346 series Electric Forklift Truck

Linde Material Handling

Operating Instructions

Models E18, E20, E20P

346 series – 3468071040 rv07 US – 01/2015

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.

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Linde trucks are sold in North America by:

KION 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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1 Introduction

2 Safety

3 Overview

4 Operation

1

Introduction

Scope

This manual contains operating and periodic maintenance instructions as well as specifications for the industrial truck to which it applies. If this manual applies to a trailer or other towed equipment, then operation or maintenance of the towing vehicle is outside the scope of this manual. Important safety rules and descriptions of some operating 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 available at the time of printing. Special designs, special attachments, or other custom modifications carried out by the manufacturer 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 authorized dealers.

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

Obligations of the Equipment Owner

The Occupational Safety and Health Administration (O.S.H.A.) requires employers of industrial truck operators to adhere to a number of regulations regarding 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's (ANSI/ITSDF) B56 standards. The owner should be familiar with 29 CFR 1910.178 as well as the ANSI/ITSDF B56 standards. 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. This equipment meets all applicable requirements of the ANSI/ITSDF B56 standards 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 authorized dealer if the owner's intended application for a truck is inconsistent with the designated performance characteristics of that truck. KION North America Corporation 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. It is recommended that all replacement parts be of OEM (Original Equipment Manufacturer) origin.

Operator Responsibilities

It is the responsibility of the operator to operate any powered industrial truck in a safe manner. In order to do this, all operators must have completed training in the safe operation of powered industrial 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 truck.

In addition, all operators must be familiar with the specific 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 truck found to be damaged or malfunctioning.

Proper use

The truck is designed for lifting, transporting and stacking 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 personnel.

The truck may be operated outdoors or in buildings only on surfaces that are flat and stable. Transporting of loads (in the lowered position) on inclines and ramps is permitted if the incline surface is flat and stable. Lifting of loads or transport of elevated loads is prohibited on inclines and ramps. If the truck is operated on public roads it must be equipped with lights and any other devices as required by state or local law. 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.

Hazard 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.

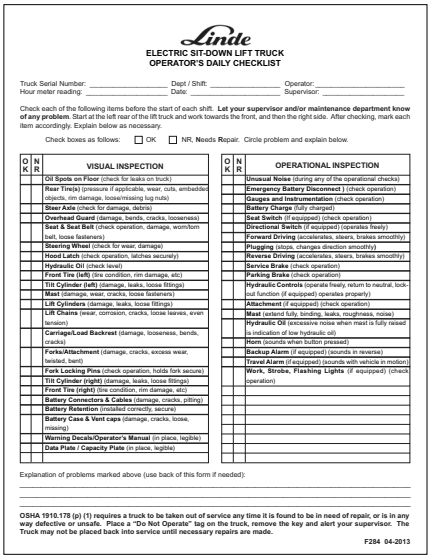
Do not remove, disable or modify any safeguards or other safety devices. These include any alarms, lights, mirrors, overhead guards, and load backrest extensions. If present, an overhead guard is intended to provide protection to the operator from falling objects, but cannot protect from every possible 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

ELECTRIC SIT-DOWN 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 left rear of the lift truck and work towards the front, and then the right side. 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)
		Rear Tire(s) (pressure if applicable, wear, cuts, embedded objects, rim damage, loose/missing lug nuts)
		Steer Axle (check for damage, debris)
		Overhead Guard (damage, bends, cracks, looseness)
		Seat & Seat Belt (check operation, damage, worn/torn belt, loose fasteners)
		Steering Wheel (check for wear, damage)
		Hood Latch (check operation, latches securely)
		Hydraulic Oil (check level)
		Front Tire (left) (tire condition, rim damage, etc)
		Tilt Cylinder (left) (damage, leaks, loose fittings)
		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)
		Tilt Cylinder (right) (damage, leaks, loose fittings)
		Front Tire (right) (tire condition, rim damage, etc)
		Battery Connectors & Cables (damage, cracks, pitting)
		Battery Retention (installed correctly, secure)
		Battery Case & Vent caps (damage, cracks, loose, missing)
		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)
		Seat Switch (If equipped) (check operation)
		Directional Switch (If equipped) (operates freely)
		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, lock-out function (if equipped) operates properly)
		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)
		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 being seated on the seat with the seat belt fastened and hands and feet inside the operator's compartment on or near the controls.

⚠ WARNING

Risk of injury!

Operate the truck only when you are in the normal operating position. Always keep hands and feet inside the operators 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 designated to lift personnel.

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.

110107_04

⚠ 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.

110107_05

Travel

The truck is designed for operation on smooth, dry surfaces such as warehouse and factory floors, loading docks or paved areas. 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 roadway 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, tilted back to cradle any load whenever possible.

Never begin travel before the mast is fully lowered and tilted into travel position. Never raise the mast during travel. 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.

When handling bulky loads that restrict your vision, operate the truck in reverse to improve visibility. 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.

Lifting and Lowering

Always ensure there is adequate overhead clearance before raising the forks. 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.

Use extreme care when maneuvering loads into or out of storage locations. Never turn the truck while maneuvering with the forks raised. Always check for mast or carriage hang-up before manueuvering out of any storage location with or without a load on the forks.

⚠ WARNING

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

Always raise the forks before you move. Watch for slack chain condition. Slack chains indicate that the mast or carriage is hung-up. Do not attempt to repair this yourself, always get a trained mechanic.

Inclines, Ramps, Docks, Elevators

If you must travel on an incline, do so with caution. Do not operate truck on a wet incline.

Keep the forks **upgrade** to maintain control when travelling up or down an incline with a **loaded** truck.

Keep the forks **downgrade** when travelling up or down an incline with an **empty** truck.

⚠ DANGER

Tip-over will occur if you turn while travelling on a ramp or travel at an angle other than straight up or straight down a ramp.

Never turn on an incline or ramp either loaded or unloaded. Travel straight up or straight down.

Be aware that when descending an incline your stopping distance will be greater than when on a level surface. Reduce your speed, and ensure that there is adequate clear space at the bottom of the ramp to stop and turn.

To avoid hazards associated with a dock, you should personally check that the trailer brakes have been applied, wheel chocks are in place, and that any trailer-to-dock locking systems are being utilized. The impact of moving in and out of a trailer may cause the trailer to creep or move. Confirm that the driver will not move the trailer until you are done.

Do not drive the truck onto an elevator without specific authorization. Verify that the capacity of the elevator exceeds the weight of the truck and the weight of the load. Approach elevators slowly and ensure that the elevator car is level with the floor before entering. Enter elevators squarely with the load end leading. Ensure that no part of the truck or load contacts any part of the elevator other than the floor. Once on the elevator, neutralize the truck controls, shut off the power, and set the brakes. Any

other personnel should leave the elevator before the truck is allowed to enter or leave.

Be especially cautious when driving the truck on ramps or bridge plates. Be sure to maintain a safe distance from each edge. Before driving the truck over a ramp or bridge plate, verify that its position is secured to prevent movement. Never exceed the rated capacity of a ramp or bridge plate.

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.
- Travel with the load or forks close to the ground and tilted back. 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 travel with mast extended.
- Never turn while travelling on a ramp or incline
- Never travel up or down an incline at an angle to the incline direction. Always travel straight up or straight down any ramp or incline.

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. Lateral tip-over can occur loaded or unloaded on a ramp. Longitudinal tip-over can occur with a combination of overloading and load elevated. This condition is even more likely with forward tilt, braking in forward travel, accelerating rearward or mast extended.

⚠ WARNING

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

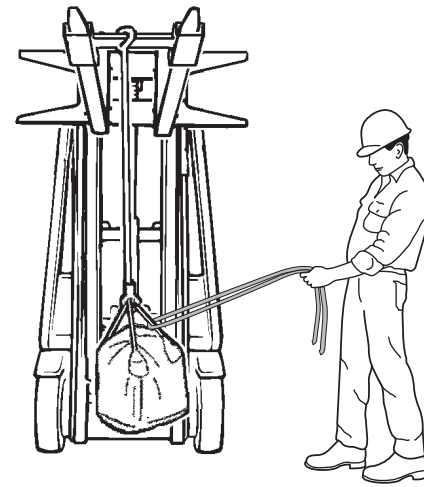
If the truck starts to tip over, DO NOT JUMP!

Stay in the seat, hold onto the steering wheel tightly, brace feet, and lean away from the direction of impact.

Suspended Loads

Traveling with suspended loads on cable or chain can induce swinging.

- Swinging of loads can cause truck tip over.
- Avoid suspending loads if possible.
- If necessary carry suspended loads low.
- Use a partner with a rope or tether to stop swinging.
- Operate truck slowly.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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.

⚠ 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.

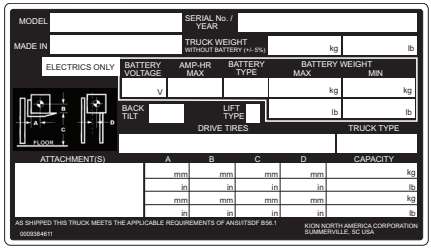
- ➢ When working with battery acid, always wear protective clothing and eye protection.
- ➢ Do not allow any acid to get onto clothing or skin or into the eyes; if this does happen, rinse immediately with plenty of clean water.
- ➢ In case of injury, seek medical advice immediately.
- ➢ Immediately rinse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

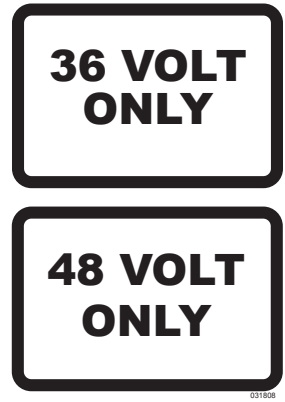
Never attempt to lift a load greater than the maximum capacity listed on this plate.

Parking brake warning decal

This decal reminds operators to engage the parking brake lever whenever it is necessary to set the parking brake as it is not automatically applied.

Voltage decal

These decals indicate the proper battery voltage for the trucks 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

SIT-DOWN RIDER TRUCK OPERATOR WARNINGS

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 truck only when you are in the normal operating position and seated in the operator's seat. Never place any part of your body into the mast structure, between the mast and the truck, or outside the truck. Do not carry passengers.
4. **PROTECT YOURSELF** - Do not operate truck without overhead guard.
5. **SEAT BELT** - MAKE SURE YOUR SEAT BELT 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 mast raised, lateral tipover also can occur by turning and/or braking when moving rearward, turning and/or accelerating forward or turning on an incline or ramp. TRAVEL WITH THE MAST LOWERED. The potential for lateral tipover will be further increased by overloading, excessive rearward tilt or off-center positioning of the load. Don't risk injury or death. Drive smart.
7. **LONGITUDINAL TIPOVER** - Can occur by driving with the load down slope on an incline or ramp, overloading, excessive forward tilt or aggressive braking when moving forward or accelerating rearward with the mast elevated. TRAVEL WITH THE MAST LOWERED. 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, or into potholes, or by impacting overhead obstacles or collision with other objects. Don't risk injury or death. Drive smart.
9. **DON'T JUMP OFF** - If your truck begins to tip over, DON'T JUMP. Hold the steering wheel tightly, brace feet, and lean away from tip. Stay in the seat to avoid being trapped between the truck and the ground.
10. **HIGH LOADS** - Do not handle loads which are higher than the load backrest or load backrest extension 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 avoid losing the load, striking bystanders, or tipping 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.
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** - Elevate forks or other lifting mechanism only to pick up or stack a load. Lift and lower with mast vertical or slightly back - NEVER FORWARD. Watch out for obstructions, especially overhead.
16. **MINIMUM TILT** - Operate tilting mechanism slowly and smoothly. Do not tilt forward when elevated except to pick up or deposit a load. When stacking use only enough backward tilt to stabilize load.
17. **EYES AHEAD** - Travel with load or lifting mechanism as low as possible and tilted back. Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with lifting mechanism trailing (except when climbing ramps).
18. **CARE ON RAMPS** - Use special care when operating on ramps, travel slowly, and do not angle or turn. When truck is loaded, travel with load uphill. When truck is empty, travel with lifting mechanism downhill.
19. **SLOW DOWN** - Observe applicable traffic regulations. Yield right-of-way to pedestrians. Slow down & sound horn at cross aisles and whenever vision is obstructed.
20. **WATCH PEOPLE** - Do not allow anyone to stand or pass under lifting mechanism, directly behind truck or within rear swing area when turning.
21. **WORK PLATFORMS** - DO NOT LIFT OR CARRY PERSONNEL USING THE FORKS OF THE TRUCK, not even with a work platform. The truck is de-signed for transporting, warehousing and stacking of material, not personnel.
22. **SHUT DOWN COMPLETELY** - Before getting off truck, neutralize travel control, fully lower lifting mechanism and set the parking brake. Shut off power when leaving truck unattended. Block wheels if truck is parked on an incline.
23. **ENGINE EXHAUST** on gas or diesel trucks contains carbon monoxide (CO). Exposure can cause severe injury or death.

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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.

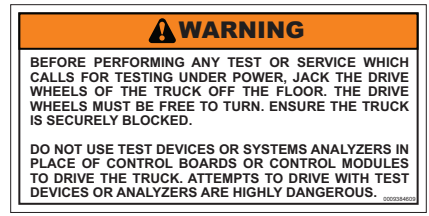
MISUSE OF THIS TRUCK COULD CAUSE INJURY TO YOURSELF OR OTHERS WORKING WITH YOU.

READ INSTRUCTIONS IN OPERATOR'S MANUAL.

0009384608

Test or service warning decal

This decal gives important safety information for personnel servicing or testing the truck.



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 personnel warning decal

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.

No step warning decal

This decal warns personnel of moving parts that are unsafe to step or stand upon.

Tip-over warning decal

This decal warns operators that tip-over accidents can be avoided by operating the truck as instructed in the operator's manual. Operators are reminded to fasten the seat belt to minimize the risk of injury if a tip-over does occur. This decal also reminds operators to slow down while turning to avoid tip-over. In case of tip-over, the decal instructs operators to stay in the seat, hold onto the steering wheel tightly, brace feet, and lean away from the direction of impact.

⚠ 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 the seat, hold onto the steering wheel tightly, brace feet, and lean away from the direction of impact.

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.

Hood latch warning decal

This decal warns operators to ensure that the hood latch is fully engaged before operating the truck.

3

Overview

Technical Description

General

The 346 series of forklifts are sit-down rider electric counterbalanced models (ITA class 1). They are designed for handling loads up to:

3500 lbs for E 18

4000 lbs for E 20 & E 20P

These capacities are nominal values and are based on a 600 mm load center. They may be downrated depending on mast height and/or attachments. Exact capacity limits for individual vehicles are found on the data plate.

Drive axle

The drive axle is comprised of two drive motors and two reduction gear units. Both motors and reduction gear units are oriented transversely on a common axis with the gear units to the outside of each motor. Disc brakes are incorporated into each reduction gear unit. A single hydraulic pump motor is positioned longitudinally between the drive motors. All three motors are integrated into the one-piece drive axle housing. Power modules for the drive and hydraulic pump motors are mounted directly to the housing. The power modules as well as the motors are cooled by three cooling fans which draw air over the top of the drive axle. Air is exhausted to the right by a fourth exhaust fan.

Drive motors

The drive motors are three-phase cage rotor AC asynchronous motors. Each stator consists of a four-pole stator core and winding assembly pressed into the axle housing as a unit. The motor housing forms the center of the drive axle. No brushes are used.

