Electric Order Picker

Linde Material Handling

Linde

Operating Instructions

Model V10

V10 – 5212801540 US – 12/2013

Linde – Your Partner

With over 100,000 fork lift trucks and warehouse machines sold annually, Linde is one of the world's leading manufacturers of material handling equipment. There are many reasons for this success: Linde products are renowned not only for their innovative, cutting-edge technology, but also for their low energy and operating costs, which are up to 40 per cent lower than those of their competitors.

The high quality of Linde products is also matched by the quality of our service. With ten production plants worldwide and an extensive network of sales partners, we are at your service around the clock and around the world.

Your local Linde partner can offer you a complete package from a single source; ranging from expert advice on all aspects of sales and service through appropriate finance options.

Linde Material Handling North America Corporation
2450 West 5th North Street
Summerville, S.C. 29483
Phone (843) 875-8000
FAX (843) 875-8329

Parts and service

See your Linde dealer for genuine Linde parts (the only factory-authorized replacements), factory-trained service personnel and manuals for your equipment.

Proposition 65

⚠ WARNING

This warning is provided pursuant to **California Health & Safety Code Sections 25249.5 et. seq.**

This product contains and emits chemicals known to the state of California to cause cancer, birth defects and other reproductive harm.

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Introduction

Scope

This manual contains operating and periodic maintenance instructions as well as specifications for the Linde industrial truck to which it applies. Important safety rules and descriptions of some lift truck hazards and how to avoid them are also included. The manual is intended to assist the owner and operators in maximizing safety and efficiency in material handling while achieving maximum product life. It describes how to correctly and safely operate and maintain the truck and all standard variants manufactured by Linde at the time of printing. Special designs, special attachments, or other custom modifications carried out by Linde to meet specialized customer requests are not covered in this manual.

This manual is not a training manual and is not to be used as the basis for formal training. It is intended to supplement such training with information specific to this truck as well as applicable good practices and safety rules which may be general in nature. This manual cannot address every possible hazard or potential accident situation. Ultimately it is the responsibility of the owner and operator(s) of the equipment to avoid or correct such potential dangers.

To assist in keeping the truck in good operating condition, a separate section devoted to maintenance is included in this manual. This section contains a list of items to be checked daily by the operator. It also has a schedule for maintenance procedures to be performed at regular intervals by those responsible for truck maintenance. All of these procedures are essential for safe operation and maximum service life of the truck. Scheduled maintenance tasks or repairs must only be performed by qualified forklift technicians. Details and instructions for performing such work are outside the scope of this manual. This information is covered in the applicable service manual available from Linde.

The descriptions and specifications included in this manual were in effect at the time of printing. Linde Material Handling, North America Corporation reserves the right to make improvements and changes without notice and without incurring obligation. Please check with your local authorized Linde dealer for information on possible updates or revisions.

Obligations of the Forklift Owner

The Occupational Safety and Health Administration (O.S.H.A.) requires employers of forklift operators to adhere to a number of regulations regarding forklift operation. These regulations are codified in section 1910.178 of title 29 of the Code of Federal Regulations. This section establishes a number of specific rules pertaining to truck operation, inspection and maintenance, and areas of use. It is up to the owner to ensure that use and maintenance of any powered industrial truck is consistent with these rules.

In addition, 29 CFR 1910.178 describes required operator training in detail. It requires employers to establish and maintain a training program to ensure that all operators of powered industrial trucks are competent and trained in the safe and proper operation of powered industrial trucks.

Many of the rules set forth in 29 CFR 1910.178 are based on the American National Standards Institute (ANSI) B56.1 standard.

The owner should be familiar with 29 CFR 1910.178 as well as ANSI B56. Other federal standards may apply depending on specific industry. Owners should also be aware of any state OSHA rules that may differ from the federal rule. Linde trucks meet all applicable requirements of ANSI B56 at time of manufacture. 29 CFR 1910.178 prohibits any modifications and/or additions which affect capacity or safe operation of industrial trucks without prior written approval of the manufacturer. An owner should consult the local authorized Linde dealer if the owner's intended application for a truck is inconsistent with the designated performance characteristics of that truck. Linde Material Handling will not assume, and expressly disclaims any liability for injuries or damages arising from or caused by unauthorized modification, removal, disconnection or disengagement of any part from any of its trucks. Linde Material Handling recommends that all replacement parts be of OEM (Original Equipment Manufacturer) origin.

Operator responsibilities

It is the responsibility of the operator to operate the lift truck in a safe manner. In order to do this, all operators must have completed training in the safe operation of lift trucks. Operators must know and understand all general safety rules as well as any safety information specific to the environment in which they will be working. They must then practice these safe operating procedures whenever using a lift truck.

In addition, all operators must be familiar with the specific lift truck they use. Therefore they must be familiar with the procedures for correct and safe operation explained in this manual. They must understand the potential hazards and safety precautions covered in the manual. This manual however, cannot cover all possible hazards. Operators must be able to identify any hazards that may exist or arise in their work environment and know how to avoid or correct them.

Finally, operators are responsible for identifying and reporting any truck that is in unsafe condition. They must know how to inspect the truck they operate and they must perform this inspection before placing a truck in service each day. Operators must not operate a lift truck found to be damaged or malfunctioning.

Proper use

The truck is designed for lifting, transporting, and stacking of palletized or other stable loads. The maximum load to be lifted is specified on the truck data plate. The truck is not designed or intended to lift or transport personnel other than the operator.

For models designated as order pickers, the truck is designed primarily for the collection or distribution of items into or from a container or pallet. Order pickers are not designed for storage and retrieval of loads using the forks in narrow-aisles. General lifting and stacking of pallet loads or other stable loads is otherwise permissible.

The truck may be operated only on surfaces that are level, flat, and stable. If the truck is to be operated in refrigerated storage areas, it must be equipped with an optional cold storage package suitable for the specific application. (Not available on all models.)

A truck must not be operated in any hazardous environment unless the truck carries the designation appropriate for that environment per 29 CFR 1910.178. It is the responsibility of the owner to ensure the safety of all operating areas and surfaces and to restrict the truck to the uses and areas for which it is designed and rated.

Hazard messages

Hazard symbols and messages are placed in this manual and on the truck to provide instructions and identify specific areas where potential hazards exist and special precautions should be taken. Operators must understand the meaning of these symbols and messages.

Damage to the truck, as well as serious injury or death to the operator or others may result if the instructions conveyed by these symbols and messages are not followed.

CAUTION

Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury.

WARNING

Indicates a potentially hazardous situation which if not avoided could result in death or serious injury.

DANGER

Indicates an imminently hazardous situation which if not avoided will result in death or serious injury.

NOTE

Indicates further information presented to ensure clarification of a particular item

ENVIRONMENT NOTE

The information contained herein must be observed, otherwise environmental damage may occur.

2

Safety

Before Operation

Before using the truck, inspect the work area. It should be neat, well lit, adequately ventilated, and free from hazardous material. Aisles and roadways should be unobstructed and well marked.

Operators must know the UL classification for the truck and use the truck only in permissible areas.

Ensure that there are no loose objects on the truck or in the operator compartment, especially on the floor plate where they could interfere with pedal operation (if equipped) or foot room.

Fire extinguishers and other emergency equipment should be visible and easy to reach. Wear safety equipment when required. Don't smoke in "No Smoking" areas, or while charging batteries or refueling combustion engine trucks.

Never operate the truck with greasy hands. This will make the controls slippery and result in loss of truck control.

Any questions or concerns about safety should be brought to the attention of a supervisor. If an accident should occur, it must be reported immediately.

⚠ WARNING

Unauthorized modifications to the truck can result in injury or death.

Do not remove, disable or modify any safeguards or other safety devices. These include the overhead guard, load backrest extension, and if equipped by the owner, alarm, lights and mirrors. The overhead guard is intended to provide protection to the operator from falling objects, but cannot protect from every possible impact.

Operator Daily Checklist

At the beginning of each shift, inspect your truck by using the **Linde Operator's Daily Checklist**. If necessary, refer to the Maintenance section of this manual for details on how to carry out this inspection. Check for damage and maintenance problems. Any necessary repairs must be completed before the truck is operated. In addition to daily inspection, scheduled maintenance is vital to safe operation of the truck. Adhere to the inspection, lubrication and maintenance schedule given in the Maintenance section of this manual.

NOTE

Any repairs or maintenance to the truck must be performed only by trained and authorized technicians.

Linde

MAN-ALOFT RIDER LIFT TRUCK
OPERATOR'S DAILY CHECKLIST

Truck Serial Number: ____________________ Dept / Shift: __________________ Operator: ______________________
Hour meter reading: ______________________ Date: _______________________ Supervisor: ____________________

Check each of the following items before the start of each shift. **Let your supervisor and/or maintenance department know of any problem**. Start at the front of the lift truck and work towards the rear. After checking, mark each item accordingly. Explain below as necessary.

Check boxes as follows: ☐ OK ☐ NR, **N**eeds **R**epair. Circle problem and explain below.

OK	NR	VISUAL INSPECTION
		Oil Spots on Floor (check for leaks on truck)
		Drive Tire(s) (wear, cuts, or embedded objects, rim damage, loose/missing lug nuts)
		Hydraulic Oil (check level)
		Steer Axle, Chain, or other mechanism (check for damage, debris)
		Overhead Guard (damage, bends, cracks, looseness)
		Steering Wheel (check for wear, damage)
		Throttle Hand Grips (if equipped) (check for wear, damage)
		Anti-slip Mat (if equipped) (check condition, cleanliness)
		Safety Shield (if equipped) (clean)
		Battery Connectors & Cables (damage, cracks, pitting)
		Battery Retention (installed correctly, secure)
		Battery Case & Vent caps (damage, cracks, loose, missing)
		Mast (damage, wear, cracks, loose fasteners)
		Lift Cylinders (damage, leaks, loose fittings)
		Lift Chains (wear, corrosion, cracks, loose leaves, even tension)
		Carriage/Load Backrest (damage, looseness, bends, cracks)
		Forks/Attachment (damage, cracks, excess wear, twisted, bent)
		Fork Locking Pins (check operation, holds fork secure)
		Load wheels (tire wear, damage, entrapped debris)
		Harness, Tether (Inspect snap hooks and mounting points)
		Warning Decals/Operator's Manual (in place, legible)
		Data Plate/Capacity Plate (in place, legible)

OK	NR	OPERATIONAL INSPECTION
		Unusual Noise (during any of the operational checks)
		Emergency Battery Disconnect (check operation)
		Gauges and Instrumentation (check operation)
		Battery Charge (fully charged)
		Directional Switch (if equipped) (operates freely)
		Operator Presence Switch (check operation)
		Forward Driving (accelerates, steers, brakes smoothly)
		Plugging (stops, changes direction smoothly)
		Reverse Driving (accelerates, steers, brakes smoothly)
		Service Brake (check operation)
		Parking Brake (check operation)
		Hydraulic Controls (operate freely, return to neutral)
		Attachment (if equipped) (check operation)
		Mast (extend fully, binding, leaks, roughness, noise)
		Hydraulic Oil (excessive noise when mast is fully raised is indication of low hydraulic oil)
		Lift/Travel Speed Governor (check operation)
		Chain Slack Prevention Switch (check operation)
		Horn (sounds when button pressed)
		Backup Alarm (if equipped) (sounds in reverse)
		Travel Alarm (if equipped) (sounds with vehicle in motion)
		Work, Strobe, Flashing Lights (if equipped) (check operation)

Explanation of problems marked above (use back of this form if needed):
____
____
____

OSHA 1910.178 (p) (1) requires a truck to be taken out of service any time it is found to be in need of repair, or is in any way defective or unsafe. Place a "Do Not Operate" tag on the truck, remove the key and alert your supervisor. The Truck may not be placed back into service until necessary repairs are made.

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Operating Position

Face the truck when mounting and dismounting. Maintain a three-point contact, one foot and two hands with the truck when mounting or dismounting. Never exit a moving truck.

The normal operating position is defined as standing with hands and feet inside the operator compartment on or near the controls. Side rails must remain in the closed position throughout operation.

⚠ WARNING

Risk of injury!

Operate the truck only when you are in the normal operating position. Always keep hands and feet inside the operator compartment during operation. Keep hands, feet and legs out of the upright.

⚠ WARNING

Risk of injury!

Do not place yourself between the mast and the body of the truck. Do not use the mast as a ladder. Do not transport personnel at any time. Do not lift personnel using the forks of the truck, or with a work platform. The truck is not designed to lift personnel.

⚠ WARNING

Risk of falls!

Never climb out onto the forks or onto any item supported on the forks. Never leave the operator compartment unless it is fully lowered and the truck is properly parked.

Pedestrians

Watch out for pedestrians. Always yield the right-of-way to pedestrians. Do not drive the truck up to anyone standing in front of a rack or fixed object. Do not pass another truck travelling in the same direction at an intersection, blind spot or other dangerous location. Sound the horn at intersections and other locations where vision is obstructed. Always look in the direction of travel.

Never engage in stunt driving or horseplay. Use lights in dark and dim areas. Always ensure that there are no pedestrians in the truck's rear swing area before turning. Watch for pedestrians around the truck.

⚠ DANGER

Risk of injury!

Watch for people in your work area because they may not watch for you, even if you have lights or alarms.

⚠ WARNING

Risk of injury!

Do not walk under raised forks at any time.

▷

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⚠ WARNING

Risk of injury!

Do not transport personnel at any time. Do not lift personnel using the forks of the truck, or with a work platform. The truck is not designed to lift personnel.

▷

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Travel

The truck is designed for operation on smooth, level, dry surfaces in warehouse environments. Under all travel conditions operate the truck at a speed that will permit it to be brought to a stop in a safe manner. Avoid running over loose objects on the floor surface.

⚠ WARNING

Loss of control!

Do not travel at excessive speeds; keep your truck under control at all times.

Travel with the forks near the floor when outside of an aisle, and whenever possible when in an aisle. Never travel outside of an aisle unless the mast is fully lowered. Never raise the mast during travel outside of an aisle. During travel, always watch for overhead obstructions such as lights, wiring, pipes, sprinkler systems, doorways, etc.

When travelling in reverse, always turn around to face the direction of travel and ensure a direct view in the direction of travel. Do not rely on mirrors when travelling in reverse.

Do not operate the truck in reverse if handling bulky loads that restrict your vision. Unstable loads are a hazard to you and to your fellow workers. Make certain that all loads are secured and evenly positioned on the forks.

Do not move railroad cars or trailers with this truck, or use it to operate or close railroad car doors. Do not enter elevators or trailers with the truck or otherwise use it in elevators or trailers. Do not use the truck to carry any type of suspended load.

Raising and Lowering the Operator Compartment

The operator compartment is raised and lowered by the mast. It should only be raised if the truck is stationary or travelling along a straight path. Never turn the truck while the operator compartment is raised. Always ensure there is adequate overhead clearance before raising the operator compartment. Before lifting any load or retrieving one from an elevated location, make certain that the load is stable and evenly positioned on the forks. Never lift a load with one fork.

Avoid any contact with racking or other obstructions while raising or lowering the operator compartment. Always check for hang-up of the forks or operator compartment before moving the truck or lowering the forks or operator compartment.

⚠ WARNING

Attempting to move the truck if the lift chains become slack can result in injury from free-fall of the fork carriage or operator compartment.

Always raise the forks and operator compartment before moving the truck. Watch for slack chain condition. Slack chains indicate that the mast, operator compartment, or fork carriage is hung up. Do not attempt to repair this yourself, always get a trained mechanic.

Avoiding Falls and Tip-overs

Lift truck tip-overs can cause serious injury or death. Following all safety rules when operating a lift truck is the best way to prevent injury.

- Never exceed the lifting capacity listed on the data plate.
- Extreme caution should be taken when working around docks, dock boards and trailers.
- Watch for overhead obstructions. Perform all truck movements smoothly and at a speed that will give you time to react in an emergency.
- An unloaded truck can tip over also. Caution must be taken when using an unloaded truck as well as a loaded one.
- Never raise the operator compartment when outside of an aisle.
- Do not operate the truck on any ramp or inclined surface.

⚠ DANGER

Tip over will occur if this truck is operated on a ramp or inclined surface.

Do not operate this truck on a ramp or inclined surface.

Lateral tip-over can occur with a combination of speed and sharpness of turn. This condition of instability is even more likely with an unloaded truck. With the load raised, lateral tip-over can occur while turning and/or braking when travelling in reverse or accelerating and turning while travelling forward. Longitudinal tip-over can occur with a combination of overloading and load elevation. This condition is even more likely with increased height, braking during rearward travel, or accelerating forward.

