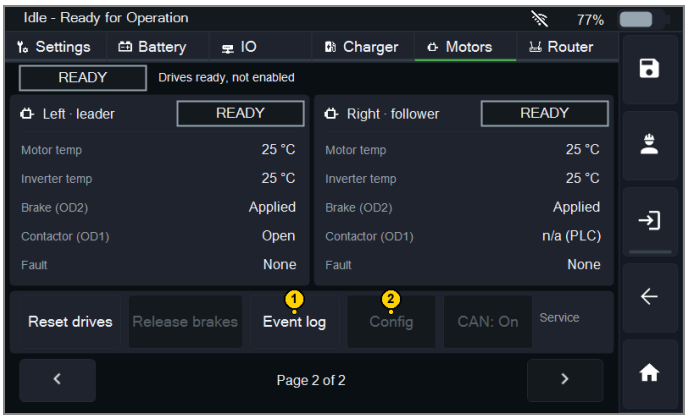
Motors, page 2

1. **Temperatures** of each motor and drive.
2. **Brake and contactor** state, and the drive fault in words.
3. **Reset drives:** clears drive faults. Press and hold to confirm.
4. **Event log:** the faults and warnings stored in the drives.
5. **Config:** motor configuration (Admin only).
6. **CAN On/Off** (Service only): Off lets a service laptop talk to the drives; the machine will not drive until it is On again.

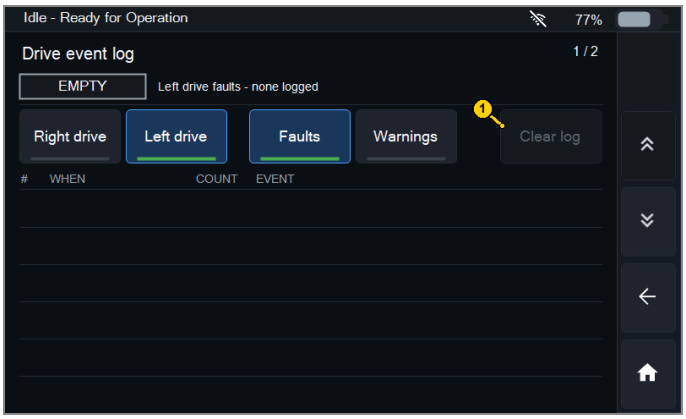
Drive event log

> This feature is available on software v2026.10.26.51 and later.

The drive event log can be opened without a login: Motors tab, page 2 > **Event log**. It lists the faults and warnings each traction drive has reported, with when they last happened and how many times. Tap an event for its description. Clearing the log, Config, CAN and Release brakes still need a Service login.



Motors page 2 without a login



Drive event log, viewed without a login (empty log shown)

1. **Event log** is available to everyone.
2. **Release brakes, Config and CAN** are grey without a Service login.

1. **Clear log** is grey: only service staff can clear the log.

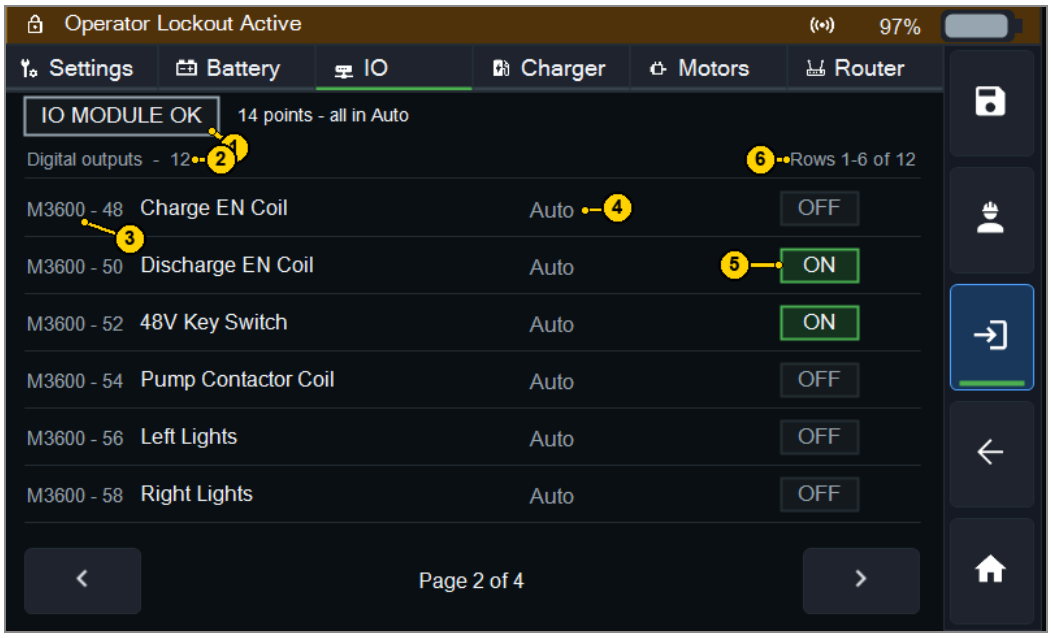
Brake release for towing (service staff)