Hydraulic system

The hydraulic system utilizes fluid pressurized by a hydraulic pump driven by a brushless AC pump motor. The pump motor is integrated into the drive axle between the drive motors as described above. The pump is gravity fed from a fluid reservoir incorporated into the vehicle frame. Pressurized hydraulic fluid from the pump is routed to a priority valve which distributes flow between the steering system and working hydraulics based on demand. Working hydraulics are controlled by a three- or four-spool proportional hydraulic valve (depending on options) which diverts fluid to power a given hydraulic function when selected by the operator via controls mounted on the armrest. This system enhances smoothness and precision and also allows programmable control over hydraulic function characteristics.

Steering system

The rear-wheel steering system is hydraulically operated and controls the rear wheel angle through a hydraulic cylinder mounted to the steering axle assembly. Positioning of the cylinder is based on steering wheel movement which actuates a proportional valve at the base of the steering column. A steer angle sensor is mounted on the steering axle to signal the main control unit to reduce speed of the inside drive motor during turns.

Brake system

Electrical and mechanical forms of braking are both present. Electric braking utilizes a regenerative feature that activates whenever the travel pedal is released. This provides faster deceleration than simple coasting and puts energy back into the battery that would otherwise be wasted. More severe slowing through regeneration becomes available by depressing the travel pedal that opposes the direction in which the truck is travelling (or reversing the directional switch on optional single-pedal trucks). This also occurs whenever the foot brake pedal is depressed thereby providing deceleration to supplement the mechanical brake. The degree of deceleration from the regenerative braking function is adjustable through system programming.

Mechanical braking is accomplished through two wet-running multi-disc brake assemblies incorporated into each reduction gear assembly. These brakes are spring activated and hydraulically released. The system is actuated through a foot pedal and parking brake handle, both of which are connected to a brake valve that controls system pressure. Whenever the truck is switched on, the hydraulic system is pressurized and the brake springs are opposed to release the brake. If the brake pedal is pressed, the hydraulic pressure is reduced by a brake valve in proportion to the amount of pedal movement allowing the brake springs to extend and provide corresponding braking force. When the parking brake is applied (or the pedal fully depressed), the brake valve reduces the pressure completely, allowing full braking force.

Masts

Four styles of masts are available with varying height capabilities - simple, dual, triple, and quad.

The simple mast consists of an inner and outer upright and a fork carriage. A pair of lift cylinders raises and lowers the inner upright during lifting and lowering. Lift chains attached to the fork carriage and anchored to the stationary outer upright are routed over pulleys on the inner upright to raise the carriage. This arrangement results in a telescopic relationship between the carriage and mast uprights.

The dual mast maintains the inner and outer uprights of the simple mast. The carriage chains however are anchored to the inner upright and routed over an additional lift cylinder dedicated to raising and lowering the fork carriage only. Hydraulic fluid does not power the mast lift cylinders until the free lift cylinder has reached maximum extension. This establishes a free-lift function that allows the fork carriage to move independently to the top of the uprights before they begin to move. Once the uprights begin to move, the carriage remains at the tip of the inner upright throughout the remainder of the lift range. The free-lift function allows lifting through the lower part of the lift range in areas where overhead clearance is limited (such as trailers).

The triple mast maintains the inner and outer uprights of the simple and double masts, but has an intermediate upright added for additional height range. An additional pair of lift cylinders raises and lowers the intermediate upright in the same telescopic relationship to the other uprights as with the simple and double masts. Like the dual mast, the carriage chains are anchored to the inner upright and routed over an additional lift cylinder for a free-lift function.

The quad mast contains four uprights for greater height capabilities as well as the free lift function for the fork carriage. The uprights are operated with one pair of lift cylinders and two lift chain pairs so that they rise and descend simultaneously in a telescopic relationship to each other.

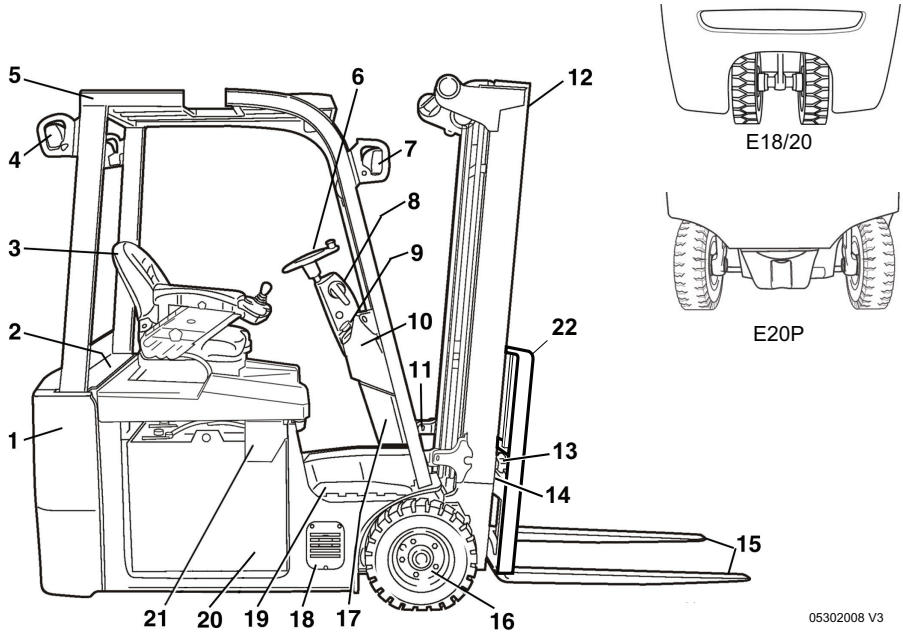
Electrical system

The 346 is available with a 36- or 48-volt electrical system. The hydraulic pump motor and drive motors are both brushless AC motors. Both drive motors are powered through a dedicated power module. A second power module is dedicated to the hydraulic pump motor. Both power modules regulate current to the motors based on input from a main control unit. The main control unit processes signals from sensors, interlocks, and operator contrls and generates the appropriate release and speed signals to the power modules through a CAN bus circuit. A second CAN bus circuit connects the main control unit to the operator display unit as well as a computer connection port. By connecting a laptop computer to this port, vehicle parameters can be set and diagnostic operations performed. A voltage transformer is also present to provide stabilized low voltage as control or reference signals or working power to various devices and sensors.

The main control unit, transformer, and control fuses are located in the upper portion of the counterweight. The power modules are both

mounted to the drive axle housing to receive air flow from the cooling fans. The main contactor and main power fuses are contained in a housing beneath the right side of the dash panel.

Truck Components

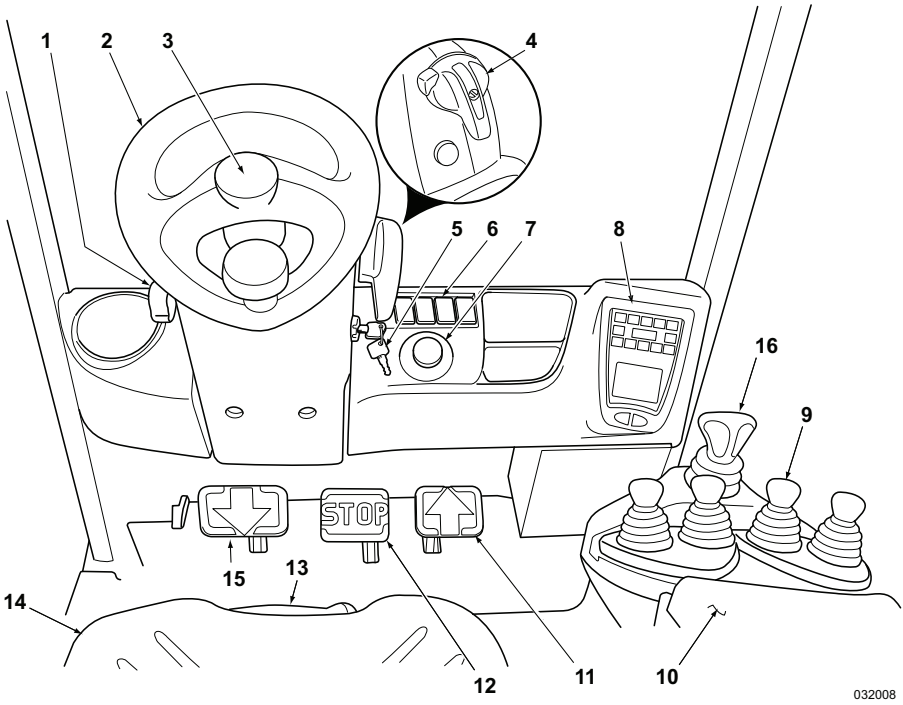


E18/20

E20P

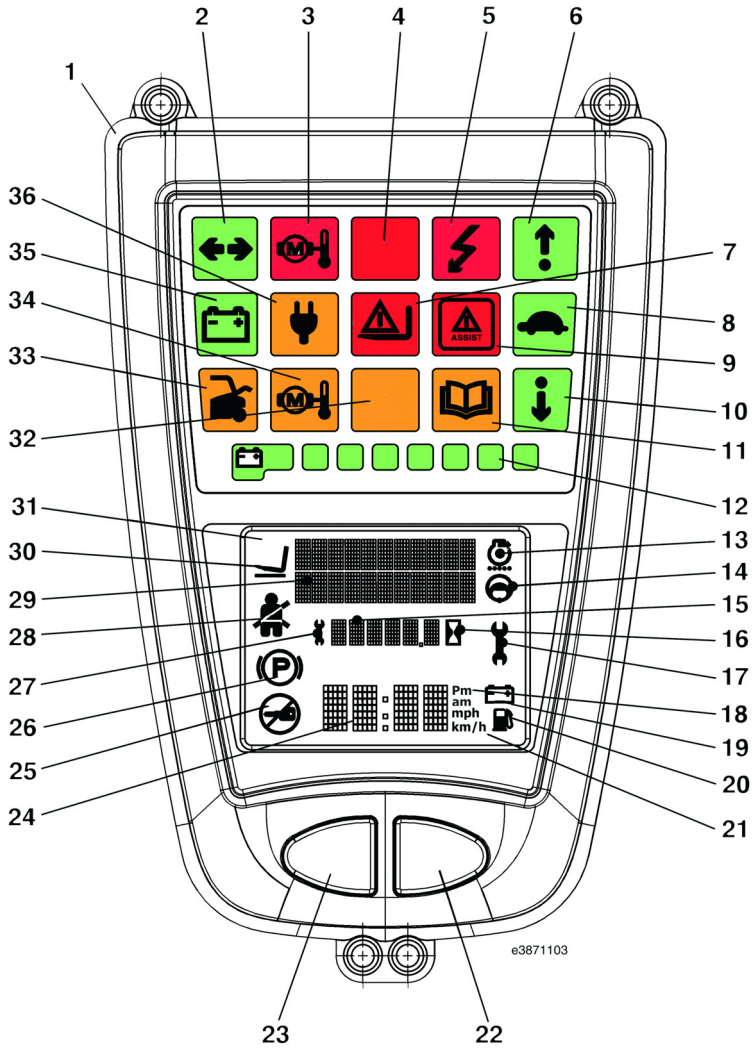
1	Counterweight	10	Indicator unit
2	Housing for relays and control fuses	11	Tilt cylinders
3	Driver's seat with armrest and operating lever	12	Lift mast
4	Rear working headlights (optional equipment)	13	Fork arm catch
5	Overhead guard	14	Fork carriage
6	Steering wheel	15	Fork arms
7	Front working headlights (direction of travel)	16	Right wheel gear
8	Steering column with parking brake and key switch	17	Contactor board with main current fuses
9	Truck console with emergency stop switch and switch panel	18	Cooling air exhaust fan
		19	Step
		20	Battery
		21	Battery retainer
		22	Load backrest extension

Controls



1	Steering column tilt adjusting knob	10	Armrest on driver's seat
2	Steering wheel	11	Forward travel accelerator pedal
3	Horn button	12	Brake pedal
4	Parking brake handle	13	Operating lever for setting driver's weight
5	Key switch	14	Driver's seat with seat switch
6	Keypad / lighting switch	15	Reverse travel accelerator pedal (dual pedal trucks only)
7	Emergency stop switch		
8	Indicator unit	16	Directional switch (single pedal trucks only)
9	Actuating levers (joystick) for working hydraulics (various configurations available)		

Indicator Unit



1	Indicator unit	6	Direction of travel forwards with single-pedal trucks (green)
2	Not used	7	Not used
3	Motor temperature at upper limit (red)	8	Not used
4	Not used	9	Not used
5	Error in electronic control (red)		

10 Direction of travel backwards with single-pedal trucks (green)
11 Consult operator manual (yellow)
12 Battery discharge indicator (green/red)
13 Not used
14 Steering position indicator active
15 Operating hours display
16 Hour meter active
17 Service interval exceeded
18 Clock (am / pm) display
19 Not used
20 Not used
21 Speed display (km/h / mph)
22 Function button
23 Reset button
24 Clock / speed display
25 Not used
26 Parking brake activated
27 Operating hours until next service
28 Not used
29 Steer angle indication and fault code display
30 Tilt memory symbol (optional equipment)
31 LCD display
32 Hydraulic depressurization system indicator (optional equipment)
33 Not used
34 Motor temperature raised (yellow)
35 Not used
36 Not used

Older trucks may have indicator units with slightly different appearance. Functionality is the same however.

The indicator unit is located at the right side of the dash panel. It is positioned within the driver's field of vision and provides information about all functions of the vehicle. After the key switch has been switched on, a self-test of the indicator unit is then performed. During the self-test all indicator lights and the LCD indicators are activated.

(2) Not used

(3) Indicator light for motor temperature at upper limit (red)

Lights up when the permissible temperature limit is reached by a motor. The text display shows an error code that allows the relevant motor to be identified.

When the permissible temperature limit is reached, the warning buzzer incorporated within the indicator unit is also activated.

(4) Not used

(5) Indicator light for error in electronic controller (red)

Lights up if malfunctions occur in the electrical controller. An error code is displayed in the text field (29) at the same time.

(6) Indicator light for forwards motion selected with single-pedal vehicles (green)

Lights up when forwards motion is selected using the direction selector switch with single-pedal vehicles.

(7) Not used

(8) Not used

(9) Not used

(10) Indicator light for reverse motion selected with single-pedal vehicles (green)

Lights up when reverse motion is selected using the direction selector switch with single-pedal vehicles.

(11) Indicator light - consult operator manual (yellow)

Lights up if a fault for which an operator could be responsible (such as incorrect static-return-to-neutral sequence) occurs, and shows an error code in the text field (29).

(12) Battery discharge indicator (LED bar display)

Shows the current charge state of the battery.

The discharge status of the battery is shown by an LED bar display in the indicator unit. The 7 green LEDs go out successively as the battery becomes increasingly discharged. Once the battery is 80% discharged the red LED with the battery symbol lights up. As the

battery discharges further (battery capacity < 20%),the red LED flashes.

(13) Not used

(14) Symbol for steering position indicator

Indicates signal from steer axle sensor is present. Should light whenever key is switched on.

The second line of the display (29) then shows the steering angle as a moving bar.

(15) Operating hours display

Shows the operating hours of the forklift truck. This indicator is evidence of the forklift truck's operating time and of the inspection and maintenance work to be performed.

When the ignition is first switched on, this display will briefly show hours remaining until the next service interval (see item 27).

(16) Symbol for operating hours meter active

The operating hours of the vehicle are shown in the display (15). The operating hours meter symbol (16) flashes and the operating hours are counted when the vehicle switched on and the seat switch is activated.

(17) Service interval exceeded symbol

If the number of operating hours until the next service is less than or equal to 0, the symbol flashes for 10 seconds every time the vehicle is started, and then lights up continuously.