⚠ WARNING

Jumping from the truck during a tip-over can result in severe injury or death.

If the truck starts to tip over, DO NOT JUMP!

Stay in place, hold onto the controls tightly, brace feet, and lean away from the direction of impact.

Parking

When you are finished with the truck, observe proper shutdown procedures.

- Never park on a grade.
- Always come to a complete stop before leaving truck.
- Place travel controls in neutral.
- Lower forks fully to the floor. If the forks can be tilted, tilt them forward.
- If the truck has a manual parking brake, apply it.
- Turn the truck off.
- If the truck has a key switch and the operator is more than 25 ft (7.5 m) away, or out of sight of the truck, the key should be removed.

⚠ WARNING

Failure to properly shut down the truck may allow inadvertent movement and result in a collision.

Never park on a grade. Ensure the parking brake is applied and turn the truck off. On trucks with a direction switch, always place it in neutral.

⚠ WARNING

Improper parking can interfere with emergency response.

Do not block stairways, main passageways or emergency routes. Do not block access to fire or emergency equipment.

Battery Safety

⚠ WARNING

Batteries contain dissolved sulfuric acid, which is poisonous and caustic. Batteries also can produce explosive gases.

Remain aware of the following information.

- Wear protective equipment (protective apron and gloves) and protective glasses when working with battery acid. If clothing, skin or eyes come into contact with battery acid, immediately flush the affected areas with water. If acid contacts the eyes, seek medical attention at once. **Clean spilled battery acid immediately with large amounts of water.**
- Remove any metal rings, bracelets, bands, or other jewelry before working with or near batteries or electrical components.
- Never expose batteries to open flame or sparks.
- Areas in which batteries are stored or charged must be well ventilated to prevent concentration of explosive gases.
- If a battery is charged while installed in the truck, the battery cover must remain completely open during the entire charging period.

- Shorting of battery terminals can cause burns, electrical shock, or explosion. Do not allow metal parts to contact the top surface of the battery. Make sure all terminal caps are in place and in good condition.
- Batteries may only be charged, serviced, or changed by properly trained personnel. Always follow all instructions provided by the manufacturers of the battery, charger, and forklift truck.

Safety During Maintenance

Personnel Qualifications

Only qualified personnel authorized by the owner are permitted to perform maintenance or repair work. All items listed in the Scheduled Maintenance Charts must be performed by qualified forklift technicians only. They must have knowledge and experience sufficient to assess the condition of a forklift truck and the effectiveness of the protective equipment according to established principles for testing forklift trucks. Any evaluation of safety must be unaffected by operational and economic conditions and must be conducted solely from a safety standpoint.

Daily inspection procedures and simple maintenance checks, e.g. checking the hydraulic oil level or checking the fluid level in the battery, may be performed by operators. This does not require training as described above.

Hazardous Substances

Oils

⚠ WARNING

Oils are flammable!

- Always comply with applicable legal regulations.
- Do not allow oil to come into contact with hot engine parts.
- Do not smoke in areas where oils are used or stored.

⚠ WARNING

Oils are toxic!

- Avoid skin contact, inhalation, or ingestion.
- If oil mist or vapors have been inhaled, seek fresh air.
- If oil comes into contact with the eyes, flush thoroughly (at least 10 minutes) with water and then seek medical assistance.
- If oil is swallowed, do not induce vomiting. Seek medical assistance immediately.

Safety During Maintenance

⚠ WARNING

Prolonged intensive contact with the skin can result in loss of natural skin oils and irritate the skin.

- ➢ Avoid skin contact.
- ➢ Wear protective gloves, long sleeves, and eye protection.
- ➢ If oil contacts the skin, wash the affected area with soap and water.
- ➢ Change oil-soaked shoes or clothing immediately.

⚠ WARNING

Spilled oil presents a risk of slipping, particularly when combined with water.

- ➢ Immediately treat spilled oil with an oil binding agent, and then dispose of it according to local regulations.

ENVIRONMENT NOTE

All oils are potent contaminants of water.

- *Recycle used oil if possible.*
- *Always store oil in appropriate containers.*
- *Avoid spills.*
- *Spilled oil should be removed with oil-binding agents at once and disposed of according to local regulations.*
- *If recycling is not possible, dispose of used oil according to local regulations.*

Pressurized Hydraulic Oil

⚠ WARNING

Like other oils, hydraulic oil is flammable, toxic, and a skin irritant.

- ➢ Do not allow hydraulic fluid to come into contact with hot motor parts.
- ➢ Avoid inhalation or skin contact of hydraulic oil.
- ➢ Refer to the safety information under "Oils".

⚠ WARNING

Hydraulic oil is pressurized during operation of the forklift truck and may remain pressurized after shut down. An escaping stream of pressurized hydraulic oil can cause serious injury.

- ➢ If pressurized hydraulic oil is found to be escaping from the truck, shut down the truck immediately and have the leak repaired before returning the truck to service.
- ➢ Only trained service personnel should attempt to repair any portion of the hydraulic system.
- ➢ Do not allow hydraulic fluid to come into contact with the skin.
- ➢ Avoid inhaling spray or mist created by escaping hydraulic oil.
- ➢ Penetration of pressurized fluids into the skin is particularly dangerous if these fluids escape at high pressure due to leaks in the hydraulic system. In case of such injury, immediate medical assistance is required.
- ➢ To help prevent injury, use appropriate personal protective equipment (e.g. protective gloves, long sleeves and industrial goggles).

ENVIRONMENT NOTE

Hydraulic oil is a potent contaminant of water.

- *Recycle used hydraulic oil if possible.*
- *Always store hydraulic oil in appropriate containers.*
- *Avoid spills.*
- *Spilled hydraulic oil should be removed with oil-binding agents at once and disposed of according to local regulations.*
- *If recycling is not possible, dispose of used hydraulic oil according to local regulations.*

Battery Acid

⚠ WARNING

Battery acid contains dissolved sulfuric acid. This is toxic.

- ➢ Avoid contact and consumption.
- ➢ In case of injury, seek medical advice immediately.

⚠ WARNING

Battery acid contains dissolved sulfuric acid. This is corrosive.

- When working with battery acid, always wear protective clothing and eye protection.
- Do not allow any acid to get onto clothing or skin or into the eyes; if this does happen, rinse immediately with plenty of clean water.
- In case of injury, seek medical advice immediately.
- Immediately rinse away spilled battery acid with plenty of water.

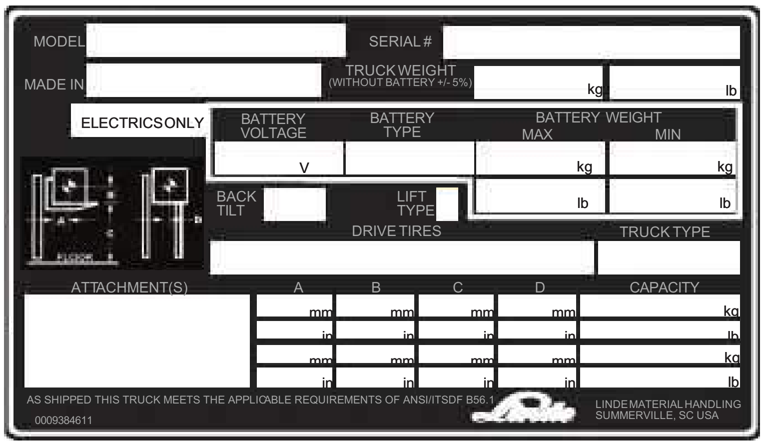
ENVIRONMENT NOTE

- Dispose of used battery acid according to local regulations.

Operator Warning Decals

Data plate

The data plate is designed to inform personnel of truck capacity and other important truck specifications. The operator should locate, read, and understand the data plate prior to using the forklift truck.



⚠ DANGER

Risk of tip-over

Never attempt to lift a load greater than the maximum capacity listed on this plate.

Voltage decal

This decal indicates the proper battery voltage for the truck's electrical system. Using a battery of wrong voltage could damage the truck.

Operator warning decal

This decal lists a number of fundamental safety points that are crucial to safe operation. Operators must understand these items and remain aware of them during truck operation.

WARNING

1. CHECK YOUR TRUCK - The truck should be checked daily before being placed in service. If found to be in need of repair, defective, or in any way unsafe it should be reported immediately to the proper authority and removed from service until restored to a safe operating condition.
2. KNOW YOUR TRUCK - Do not operate this truck unless you have been trained and authorized to do so. Read all warnings and instructions in the operator's manual on this truck or obtain them from plant Safety Director or the local Linde representative.
3. KEEP INSIDE - Operate the truck only when you are in the normal operating position and within the confines of the operator's compartment. Never place any part of your body into the mast structure, between the mast and the truck, or outside the truck. Aside from the operator, there must be no other person in the operator compartment unless the truck has additional equipment to accomodate a second person. Under no circumstances may the truck be operated with more than two persons aboard.
4. PROTECT YOURSELF - If the truck has an overhead guard, be sure it is in place before operating the truck. Ensure side rails are lowered and all safety equipment is working properly.
5. SAFETY HARNESS - Some models require that a safety harness be worn during operation. If so, make sure it is fastened before operating the truck.
6. LATERAL TIPOVER - Can occur loaded or unloaded by a combination of speed and sharpness of turn. SLOW DOWN BEFORE TURNING. With the forks raised, lateral tipover also can occur by accelerating or braking while turning. TRAVEL WITH THE MAST AND FORKS LOWERED WHEN OUTSIDE OF AN AISLE. The potential for lateral tipover will be further increased by overloading, or off-center positioning of the load. Don't risk injury or death. Drive smart.
7. LONGITUDINAL TIPOVER - Can occur by overloading or aggressive braking when moving forward or accelerating rearward with the forks elevated. TRAVEL WITH THE MAST AND FORKS LOWERED WHEN OUTSIDE OF AN AISLE. Don't risk injury or death. Drive smart.
8. LATERAL OR LONGITUDINAL TIPOVER - Can occur if the truck is driven over objects on the floor or ground, off the edge of improved surfaces, into potholes, by impacting overhead obstacles or collision with other objects. Don't risk injury or death. Drive smart.
9. COLLISION - If a collision is imminent, stay within the operator's compartment to utilize its protection.
10. HIGH LOADS - Do not handle loads which are high unless load is secured so that no part of it could fall backward.
11. STABILIZE YOUR LOAD - Do not handle unstable or loosely stacked loads. Use special care when handling long, high, or wide loads to avoidlosing the load, striking bystanders, or tipping the truck.
12. CENTER YOUR LOAD - When using forks, space forks as far apart as load will permit. Before lifting, be sure load is centered and forks are completely under load. During picking operations, maintain load balance as objects are removed from or added to the pallet.
13. NEVER OVERLOAD - Do not overload truck. Check capacity plate for load weight and load center information.
14. AVOID SUDDEN MOVEMENTS - Start, stop, travel, steer, and brake smoothly. Sudden movements can endanger yourself and others.
15. LOOK OVERHEAD - Watch out for obstructions, especially overhead.
16. EYES AHEAD - Travel with load or lifting mechanism as low as possible. Always look in direction of travel. Keep a clear view and travel with load trailing.
17. RAMPS - The truck is designed for operation on smooth, relatively level surfaces such as warehouse and factory floors, loading docks, or paved areas. Do not operate on ramps or inclines unless specifically permitted in the operator's manual.
18. SLOW DOWN - Observe applicable traffic regulations. Yield right-of-way to pedestrians. Slow down & sound horn at cross aisles and whenever vision is obstructed.
19. WATCH PEOPLE - Do not allow anyone to stand or pass under lifting mechanism, directly behind truck or within rear swing area when turning.
20. WORK PLATFORMS - DO NOT LIFT OR CARRY PEOPLE USING THE FORKS OF THE TRUCK, not even with a work platform. Never step or climb out onto the forks or onto a pallet supported by the forks.
21. SHUT DOWN COMPLETELY - Before getting off truck, neutralize travel control and fully lower the lifting mechanism. If the truck has a manual parking brake, apply it. Shut off power when leaving truck unattended.

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Failure to comply with these warnings will create an unreasonable risk of injury to yourself and others.

Trained operator warning decal

This decal states the requirement that only trained and authorized personnel are to operate truck.

WARNING

TRAINED AND AUTHORIZED OPERATORS ONLY.

MISUSE OF THIS TRUCK COULD CAUSE INJURY TO YOURSELF OR OTHERS WORKING WITH YOU.

READ INSTRUCTIONS IN OPERATOR'S MANUAL.

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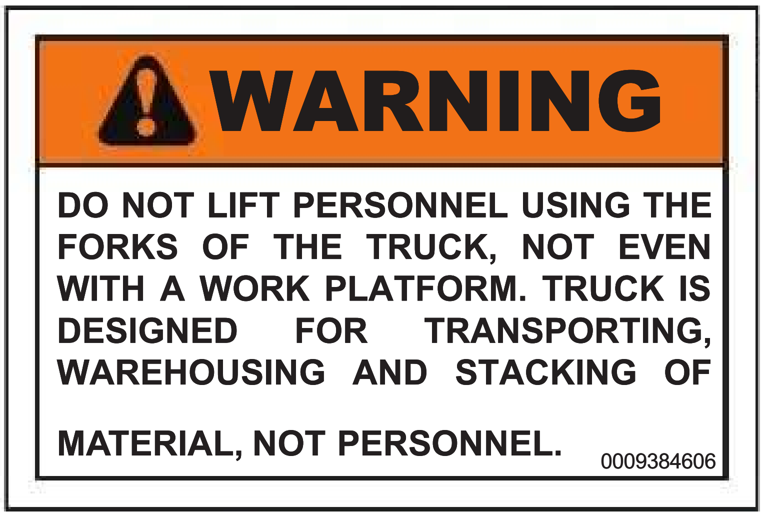
Never stand or walk under forks warning decal

This decal warns personnel not to stand or walk on, or under, the forks at any time. This applies to operators as well as all others.

Do not lift person ng d

This decal states that the operator should never use the forks for lifting personnel for any reason. Even if special work platforms for lifting personnel are available, they are not to be used with this truck to lift personnel.

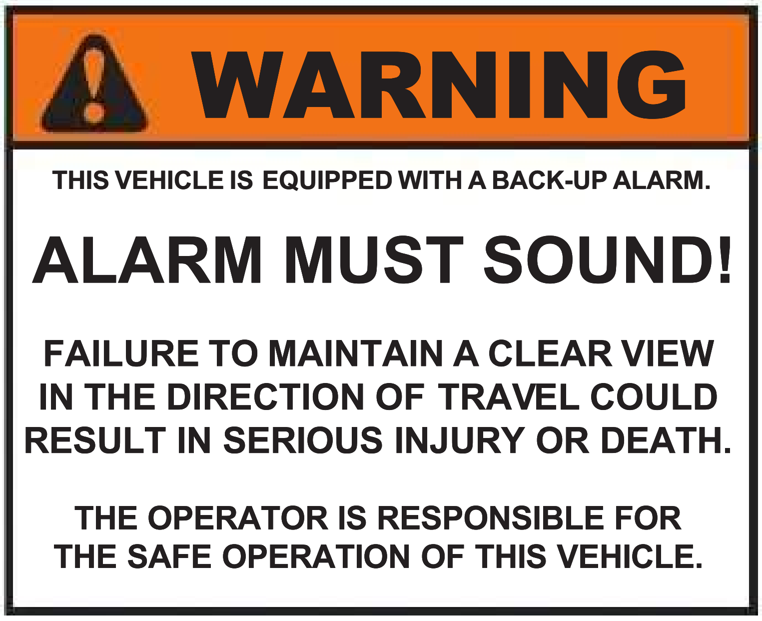


Crushed fingers warning decal

This decal is placed in areas where parts move close together during normal truck operation. The decal warns personnel to keep hands clear of these areas at all times.

Back up alarm warning decal

This decal is present if the truck is equipped with a back-up alarm. The decal reminds the operator that the alarm must sound anytime the truck is moving in reverse. It also warns the operator to maintain a clear view in the direction of travel.



3

Overview

Technical Description

General

The V10 electric order picker is a man-aloft model intended for use in narrow-aisle warehouse applications (ITA class 2). It is designed with a nominal load capacity of 2200 pounds (1000 kg) at a 15.75 in (400 mm) load center.

This capacity may be downrated in special circumstances. Exact capacity limits for individual vehicles are found on the data plate.