> This feature is available on software v2026.10.26.51 and later.

Service staff can release both track brakes from the screen so the machine can be towed: Motors tab, page 2 > **Release brakes** (Service login). While it is active the band reads **TOW MODE - brakes released** and the machine can roll. The brakes apply again on the E-stop, key-off, any drive-stick movement, plugging in, the **Apply brakes** key, or after 30 minutes. Tow below 2 mph; above about 2 mph the band adds "- tow slowly". The full procedure is in the Service Software Guide. With the key off or both drives dead, the brakes cannot be released from the screen; use the mechanical release.

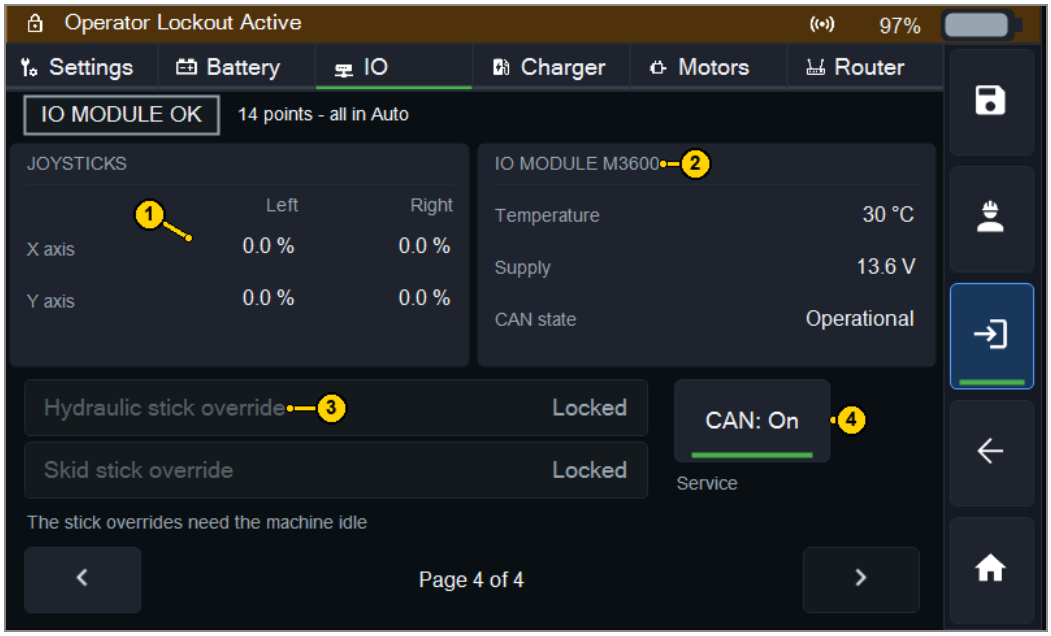
> Never release the brakes on a slope or without the machine attached to the towing vehicle. A machine with released brakes rolls freely.

12. Inputs and Outputs



IO tab, digital outputs

1. **IO module state:** IO MODULE OK, or offline, with a summary ("14 points - all in Auto").
2. **Group:** digital inputs or digital outputs, with the count.
3. **Connector and pin** on the IO module, then the point name.
4. **Mode:** Auto in normal work. Hand or Off appear only while a service technician is forcing a point.
5. **Live state:** ON (green) or OFF.
6. **Rows** shown out of the total.