The intervals must be adjusted and reset using the diagnostic software. Contact your authorized dealer if necessary.

(18) Symbol for clock display (am/pm)

(19) Not used

(20) Not used

(21) Symbol for speed display (km/h/mph)

(22) Function button

Toggles the information shown in display (24). Indicators 18 (time), 19 (unused) or 21 (speed) will light with each successive touch of the button to identify the information on display.

Also used to adjust the time display and for scrolling through fault codes.

(23) Reset button

Used to silence the warning alarm. Also used to confirm the time setting after adjustment or to scroll through fault codes.

(24) Clock / speed display

Displays time in 24-hour format or truck speed as selected with function button (22). The time setting is adjustable using buttons (22) and (23). (Refer to chapter 4.)

The clock display can be changed to a 12-hour format using the diagnostic software.

(25) Not used

(26) Symbol for parking brake

Lights when the parking brake is applied.

(27) Symbol for operating hours until next service

After the key switch is turned on, symbol (27) lights and display field (15) shows the operating hours until the next service (counting backwards).

After 5 seconds symbol (27) goes out and the display (15) automatically switches to the operating hours of the truck. The operating hours symbol (16) flashes.

(28) Not used

(29) Steering position indicator/fault code display

During normal operation (item 14 lit) this display shows a graphic representation of steering angle. If fault codes occur, they will be displayed here also.

The sequence in which fault codes are displayed depends on the code letter prefix (see table) and on the sequence in which faults are sent from the control unit.

If more faults have occurred than can be shown in the text field, buttons (22 and 23) must be used for scrolling. When the "〈" symbol is displayed in the text field, the left push button is used for scrolling to the left and

when the " 〉 " symbol is displayed, the right push button is used for scrolling to the right.

Fault code display priority: T before L before S before D etc according to table below.

T	Traction
L	Lifting
S	Steering
C	(codes not used)
D	Display
R	Recorder or data logger (option)
X, Y, Z	Custom options

(30) Tilt memory symbol

Lights when the optional tilt memory function is activated.

(31) LCD display

(32) Hydraulic depressurization system indicator (yellow)

(33) Not used

This lens will flash yellow when the optional hydraulic depressurization system is activated.

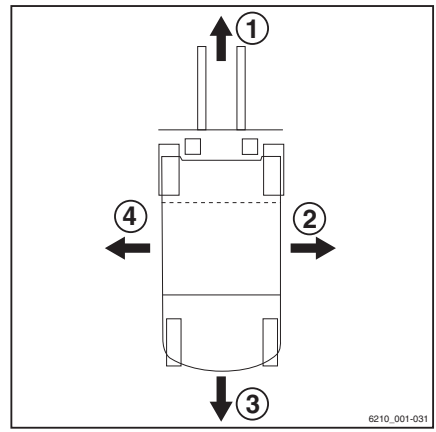
(34) Indicator light for motor temperature high (yellow)

Lights up when the temperature of a motor is raised.

(35) Not used

(36) Not used

Definition of directions

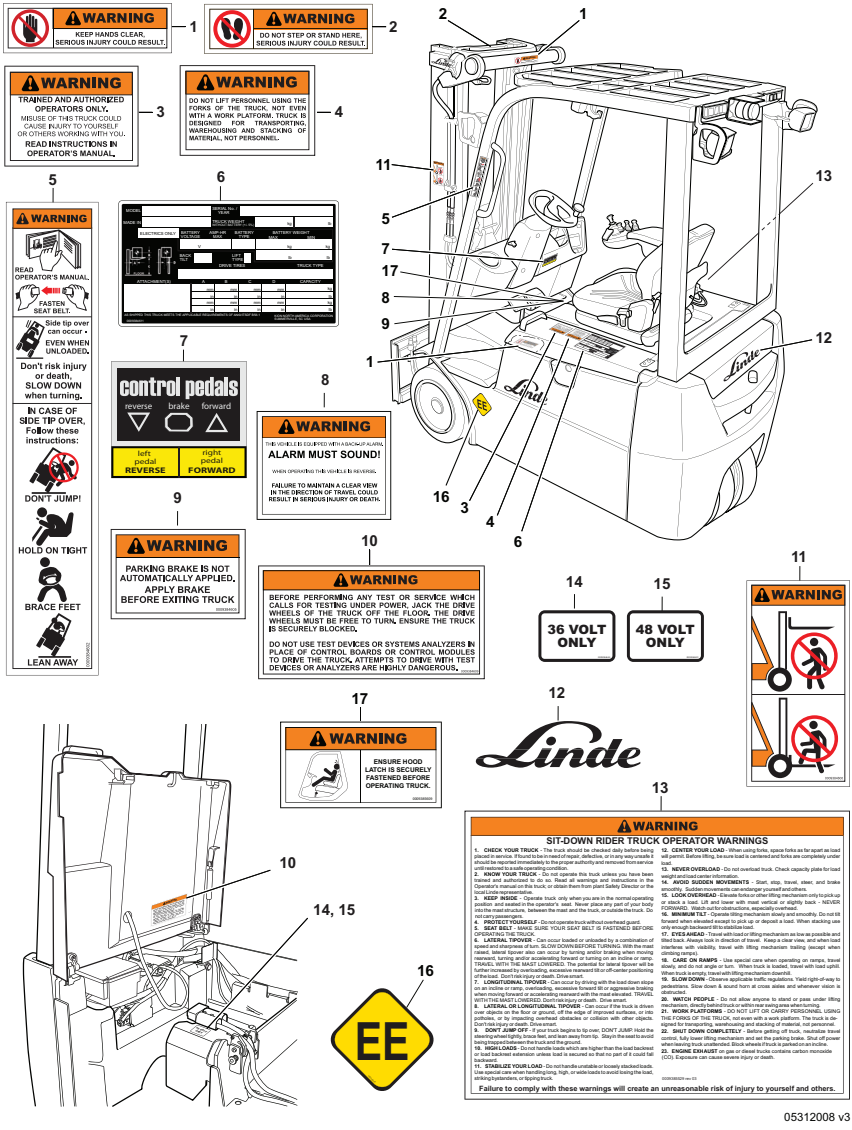


(1)	Forwards
(2)	Right
(3)	Backwards
(4)	Left

Directions as seen from the driving position; the load is at the front.

Vehicle Marking

Decal and Data Plate Location



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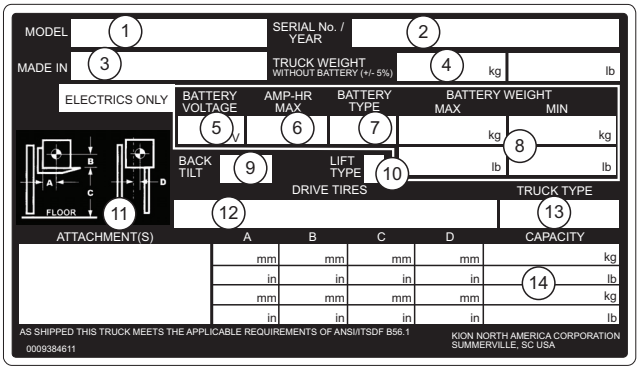
1 Warning Decal, Crushed Fingers
2 Warning Decal, No Step
3 Warning Decal, Trained & Authorized Operator
4 Warning Decal, Do Not Lift Personnel
5 Warning Decal, Tip-Over, Sit-Down Rider Truck
6 Data Plate
7 Decal, Control Pedals, Dual Pedal Only
8 Warning Decal, Back-Up Alarm
9 Warning Decal, Parking Brake
10 Warning Decal, Service Work
11 Warning Decal, Personnel/Forks
12 Decal, Linde
13 Warning Decal, Sit-Down Rider
14 Decal, 36 Volt (depending on model)
15 Decal, 48 Volt (depending on model)
16 Decal, "EE" (only on trucks equipped with optional EE rated protection for hazardous environments)
17 Decal, Hood latch warning

Data Plate



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

(2) **SERIAL No./Year** – shows the serial number and year of manufacture 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) **AMP-HR MAX** – (electric trucks only) – shows the maximum current capacity in amp-hrs for any battery to be used in the truck.

(7) **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.

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

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

(10) **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

(11) **(Diagram)** – illustrates the dimensions A, B, C, and D used in CAPACITY chart (14).

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

(13) **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.

(14) **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.

Variants and Options

Mast variants

- Simple
- Double
- Triple
- Quad

Attachments

- Integral sideshifter
- Hang-on sideshifter
- 3rd and 4th function valves
- 3rd and 4th function reeving
- Quick-disconnect reeving termination

NOTE

Aftermarket attachments not manufactured by Linde may be fitted per customer requirements. Operation of such attachments is outside the scope of this manual. Refer to documentation supplied by the attachment manufacturer.

System options

- Single pedal travel control
- Back-up alarm
- Lighting system (various optional versions)
- Keyless power switch

Chassis Options

- Solid, cushion, or non-marking tires
- Battery rollers
- Battery slides
- Battery compartment side covers
- Anti-static strap (included with non-marking tires)
- Low-profile overhead guard
- Drive-in rack overhead guard

Cabin Options

- Cloth seat
- Adjustable headrest, adjustable lumbar support, heated seat
- Mirrors
- Operator fan

Operating Environment Options

- Cold storage package (special lubricants)
- Explosive environment package (EE designation)

4

Operation

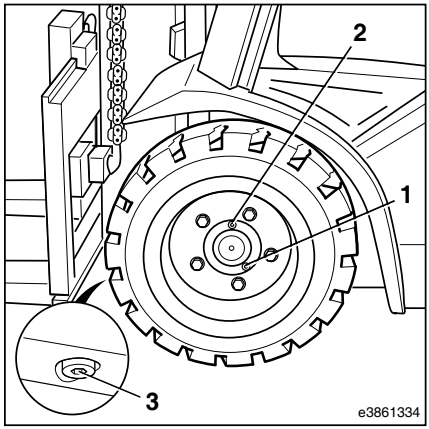
Unloading and Preparing a New Truck for Operation

When unloading a new truck, it may be necessary or desirable to tow the truck before a battery is installed. In this case, the hydraulic brake system must be manually pressurized to release the brakes and allow the truck to roll. See "Towing the Truck".

Before placing a new truck into service, perform the Daily Maintenance Inspection as found in the Maintenance section. Also check the oil level in the final drive gear units as follows:

- Park the truck in such a way that the checking screw (1) is at the 5 o'clock position and the filling screw (2) is positioned above.
- Apply parking brake and switch off truck.
- Clean the area around checking screw (1).
- Unscrew the checking screw (1).

The oil level must reach the lower edge of the checking screw hole. If necessary, top up with gear lubricant.



⚠ CAUTION

Overfilling will cause overheating and result in drive unit damage.

Do not overfill the final drive units.

- Screw the checking screw (1) back in and tighten to 15 ft-lbs (20 Nm).

NOTE

Item (3) is a drain screw located on the bottom of each final drive unit. It is not used during the level check.

The forklift truck can then be operated at full speed immediately upon being placed in service. However, during the first 50 operating hours, avoid subjecting the drive motors or hydraulic system to high continuous loads.

⚠ 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.

Adjusting the Operator's Seat

⚠ WARNING

Adjusting the seat while driving can result in an accident due to loss of control.

Do not adjust the seat during operation.

Adjusting seat position

⚠ CAUTION

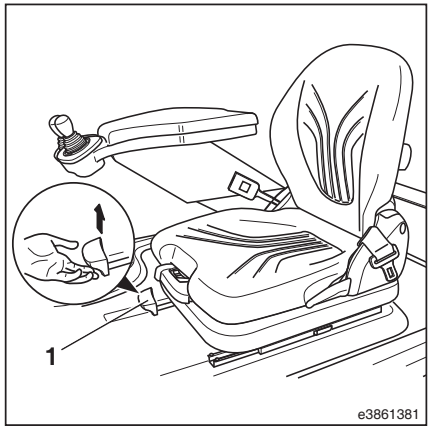
There is a risk of pinching if the lever is grasped fully.

Only grasp the lever by the trough provided for this purpose.

➢ Pull lever (1) up. ▷

➢ Move the seat on the slide rails backwards or forwards to give the operator the best position in relation to the steering wheel and the accelerator pedals.

➢ Allow lever (1) to snap back into place.



Adjusting seat suspension

NOTE

This adjustment depends on the individual operator's weight. Therefore this adjustment must be made with the operator sitting in the seat.

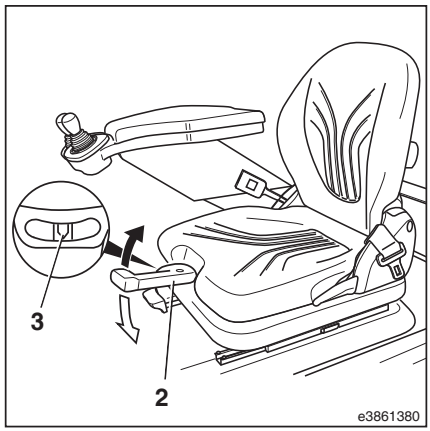
➢ Sit on the operator seat and pull out lever (2). ▷

➢ Pump the lever to adjust the seat suspension.

Pumping the lever (2) upwards adjusts the suspension to accommodate more weight.

Pumping the lever (2) downwards adjusts it for less weight.

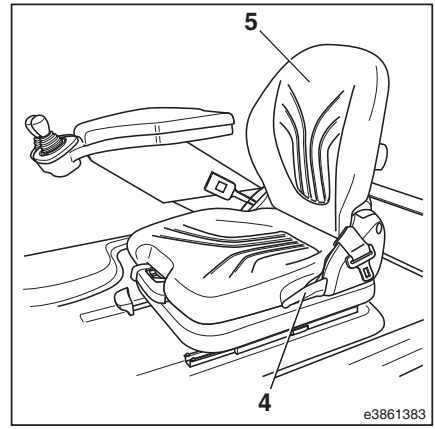
The seat suspension is correctly adjusted to the operator's weight when the arrow(3) is in the middle of the viewing lens.



Adjusting seat back

- ➢ Lift lever (4) and hold.
- ➢ Move the seat back (5) forward and back until a comfortable sitting position is found.
- ➢ Release lever (4) and allow seat back (5) to snap into the appropriate position.

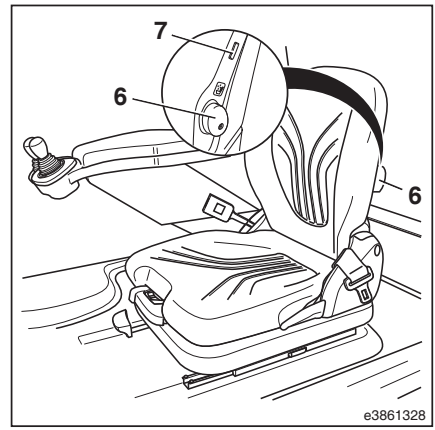
▷



Adjusting lumbar support (optional equipment)

- ➢ Rotate the knob (6) to the left or right to adjust the lumbar support as required.

▷



NOTE

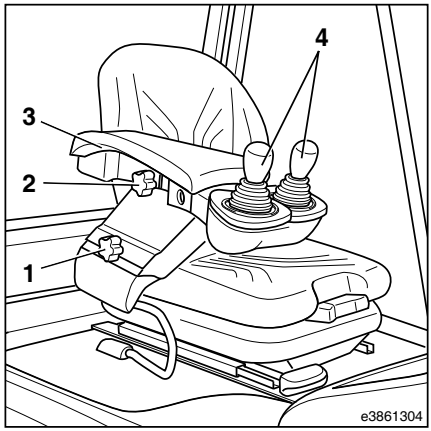
Take note of the symbol label affixed to the rear of the seat back.