Drive unit

The drive unit is comprised of a 24-volt brushless AC drive motor mounted vertically to a reduction gear unit. The drive unit pivots in the chassis through gearing with an electric steer motor to determine drive wheel direction. A mechanical brake is installed at the top end of the drive motor for use as a parking brake or emergency brake. Whenever the floor pedal is released, the truck will slow with regenerative braking until it is nearly stationary at which time the mechanical brake will be applied. This brake also serves as a parking brake when the truck is switched off.

Travel control

Travel speed and direction is controlled through a rotating travel control lever at the top of the control handle. When the travel control is released, the truck will decelerate via regenerative braking. More aggressive slowing is available by rotating the travel control in the opposing direction. The degree of braking for both of these functions is adjustable in the truck control software.

Hydraulic system

The hydraulic system utilizes fluid pressurized by a hydraulic pump driven by a DC pump motor. The pump motor is part of an integrated hydraulic pump unit which also contains the pump, a valve assembly, and a hydraulic oil reservoir. During lifting, pressurized hydraulic fluid from the pump is routed through the valve assembly to the lift cylinders. Lowering occurs by gravity when the lowering solenoid is activated.

Steering system

Steering is accomplished by separate AC steering motor through a pinion meshed to a ring gear on the drive unit. There is no steering chain. Control is maintained through a potentiometer at the steering wheel in the operator compartment and one at the steering gears in the chassis. The potentiometers provide feedback signals to the steering controller which activates the steer motor as necessary to keep the potentiometer values equal.

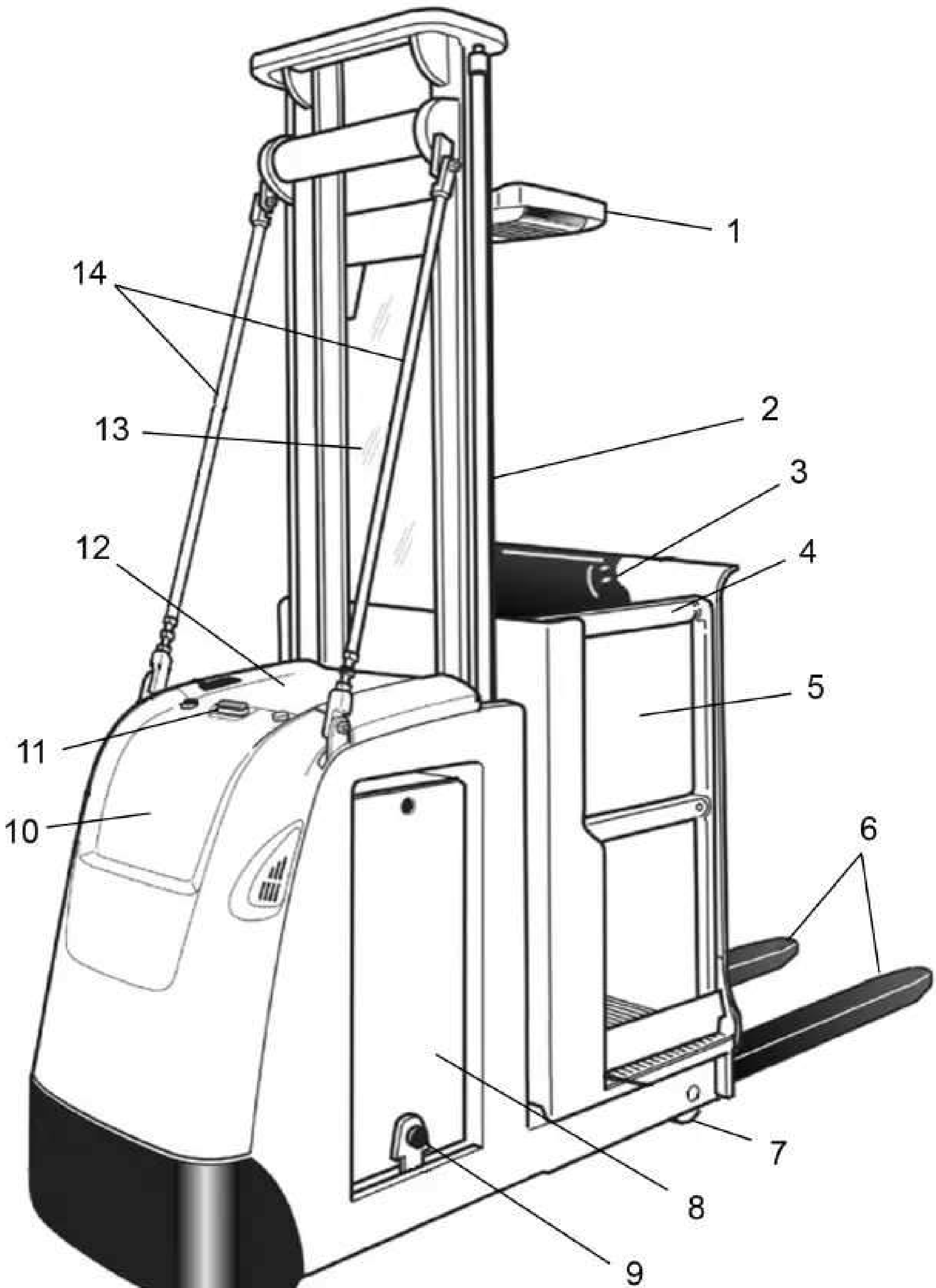
Mast

The mast consists of an inner and outer upright and a fork carriage/operator compartment. A pair of lift cylinders raises and lowers the inner upright during lifting and lowering. The mast is braced to the chassis with a pair of stabilizer rods. Lift chains attached to the operator compartment are routed over pulleys on the inner upright and anchored to the stationary outer upright to raise the operator compartment. This arrangement results in a telescopic relationship between the operator compartment and mast uprights. The operator compartment rises with the forks during lifting to facilitate hand picking or loading operations to or from elevated storage locations. All operator controls for travel and lift are located in the operator compartment. An auxiliary lift function is provided to adjust the fork height relative to the operator compartment for optimal access to the fork load. In the event of an emergency or malfunction, the mast may be lowered by personnel on the ground by means of a manual bypass screw on the valve block in the chassis.

Electrical system

The truck is equipped with a 24-volt electrical system. All travel and lift function is controlled by a transistorized main controller. Steering motor function is controlled by second separate controller. A line contactor and main power fuse is provided for each controller. These motor controllers contain both control logic and an array of power transistors for their respective motors. The control logic in these controllers processes signals from sensors, interlocks, and an operator compartment controller to in order to generate the appropriate release and speed signals to the power transistors to operate the motors. The operator compartment controller provides outputs to the motor controllers based on inputs from for the various operator controls. A number of control fuses are used for the remainder of the system and certain options. Except for the operator compartment controller, these components are mounted to an electrical panel in the chassis. The operator compartment controller is located in the operator compartment console. A diagnostic connector is provided at the chassis electrical panel to connect a laptop computer to the controller for diagnostics or adjustment of certain performance parameters.

Truck Components



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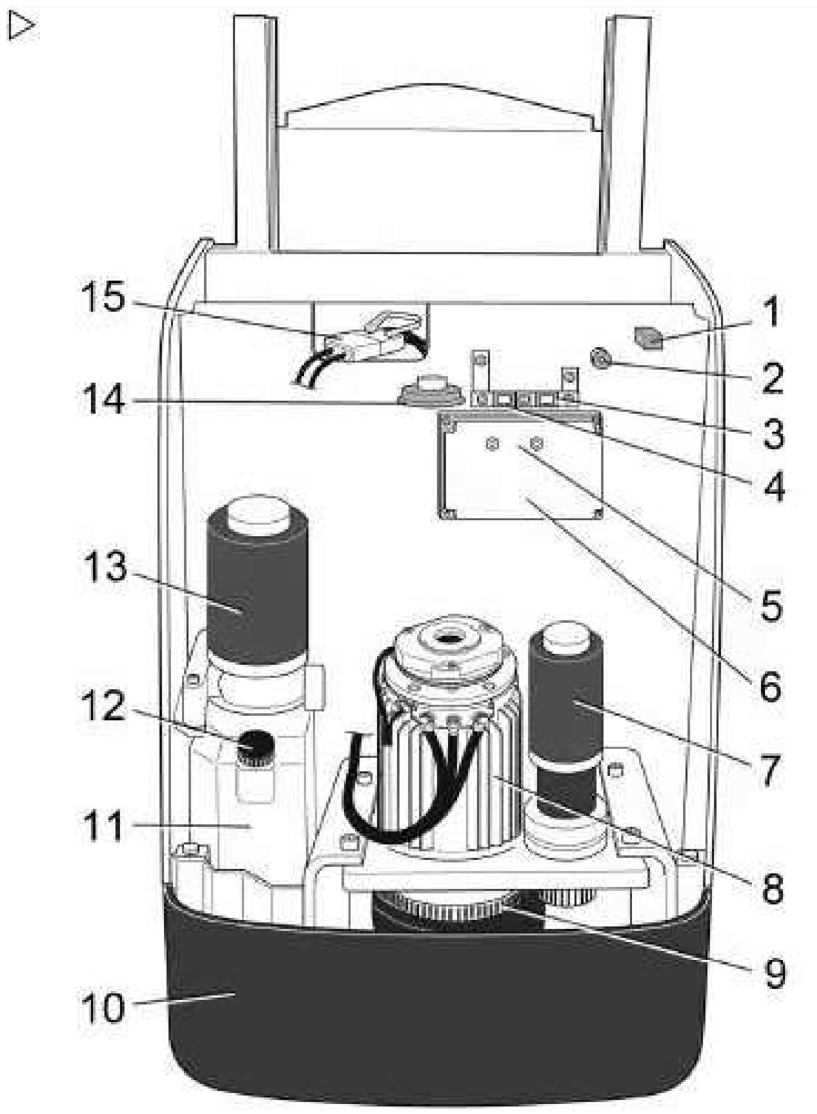
1	Overhead guard	6	Forks
2	Mast	7	Load wheel
3	Load-side operating panel	8	Battery
4	Guard rail	9	Battery retainer
5	Operator compartment	10	Motor compartment

11	Warning light	13	Safety shield
12	Battery cover	14	Mast bracing

Motor Compartment



(1) Control current fuses

(2) Programming interface

(3) Main current fuse, steering

(4) Main current fuse, drive and pump

(5) Fuse holder, not used

(6) Combined drive and pump control

(7) Steering motor

(8) Drive motor

(9) Steering gears and transmission
(10) Bumper

(11) Hydraulic oil tank

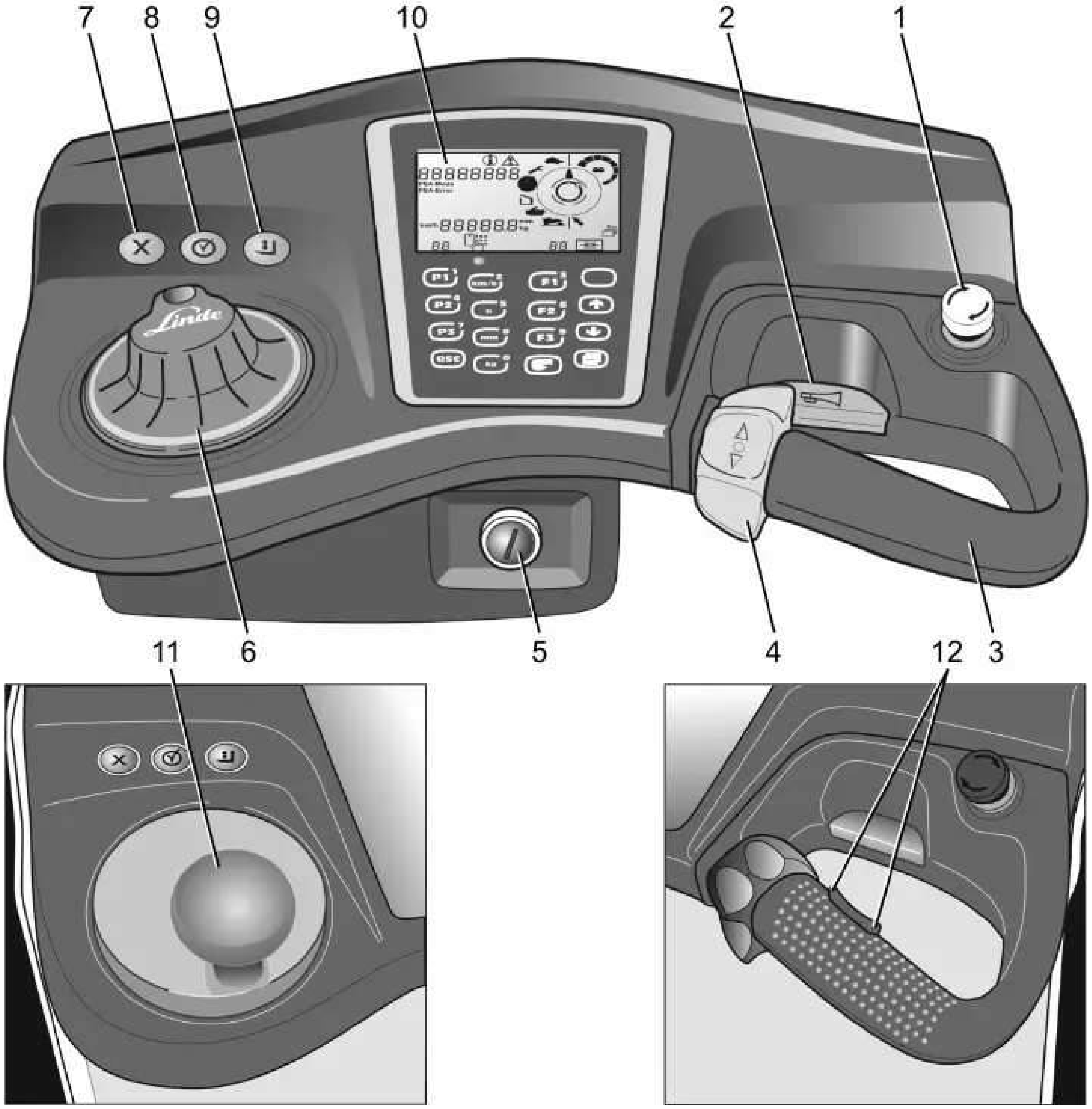
(12) Filling opening, hydraulic oil

(13) Pump motor

(14) Horn

(15) Battery connector

Controls



1	Emergency stop switch	8	Override button
2	Horn button	9	Auxiliary lift button
3	Handhold and sensor surface for two-hand operation	10	Display unit (optional LCD version shown)
4	Operating lever – forward/reverse travel	11	Steering wheel and sensor surface for two-hand operation
5	Key switch	12	Lift/lower switch (operates auxiliary lift when button (9) is held in; otherwise main lift)
6	not used - see item 11		
7	Function button for optional equipment		

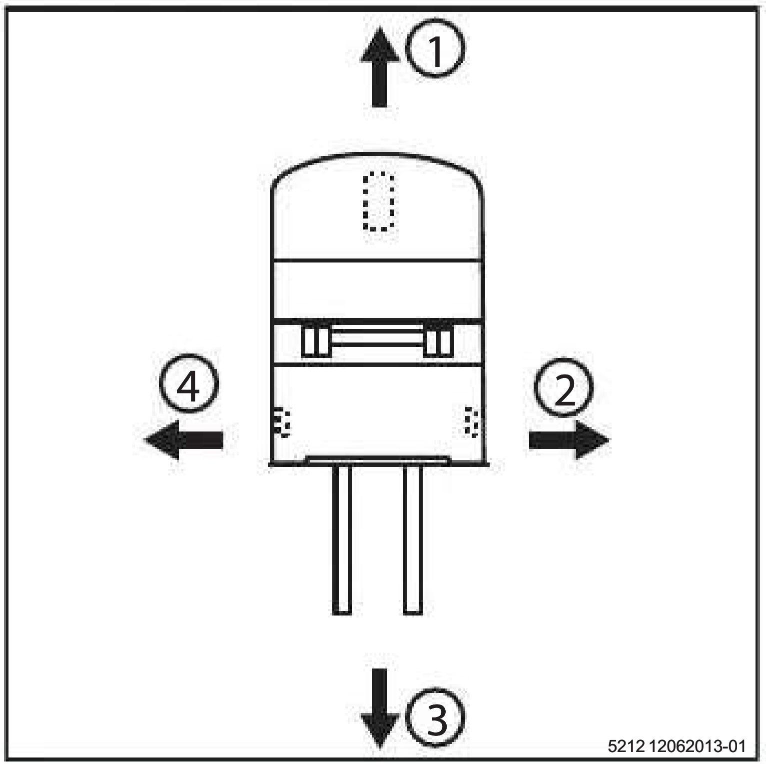
Definition of Direction

(1) Forward (load trailing)