IO tab, joysticks and IO module

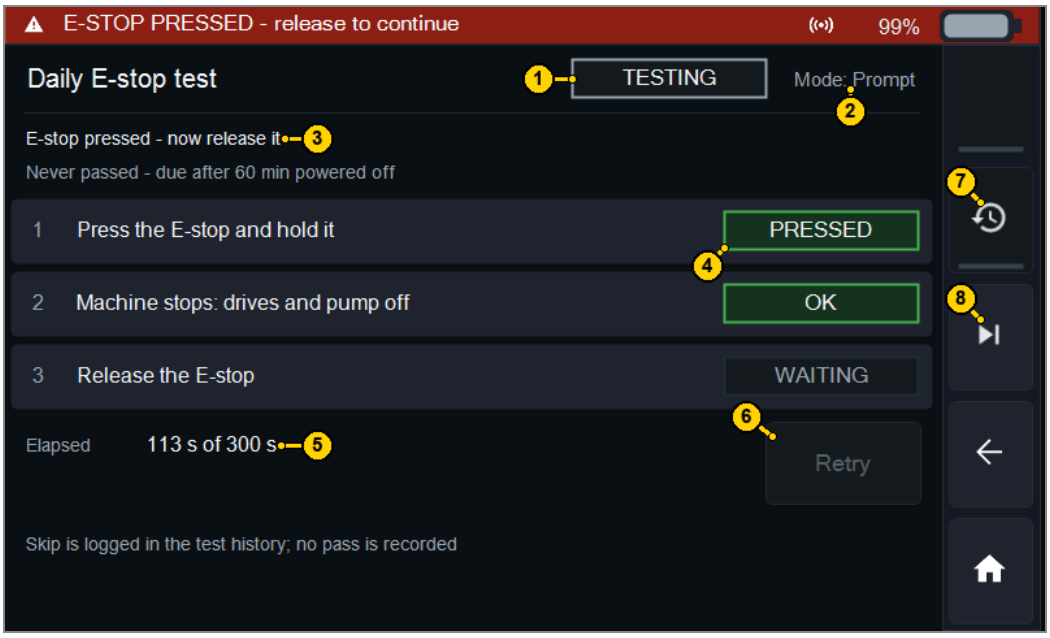
1. **Joystick positions,** left and right stick, X (left-right) and Y (forward-back) in %. Use this to check a stick returns to 0 % at rest.
2. **IO module:** temperature, supply voltage and CAN state.
3. **Stick overrides** (Service only, machine idle). "Locked" without a login.
4. **Joysticks CAN On/Off** (Service only).

Tap a point in the list to open its detail page (live value, mode, health). Forcing points is for service staff only.

> Forcing outputs (Hand/Off) needs a Service login, the machine idle and the E-stop released, and ends by itself when any of these stops. The E-stop input can never be forced.

13. Daily E-stop test

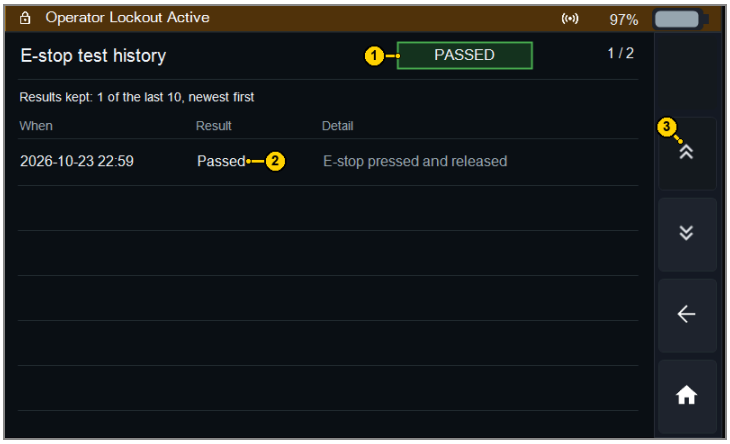
After the machine has been powered off for 60 minutes, the E-stop test page opens at start-up. It checks that the E-stop stops the machine.



Daily E-stop test, E-stop pressed

1. **Test state:** TESTING, then PASSED or FAILED.
2. **Mode:** Prompt (Reminder): the test can be skipped.
3. **What to do now,** and when the test last passed.
4. **Steps:** 1 Press the E-stop and hold it; 2 the machine stops (drives and pump off); 3 release the E-stop. Each step shows WAITING, then PRESSED or OK.
5. **Elapsed time** out of the time allowed (5 minutes).
6. **Retry:** starts the test again after a failure.
7. **History key:** opens the test history.
8. **Skip key:** skips the test. A skip is logged in the history and no pass is recorded.