Adjusting armrest

NOTE

The armrest is automatically pushed up by spring pressure after the locking screw (1) is released.

- Sit down on the seat and release the locking screw (1).
- Push the armrest (3) down against the spring pressure until a comfortable position for the arm is found.
- Tighten locking screw (1).
- Release the locking screw (2) and move the armrest (3) backwards or forwards until the actuating levers (4) are easily accessible.
- Tighten locking screw (2).

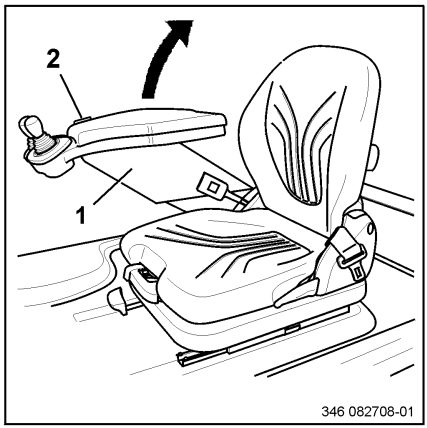


Tilt-away armrest (optional equipment)

This option is designed to allow the armrest to swing up so an operator can enter or exit the truck from the right side. To raise or lower the armrest, simply grasp the handle (2) and pivot it up out of the way or back into position. A limit switch in the mechanism requires that the armrest be fully lowered before the truck will operate.

NOTE

A gas spring cylinder provides an assisting force for the raising and lowering motions.



Swivel seat (optional equipment)

A swivel seat is present on trucks equipped with a narrow overhead guard for drive-in racking. The seat must be swivelled to the right 90 degrees whenever the battery cover is opened in order for the seat to clear the overhead guard.

- ➢ Lift the armrest up (1).
- ➢ Move the seat fully forward (2).
- ➢ Pull the swivel mechanism release chain (3).
- ➢ Begin rotating the seat to the right (4) and release the chain. Rotate the seat fully to the right until it locks into the rotated position.

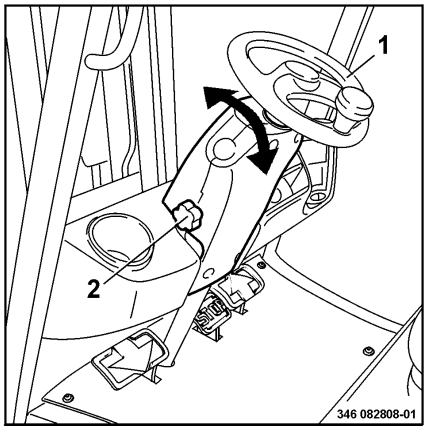
The battery cover may now be opened. To return the seat to the straight-ahead position, pull the chain again and rotate the seat. Ensure that the mechanism locks into the straight ahead position.

NOTE

The truck will not operate unless the swivel seat is locked back into the straight-ahead position.

▷

Steering column tilt angle adjustment



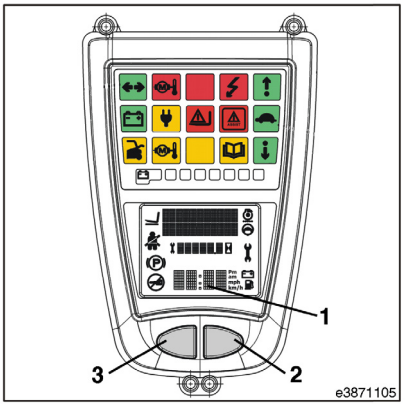
⚠ WARNING

Driving with the tilt angle locking knob loose can cause a collision due to loss of control.

Adjust the steering column tilt angle only when the vehicle is stationary.

- ➢ Loosen the locking knob (2) by turning it counter-clockwise.
- ➢ Move the steering wheel (1) into the desired position.
- ➢ Tighten the locking knob by turning it clockwise.

Setting the Clock Display



NOTE

Time display is set to 24-hour format at the factory. It can be changed to 12-hour format using Linde Pathfinder diagnostic software and a notebook computer.

- ➢ Press the two buttons (2) and (3) simultaneously for 3 seconds.

The hours portion of the time display (1) flashes.

NOTE

The hours and minutes can be adjusted slowly by repeatedly pressing button (2) or quickly by holding it down.

- ➢ Press button (2) to adjust hours.
- ➢ Press button (3) to confirm the hour setting.

The minutes portion of the display now flashes.

- ➢ Press button (2) to adjust minutes.
- ➢ Press button (3) to confirm the minute setting.

Seat Belt

⚠ WARNING

Failure to properly wear the seat belt can result in death or serious injury in the event of an accident.

Always wear the seat belt when operating the truck.

⚠ WARNING

A malfunctioning or damaged seat belt can result in death or serious injury in the event of an accident.

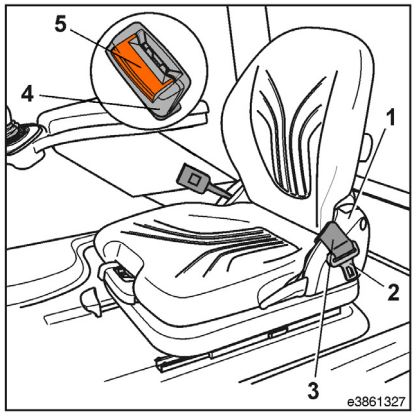
Ensure that the belt always operates correctly. It must not become twisted, trapped or tangled up. The catch and belt retractor must be protected from dirt, damage, or foreign objects. A damaged or frayed seat belt must be repaired or replaced before operating the truck.

The automatic locking mechanism will prevent the belt from being pulled out of the retractor whenever the truck is on a steep slope. To release the locking mechanism, carefully move the truck so that it is no longer positioned at an angle.

While using the vehicle (e.g. driving, operating lift mast etc.), adopt a sitting position as far back as possible so that the driver's back rests against the seat back. The automatic locking mechanism of the belt retractor offers sufficient freedom of movement on the seat for normal use of the fork-lift truck.

Fastening the seat belt

▷



- ➢ Pull the seat belt (3) smoothly from the retractor on the left.
- ➢ Position belt over lap, not over stomach.
- ➢ Ensure that buckle (2) snaps into place in the receiver (4).
- ➢ Check seat belt tension.

Belt must fit close to the body.

Releasing the seat belt

- ➢ While holding the buckle, press red key (5) on the receiver(4).
- ➢ Hold onto the buckle (2) and slowly allow it to retract into the seat (1). Do not allow

the buckle to snap uncontrolled against the retractor housing.

NOTE

If the belt snaps rapidly into the retractor housing, the automatic locking mechanism may lock the belt with the buckle against the housing. This will prevent the belt from being pulled out with normal force. To free the belt, pull it strenuously until slight movement is detected, then release it slowly. This should unlock the belt and allow it to be withdrawn normally from the retractor housing.

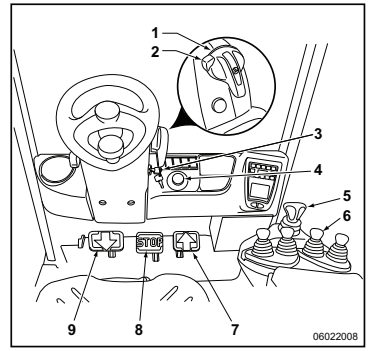
Turning the Truck On and Off

Switching the truck on

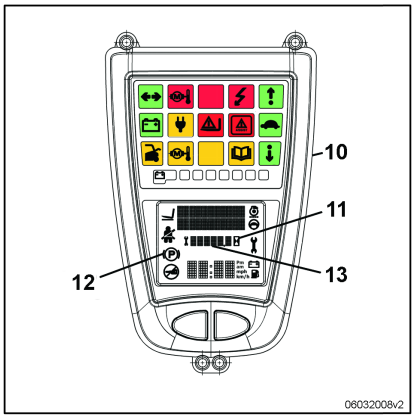
The hydraulic control levers (6) and accelerator pedal(s) (7 and 9) must remain in the neutral, released position throughout the startup sequence. For single pedal trucks, the direction selector (5) must be in neutral.

- Sit on the operator seat.
- Fasten the seat belt.
- Press the brake pedal (8).
- Pull out the emergency stop switch (4).
- Insert the key in the key switch (3) and turn it clockwise.

The electrical system is switched on.



➢ Check indicator unit (10).



NOTE

After the key switch has been switched on, the indicator unit (10) performs a self-test. All indicators light up for approximately 4 seconds, and the operating hours (13) are shown on the indicator unit. The symbol (11) flashes, and the hour meter (13) is in service. All indicator lights are extinguished on the indicator unit (10) after approximately 4 seconds (except for the parking brake light (12) which will turn on or off with parking brake use).

NOTE

The hydraulic control levers and accelerator pedals must remain in the neutral or released position until all indicator lights (except 12) extinguish. For single pedal trucks, the direction selector must be in neutral. Otherwise the startup self-test will be interrupted, a fault code displayed, and the truck will have to be restarted. To restart, switch off and on again with the key switch.

➢ Release the parking brake by pressing the release button (2) on the parking brake handle (1) and allowing the handle to release counter-clockwise. Verify that indicator light (12) is extinguished.

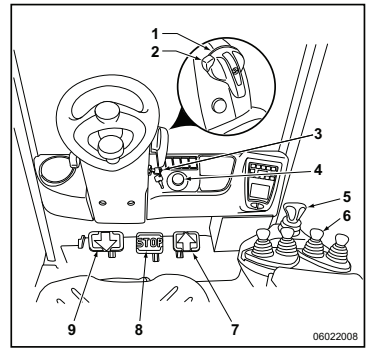
NOTE

Make sure to press the brake pedal (8) whenever releasing or applying the parking brake. This will reduce the force necessary at the handle and avoid excessive wear on the parking brake mechanism.

The truck is now ready for use.

Switching the truck off

- Take your feet off accelerator pedal(s) (7 and 9).
- Press the brake pedal.
- Turn the key (3) counter-clockwise to the off position.
- Turn the parking brake handle (1) clockwise to engage the parking brake.



NOTE

Make sure to press the brake pedal (8) whenever releasing or applying the parking brake. This will reduce the force necessary at the handle and avoid excessive wear on the parking brake mechanism.

- When leaving the vehicle, remove the key from the key switch (3).

Driving (single-pedal operation)

⚠ 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.

NOTE

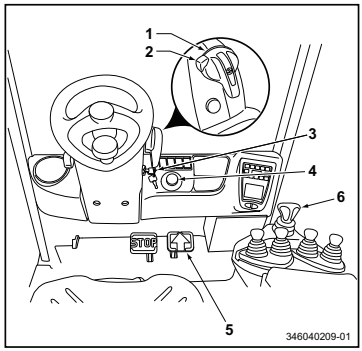
The operator's weight must remain on the seat while driving or the truck will shut off.

➢ Switch the truck on with the key switch (3). See "Turning the truck on and off" if necessary.

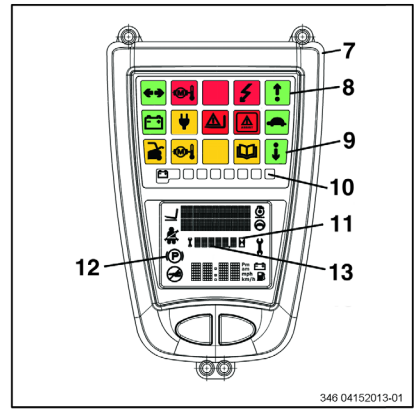
NOTE

The hydraulic control levers and/or accelerator pedals should not be used until the lights on the indicator unit are extinguished (except for the parking brake light (12) which will turn on or off with parking brake use). Otherwise the startup self-test will be interrupted, a fault code displayed, and the truck will have to be restarted. To restart, switch off and on again with the key switch.

➢ Slightly raise fork arms and tilt lift mast back.



➢ Ensure that the parking brake is released. If not, release the parking brake by pressing the release button (2) on the brake lever (1) and allowing the lever to release counter-clockwise. Verify that indicator light (12) is extinguished. ▷



Forward motion

➢ Move the directional lever (6) forwards.

➢ Carefully press accelerator pedal (5).

Control light (8) lights up.

The driving speed of the forklift truck increases the further the pedal is pressed down.

NOTE

The maximum acceleration rate is set by the main control unit. Pressing the accelerator pedal down hard will not increase acceleration.

If the pedal is released, the electric braking function will automatically slow the truck.

⚠ WARNING

If the emergency stop button (4) is pressed, the electric brake will not function.

The truck can then only be slowed with the brake pedal.

Reverse motion

➢ Move the directional lever (6) backwards.

➢ Carefully press accelerator pedal (5).

Indicator light (9) lights up.

Control of speed and braking in reverse is the same as for forward motion.

Changing direction

➢ Move the directional lever (6) to the opposite direction of travel. It is not necessary to release the accelerator pedal to change direction.

The truck will be electrically braked until stationary. If the accelerator pedal was not released, the truck will then accelerate in the new direction.

Driving (two-pedal operation)

⚠ WARNING

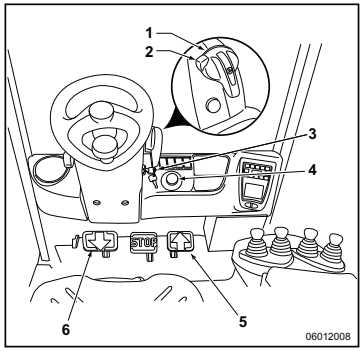
Operators must be familiar with all safety procedures that apply to forklift operation before driving.

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

NOTE

The operator's weight must remain on the seat while driving or the truck will shut off.

➢ Switch the truck on with the key switch (3). See "Turning the truck on and off" if necessary.

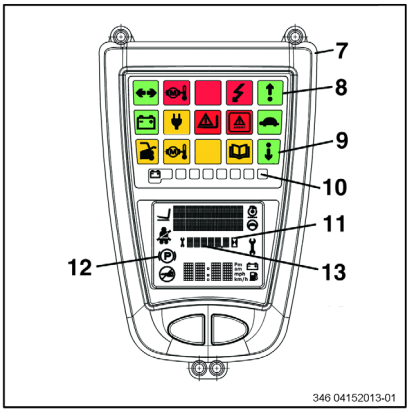


NOTE

The hydraulic control levers and/or accelerator pedals should not be used until the lights on the indicator unit are extinguished (except for the parking brake light (12) which will turn on or off with parking brake use). Otherwise the startup self-test will be interrupted, a fault code displayed, and the truck will have to be restarted. To restart, switch off and on again with the key switch.

➢ Slightly raise fork arms and tilt lift mast back.

➢ Ensure that the parking brake is released. If not, release the parking brake by pressing the release button (2) on the brake lever (1) and allowing the lever to release counterclockwise. Verify that indicator light (12) is extinguished.



Forward motion

➢ Carefully press the right-hand accelerator pedal (5).

Indicator light (8) lights up.

The driving speed of the truck increases the further the pedal is pressed down.

NOTE

The maximum acceleration rate is set by the main control unit. Pressing the accelerator pedal down hard will not increase acceleration.

If the pedal is released, the electric braking function will automatically slow the truck.

⚠ WARNING

If the emergency stop button (4) is pressed, the electric brake will not function.

The truck can then only be slowed with the brake pedal.

Reverse motion

➢ Carefully press the left-hand accelerator pedal (6).

Indicator light (9) lights up.

Control of speed and braking in reverse is the same as for forward motion.

Changing direction

➢ Release the accelerator pedal that is pressed.

➢ Press the other accelerator pedal (for the opposite direction of travel).