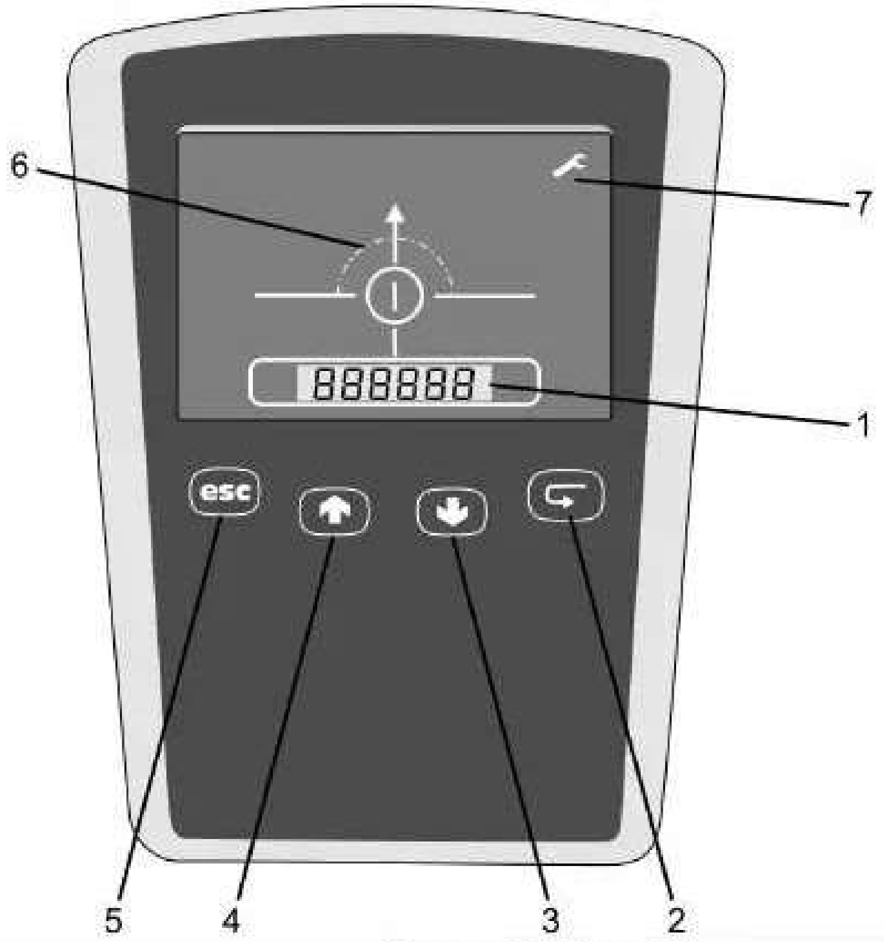
(2) Right

(3) Reverse (load leading)

(4) Left



Standard Display Unit



1	Display for operating hours and battery charge status. After switching on, the operating hours are displayed for 2 seconds, after which the residual battery charge appears as a percentage value.	3	Toggle value displayed in (1) between operating hours and battery charge status
2	Not assigned	4	Toggle value displayed in (1) between operating hours and battery charge status
		5	Not assigned
		6	Steering angle, actual value
		7	Maintenance interval expired

Operating Hours

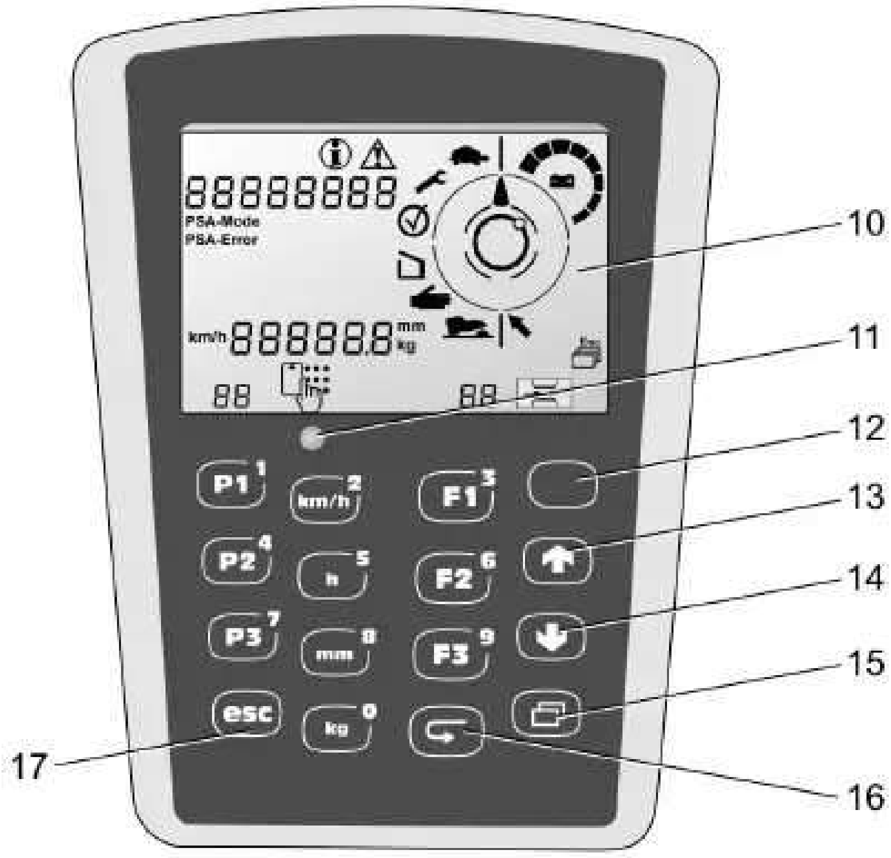
The operating hours are counted according to the truck control unit setting and are displayed in 1/10 hours (6-minute cycle).

▷

Battery Charge Status

The residual charge of the battery is shown as a percentage.

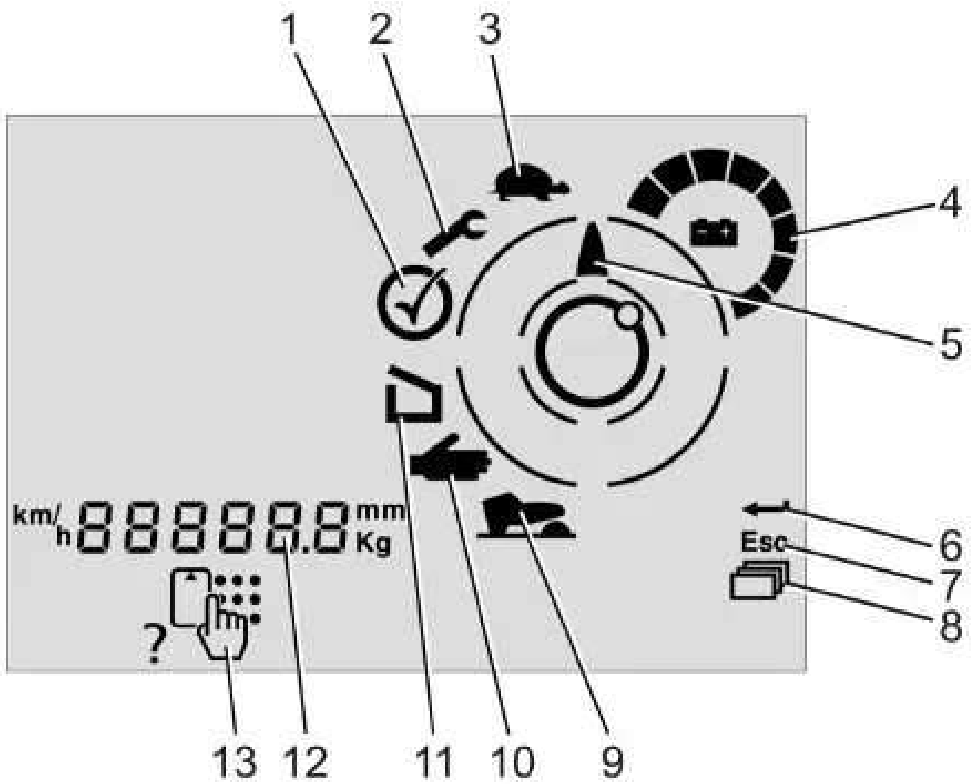
LCD Display Unit (Optional equipment)



0	Entry of number 0 or switchover to weight display in kg*
1	Entry of number 1 or switchover to drive program 1*
2	Entry of number 2 or switchover to speed display in km/h
3	Entry of number 3 or switchover to function 1*
4	Entry of number 4 or switchover to drive program 2*
5	Entry of number 5 or switchover to operating hour meter reading in h
6	Entry of number 6 or switchover to function 2*
7	Entry of number 7 or switchover to drive program 3*
8	Entry of number 8 or switchover to lift height display in mm
9	Entry of number 9 or switchover to function 3*
10	Display window
11	Brightness sensor
12	Not assigned
13	Arrow button UP
14	Arrow button DOWN
15	Change menu button
16	Confirm input
17	Cancel input

*Option

Display Window

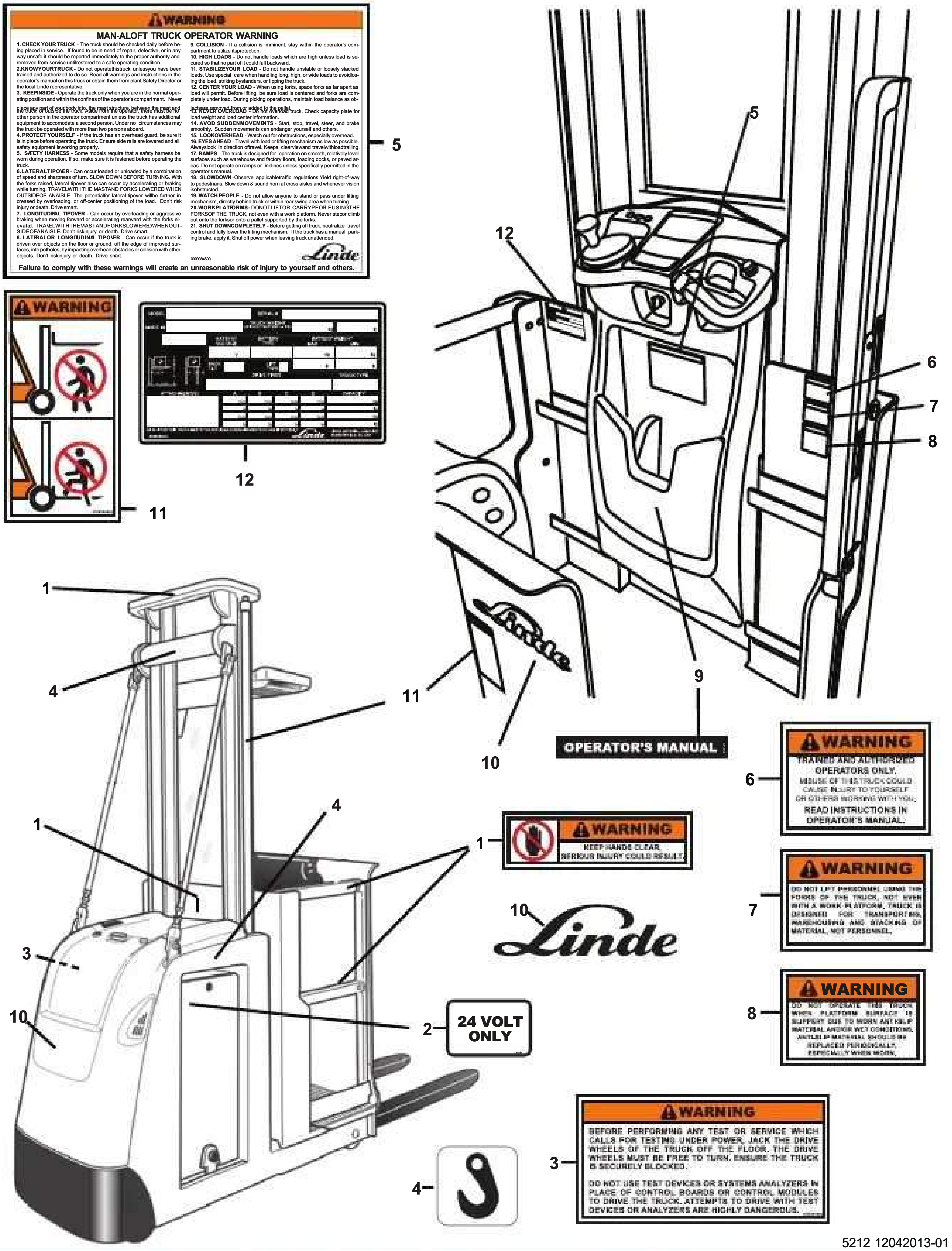


1	Confirmation button required*
2	Maintenance interval expired*
3	Creep speed active*
4	Battery discharge display
5	Steering angle display*
6	Input confirmation required
7	Cancel required
8	Menu change required
9	Foot switch required
10	Two-hand operation required*
11	Barrier open*
12	Display for operating hours, speed*, lift*, load weight*, error messages
13	Numerical input required using keypad*

*Option

Vehicle Marking

Decal and Data Plate Location



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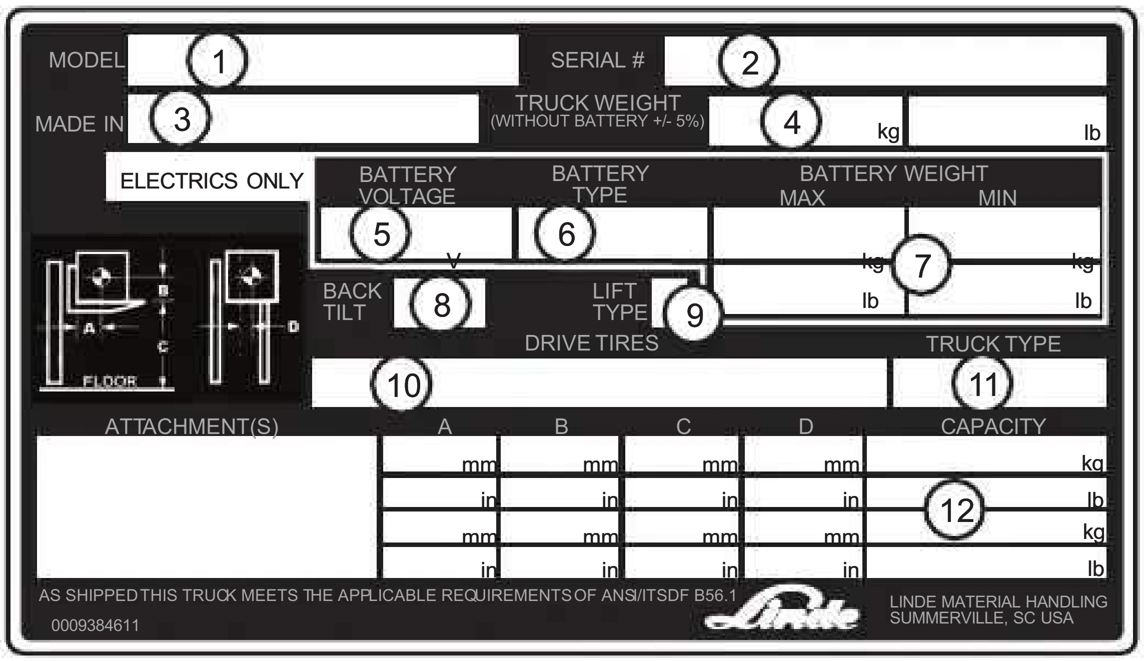
1	Warning Decal, Crushed Fingers	7	Warning Decal, Do Not Lift Personnel
2	Voltage Decal, 24V	8	Warning Decal, Platform Surface
3	Warning Decal, Service Work	9	Decal, Operator Manual storage
4	Decal, Lifting point	10	Decal, Linde
5	Warning Decal, Man-Aloft Truck	11	Warning Decal, Personnel/Forks
6	Warning Decal, Trained & Authorized Operator	12	Data Plate

Data Plate



(1) **MODEL** – shows the model designation of the truck.

(2) **SERIAL #** – shows the serial number of the individual truck.

(3) **MADE IN** – shows the country in which the truck was originally manufactured.

(4) **TRUCK WEIGHT** – shows the weight of the truck (in pounds and kilograms) with forks. This weight does not include the battery on electric trucks.

(5) **BATTERY VOLTAGE** – (electric trucks only) – shows the system voltage of the truck.