1. When the page opens, press the E-stop button and hold it for a moment.
2. Check the screen shows steps 1 and 2 done: the drives and the pump are off.
3. Release the E-stop (pull it out). Step 3 turns done and the test shows PASSED.

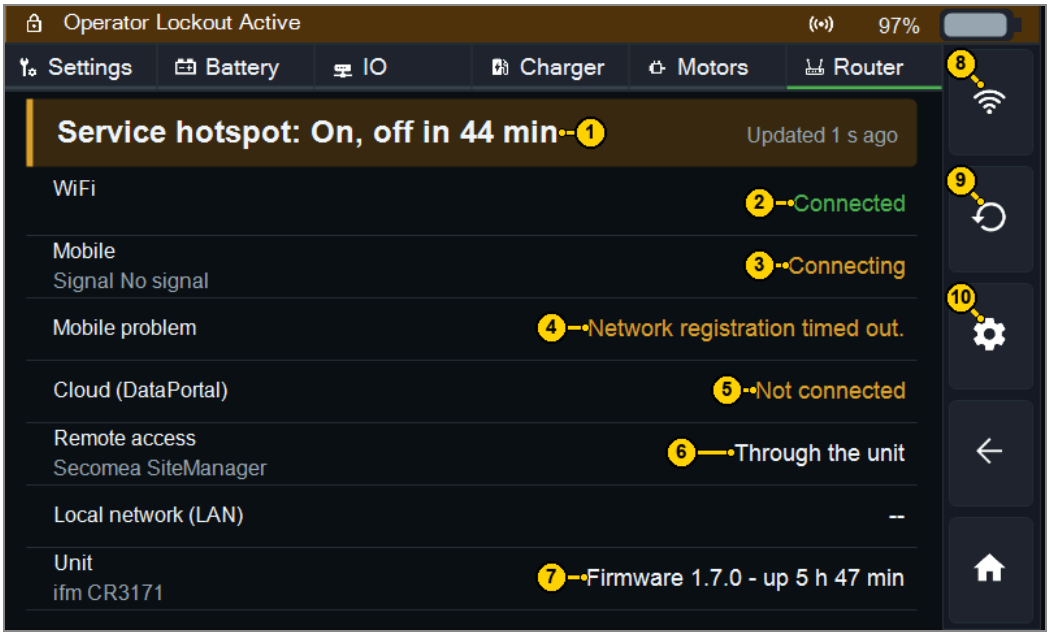


E-stop test history

1. **Last result.**
2. **Each test:** date and time, result (Passed, Skipped, Failed) and detail. The last 10 are kept, newest first.
3. **Page up / down** keys.

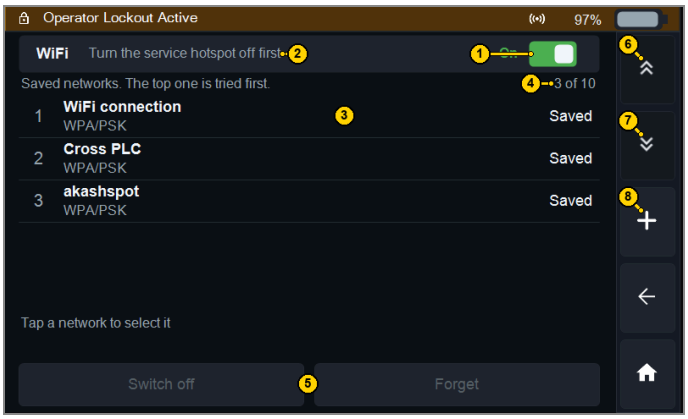
14. Router (telematics) tab

The Router tab shows how the machine's telematics unit (ifm CR3171) is connected: WiFi, mobile, the cloud service and remote access. Anyone can view it.

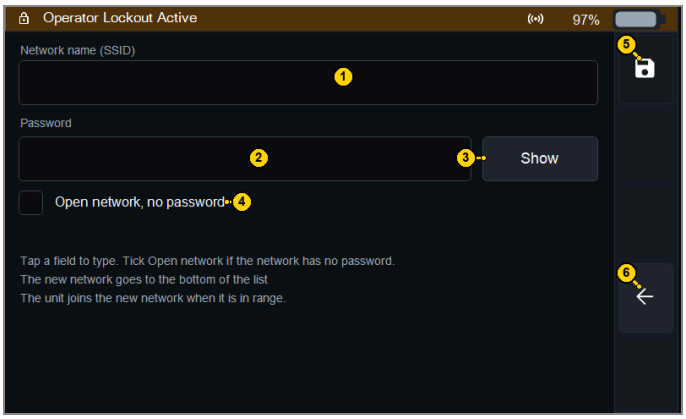


Router status (shown with the service hotspot on)