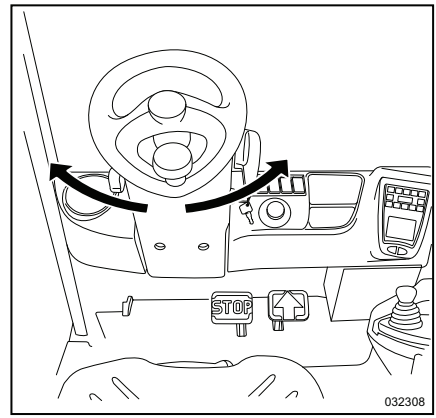
The truck will be electrically braked until stationary and then accelerated in the new direction.

➢ Both feet should remain on the accelerator pedals so that the truck is easily controlled throughout operation.

Steering System

Turning the steering wheel will steer the truck via the rear wheels.

➢ Turn the steering wheel clockwise to turn the truck to the right. Turn the steering wheel counter-clockwise to turn the truck to the left.



Braking

The truck has electric braking built in to the motor control equipment and mechanical braking through brake discs in the gear drive units. Electric braking is controlled by the position of the accelerator pedal(s). On single pedal trucks, the position of the directional lever also affects electric braking. The mechanical brake is controlled by the brake pedal or parking brake handle.

Electric braking

There are two modes of electric braking. The first mode activates when the truck is in motion and the accelerator pedal is simply released to the neutral position as if coasting. The second mode activates when, after the accelerator pedal is released, the opposing accelerator pedal is pressed. (On single pedal trucks this occurs when the direction lever is moved to the direction opposite that of travel without releasing the accelerator pedal.) 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. The first mode can be disabled completely in the program. In this case the truck would truly coast when the pedal is simply released. The second mode can be minimized but not disabled completely in the program.

⚠ WARNING

If the emergency stop button (6) is pressed, electric braking will not function.

The truck can then only be slowed with the brake pedal.

➢ While travelling, release the accelerator pedal (1) (or (3)for dual pedal trucks).

The truck will slow to a stop depending on the setting of the electric brake function.

NOTE

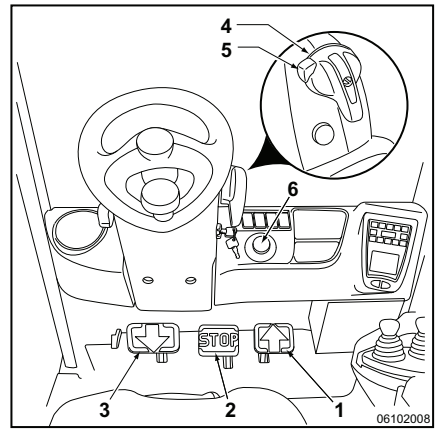
Slow or quick release of the accelerator pedal (1) (or (3) for dual pedal trucks) into the neutral position allows the braking action to be sensitively controlled, from gentle to hard braking.

➢ While travelling, press the accelerator pedal for the opposite direction (or move the directional lever to the opposite direction for single pedal trucks) until the truck has been electrically braked to a stop.

The truck will slow to a stop faster than if the accelerator pedal is simply released. After stopping, the truck will accelerate in the new direction unless the pedal is then released.

Mechanical brake

The mechanical brake is applied by spring force acting on the brake discs in the brake assemblies. Upon start up, and release of the parking brake handle, hydraulic pressure is used to overcome the spring force and release the brake. Whenever the brake pedal is pressed or the parking brake handle is engaged, the hydraulic pressure is removed, allowing the springs to apply the brake. When the pedal or handle is released, the pressure is reapplied (as long as the truck remains switched on) and the brake is released. The hydraulic holding pressure remains present for some time even if the truck is switched off or the emergency stop button is pressed. The brake is therefore not automatically applied by switching the truck off with the key switch or emergency stop button. Braking however, is always available with the pedal or parking brake handle regardless of truck power state.



⚠ WARNING

The parking brake is not automatically applied by switching the truck off with the key switch or emergency stop button.

Always apply the parking brake using the parking brake handle immediately after switching off the truck to prevent inadvertent truck movement.

NOTE

Mode two of the electric braking function described previously is automatically activated whenever the brake pedal is pressed. This assists in slowing the truck as well as reducing wear on the brake discs.

➢ While travelling, press the brake pedal (2).

The braking action will be greater or less depending on how hard the brake pedal is pressed.

NOTE

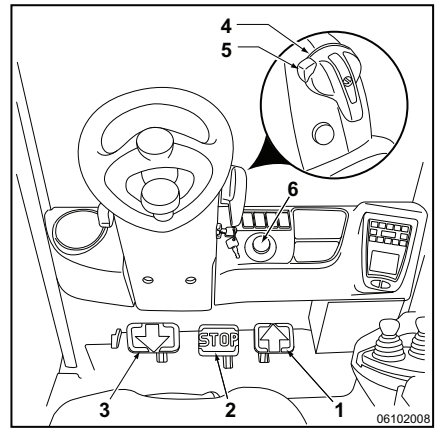
For emergency braking, press the brake pedal (2) hard. This will result in full application of the brake.

Applying the parking brake

NOTE

Make sure to press the brake pedal (2) whenever releasing or applying the parking brake. This will reduce the force necessary at the handle and avoid excessive wear on the parking brake mechanism.

➢ Turn the parking brake handle (4) clockwise to engage the parking brake. ▷



The braking symbol on the indicator unit will light up. The parking brake has been applied.

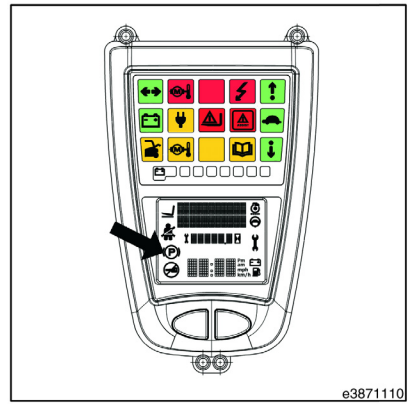
Releasing the parking brake

NOTE

Make sure to press the brake pedal (2) whenever releasing or applying the parking brake. This will reduce the force necessary at the handle and avoid excessive wear on the parking brake mechanism.

➢ Release the parking brake by pressing the release button (5) on the parking brake handle (4) and allowing the handle to release counter-clockwise.

➢ Verify that indicator light (arrow) is extinguished. ▷

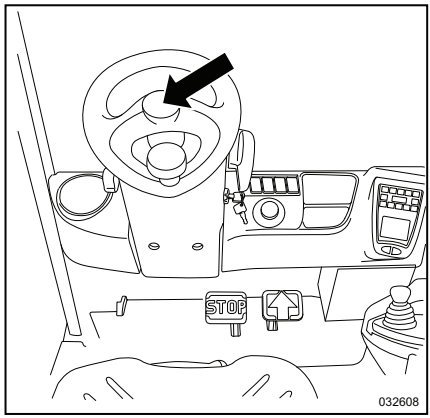


Horn

The horn is used as a warning signal, e.g. at blind spots and junctions .

➢ Press the horn button (see arrow) on the steering wheel to sound the horn.

▷



NOTE

An additional foot-operated horn button located on the floor plate is available as an option. In this case, pressing either button (floor or steering wheel) will sound the horn.

Fork Position Adjustment

⚠ WARNING

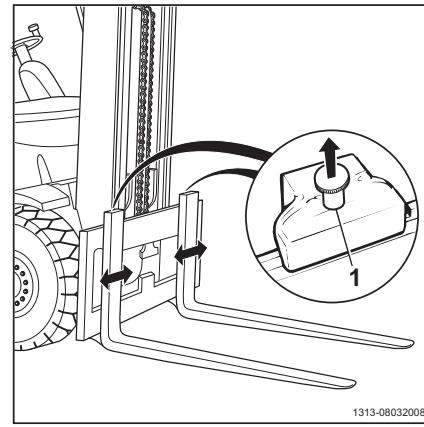
Incorrect fork position can result in an unstable or unbalanced load.

Always position the forks so that the center of gravity of the load is centered between the forks. Both forks must be the same distance from the centerline of the truck.

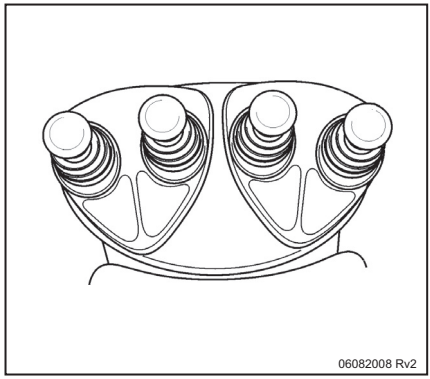
The base of the latch pin knob is bevelled to facilitate the locking and unlocking process.

- ➢ Lift the forks slightly off the floor.
- ➢ Lift the fork latch pin knob(1) and twist it to hold the latch pin up.
- ➢ Slide the fork arms inwards or outwards until the latch pins align with the position notches that best fit the load.
- ➢ Lift and twist the knob and allow it to spring back down along its bevelled edge and seat fully. Ensure that each latch pin is engaged securely in a notch on the fork carriage. If the knob will not go back down, then the fork is not aligned with a notch or the bevelled edge is not twisted into the correct position. Wiggle the fork slightly if necessary until the latch pin seats fully.

▷



Hydraulic Controls - Individual Levers



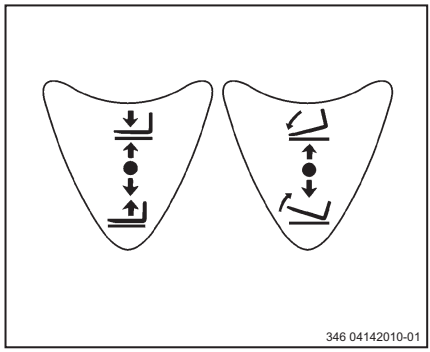
⚠ WARNING

Operators must be familiar with all safety procedures that apply to forklift operation before operating hydraulic functions.

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

Actuating levers should always be operated smoothly. Function speed is proportional to lever movement. When released, levers automatically return to the neutral position.

➢ Note the function symbols on the control lever decals.

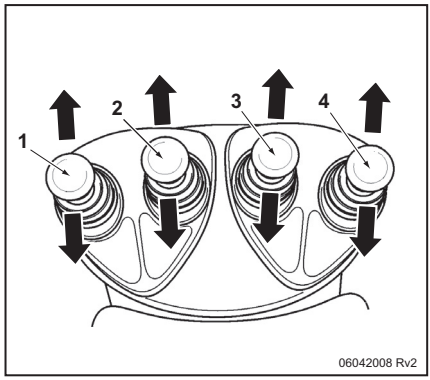


NOTE

The lifting system will only function with the truck switched on and the operator's seat occupied.

Raising the mast

➢ Pull actuating lever (1) backward.



Lowering the mast

➢ Push actuating lever (1) forward.

Tilting the mast forwards

➢ Push actuating lever (2) forward.

Tilting the mast backwards.

➢ Pull actuating lever (2) backward.

Attachments (optional equipment)

Third- and fourth-function attachments can be fitted to the truck as optional equipment (e.g. sideshifter, clamps etc.). In this case

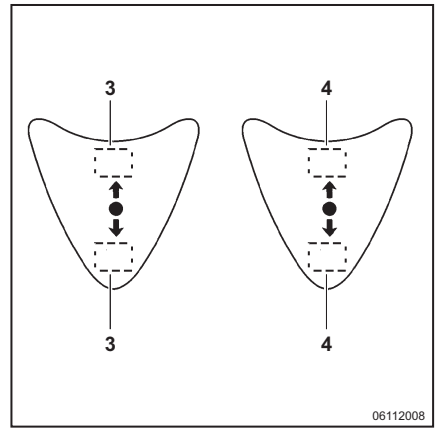
additional actuating levers (3 and 4) are provided.

NOTE

Trucks manufactured after 10/2010 are equipped with a locking lever for any hydraulic circuit that operates a clamp or similar attachment. This type of lever requires two distinct movements for operation. Before the lever will move, it must be unlocked by pressing down on it slightly. The dual-motion condition is intended to prevent accidental operation of the attachment. If present, the locking lever will be slightly longer than the other function levers.

➢ Note the symbols on the lever decals. The symbols for the third function will appear in position (3). The symbols for the fourth-function will appear in position (4).

▷



Operating the sideshifter or other third-function (optional equipment)

For a clamp or similar attachment equipped with a locking lever, the lever must be pushed down slightly before it will move. See the note above.

➢ Push actuating lever (3) forward.

Sideshifter moves to the left. (Third-function other than sideshifter operates according to the symbol arrows on the lever decal.)

➢ Pull actuating lever (3) backward.

Sideshifter moves to the right. (Third-function other than sideshifter operates according to the symbol arrows on the lever decal.)

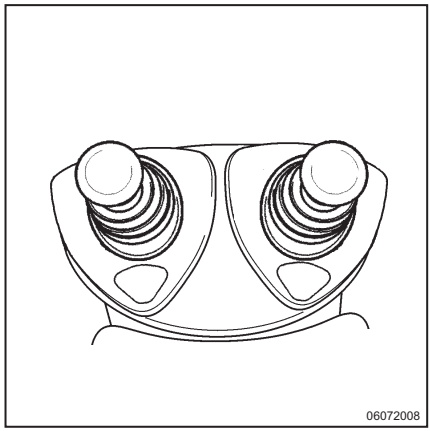
Operating the fourth-function (optional equipment)

For a clamp or similar attachment equipped with a locking lever, the lever must be pushed down slightly before it will move. See the note above.

➢ Move actuating lever (4) forward or backward.

Fourth-function operates according to the symbol arrows on the lever decal.

Hydraulic Controls - Multi-Function Levers



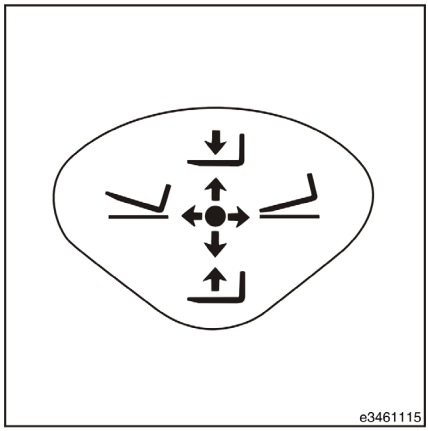
⚠ WARNING

Operators must be familiar with all safety procedures that apply to forklift operation before operating hydraulic functions.

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

Actuating levers should always be operated smoothly. Function speed is proportional to lever movement. When released, levers automatically return to the neutral position.

➢ Note the function symbols on the control lever decals.



NOTE

The lifting system will only function with the truck switched on and the operator's seat occupied.

Raising the mast

➢ Pull actuating lever (1) backward.

Lowering the mast

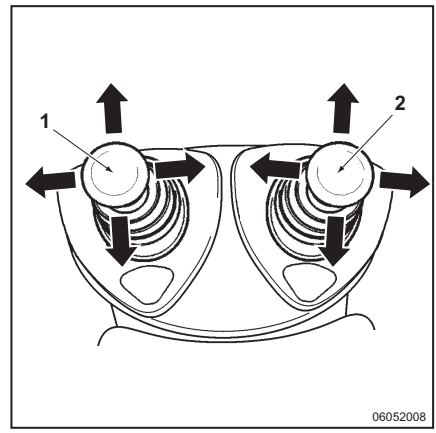
➢ Push actuating lever (1) forward.

Tilting the mast forwards

➢ Push actuating lever (1) to the right.