(6) **BATTERY TYPE** – (electric trucks only) – shows the required battery designation, as outlined in ANSI B56.1. A battery of the correct designation must be installed in order for the TRUCK TYPE designation to be valid.

(7) **BATTERY WEIGHT** – (electric trucks only) – shows the allowable weight range (MAX and MIN) for the battery in pounds and kilograms.

(8) **BACK TILT** – shows the maximum angle that the mast can be tilted back.

(9) **LIFT TYPE** – shows a letter corresponding to the type of mast construction as follows:
S for single masts
D for double masts
T for triple masts
Q for quad masts

(10) **DRIVE TIRES** – shows the required size and type of drive tire

(11) **TRUCK TYPE** – shows the designation of the truck with respect to hazardous environments as outlined in 29CFR1910.178. This designation corresponds to the environment(s) in which the truck is approved for use.

(12) **CAPACITY** – shows the maximum load weight (in pounds and kilograms) that can be safely lifted for the corresponding devices listed under ATTACHMENT(S). In order to achieve a listed capacity safely, the lift height must be kept within the corresponding value shown in column C and the load center of gravity must be within the corresponding values shown in columns A, B, and D.

4

Operation

Unloading and Preparing a New Truck for Operation

When unloading a new truck, it may be necessary or desirable to tow the truck from the delivery vehicle. In this case, the hydraulic brake system must be manually released to allow the truck to roll. See "Towing the Truck".

The battery retainers must be properly adjusted for the width of the battery that is to be used in the truck. "See Changing the Battery".

Before placing a new truck into service, perform the Daily Maintenance Inspection as found in the Maintenance section. The truck can then be operated immediately upon being placed in service.

⚠ WARNING

Wheel mounting hardware sometimes requires several cycles of tightening before it fully seats. For this reason, wheel mounting screws or nuts will often work loose in the period immediately following initial tightening.

When placing a new truck into service, the wheel mounting screws or nuts must be checked for tightness every 10 hours until no further loosening is detected. See the procedure for checking wheels and tires in the Maintenance section.

Turning the Truck On and Off

Switching the truck on

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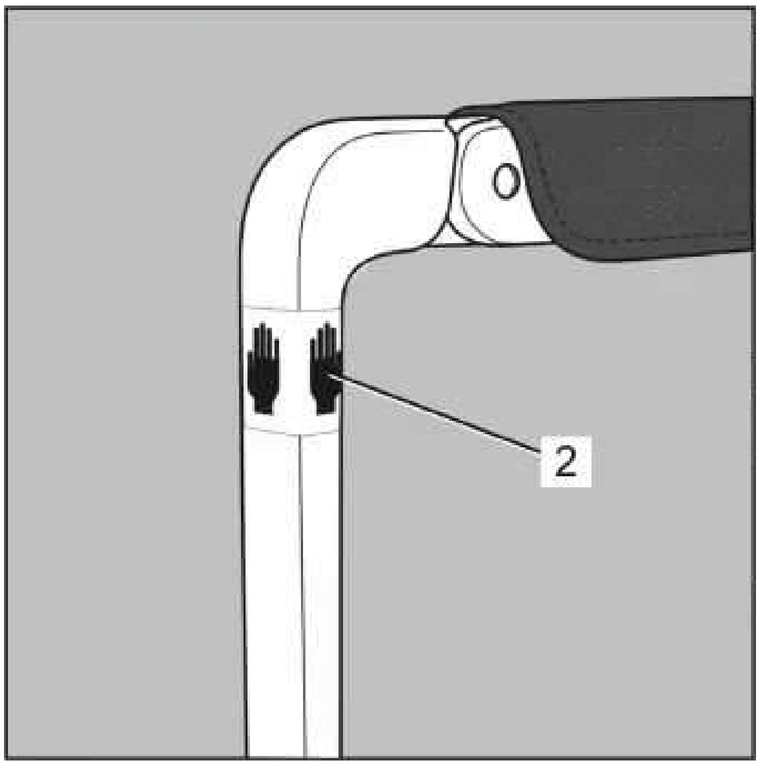
- Step into the operator compartment. Do not step on the floor pedal (1).
- Close the operator compartment guard rails. When operating the guard rails, grasp them near the top of the vertical support (2).
- Ensure the emergency stop switch (3) is released. Release if necessary by briefly twisting the switch button clockwise.
- Turn the key switch (4) clockwise. Ensure that the foot pedal is released and both the travel control and lift/lower control are released to neutral.

Upon successful start-up, the battery state of charge will be displayed. The foot pedal must now be pressed. This will release the brake and enable travel and lift/lower function.



NOTE

The truck is equipped with a static-return-to neutral function. If the travel control or lift/lower control is out of neutral or the foot pedal is activated at start-up, then an out-of-sequence fault will be displayed. Releasing the pedal or the affected control should clear the fault.

Switching the truck off

To turn the truck off, turn the key switch counter-clockwise to the vertical position. The indicator unit will turn off.

Driving

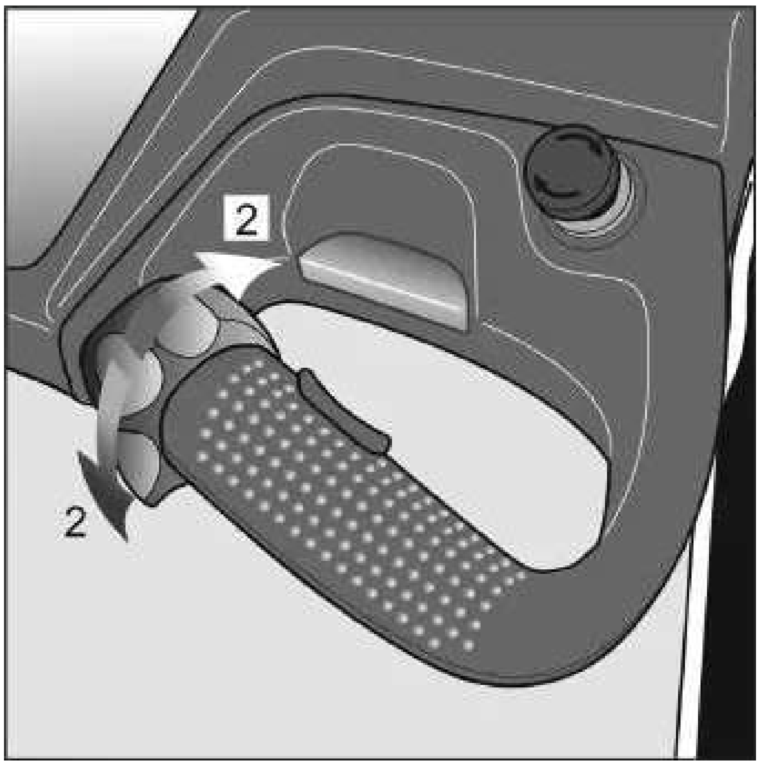
⚠ WARNING

Operators must be familiar with all safety procedures that apply to forklift operation before driving.

Read and understand all safety information in Section 2 before operating the truck.

Forward is defined as forks trailing. Reverse is defined as forks leading. See section three if necessary.

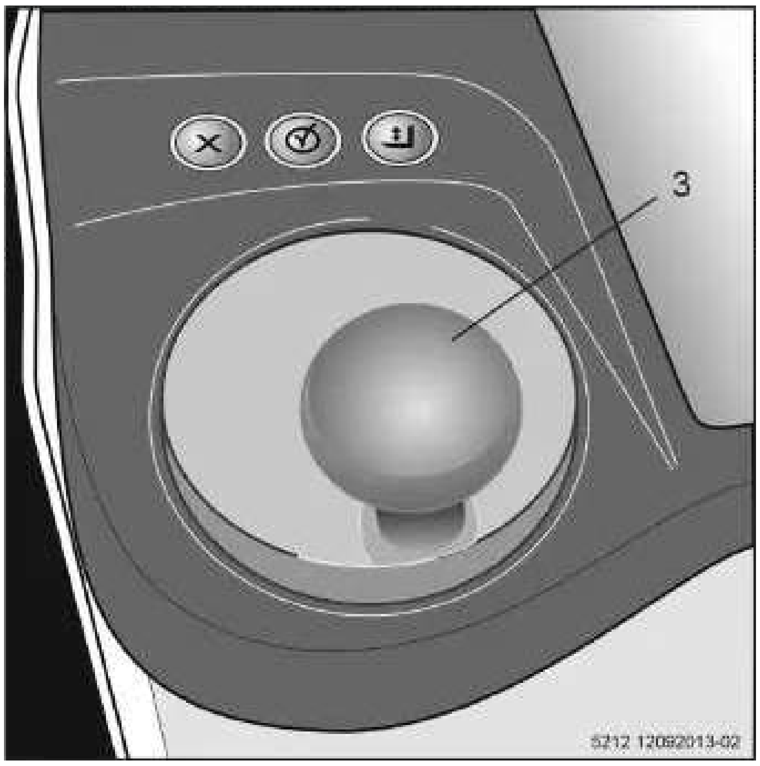
- Switch the truck on. See "Turning the truck on and off" if necessary.
- If necessary, raise the fork arms so that any load is clear of the ground.
- Ensure that the foot pedal (1) is pressed.



NOTE

The foot pedal functions as a "deadman" pedal. Whenever it is released, the travel function is disabled and the electro-mechanical brake is applied. Braking will also occur by releasing the travel control (2). Braking during normal operation should be achieved using the travel control. The electro-mechanical brake is intended for emergency stops and also functions as a parking brake when the truck is off.

- Note the steering angle of the drive wheel on the display. This will indicate the direction the truck will move.
- Grasp the handhold and rotate the travel control (2) in the desired direction. The travel direction and speed are controlled through movement of the travel control.



NOTE

A grip sensor is incorporated into the handhold which detects the presence of the operator's hand. The operator's hand must be grasping the handhold for travel to be enabled.

Steering

- Turn the steering wheel (3) as necessary to steer the truck. The steering wheel has no mechanical stops. Steering direction is always displayed on the indicator unit.

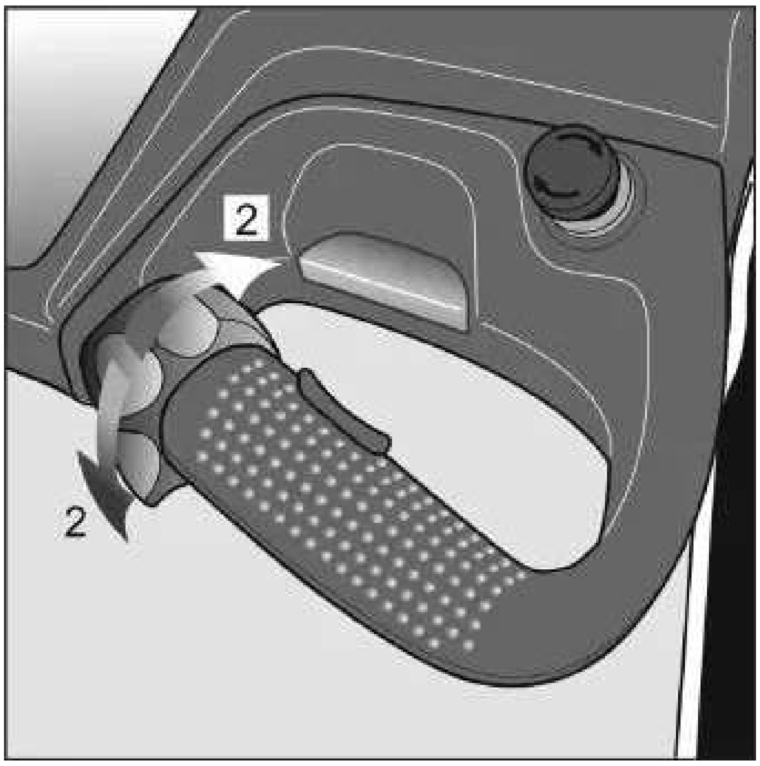
Changing direction

- To change direction at any time during travel, release the travel control and rotate it in the opposite direction. This can be done while the truck is still moving in the original direction. The truck will be electrically braked to a stop and then begin moving in the new direction.

Braking

The truck has electric braking built in to the motor control equipment and mechanical braking through an electro-mechanical disc brake on the drive unit. The electro-mechanical brake

is controlled by the foot pedal (1). Electric braking is controlled by the position of the travel control (2). Braking during normal operation should be achieved using electric braking. The electro-mechanical brake is intended for emergency operation and as a parking brake. The electro-mechanical brake will be applied whenever the foot pedal is released, the emergency stop button is pressed, or the truck is turned off.



There are two modes of electric braking. The first mode activates when the travel control is eased towards the neutral position. The second mode activates if the travel control is rotated toward the opposing direction. The braking force is greater with the second mode than with the first. The second mode is sometimes referred to as plugging. Both modes are regenerative and therefore convert truck momentum back into energy to recharge the battery. The amount of braking force that occurs in each of these modes is adjustable in the truck control program. While travelling, release the travel control (2). The truck will slow to a stop depending on the setting of the electric brake function.

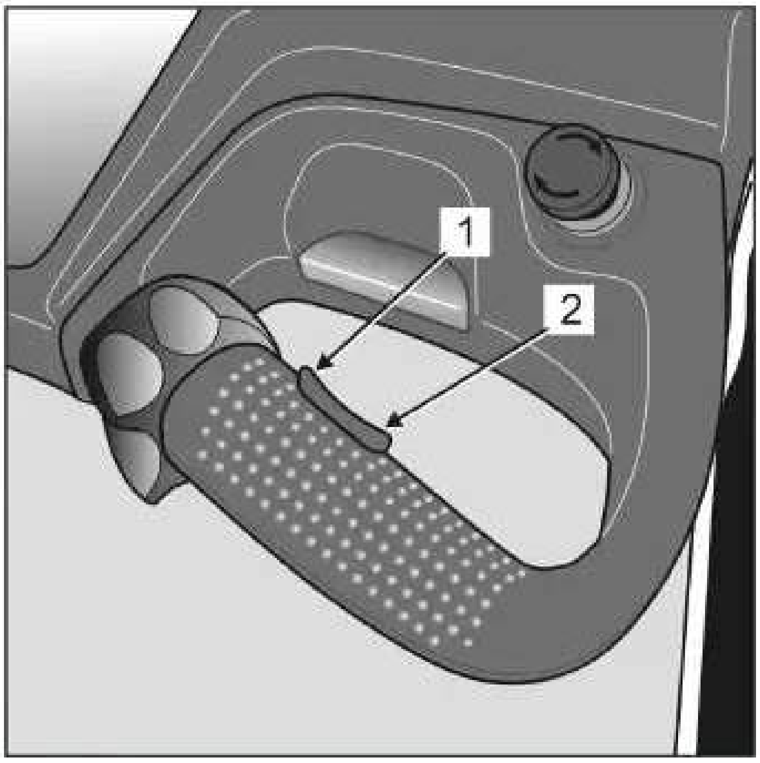
NOTE

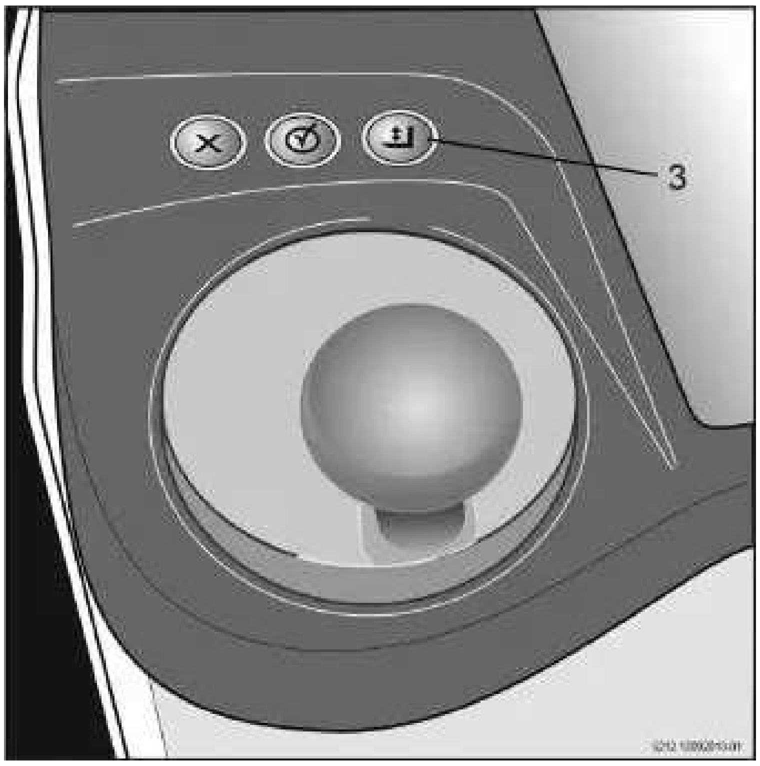
Slow or quick release of the travel control into the neutral position allows the braking action to be sensitively controlled, from gentle to hard braking.