1. **Headline:** how the machine is online now, for example "Online via WiFi: <network>", "Online via mobile", "Not online", or "Service hotspot: On, off in 44 min". Next to it, when the status was last read.
2. **WiFi:** connected or not.
3. **Mobile:** mobile connection state and signal.
4. **Mobile problem:** why mobile is not connected, if it is not.
5. **Cloud (DataPortal):** connection to the remote data service.
6. **Remote access** for LHD support.
7. **Unit:** firmware and time since the unit started.
8. **WiFi networks** key.
9. **Refresh** key: reads the unit again.
10. **Setup** key (Service only).



WiFi networks



Add network

1. **WiFi on/off** for the unit.
2. **Hint** (here: turn the service hotspot off first).
3. **Saved networks.** The top one is tried first. Tap a network to select it.
4. **Number saved** out of 10.
5. **Switch off / Forget** the selected network.
6. **Move up** the selected network.
7. **Move down.**
8. **Add a network.**

1. **Network name (SSID):** tap to type on the on-screen keyboard.
2. **Password:** tap to type.
3. **Show:** shows the password while typing.
4. **Open network:** tick if the network has no password.
5. **Save:** adds the network to the bottom of the list. The unit joins it when it is in range.
6. **Back:** leaves without saving.

WiFi changes are blocked in Rental mode.

15. Service pages

After a Service login, Settings > Tools opens the service pages: stick overrides, Hydraulics, Devices, Drive event log, Task timing, CAN trace and the E-stop test settings. They are described in the *Service Software Guide*.

> Once a stick override is enabled, the on-screen joystick moves the machine. Only trained service staff may use it, with everyone clear.

16. What changed from Ed. 3

Area	Change
Look	Dark theme; text and rows enlarged for gloved use.
Main screen	Status band in words with notes, ground speed in mph, network icon.
Navigation	Five fixed side-bar keys; six tabs including Router; software version under Settings > About this machine.
Settings	Touch list with keypad; Save and Revert need confirmation; Rental mode with its own code; new AC input limit.
Lockout	Confirmation when turning off; hold-progress bar; touch counts as activity; survives E-stop and plug-in.
Charging	Charge screen with states, time to full, battery current and AC supply; hydraulics usable while charging.
Battery / Charger / Motors / IO	Multi-page tabs; pack detail; charger health and session; both drives side by side; full IO list.
Drive naming	Left/Right follow the machine as seen from the platform: left = leader (node 7).
New pages	About, Router, daily E-stop test and history, service pages.
Security (v2026.10.26.51 and later)	PIN to drive: an anti-theft PIN asked at every key-on. Drive event log viewable without a login.
E-stop	Drives ramp down, then the brakes set.

> **Technical Data update.** Top speed is about 5 mph at the maximum motor speed of 6000 rpm (Ed. 3 quotes 6 mph). Eco mode limits motors to 3000 rpm.

17. Troubleshooting the display

Symptom	Check
Stuck on Starting up	Open Alerts. Typical causes: a drive or battery pack offline, IO module offline, E-stop pressed.
Operator Lockout box	Press and hold the box for 1 second.
Machine will not drive	The band must read Idle - Ready for Operation. Check the E-stop, that the charge cable is out, the joystick values on the IO tab, and the Speed limit.
E-stop test page at start-up	Do the test (section 13), or skip it.
Touch is unresponsive	Set Touch mode to Wet or Gloves; clean the screen.
Charge screen says Check plug, or Charger shows NO AC	Push the plug fully home; check the supply is live.
Charging slowly	Charger page 1 status text says what limits it (supply, temperature, AC input limit).
Band says Battery full: avoid grades	Normal after a full charge or in the cold; avoid long downhill runs until some charge is used, or charge to 80 % for normal work.
Pump runs while braking	Normal at a high state of charge (band says Pump dump). The pump absorbs braking energy the full battery cannot take.
Machine turned on by itself	Normal when the charge cable is plugged in with the key OFF: the charger wakes the controller. It turns off again when unplugged.
Packs asleep after storage	Hold the SOC button on each pack for 5 s.

For anything not resolved, write down the active alarm message and the software version (Settings > About this machine) and call LHD Machinery at 1-888-LHD-7472.