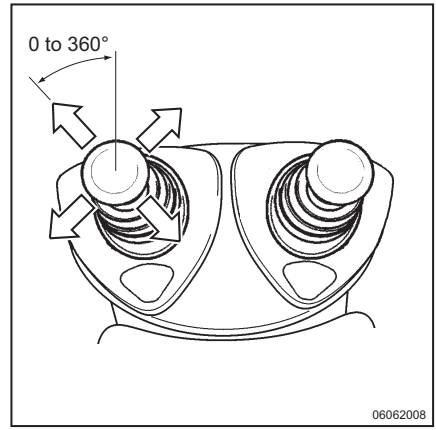
Tilting the mast backwards.

➢ Push actuating lever (1) to the left.



Simultaneous function control

➢ The lift and tilt lever (1) is not restricted to left/right or forward/backward motion. It can be moved in a circular motion to any position. This eases transition between lift and tilt and also allows use of both functions simultaneously.



Attachments (optional equipment)

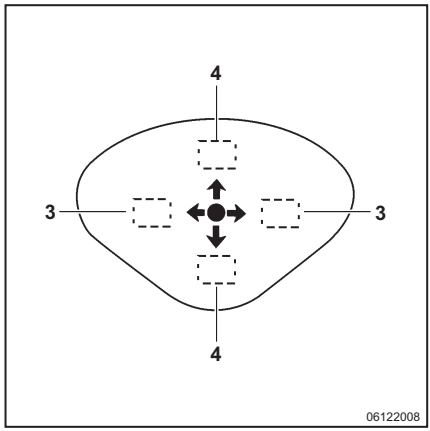
Third- and fourth-function attachments can be fitted to the truck as optional equipment (e.g. sideshifter, clamps etc.). In this case an additional actuating lever (2) is provided.

NOTE

Trucks manufactured after 10/2010 are equipped with a locking lever for any hydraulic circuit that operates a clamp or similar attachment. In this case, an individual lever with locking ability is used in position (2) to control the attachment. This type of lever requires two distinct movements for operation. Before the lever will move, it must be unlocked by pressing down on it slightly. The lever will then move forward or backward to operate the attachment. The dual-motion condition is intended to prevent accidental operation of the attachment. Individual levers do not move left or right. If an

additional attachment is present, there will be two individual levers in position (2). See Hydraulic Controls - Individual Levers if necessary.

➢ Note the symbols on the lever decals. The symbols for the third function will appear in position (3). The symbols for the fourth-function will appear in position (4).



Operating the sideshifter or other third-function (optional equipment)

For a clamp or similar attachment, individual levers will be installed in position (2) instead of a multi-function lever. The lever for the clamp must be pushed down slightly before it will move. See the note above.

➢ Push actuating lever (2) to the left.

Sideshifter moves to the left. (Third-function other than sideshifter operates according to the symbol arrows on the lever decal.)

➢ Push actuating lever (2) to the right.

Sideshifter moves to the right. (Third-function other than sideshifter operates according to the symbol arrows on the lever decal.)

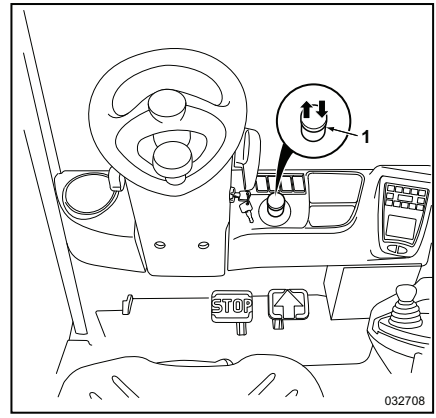
Operating the fourth-function (optional equipment)

For a clamp or similar attachment, individual levers will be installed in position (2) instead of a multi-function lever. The lever for the clamp must be pushed down slightly before it will move. See the note above.

➢ Move actuating lever (2) forward or backward.

Fourth-function operates according to the symbol arrows on the lever decal.

Emergency Stop Switch



Pushing the emergency stop button (1) in will shut the truck off at any time. The emergency stop switch will open and the truck will coast to a stop unless the foot brake is applied. Also, increased effort will be required to turn the steering wheel.

⚠ WARNING

If the emergency stop switch is operated while in motion, the vehicle will coast without electric braking or power assisted steering. The brake pedal must be used to stop the truck. More effort will be required for steering and braking. Stopping distance may be longer than normal. For these reasons there may be an increased risk of collision.

Always be prepared to stop the truck with the brake pedal and increase the steering effort if the emergency stop button is pressed.

Emergency Stop Procedure

➢ To stop the truck in an emergency, push in the emergency stop button (1).

The button will lock into the pressed position with an audible click. The emergency stop switch will open and the forklift truck will be switched off completely.

To resume operation, release the drive pedal and pull the emergency stop button out. For single pedal trucks, the directional lever must be moved to neutral before the truck will operate.

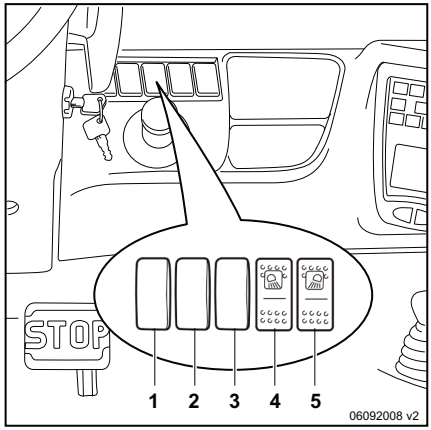
Lights and Back-Up Alarm

The truck is equipped with two headlights as standard equipment. Additionally, a brake/tail light combination, one or two rear spotlights, and a flashing beacon are available as individual options. Lights may be configured to operate from a switch on the dash or continuously whenever the key switch is on. The rear spotlights and flashing beacon can be configured to illuminate only when the truck is travelling in reverse.

NOTE

Other types or combinations of lighting may be fitted as custom options. Such custom options are not covered by this manual.

Toggle Switches



The truck may have one or more toggle switches to control the headlights and optional lights. If switches are not present, then the head lights (and tail lights if equipped) will illuminate continuously when the key switch is on. In the case of the optional rear spot light(s), if switches are not present, these lights may be configured to illuminate whenever the truck is travelling in reverse, or continuously via the key switch as with the head lights.

NOTE

The arrangement of the individual toggle switches on the console may vary depending on options. Note the symbols on the switch lenses.

The toggle switch (5) is used to turn the front working headlights (6) on and off. The tail lights (8) (if equipped) will illuminate with the headlights.

The toggle switch (4) is used to control the rear spot lights (7). In its center position, this switch will allow the rear spot light(s) to illuminate only when the truck is travelling in reverse. In the fully pressed position, this switch will illuminate the rear spot light(s) continuously.

NOTE

The other toggle switch positions (1, 2, and 3) are provided for optional additional functions.

Lighting Arrangement

The lights (and the optional back-up alarm) are mounted to the overhead guard.

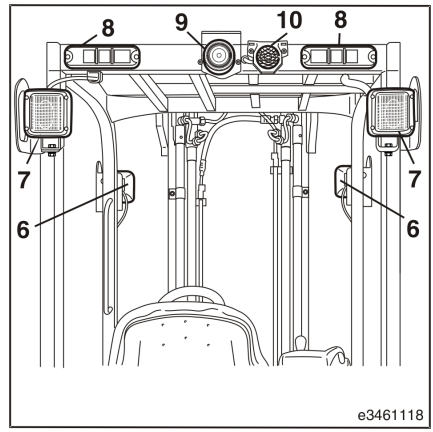
(6) Headlights

(7) Rear spot lights (one or two optional)

(8) Brake/tail light assemblies (optional)

(9) Flashing beacon (optional)

(10) Back up alarm (optional)

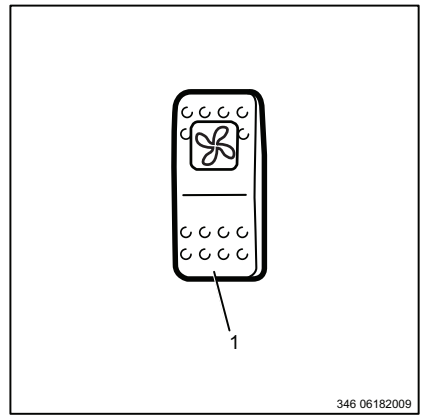


Back-Up Alarm

The back-up alarm (10) (optional) is configured to automatically operate when the truck is travelling in reverse.

Fan (optional equipment)

A cooling fan for the operator is available as an option. The standard location for the fan is the front right-hand leg of the overhead guard. Use toggle switch (1) to turn the fan on or off.



Hydraulic Function Depressurization System (optional equipment)

The truck's auxiliary hydraulic functions can be depressurized using the toggle switch (1). This is convenient for applications where hydraulic attachments are changed often. This system can not depressurize the lift or tilt circuits.

⚠ WARNING

Pressurized hydraulic oil can cause severe injury.

Always use care when disconnecting hydraulic components. Disconnect slowly in case unexpected pressure is present.

Before the depressurization system will activate, the following conditions must be satisfied:

- Key switch on
- Seat switch activated
- Parking brake applied
- No movement of steering wheel
- Hydraulic control levers in neutral

➢ To activate the depressurization system, slide the orange thumb lock on the toggle switch (1) and hold the switch in.

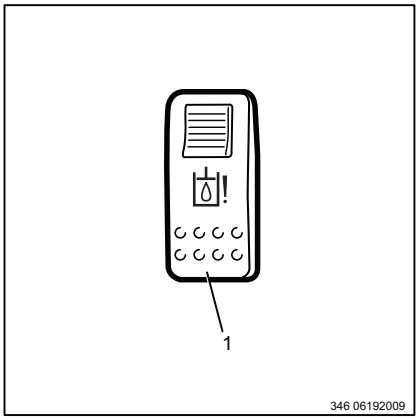
NOTE

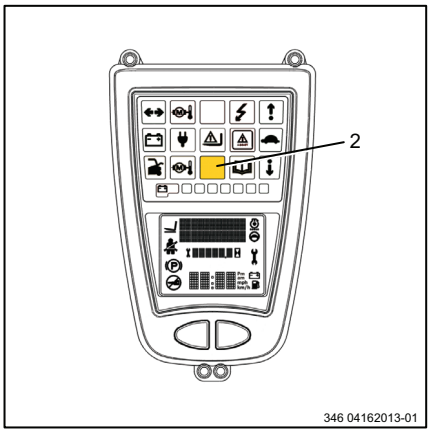
The truck will not operate while the depressurization system is active.

➢ If the conditions above are satisfied, the yellow indicator light (2) in the indicator unit will flash to confirm that the depressurization system is active.

➢ With the switch held in, move the control lever of the function to be depressurized fully in both directions. If both auxiliary functions are to be depressurized, both levers must be moved fully in both directions.

➢ To restore hydraulic function, turn the truck off and then back on using the key switch.



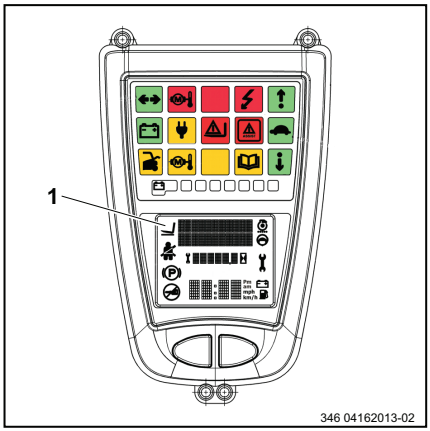


Tilt Memory (optional equipment)

The tilt memory option allows the mast to be rapidly and consistently tilted to a pre-set angle.

Whenever tilt memory is active, symbol (1) on the indicator unit will illuminate.

Tilt memory can be activated at any time via button switch (2).

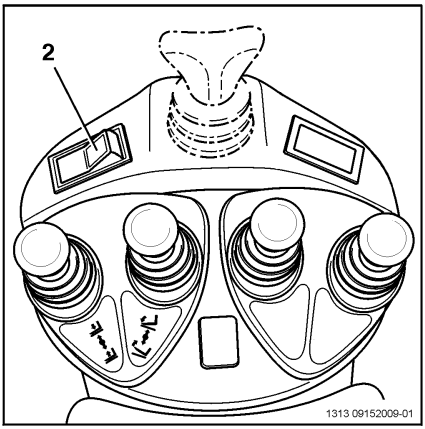


NOTE

*To ensure safety, the tilt memory function does not automatically tilt the mast. Instead it automatically **stops** the tilting motion when the pre-set angle is reached. Tilt motion must still be initiated and maintained by the operator using the tilt lever as during normal tilting. Tilt motion is therefore under operator control at all times.*

Setting the Tilt Reference Angle

The tilt angle sensor allows any mast angle to be stored into the system memory as the pre-set reference angle.



- Tilt the mast to the desired angle.
- Press and hold button (2) in the console to the right of the driver's seat for more than 2 seconds.

The angle of tilt is now stored in the system memory. The buzzer sounds twice and the lamp in the button (2) blinks briefly several times as confirmation.

WARNING

The tilt reference angle is set relative to the vehicle. The tilt of the mast in relation to the ground depends on various factors such as tire wear, tire inflation pressure (if applicable), load, and unevenness and gradient of the ground.

Do not rely on the same pre-set angle for all conditions.

Operation with Tilt Memory

⚠ WARNING

The tilt memory feature is designed to increase efficiency and reduce operator fatigue during repetitive operations only. The operator always has the responsibility to ensure correct tilt angle.

Do not rely on the same pre-set angle for all conditions.

- Briefly depress button (2) in the console to the right of the driver's seat. The lamp in the button comes on and the tilt memory function is now active. Do not hold the button down or the reference angle will be reset.
- Operate the tilt lever in the direction of the pre-set reference angle. Tilting is only possible in the direction of the reference angle. When the mast reaches the pre-set reference angle, tilting will stop automatically and a buzzer in the indicator unit will sound.

NOTE

If the tilt lever is released before the reference angle is reached, the tilt memory function must be reactivated with the button (2).

- Release the tilt lever or briefly depress button (2) again. The tilt memory function is deactivated and the lamp in the button will go out.
- The mast can now be tilted normally with the tilt lever.
- Briefly depress button (2) again to reactivate the tilt memory function as required.

Opening and Closing the Battery Cover

Opening the battery cover is necessary when:

- servicing or changing the battery
- connecting service equipment to the diagnostic port

➢ Remove any loose items from the battery cover or from under the driver's seat. Also ensure the operator's manual pouch flap is closed.

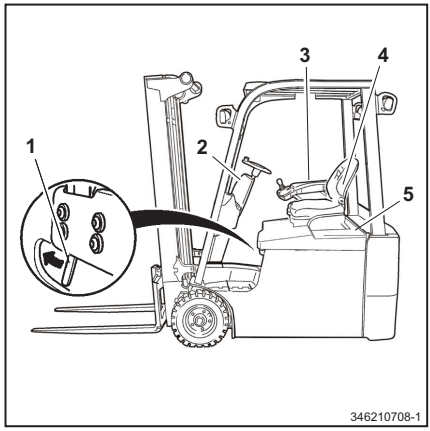
➢ Tilt the steering column (2) fully forward and move the seat (4) fully forward.

NOTE

If the truck has a narrow overhead guard (for drive-through racking), the seat is equipped with a swivel mechanism. This allows the seat to rotate 90 degrees to clear the overhead guard as the battery cover is opened. To rotate the seat, pull the mechanism release chain at the front of the seat and pivot the seat to the right. Release the chain and allow the seat to lock into the rotated position.

➢ Operate the locking lever (1).

➢ Slowly swing the battery cover (5) with the driver's seat to the rear.



Closing the battery cover

➢ Swing the battery cover against the pressure of the gas spring and push it closed until the locking lever engages with an audible click.