While travelling, rotate the travel control toward the opposite direction until the truck has been electrically braked to a stop. The truck will slow to a stop faster than if the travel control is simply released. After stopping, the truck will accelerate in the new direction unless the travel control is then released.

Raising and Lowering the Forks

▷





⚠ WARNING

Operators must be familiar with all safety procedures that apply to truck operation before raising or lowering the forks.

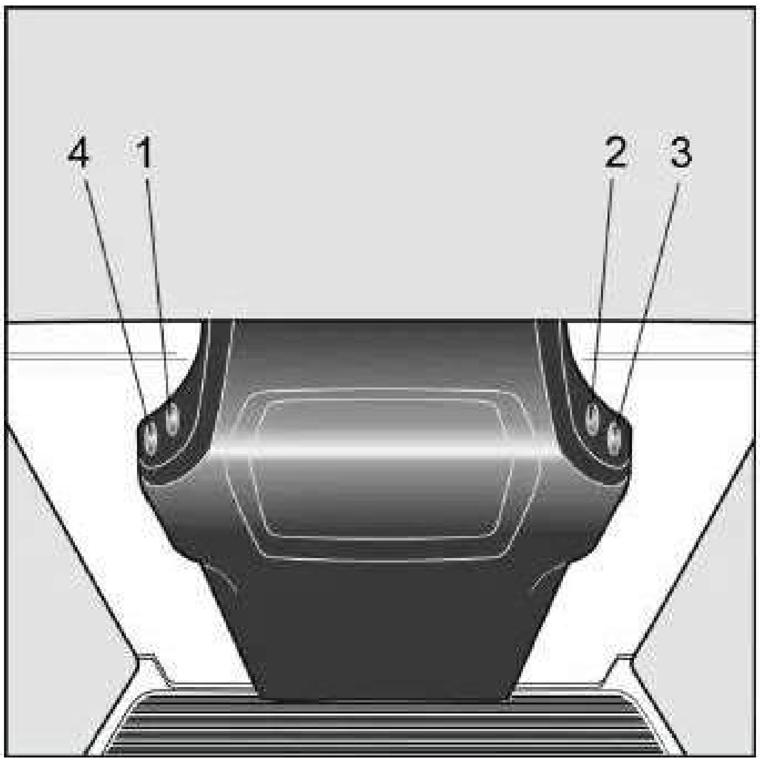
Read and understand all safety information in Section 2 before operating the truck.

There are two separate lifting functions. The main lift function will raise or lower the operator compartment and the forks. The auxiliary lifting function will raise or lower the forks without moving the operator compartment. The auxiliary lift function is intended to allow the forks to be set at a convenient height for manual picking operations.

- ➤ Grasp the knob on the steering wheel.
  A sensor is integrated into the steering knob to detect hand contact. The lift/lower function will not operate if the steering knob is not grasped. Grasp must be maintained throughout lifting or lowering.
- ➤ To raise or lower the operator compartment, press either end of the lift/lower rocker switch. The inside end of the switch (1) will lower the operator compartment. The outside end of the switch (2) will raise the operator compartment. The speed of lifting or lowering can be controlled by finger pressure on the switch.
- ➤ To raise or lower the forks using the auxiliary lift function, release the steering knob and press and hold the auxiliary lift button (3). With the button held in, the lift/lower rocker switch will now control the auxiliary lift function. The forks will now move independently of the operator compartment.

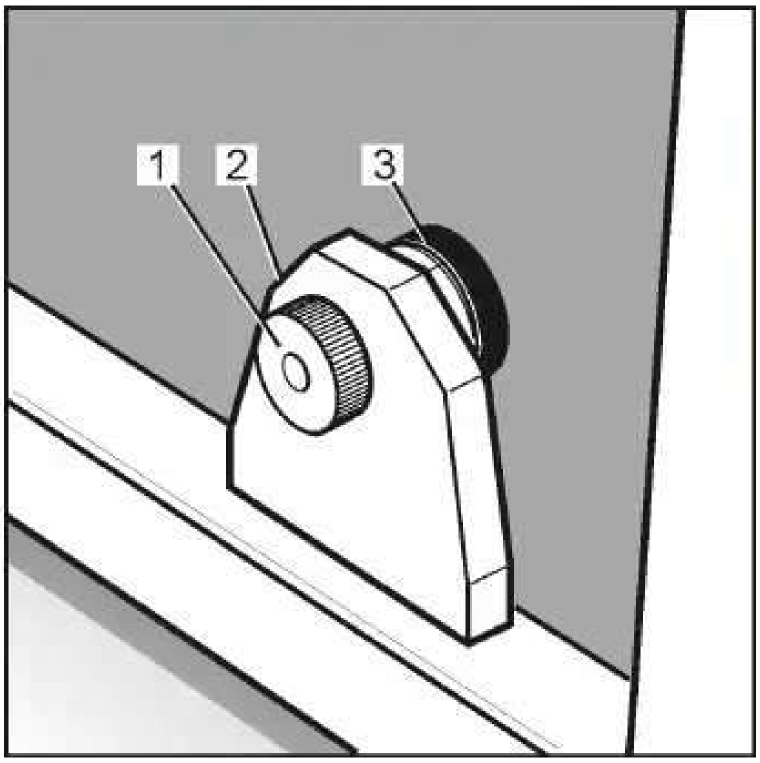
Load-side Operation of Auxiliary Lift

For convenience, the auxiliary lift function can also be operated while facing the load. This is done using the buttons on the console on the load side of the operator compartment. The two-hand operation button (2) must be held in while pushing either button for lift (1) or lower (4). The foot pedal must also be pressed to enable operation.



1	Lift
2	Two-hand operation
3	(not used)
4	Lower

Changing the Battery



⚠ WARNING

Specialized training is required to handle batteries safely.

Batteries may only be changed by properly trained personnel in accordance with the instructions of the battery manufacturer and the following procedure.

The battery rests on rollers in the battery compartment. Changing the battery requires a carrier equipped with rollers to be placed beside the battery compartment at the same level as the compartment rollers. Once the battery is out of the truck, it may be lifted away by means of suitable lifting equipment.

⚠ WARNING

If any lifting equipment (forklift trucks or other lifting equipment) used to change a battery has insufficient load carrying capability and/or forks whose length is too short, there is a risk of accidental injury or death.

Use only equipment of sufficient size and load carrying capability to change batteries.

⚠ WARNING

Batteries must not be changed if the truck is bearing any load. The weight of the battery affects truck stability so there is a risk of the truck tipping over with injury to operators or bystanders if a battery is changed while the truck is loaded.

Always lower the forks fully before changing a battery.

- Park the truck safely.
- Fully lower the operator compartment and auxiliary mast.
- Switch off the key switch.
- Press the emergency stop button.
- Remove the battery cover.
- Pull the battery plug out of the battery socket .
- Carefully set the battery cables on top of the battery so that they will not become hung-up during removal.

⚠ WARNING

Shorting of battery terminals can cause burns, electrical shock, or explosion.

Do not allow metal parts to contact the top surface of the battery. Make sure all terminal caps are in place and in good condition.

- Loosen the clamping screw knob (1) on the side from which the battery is being removed. Note the engagement of the retainer plate (2) in its slot for reassembly, then lift out the retainer.
- Position a roller tray or other equipment to receive the battery beside the battery.
- Carefully pull the battery out of the compartment onto the receiving equipment.
- Check that the battery plug and cable are in good condition and leave the battery in a safe place.

⚠ WARNING

Batteries of incorrect size or weight will affect truck stability and cause the risk of tip-over.

Install only batteries whose weight meets the specification listed on the truck data plate.

⚠ WARNING

On trucks equipped with battery rollers, an unsecured battery can roll out of the truck during operation and cause severe injury.

Ensure that both battery retainers are in place and correctly adjusted before operating the truck.

- Carefully position the replacement battery beside the battery compartment at the same level as the battery rollers.
- Ensure that the battery retainer on the opposite side is in place. Slowly push the replacement battery into the battery compartment. Ensure that it is snug against the opposite side battery retainer.
- Install the remaining battery retainer ensuring that it is fully engaged in its slot. Tighten its clamping knob (1) until the rubber bumper (3) is seated against the battery.

NOTE

The battery retainers must be correctly engaged in their chassis slots or the truck will not operate. A fault code will be displayed in this case.

➢ Plug the battery plug into the battery connector socket.

➢ Replace the battery cover.

➢ Pull out the emergency stop button and the truck is ready for service.

⚠ WARNING

Batteries produce explosive gases.

Always store batteries in well ventilated areas.

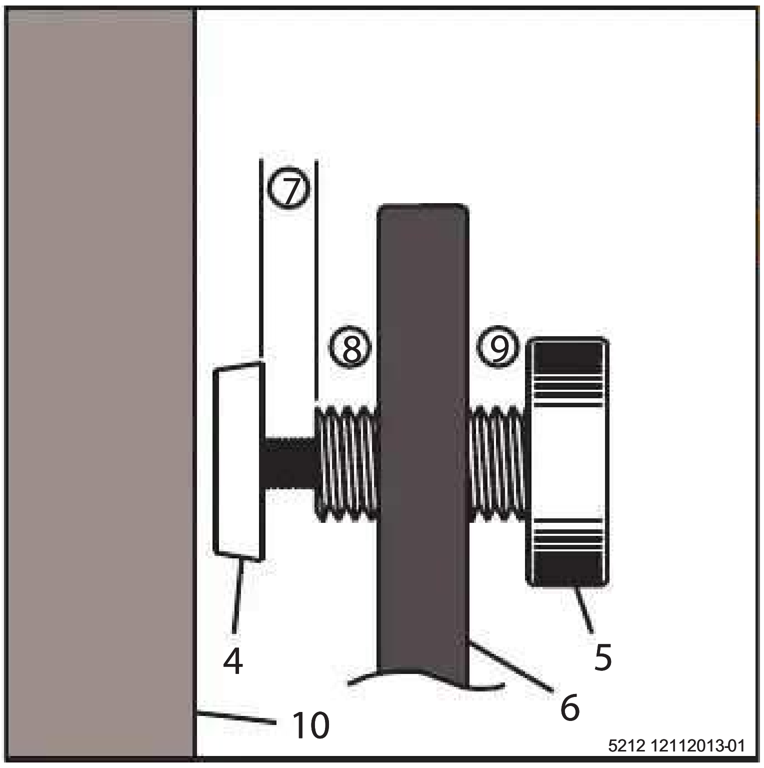
⚠ WARNING

Use of a fuel cell can affect truck stability and cause the risk of tip-over.

Contact the factory for written approval for use of a fuel cell with the truck. Do not install a fuel cell in the truck without written approval.

Adjusting the Battery Retainers

▷



The battery retainers should not require adjustment after every routine battery change as long as batteries of the same size are used. Each battery retainer should be adjusted the same on each side to ensure the battery is centered in the chassis. Each retainer has a rubber bumper (4) on a small shaft that is screwed into a larger clamping knob (5). This arrangement will allow approximately 1-3/16 inch (30 mm) of adjustment on each side. This will accommodate a total battery width variance of approximately 2-3/8 inch (60 mm). If a new size battery is being installed for the first time, the battery retainers may be adjusted as follows:

➢ Precisely position the battery in the center of the chassis.

➢ On both retainers, run the rubber bumper (4) all the way into the shaft of the clamping knob (5).

- On both retainers, unscrew the clamping knob until the rubber bumper is back against the retainer plate (6).
- Place both retainers in position in the chassis.
- On both retainers, hold the knob still and carefully unscrew the rubber bumber until it is about 1/8 inch (3 mm) from the battery or 3/4 inch (20 mm) out of the knob, whichever occurs first. Do not unscrew the rubber bumber more than 3/4 inch out of the clamping knob.
- On both retainers, run the clamping knob in until the bumper now contacts the battery (10). Do this carefully on the first side so that the battery is not pushed out of position before the other retainer is adjusted.
- When contact with the battery has been made on both sides, confirm that the two retainers appear equally adjusted and tighten the clamping knobs firmly by hand.

The visible portion (7) of the bumper shaft should never exceed 3/4 inch (20 mm) nor should it be threaded all the way in. The larger clamping knob shaft must have some thread visible on both sides (8 and 9) of the retainer plate. When correctly adjusted, dimension 7 must not exceed 3/4 inch (20 mm) and at least some thread must remain visible at all three positions 7, 8, and 9.

Connecting the Battery to an External Charger

⚠ WARNING

Specialized training is required to charge batteries safely.

Batteries may only be charged by properly trained personnel in accordance with the instructions of the charger manufacturer and the following procedure.

⚠ WARNING

Explosive gases are released during battery charging.

Charge batteries only in well ventilated areas.

- ➢ Park the truck safely.
- ➢ Fully lower the operator compartment and the auxiliary lift.
- ➢ Turn off the key switch.
- ➢ Remove the battery cover.

⚠ WARNING

Dangerous concentrations of explosive gases can occur during battery charging if the battery cover is not removed.

The battery cover must be removed during the entire charging period to allow ventilation.

- ➢ Unplug the battery connector.
- ➢ Attach the battery connector on the battery cables to the connector plug of the external battery charger.
- ➢ Charge the battery in accordance with the charger manufacturer's instructions.

Emergency Lowering of Operator Compartment

The truck is equipped with an emergency lowering valve. If a technical defect causes the truck to shut down when the driver's cab is raised, or if an operator in the raised cab becomes incapacitated, e.g. falls unconscious, the driver's cab can be lowered by a person on the ground using the hand-operated emergency lowering valve.

- Remove the motor compartment cover.
- Rotate the flange-head screw (1) counter-clockwise. When the lowering procedure is complete, rotate the screw clockwise to close the valve again.

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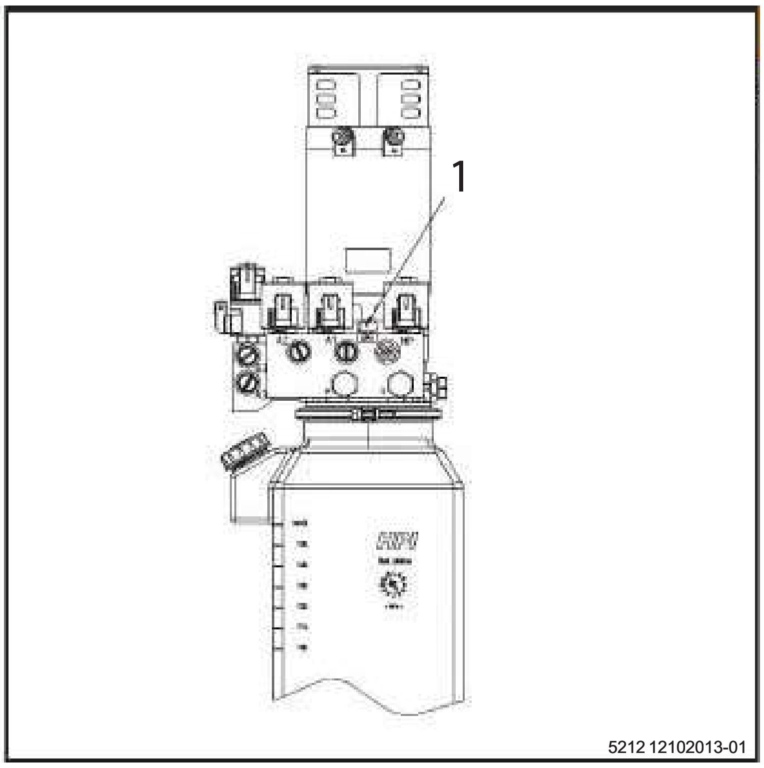


⚠ WARNING

Risk of injury
The attachment and load must have enough space from the racking on all sides. Otherwise, safe lowering of the cab cannot be guaranteed.

If the operator falls unconscious, make sure that all parts of the body are completely inside the driver's cab and that there is no risk of injury for the operator during the lowering procedure.

The operator of the emergency lowering valve must be certain that the moving components of the lift mast are immediately set in motion on opening the valve. Special attention must be given to the cab, the chains and the inner masts of the lift mast.

All of the load chains in the lift mast must remain taut throughout the whole of the lowering procedure. If the components of the lift mast are not immediately set in motion after opening the emergency lowering valve, close the valve immediately.

If the view that the operator of the emergency lowering valve has of the lift mast is obstructed, a third person with full view of the lift mast must be involved. Clearly, this third person must be able to communicate readily with the operator of the lowering valve and the truck operator.

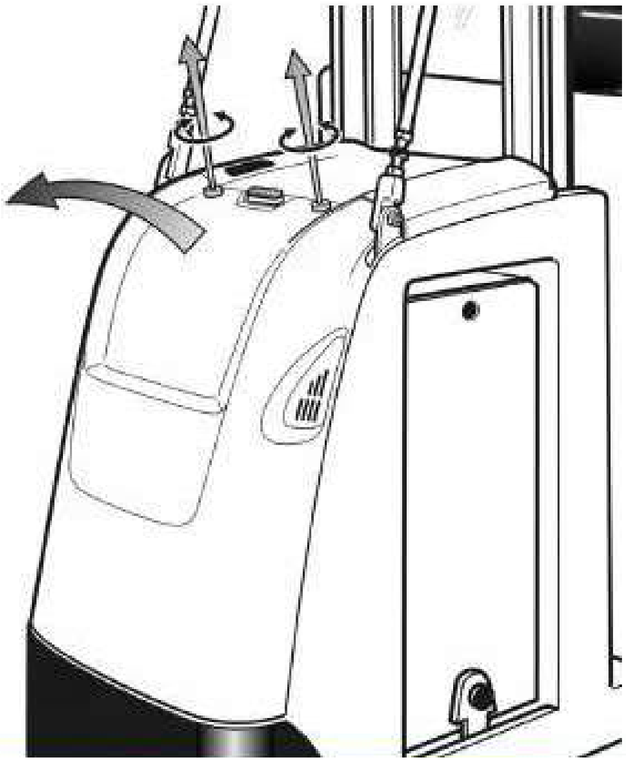
If a movement like the one described cannot be detected immediately or if one of the chains has slackened, a mechanical jam at the lift mast is suspected. The emergency lowering procedure must then be stopped immediately by closing the emergency lowering valve.

The operator must then be retrieved some other way. A second turret truck could be used if suitable, or a lifting working platform.

Removing the Motor Compartment Cover

- Rotate the two screw plugs on the hood counter-clockwise and remove them.
- Hold the hood at the ventilation openings, lift off and place to one side. The lowering valve is in the control compartment and can be accessed once the cowling has been opened.
- Rotate the flange-head screw (1) on the valve block anticlockwise. The lowering procedure begins.
- Do not adjust any others screws apart from the flange-head screw on the emergency lowering valve.

▷



Restarting after emergency lowering

⚠ WARNING

Risk of accident

If the emergency lowering function was required because of a technical defect, the truck may only be put back into operation if the cause of the error has been rectified by a specialist.

Towing the Truck

During towing, the electro-mechanical brake and/or the steering may not be functional depending on the situation. If the steering will not function, the front of the truck must

be lifted slightly by the towing equipment so that the drive tire remains clear of the ground during towing. If the steering is functional but the brake cannot be released electrically, the brake may be manually released as explained below to allow towing without lifting the drive unit.

⚠ WARNING

Towing the truck with the operator compartment raised can result in tip-over.

Lower the operator compartment completely before towing. The operator compartment may be manually lowered If necessary by using the emergency lowering valve.

Towing with steering system not operational

If the steering system is not functioning correctly, the truck can be towed by lifting the front end slightly with a tow vehicle or by using a steerable heavy-duty roller unit. Do not lift the truck so much that the fork tips drag.

With this method the drive wheel does not have contact with the floor, therefore no braking will be available.

⚠ WARNING

Braking the truck will no longer be possible. The parking brake will not operate either.

Towing the truck requires a towing vehicle with sufficient tractive power and braking force for the truck mass. Towing must be carried out using a fixed connection (towing bar).

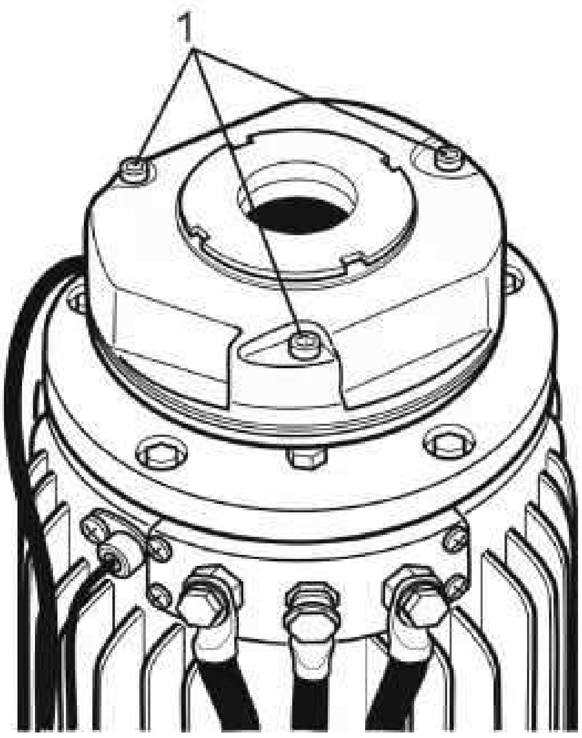
Towing with operational steering

If the steering system is still in working order and the brake has been released, the truck can be towed using a towing bar or other fixed connection designed for the purpose. The brake may be manually released if necessary.

Please observe the following instructions:

- When towing, never drive above creep speed.
- There must always be a driver in the towed vehicle.
- Completely clear the danger area around the towing and towed vehicle of any personnel.
- In order to avoid strong lateral tension and thus the risk of tilting, take all corners as wide as possible.
- If the brake has not been manually released, the driver of the towing vehicle must maintain pressure on the foot switch unless intentionally braking.

Manual release of the brake



⚠ WARNING

Risk of collision.

If the brakes have been manually released they must be tested for perfect assembly and function during the recommissioning of the vehicle. Part of this involves checking the brake lining gap when released which should be approx. 0.4 mm.

There are two methods of manually releasing the brake. The brake may be removed from the drive unit or the brake spring pressure can be overridden using override screws.

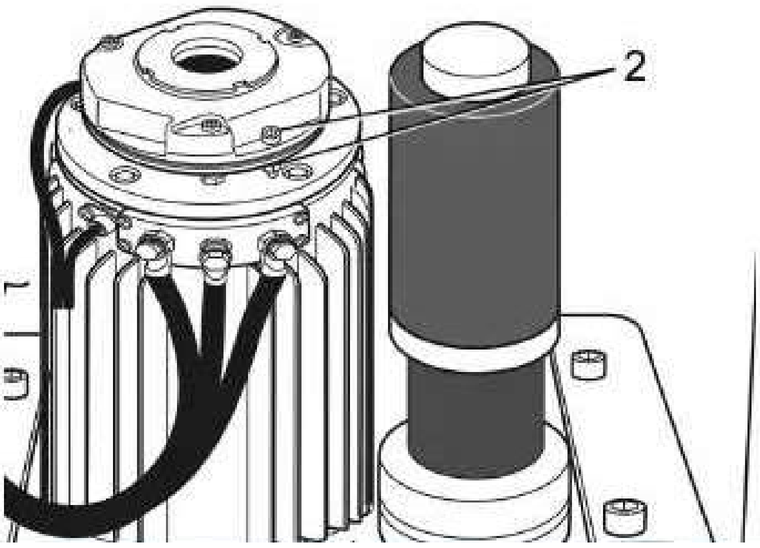
Option 1 Removing the brake

➢ Unscrew the three mounting screws (1) and place the brake to one side.

Option 2 Overriding the brake

This method will draw the brake backing plate up off of the brake disc against spring pressure. Two M4x25 mm screws, washers, and nuts are required.

➢ Insert the two screws into the override holes provided (2). Install the washers and nuts and tighten both sides evenly.



Securing the Truck for Transport

This procedure explains the attachment of equipment to the truck for the purpose of securing it for ground transport by tractor-trailer or other vehicle. Securing the truck for transport must be performed by personnel experienced in rigging loads for transport.

⚠ WARNING

Transport vehicles, loading ramps, or other equipment of insufficient capacity can fail and cause severe injury or death.

Ensure that the transport vehicle as well as any loading ramps or other equipment has sufficient capacity to carry the weight of the truck. Refer to the truck data plate for truck weight.

Ensure that all surfaces on which the truck will be driven or carried can support the wheel load of the truck. Contact the factory for wheel load values if necessary.

⚠ WARNING

If the truck is to be driven onto the transport vehicle, the operator must be familiar with all safety procedures that apply to forklift operation before driving. Be aware that the truck has rear steering and that the rear end will move out during a turn. Failure to carefully monitor truck position while turning could cause the truck to fall during the loading process.

Read and understand all safety information in Section 2 before driving the truck onto a transport vehicle. Remain aware of truck position at all times especially if turning. If possible, align the truck with the transport vehicle so that it can be driven straight onto it without turning. Drive very slowly during the entire loading process.

➢ Once the truck is in position, disconnect the battery.

To fix the truck safely on a loading surface for transport, a total of 8 wooden wedges and a suitable tension belts must be used. Two of the wooden blocks must be placed each at the front and back of the truck, and the others in pairs on the right and left of the truck. The tension belts must be guided above the battery compartment around the supports in order to firmly tension the truck on the loading surface. To do this, remove the lid of the battery compartment. The mast must be additionally secured at the sides with belts.

Hoisting the Truck

This section explains the attachment of lifting equipment to the truck for the purpose of hoisting it. Many methods of rigging to a crane or hoist are possible. Explanation of such methods as well as operation of lifting equipment is outside the scope of this manual. Both the attachment of lifting equipment to the truck and the hoisting operation itself must be performed by personnel experienced in rigging.

⚠ WARNING

Lifting equipment of insufficient capacity can fail and cause severe injury or death.

Ensure that all lifting slings, hardware, or other equipment has sufficient capacity to carry the weight of the truck. Refer to the truck data plate for truck weight. If a battery is installed, its weight must be added to the truck weight listed on the data plate.

⚠ WARNING

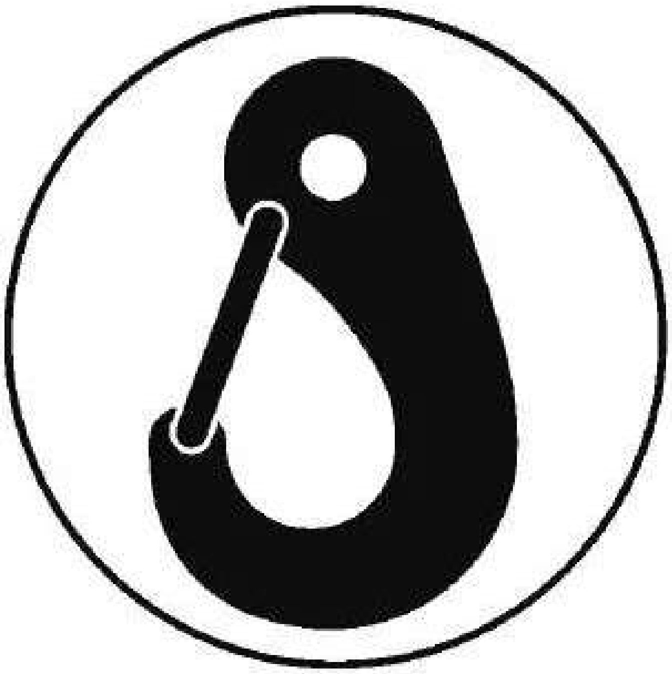
The overhead guard will be damaged if it is contacted by lifting equipment that is under tension from lifting. This can result in later failure of the overhead guard and the risk of severe injury or death.

Ensure that no part of any lifting equipment contacts the overhead guard during lifting.

If the mast has been removed from the chassis, the lifting points for the chassis alone are located at the longitudinal supports over the battery compartment and the front ends of the load wheel supports.

For an assembled truck with mast (or the mast alone), the lifting point is the upper cross member of the outer mast upright. This is suitable for lifting the whole truck. All of these locations are marked with the lifting point symbol. To ensure stability, lifting equipment must be attached at these lifting points on both sides of the chassis or mast. When attaching at the mast cross member, care must be taken to ensure attachment is secure at the outer

▷



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sides of the cross member and cannot slip toward the center.

Ensure that slings or any other lifting equipment will remain clear of any sharp edges, hydraulic lines or hoses, or attached items such as lights or brackets throughout the lifting process.

5

Maintenance

Personnel Qualifications

Only qualified personnel authorized by the owner are permitted to perform maintenance or repair work. All items listed in the Scheduled Maintenance Charts must be performed by qualified forklift technicians only. They must have knowledge and experience sufficient to assess the condition of a forklift truck and the effectiveness of the protective equipment according to established principles for testing forklift trucks. Any evaluation of safety must be unaffected by operational and economic conditions and must be conducted solely from a safety standpoint.

Daily inspection procedures and simple maintenance checks, e.g. checking the hydraulic oil level or checking the fluid level in the battery, may be performed by operators. This does not require training as described above.

Cleaning

Cleaning the Truck

The need for cleaning depends on use of the truck. If highly aggressive media are involved, e.g. salt water, fertilizer, chemicals, cement etc., thorough cleaning is required after finishing the work assignment.

Hot steam or cleaning materials with a powerful degreasing effect should only be used with great caution as this will affect the grease filling of bearings with lifetime lubrication, causing it to escape. As re-lubrication is not possible, the bearings will be irreparably damaged.

When using compressed air for cleaning, remove stubborn soiling with cold cleaner.

During cleaning pay special attention to the oil filler openings and the surrounding areas as well as the lubricating nipples prior to greasing.

Run the truck immediately after cleaning to check operation and to aid in drying in case any motors became exposed to moisture.

⚠ CAUTION

Never wash truck when switched on.
Switch the truck off and disconnect the battery before any cleaning operations.

⚠ CAUTION

When cleaning with a water jet (high-pressure or steam cleaner etc.), it should not be applied directly to the drive unit, any electric or electronic components, connector plugs or insulating material. High pressure water also should not be applied directly to the operator controls on the control handle.

If this is unavoidable, the parts concerned should be covered up beforehand or only cleaned with a dry cloth or clean compressed air.

Cleaning the Lift Chains

If the lift chains are so dirty that lubricant penetration is not assured, the chains must be cleaned.

⚠ WARNING

Lift chains are safety elements. Incorrect cleaning materials can damage them.

Do not use cold/chemical cleaners or fluids that are corrosive or contain acid or chlorine. Note the manufacturer's safety information. When cleaning with a steam jet, do not use additives.

- Place a collection vessel under the mast.
- Clean lift chains with a paraffin derivative such as petroleum ether.
- Immediately after cleaning, dry the chains with compressed air to remove any water remaining on the surface and in the chain joints. Flex the chains while drying to ensure thorough moisture removal.
- Immediately apply chain lubricant to the chains. Flex the chains while applying the chain lubricant to ensure lubricant penetration.

NOTE

Lift chains on trucks used in the food industry must be lubricated with an oil approved for the food industry.

Daily Inspection

Daily Inspection Overview

The following inspection tasks in this section should be carried out by the operator or designated service personnel before each shift or at least daily. This inspection is not part of the regularly scheduled maintenance listed elsewhere in this chapter and is not intended to replace any of it. Regularly scheduled maintenance must be performed by a qualified forklift technician at the intervals indicated.

If any problem affecting safety is noted, it must be repaired immediately by a trained forklift technician. The truck must not be operated until such repairs are complete. This list does not cover attachments or other truck modifications not manufactured by Linde. Refer to the respective manufacturer’s documentation for maintenance information pertaining to such items.

⚠ WARNING

To prevent accidents during maintenance activities, the truck must be secured against unintentional movement or start-up. Before beginning any maintenance, the mast should be fully lowered, the parking brake should be on and the key switch turned off. The truck must remain in this state throughout the maintenance process except for individual maintenance activities that specifically require otherwise.

Daily Inspection Checklist

Linde

MAN-ALOFT RIDER LIFT TRUCK

OPERATOR'S DAILY CHECKLIST

Truck Serial Number: ____________________ Dept / Shift: __________________ Operator: ______________________
Hour meter reading: _____________________ Date: ______________________ Supervisor: _____________________

Check each of the following items before the start of each shift. **Let your supervisor and/or maintenance department know of any problem**. Start at the front of the lift truck and work towards the rear. After checking, mark each item accordingly. Explain below as necessary.

Check boxes as follows: ☐ OK ☐ NR, **N**eeds **R**epair. Circle problem and explain below.