➢ Lift up on one of the battery cover grab handles to ensure the cover is securely locked in the closed position.

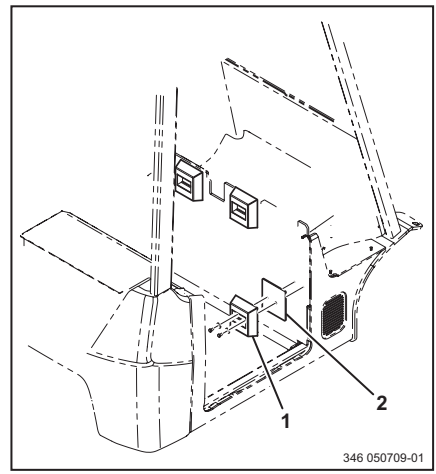
NOTE

If the truck is equipped with a narrow overhead guard, it will not operate unless the swivel seat is locked back into the straight-ahead position.

Battery Shims

Battery shims are included with the truck to accommodate smaller batteries. If necessary, the shims can be used to increase the effective thickness of the three battery spacers on the front wall of the battery compartment. This will allow a closer fit to smaller batteries.

- To install battery shims, remove the battery spacers (1) by removing their mounting screws and washers.
- Position a shim (2) between the spacer and the wall of the battery compartment as shown.
- Reinstall the screws and washers.
- Repeat the above steps for each battery spacer.



NOTE

If more than one shim per spacer is installed, longer mounting screws will be required.

⚠ CAUTION

Unequal numbers of shims in the three spacer locations can result in battery shifting during operation.

Always use the same number of shims behind each spacer.

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.

NOTE

The battery must always be changed on the right-hand side of the truck.

The battery can be changed in various ways:

- Using a crane (taking care to stay within the permissible load carrying capacity of the crane and the lifting gear)
- Using an additional truck (taking care to stay within the permissible load carrying capacity of the truck; see load diagram)
- Using specialized side extraction equipment if the truck is equipped with the optional battery roller tray.

⚠ 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 so they are resting on the ground before changing a battery.

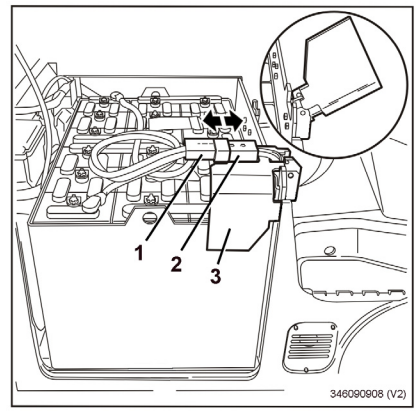
➢ Park the truck safely.

➢ Fully lower the fork carriage.

➢ Tilt the lift mast forwards until the fork arms touch the ground.

➢ Apply the parking brake.

- Switch off the key switch.
- Press the emergency stop button.
- Open the battery cover.
- Pull the battery plug (1) out of the battery socket (2).
- Swing the battery connector support(3) upwards out of the way.



⚠ 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.

- Using a crane or another truck, carefully move the lifting gear into position over the battery. If using specialized side extraction equipment, position it at the battery according to the manufacturer's instructions.
- Insert the hooks of the lifting gear into the openings provided for this purpose in the battery carrier. If using specialized side extraction equipment, attach it according to the manufacturer's instructions.
- Carefully lift the battery and move it slowly out of the truck chassis. The battery does not have to be lifted more than a few inches. (The battery does not have to be lifted at all if the truck is equipped with the optional battery roller tray.)
- Check the battery for leaking acid, cracked housing or raised plates.
- 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

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.

- Carefully position the replacement battery in the battery box. Disconnect and remove all lifting equipment.
- Swing the support (3)down into its closed position.
- Plug the battery plug (1) into the battery connector socket(2).
- Close 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.

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 fork carriage.
- Tilt the lift mast forwards

The fork arms must touch the ground.

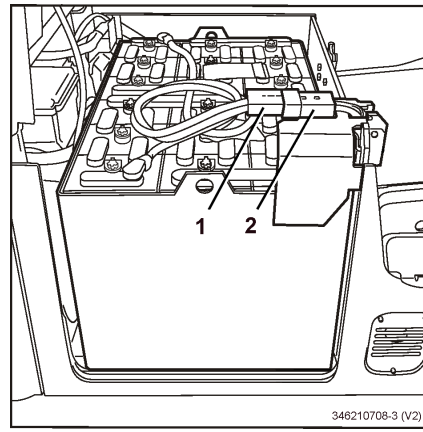
- Apply the parking brake.
- Switch off the key switch.
- Press the emergency stop button.
- Open the battery cover.

⚠ WARNING

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

The battery cover must be left completely open during the entire charging period to allow ventilation.

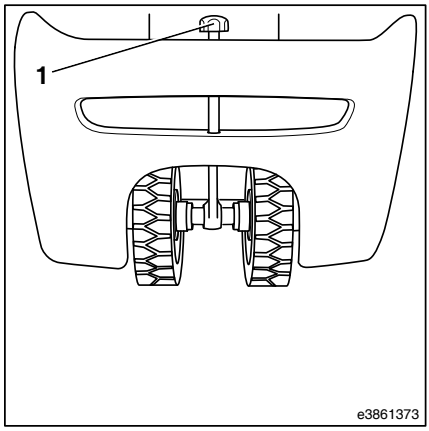
- Remove the battery plug (1) from the connecting socket (2).
- Attach the connector plug of the external battery charger to the battery plug (1).
- Switch on the battery charger.



Towing Loads

The towing pin can be used to secure light loads for occasional towing by the forklift truck.

Towed load capacity is limited by the maximum rated towing force listed in section 6. No load may be towed that exceeds the maximum towing force, regardless of weight. Contact the factory for towed weight capacity if necessary.



⚠ CAUTION

Exceeding the maximum rated towing force can damage the truck.

Refer to the specifications in section 6 for the maximum towing force. Do not tow any type of load that will exceed the maximum towing force. This specification only applies to loads towed on level surfaces (+/- 1%). If towing on gradients is required, contact the factory for load specifications.

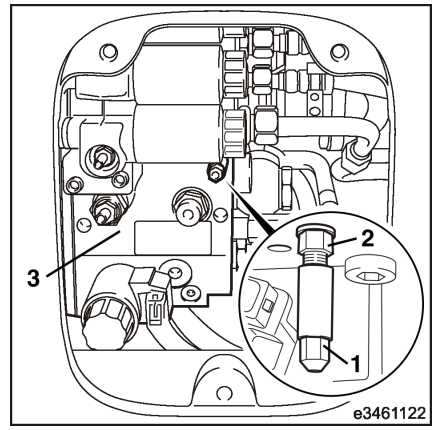
⚠ WARNING

Incorrect attachment of towed loads can damage the truck and cause serious injury.

Never attach a load to any part of the truck other than the towing pin.

- Lift the towing pin (2) up using the handle (1).
- Insert the tongue of the towed load into the coupling space (3).
- Allow the towing pin to drop back into place through the tongue of the towed load. Ensure that the towing pin engages its lower bore.
- Reverse the above procedure to uncouple loads from the truck.

Manual Lowering of Fork Carriage



If a malfunction occurs in the hydraulic system, the fork carriage can be lowered manually.

For this purpose, a manual lowering screw (1) is located on the control valve block (3). This screw is secured with a self-locking nut (2).

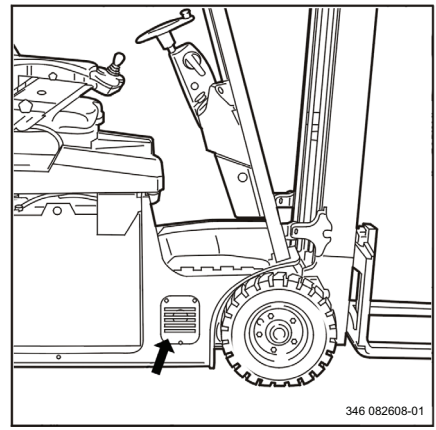
⚠ DANGER

Injury or death will occur if personnel are beneath the fork arms during the manual lowering process.

All personnel must remain clear of the area beneath the fork arms while the fork carriage is being manually lowered.

Always leave the wrench on the screw(1) throughout the manual lowering process to enable lowering to be quickly interrupted at any time.

In order to access the manual lowering screw (1), the fan grill with its attached fan must be removed (see arrow).



- Remove the three grill mounting screws and remove the grill and fan assembly.
- Loosen the lock nut (2). Using an 8 mm socket, slowly turn the threaded stud (1) approximately 1.5 turns counter-clockwise. The carriage will begin to lower slowly. Do not unscrew the stud more than two complete turns. Unscrewing the stud further will not increase the lowering speed.

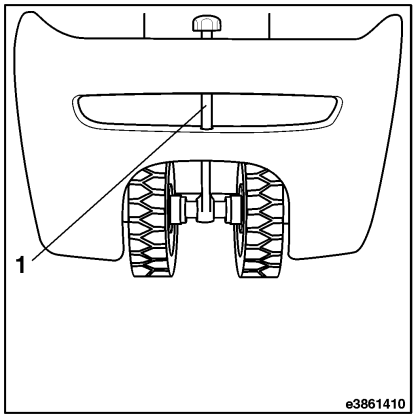
⚠ CAUTION

If the lowering stud (1) is unscrewed too much, it will come completely out under pressure. If the stud comes out, it is impossible to re-install it against the flow of escaping hydraulic oil. If this occurs, the carriage will still not lower any faster, but hydraulic oil will be lost in an uncontrolled manner.

Do not unscrew the stud more than two complete turns.

- After the carriage has lowered to the desired position, screw the threaded stud (1) back in clockwise and tighten to 7.5 ft-lb (10 Nm). This must be done to restore normal mast operation.
- Tighten the lock nut (2) to 7 ft-lb (9.5 Nm).
- Refit the chassis fan.

Towing the Truck



⚠ WARNING

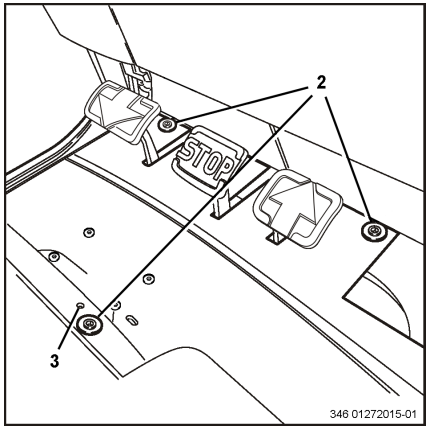
Braking will not be available during towing.

If the truck must be towed, use only a tow bar designed for this purpose. Do not exceed the towing speed.

NOTE

The power-assisted steering will not function if the truck is unable to be switched on. Increased effort will then be required for steering.

- Remove any load from the forks.
- If the hydraulic system is functional, raise the forks if necessary so they will not drag during towing. If the carriage cannot be raised hydraulically, remove the forks from the carriage.
- Attach the towing vehicle to the towing pin (1) using a tow bar.
- Release the parking brake.
- Remove the three floor plate screws (2) and lift out the floor plate.

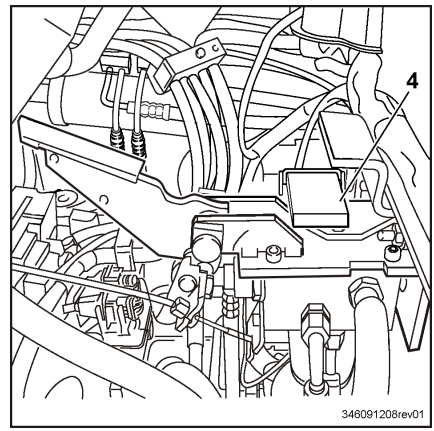


NOTE

Trucks from S/N A1X346B00324 have an access hole (3) in the floor plate into which a screwdriver may be inserted to pump the pressurizing lever. It is not necessary to remove the floor plate on these trucks.

➢ Pump the manual pressurizing lever (4) on the brake valve block several times until increased resistance can be felt. This will create pressure that releases the disc brake in the drive axle.

▷



⚠ DANGER

Pumping the manual pressurizing lever will pressurize the brake and hydraulic system.

Before starting repair work on the accumulator or on any pressurized hydraulic piping, the hydraulic system must be completely depressurized by pressing the brake pedal all the way down at least 10 times in a row. Refer to the service manual before working on the hydraulic system.

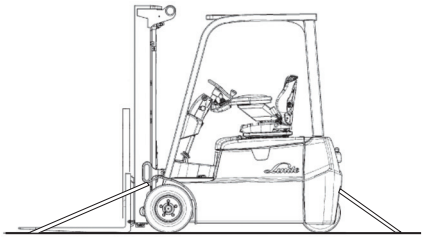
NOTE

Pressing the brake pedal will bleed off the release pressure created by pumping the manual pressurizing lever and the brakes will be applied. If further towing is required, the lever must then be pumped again to release the brakes. Release pressure will gradually dissipate on its own over time even if the brake pedal is not pressed.

➢ A driver must steer the truck during towing.

➢ Do not exceed the permissible running speed when towing away the truck.

Securing the Truck for Transport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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, lower the mast completely.
- ➢ Apply the parking brake.
- ➢ Disconnect the battery.
- ➢ Attach lashing straps or tie-downs to the front of the truck at the holes in the fenders.

⚠ CAUTION

The holes in the front fenders are for securing the truck against movement during ground transport. They are not intended for lifting and will not support the free weight of the truck during lifting. If the truck is lifted using these holes, the chassis will be damaged.

Never lift the truck using the holes in the fenders.

- Attach lashing straps or tie-downs to the rear of the truck at the towing pin. Ensure that the towing pin is fully inserted through both of its bores in the counterweight.
- Ensure that all lashing straps or tie-downs are tight and securely attached to the transport vehicle.
- Chock the wheels.

Hoisting the Truck

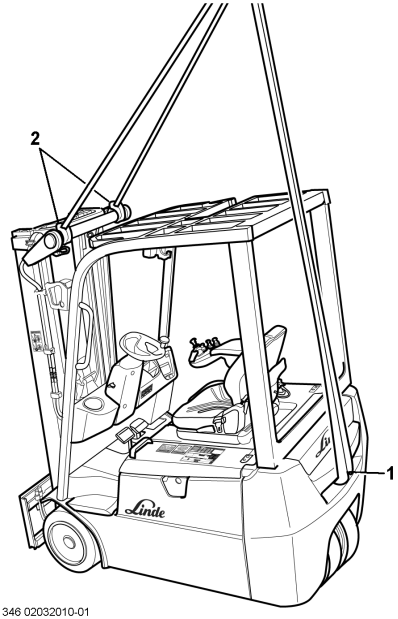
This section explains the attachment of lifting equipment to the truck for the purpose of hoisting it. Many methods of rigging to a crane or hoist are possible. Explanation of such methods as well as operation of lifting equipment is outside the scope of this manual. Both the attachment of lifting equipment 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.

- ➢ Lower the mast fully, and tilt it fully back.
- ➢ Disconnect the battery.
- ➢ Attach lifting slings at the towing pin on the rear (1), and the outer sides of the top crossmember of the outer upright on the mast (2) to provide a three-point lifting arrangement. Secure the slings on the mast so they will not slide together. Ensure that the towing pin is fully inserted through both of its bores in the counterweight.



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⚠ CAUTION

The holes in the front fenders are for securing the truck during ground transport. They are not intended for lifting and will not support the weight of the truck. If the truck is lifted using these holes, the chassis will be damaged.

Never attach any lifting equipment to the holes in the fenders.