OK	NR	VISUAL INSPECTION
		Oil Spots on Floor (check for leaks on truck)
		Drive Tire(s) (wear, cuts, or embedded objects, rim damage, loose/missing lug nuts)
		Hydraulic Oil (check level)
		Steer Axle, Chain, or other mechanism (check for damage, debris)
		Overhead Guard (damage, bends, cracks, looseness)
		Steering Wheel (check for wear, damage)
		Throttle Hand Grips (if equipped) (check for wear, damage)
		Anti-slip Mat (if equipped) (check condition, cleanliness)
		Safety Shield (if equipped) (clean)
		Battery Connectors & Cables (damage, cracks, pitting)
		Battery Retention (installed correctly, secure)
		Battery Case & Vent caps (damage, cracks, loose, missing)
		Mast (damage, wear, cracks, loose fasteners)
		Lift Cylinders (damage, leaks, loose fittings)
		Lift Chains (wear, corrosion, cracks, loose leaves, even tension)
		Carriage/Load Backrest (damage, looseness, bends, cracks)
		Forks/Attachment (damage, cracks, excess wear, twisted, bent)
		Fork Locking Pins (check operation, holds fork secure)
		Load wheels (tire wear, damage, entrapped debris)
		Harness, Tether (Inspect snap hooks and mounting points)
		Warning Decals/Operator's Manual (in place, legible)
		Data Plate/Capacity Plate (in place, legible)

OK	NR	OPERATIONAL INSPECTION
		Unusual Noise (during any of the operational checks)
		Emergency Battery Disconnect (check operation)
		Gauges and Instrumentation (check operation)
		Battery Charge (fully charged)
		Directional Switch (if equipped) (operates freely)
		Operator Presence Switch (check operation)
		Forward Driving (accelerates, steers, brakes smoothly)
		Plugging (stops, changes direction smoothly)
		Reverse Driving (accelerates, steers, brakes smoothly)
		Service Brake (check operation)
		Parking Brake (check operation)
		Hydraulic Controls (operate freely, return to neutral)
		Attachment (if equipped) (check operation)
		Mast (extend fully, binding, leaks, roughness, noise)
		Hydraulic Oil (excessive noise when mast is fully raised is indication of low hydraulic oil)
		Lift/Travel Speed Governor (check operation)
		Chain Slack Prevention Switch (check operation)
		Horn (sounds when button pressed)
		Backup Alarm (if equipped) (sounds in reverse)
		Travel Alarm (if equipped) (sounds with vehicle in motion)
		Work, Strobe, Flashing Lights (if equipped) (check operation)

Explanation of problems marked above (use back of this form if needed):

____
____
____

OSHA 1910.178 (p) (1) requires a truck to be taken out of service any time it is found to be in need of repair, or is in any way defective or unsafe. Place a "Do Not Operate" tag on the truck, remove the key and alert your supervisor. The Truck may not be placed back into service until necessary repairs are made.

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Check for fluid leakage

Check the entire truck as well as the surface beneath it for signs of fluid leakage.

Check overhead guard

Check the condition of the overhead guard for deformity, looseness, or other obvious damage.

Check hydraulic cylinders

Inspect lift, tilt, and any attachment cylinders for damage or leakage.

Check lift chains

Inspect the mast lift chains for broken link plates, broken or deformed pins, rust, and stiffness. Inspect the chain anchor and hardware for damage as well.

Check fork carriage

Inspect the forks, carriage and load backrest for deformity, cracks, or other damage. Check fork latch pins for correct operation. (Trucks equipped with a fork positioner will not have fork latch pins.)

Check battery connector

Inspect the battery connector and its cables for damage.

Check decal condition

Inspect all decals and the data/capacity plate for condition and legibility. Decal locations are given in the Overview section of this manual. Refer to the decal descriptions in the Safety section of this manual if necessary.

Any damaged or unreadable decals must be replaced.

Wheels and Tire

⚠ WARNING

Uneven wear or excessive damage to the tires can reduce stability as well as brake performance. Reduced stability can cause tip-over. Reduced brake performance can cause collisions.

Have worn or damaged tires changed immediately.

Inspect the drive tire for damage or excessive wear. Remove any foreign objects that may be embedded in the tire surface. Solid smooth tires must be replaced when worn down by one-third (33%) of the original outside diameter. (The first number of the tire size shown on the sidewall is the original diameter.

Check wheel mounting hardware for looseness. This is especially important if a wheel has recently been removed and reinstalled for repairs, replacement, or any other reason. Have any loose wheel mounting hardware tightened to the following torque before operation.

Drive wheel nuts should be tightened to 114 ft-lb (154 Nm).

⚠ WARNING

Wheel mounting hardware sometimes requires several cycles of tightening before it fully seats. For this reason, wheel mounting screws or nuts will often work loose in the period immediately following initial tightening.

Whenever a wheel is removed and replaced for any reason, the wheel mounting screws or nuts must be checked for tightness every 10 hours thereafter until no further loosening is detected.

Check load wheels for damage and any entangled debris.

Check battery retention

Ensure that all battery retention devices are in place, undamaged, and hold the battery firmly.

Operational checks

Before returning the truck to service, conduct an operation check of the following items:

- Emergency stop button
- Foot pedal brake release
- Safety interlocks (contact sensors on controls, foot pedal, guard rail)
- Multi-function display/battery discharge indicator
- Working lights (if equipped)
- Horn
- Forward and reverse travel
- Back-up or motion alarm (if equipped)
- Electric braking (plugging)
- Mast and any auxiliary hydraulic functions (operate through complete range of motion)
- Steering function and angle display

Scheduled Maintenance

Maintenance Schedule

This maintenance schedule is valid for normal service with one-shift operation. (normal service is 50% capacity utilization - full load for half shift or half load for full shift) For high-duty service, multi-shift operation, or use in environments with large temperature fluctuations, the intervals must be shortened respectively. Contact your Linde dealer for specific maintenance requirements in these circumstances.

The schedule is intended as an overview. It does not describe necessary procedures. More information regarding maintenance and repair is available in the service manual. Use only high-quality lubricants or other materials meeting the specifications listed in Fluid and Lubricant Specifications. All work must be performed only by qualified forklift technicians. Linde recommends having all scheduled maintenance performed by an authorized Linde dealer. Custom-fitted equipment is not covered by the scheduled maintenance charts. If such equipment is installed, refer to the manufacturer's documentation for maintenance requirements.

Maintenance every 6 months or every 1000 hours

Drive unit

- Perform an initial gear oil change at 1000 hours. Thereafter gear oil should be changed every 2000 hours.
- Check gear for noises and leakages.
- Check gear oil level; fill up, if necessary.
- Check drive unit fastener torque.
- Check drive wheel and tire for condition and wear.
- Check drive wheel nut torque.
- Check for running noises at the drive motor bearings; change if necessary.

Steering

- Function check of steering.
- Check for: steering angle > 90° on both sides
- Check for: clearance, or condition of the steering angle measuring equipment (actual value)
- Check for: smoothness steering wheel (rated value).
- Check the straight run, adjust actual value potentiometer position (rail), if necessary.
- Check swivel plate bearing for smoothness and abrasion.
- Check the steering gears for excessive play.
- Check the steering for smooth operation.
- Check for running noises at the steering motor bearings; change if necessary.
- Lubricate steering gears with all-purpose grease
- Test the safety shutdown of the electric steering control. The details given in the relevant manufacturer's documentation must be complied with to ensure correct implementation.

Brake

⚠ WARNING

Brake lining dust can present a respiratory hazard.

Always wear respiratory protection when blowing out or otherwise disturbing dust on the brake lining.

- Check the foot switch operation.
- Check electric-braking (plugging).
- Check brake lining, thickness, and condition; change if necessary.
- Check brake clearance; adjust, if necessary (0,4 - 1,0 mm).
- Clean brake lining with compressed air.
- Check the braking deceleration values (f. ex. dynometer) after any adjustment of the brake.

Chassis

- Check stops and limit switches for condition and function.
- Check covers, doors and lids for condition and smoothness.
- Visually check the over head guard for damage.

Lifting device

⚠ WARNING

Risk of accident

The **main lifting chains** and the **auxiliary lifting chain** must be replaced after 5000 operating hours, even if the wear limit of 2% has not yet been reached. Follow the current applicable guidelines for cold store version trucks.

- Check the condition of the fixture and bearing points of the lifting cylinder.
- Check the lift chains on the mast and auxiliary lift for damage, lubrication and correct tension. The details given in the relevant manufacturer's documentation must be complied with to ensure correct implementation.
- Measure the lift chains on the mast and auxiliary lift for stretch. Replace both chains in a pair if either one is stretched greater than 2%.
- Check chain rollers for proper function.
- Check mast guide surfaces for wear.
- Check the condition / setting of mast rollers and wear strips.
- Check the condition of the guide elements and lateral play, replace if necessary
- Visually check forks for cracks or bends.
- Grease all lift chains with chain spray.
- Keep sliding surfaces of the mast sections free of corrosion with a film of grease.

Load wheels and rollers

- Check the condition, fixture and wear of rollers and load wheels.
- Check for easy running.

Electrical system

- Check battery cable, connections, and battery plug for condition and tight fit.
- Measure battery voltage (under load).
- Measure tray insulation.
- Check battery acid level.

- Check function of drive and pump control, check acceleration and plugging of drive control.
- Check all connections and plugs for tight seat.
- Check contactor tips for burning and condition; change if necessary.
- Check fuse values and condition.

NOTE

Battery maintenance is not part of the vehicle maintenance routine and must be carried out as specified by the battery manufacturer.

Hydraulic system

- Check the main lift cylinder for leaks and correct operation.
- Check the auxiliary lift cylinder for leaks.
- Check the oil level in the hydraulic oil tank and top up if necessary.
- Check all hydraulic connections for leakage; tighten or change if necessary.
- Check pump motor for running noises.

- Check pump motor brushes; change if necessary.
- Clean or change hydraulic oil filter.

Further checks

- Check all operating devices for function and condition.
- Lubricate all moving parts with oil.
- Check safety devices depending on equipment; repair if necessary.
- Check that the factory data plate and warning decals are present and legible. Replace any missing or illegible items.

Yearly or 2000 hour maintenance

- Change hydraulic oil.
- Change gear oil in the drive unit.

Fluids and Lubricants

Lubricants and Capacities

⚠ CAUTION

Risk of damage to property
Trucks for cold store operation must be lubricated with different lubricants. Refer to the operating instructions for cold store trucks.

The following lubricants must be used:

Hydraulic system

- HLP DIN 51524/T2
- The hydraulic oil reservoir holds up to 15.8 quarts (15 l) of hydraulic oil.

The reservoir is labelled with a "max" marking. The hydraulic oil level must be at or near the "max" marking.

Gearbox

- Oil quality must conform to at least API GL5.

The gearbox holds 1.6 quarts (1.5 l) of gear oil.

Grease lubrication points

- ESSO Beacon 2 multi-purpose grease

Chain lubrication

- Stabylan 2100

Troubleshooting

Removing the Motor Cover

To gain access to the motor and control compartment, the motor cover must be

removed.

- Remove the two plastic screws by turning counter-clockwise.
- Note for later reference how the lower edge of the cover engages the chassis. Then lift the cover upwards and place to the side. The cover is very light and can be lifted easily.

To install the cover, place it carefully into its position taking care to engage the lower edge properly with the chassis. Hand tighten the plastic screws.

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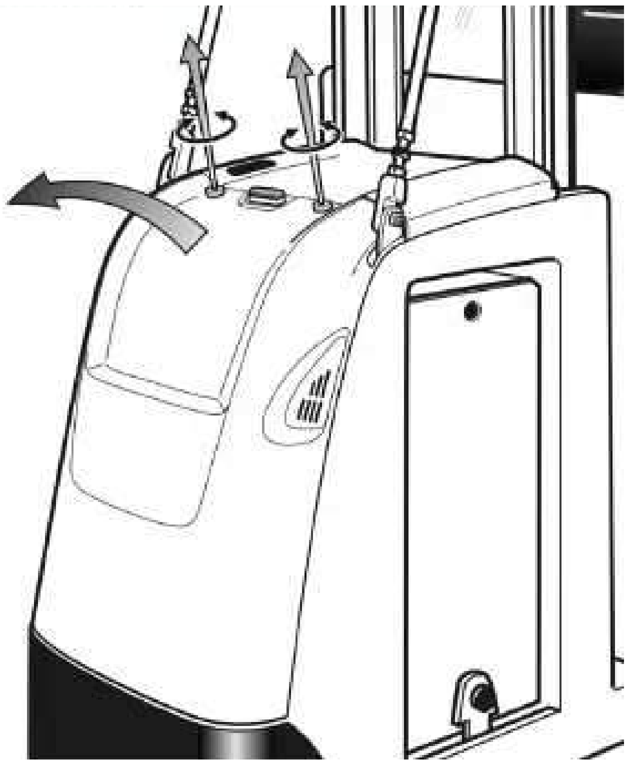

Fuses

(1) F2, Control current fuse 5,0 A

(2) F3, Control current fuse 7,5 A

(3) 3F1, Primary current fuse Steering 35 A

(4) F1, Primary current fuse Traction and Hydraulic 275A or 355 A

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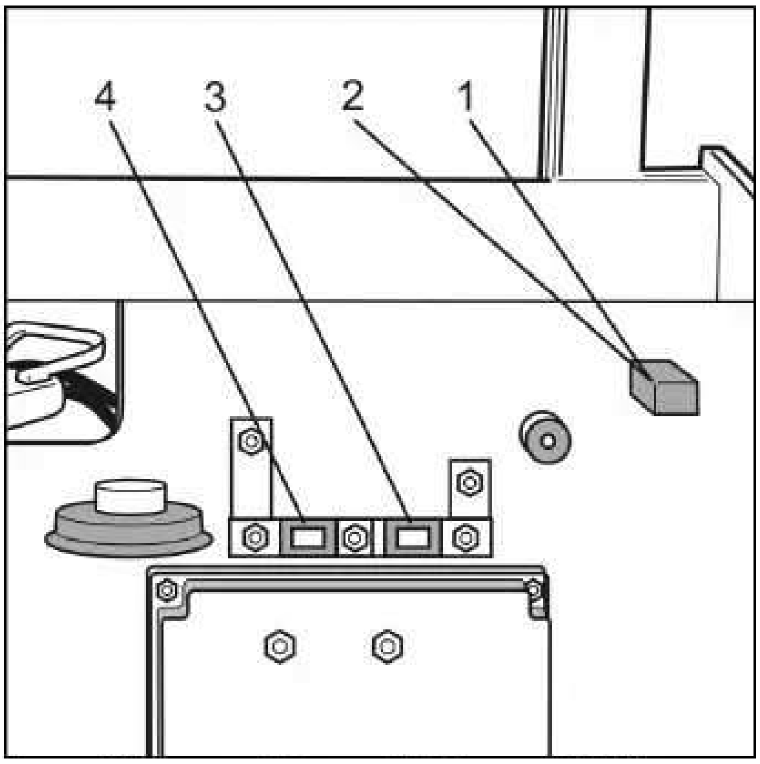

Fault Codes

In the event of technical faults, a code will appear in the display unit. Several of these faults may be due to missing or out-of-sequence operator actions, or simple problems that are easily corrected. Some of the fault codes are listed here. A more complete list of fault codes is contained in the service manual.

Code:	Description:	Response:	Cause:	Remedy:
In 01	Battery voltage too low	Truck malfunctioning possible	Battery discharged; Battery defective	Charge battery; Have battery checked or repaired
In 02 (or FE146)	Emergency stop switch engaged	Truck will not function	Emergency stop button pressed	Twist button briefly to release
In 14	Travel input missing or out-of-sequence	Loss of travel function	Foot pedal not pressed; Contact with hand grip missing	Release all controls, ensure foot pedal and hand grip sensor are activated before operating travel control
In 15	Out-of-sequence inputs at start-up	Truck will not function	Foot pedal pressed or other controls activated during start-up	Release foot pedal and any other controls briefly to clear fault
FE168	Battery retainer missing	Truck will not travel or limited to programmed speed	One or both of the battery retainers is not properly engaged in its slot	Ensure correct placement of battery retainers
FE2325	Lift/lower input missing or out-of-sequence	Loss of lift/lower function	Foot pedal not pressed; Contact with hand grip or steer knob missing	Release all controls, ensure foot pedal, steer knob sensor, and hand grip sensor are activated before operating lift/lower switch

5 Maintenance

Troubleshooting

Linde Material Handling Linde

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Linde Material Handling

Linde Material Handling North America Corp.

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