- ➢ Adjust the slings and lifting device so that they will not contact the overhead guard during the lifting process. If a spreader bar is not used, the truck can be lifted with the rear wheels higher than the front wheels to achieve clearance between the lifting equipment and the overhead guard or

its attached accessories such as lights. Remove the forks if necessary.

⚠ 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.

➢ 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.

Long term storage

Measures prior to storage

If the vehicle is to be stored for more than 2 months e.g. for operational reasons, it should only be left in a well ventilated, clean and dry room free of frost, and the following measures undertaken beforehand.

- Clean forklift truck thoroughly.
- Raise fork carriage several times to the end stop, move lift mast backwards and forwards a few times and operate any attachments several times.
- Lower the fork carriage to a supporting surface until the chains are relieved of load.
- Check the hydraulic oil level and top up if necessary.
- All unpainted mechanical components should be coated with a thin film of oil or grease.
- Grease vehicle.
- Check battery condition and density of acid.
- Lubricate battery terminals with acid-free grease. (Follow instructions of battery manufacturer .)
- Apply a suitable contact spray to all exposed electrical contacts .
- Jack up the vehicle so all wheels are off the ground.

This will prevent permanent deformation of the tires.

NOTE

Do not cover with plastic film or this will encourage the formation and collection of condensed water.

Start up after storage

- Clean forklift truck thoroughly and grease.
- Clean the battery and lubricate battery terminals with acid-free grease
- Check battery condition and density of acid and recharge if necessary.
- Check hydraulic oil for condensed water and change if necessary.
- Perform maintenance as before initial commissioning.
- Put forklift truck into service.

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 aid in drying and check operation.

⚠ CAUTION

Never wash truck when switched on.

Switch the truck off 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 area of the front axle, electric and electronic components, connector plugs or insulating material. Water should not be used for cleaning in the area of the central electrical system and switch console.

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

NOTE

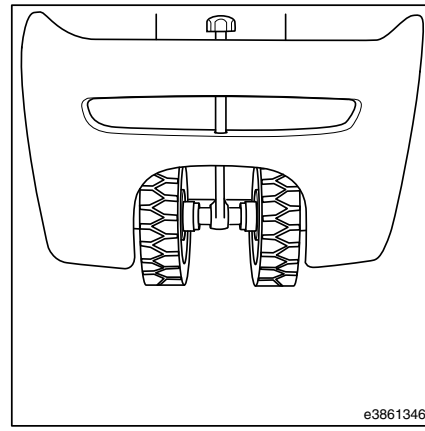
If the truck is equipped with a sideshifter (optional equipment), its top and bottom bearings should be greased after the truck is washed. Use lubricating grease complying with the recommendations for working materials.

Cleaning the Steer Axle

When used indoors in clean dry conditions, it is generally sufficient to perform maintenance every 1,000 operating hours. If used both indoors and outdoors, cleaning is recommended between 500 and 1000 operating hours, however not later than 12 months.

➢ Fully lower the fork carriage.

➢ Clean the axle with water or cleaner solvent.



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

ELECTRIC SIT-DOWN 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 left rear of the lift truck and work towards the front, and then the right side. 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)
		Rear Tire(s) (pressure if applicable, wear, cuts, embedded objects, rim damage, loose/missing lug nuts)
		Steer Axle (check for damage, debris)
		Overhead Guard (damage, bends, cracks, looseness)
		Seat & Seat Belt (check operation, damage, worn/torn belt, loose fasteners)
		Steering Wheel (check for wear, damage)
		Hood Latch (check operation, latches securely)
		Hydraulic Oil (check level)
		Front Tire (left) (tire condition, rim damage, etc)
		Tilt Cylinder (left) (damage, leaks, loose fittings)
		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)
		Tilt Cylinder (right) (damage, leaks, loose fittings)
		Front Tire (right) (tire condition, rim damage, etc)
		Battery Connectors & Cables (damage, cracks, pitting)
		Battery Retention (installed correctly, secure)
		Battery Case & Vent caps (damage, cracks, loose, missing)
		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)
		Seat Switch (If equipped) (check operation)
		Directional Switch (if equipped) (operates freely)
		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, lock-out function (if equipped) operates properly)
		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)
		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 cover latch

Open and shut the battery cover and ensure the battery cover latch functions correctly and holds the cover closed securely.

Check battery connector

Inspect the battery connector and its cables for damage.

Hydraulic oil level

ENVIRONMENT NOTE

Hydraulic oil can harm the environment and water supply if not handled or disposed of properly. Observe the precautions given in Safe Handling of Lubricants and Supplies.

⚠ CAUTION

Incorrect hydraulic oil level can damage the truck.

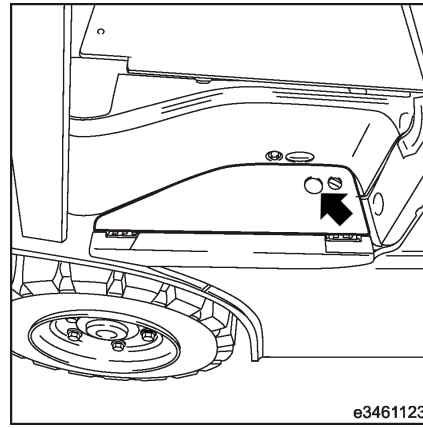
When checking the hydraulic oil level, always position the mast upright (0° tilt) and lower the carriage completely.

⚠ CAUTION

Incorrect hydraulic oil type can damage the truck.

Always use the proper grade of hydraulic oil as specified in "Recommended Lubricants and Supplies".

- ➢ Fully lower fork carriage.
- ➢ Apply the parking brake.
- ➢ Switch off the key switch.
- ➢ Flip up the folding plate (see arrow) using the finger-sized hole (2) on the step. ▷

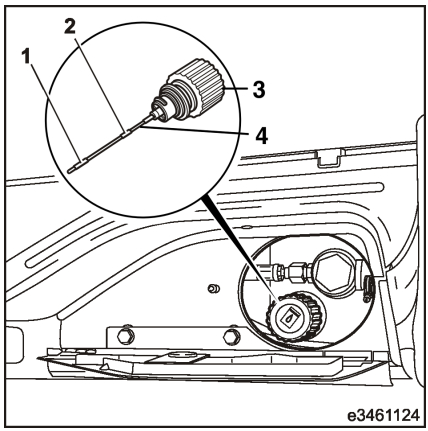


- Pull out the breather (3) with dipstick (4) by rotating it ¼ turn counter-clockwise.
- Wipe the oil dipstick with a clean cloth.
- Reinsert the breather filter with the oil dipstick, and lock it into position by rotating it ¼ turn clockwise.
- Release the breather filter with oil dipstick again and pull it out.
- Check oil level.

The oil dipstick has two marks for the different mast types.

- Mark (1) is for all single and all double masts and triple masts up to 225 inches (5700 mm) lift height.
- Mark(2) is for triple mast lift heights greater than 225 inches (5700 mm) and all quad masts.

- Top up hydraulic oil to the appropriate mark as required.
- Reinsert the breather filter with the oil dipstick, and lock it into position by rotating it ¼ turn clockwise.
- Fold the step plate back down again.



NOTE

Total hydraulic system oil capacity is 12.2 quarts (11.5 l) for mark 1 and 14.8 quarts (14 l) for mark 2.

Check the steering axle

Check for any debris entangled or wrapped around the steer wheels and remove it.

On three-wheel versions (E18, E20), check for lubricant leakage at the top of the steering spindle as well as the inside and outside of both steer wheel hubs. On four-wheel versions (E20P), check the steering cylinder for leakage at its seals and fittings.

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.

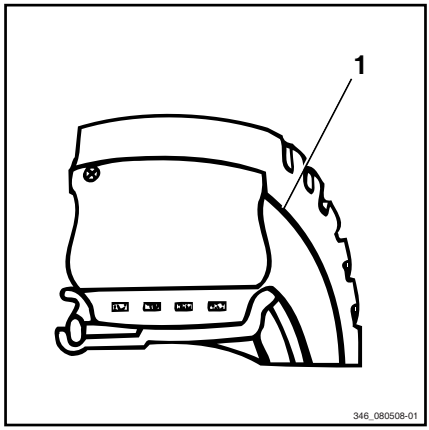
Check control lever bellows

Inspect the flexible bellows on each hydraulic control lever for correct position and condition. Torn or otherwise damaged bellows must be replaced.

Anti-static strap (optional equipment)

An anti-static strap is typically installed on trucks with non-marking tires that are more prone to static electricity build-up. An anti-static strap may also be installed on trucks that operate in certain applications regardless of tires. If equipped, inspect the anti-static strap for wear or damage. The strap must maintain continuous contact with the driving surface. If any wear or damage preventing this contact is present, the strap must be replaced. Also check that the strap mounting is secure. Correct as required.

Wheels and Tires



⚠ 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 tires 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.) Solid treaded tires can be worn down to the wear mark (1) on the sidewall.

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 screws and steer wheel nuts should be tightened to 155 ft-lb (210 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 the seat and seat belt

Check the seat condition and mounting. Verify that seat mounting hardware is tight and that the seat is stable.

Pull the seat belt completely out and inspect it for fraying or damage. Buckle the belt and check that the buckle holds securely and that it releases easily and completely when the

release button is pressed. With the truck on a horizontal surface, quickly pull the belt out of its retractor and verify that the locking mechanism prevents rapid extension.

⚠ WARNING

A malfunctioning or defective seat belt can result in injury or death in case of accident.

Do not use the truck if the seat belt is defective. If any defect in the function of the seat or seat belt is noticed, the truck must be removed from service until the cause is corrected.

The seat belt must be replaced after an accident. For seat belts integrated into the driver's seat, the seat and its fastening must also be checked by trained technicians after an accident.

Operational checks

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

- Emergency stop button
- Parking brake
- Seat switch
- Multi-function display/battery discharge indicator
- Working lights
- Horn
- Forward and reverse travel
- Back-up alarm if equipped
- Service brake
- Electric braking if enabled
- Mast, tilt, and any other hydraulic functions (operate through complete range of motion)

⚠ CAUTION

Excessive noise during hydraulic function operation indicates low hydraulic fluid.

This condition must be checked and corrected immediately to avoid damage to the hydraulic pump.

Scheduled Maintenance

General Maintenance Information

This section contains all information required to determine when the truck must be serviced and what must be done. This information is presented as scheduled maintenance charts on the following pages. Be sure to perform maintenance within the time limit given in the maintenance charts. Proper and timely maintenance is essential to obtain the full operability, performance and service life from the truck, and is a prerequisite for any warranty claims.

Maintenance Intervals

Maintenance intervals are based on operating hours but are also subject to the maximum intervals (based on years in service) listed at the top of each chart.

All lubrication and service intervals must be reduced for dusty conditions, large temperature fluctuations or intensive use.

Scheduled Maintenance Charts

The scheduled maintenance charts provide a list of maintenance tasks and associated time intervals at which they must be carried out. Charts are provided for all intervals and are complete for each interval in that they include all necessary items from lesser intervals that might come due at the same time. (For example, a 3000 hour chart would include all of the items from the 1000 hour chart plus a few specific 3000 hour items.) For this reason only one chart is necessary to cover any given interval. All the intervals at which a chart applies are listed at the top of the chart (up to 20,000 hours). A check-off box is provided beside each interval to allow for a written record of maintenance completion.

Detailed instructions for performing the maintenance items listed are found 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. 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.

Sideshifter Maintenance Intervals

NOTE

The optional sideshifter has maintenance intervals in addition to those given in the standard maintenance charts. See Sideshifter Maintenance section.

Maintenance at 1000 Hours

At operating hours										Carried out	
1000		2000		4000		5000		7000			
8000		10,000		11,000		13,000		14,000			
16,000		17,000		19,000		20,000				✓	✖
Maximum interval											
Dependent on the driving style and operating conditions, but at least after 1, 5, 7, 11, 13, 17 and 19 years of service.											
Preparations											
Clean the truck (if necessary).											
Read out error log and delete.											
Check time and date settings on the indicator unit; adjust if necessary.											
Calibrate the drive potentiometer and joysticks.											
Enter the next maintenance interval.											
Final drive units											
Check both final drive/wheel hub gear units for leaks.											
Check fastening of the drive axle and the final drive/wheel hub gear units.											
Chassis											
Check the mounting fasteners of the OHG, steering axle, and counterweight.											
Check and grease seat rails (if necessary).											
Check for correct operation of the parking brake and readjust if necessary.											
Check wheel fasteners and tighten if necessary.											
Check the release of the multi-disc brake for the towing procedure: press the actuating lever at the brake valve several times.											
Clean the steering axle. For E20P, also grease the tie rods.											
Check condition of steer axle bearings.											
Controls											
Check pedals for smooth action and oil as required.											
Check the bellows on the joysticks.											
Electrics											
Check condition/secure positioning of cables, wiring, connections and connectors.											
Check tightness of conductor rail connections between the power modules and motors.											
Check the battery condition, acid level and acid density.											

At operating hours										Carried out	
1000		2000		4000		5000		7000			
8000		10,000		11,000		13,000		14,000			
16,000		17,000		19,000		20,000				✓	✖
Check power module cooling fans for correct operation.											
Clean the drive and pump motor power modules, heat sinks, and cooling fans with compressed air (if necessary).											
Check the main contactor and clean it and nearby components with compressed air.											
Hydraulics											
Check the hydraulic oil level.											
Check the hydraulic system for leaks.											
Check the bleeder valve on the hydraulic tank for correct operation.											
Check the hydraulic control valve for correct operation.											
Check the reeving hose carrier (optional equipment).											
Check the reeving hose pre-tension (optional equipment).											
Mast											
Check condition, fastening, and function of mast, lift chains, cylinders, & stops.											
Check lift chain stretch and adjust chains if necessary.											
Clean and lubricate the lift chains.											
Clean and check the condition of the tilt cylinder clevis pins and bearings at the chassis and mast. Grease the bearings.											
Grease the mast pivot bearings.											
Check forks for wear or damage and check latch pin operation.											
Optional sideshifter only: Perform any common-interval maintenance in Sideshifter Maintenance section.											
Subsequent tasks											
Carry out functional test and test drive.											
Attach maintenance sticker.											

Maintenance at 3000 Hours

At operating hours										Carried out	
3000		9000		15000						✓	✖
Maximum interval											
Dependent on the driving style and operating conditions, but at least after 2, 10 and 14 years of service.											
Preparations											
Clean the truck (if necessary).											
Read out error log and delete.											
Check time and date settings on the indicator unit; adjust if necessary.											
Calibrate the drive potentiometer and joysticks.											
Enter the next maintenance interval.											
Final drive units											
Check both final drive/wheel hub gear units for leaks.											
Change the oil in both final drive/wheel hub gear units.											
Check fastening of drive axle and the final drive/wheel hub gear units.											
Chassis											
Check the mounting fasteners of the OHG, steering axle, and counterweight.											
Check and grease seat rails (if necessary).											
Check for correct operation of the parking brake and readjust if necessary.											
Check wheel fasteners and tighten if necessary.											
Check the release of the multi-disc brake for the towing procedure: press the actuating lever at the brake valve several times.											
Clean the steering axle. For E20P, also grease the tie rods.											
Check condition of steer axle bearings.											
Controls											
Check pedals for smooth action and oil as required.											
Check the bellows on the joysticks.											
Electrics											
Check condition/secure positioning of cables, wiring, connections and connectors.											
Check tightness of conductor rail connections between the power modules and motors.											
Check the battery condition, acid level and acid density.											
Check power module cooling fans for correct operation.											

At operating hours										Carried out	
3000		9000		15000						✓	✖
Clean the drive and pump motor power modules, heat sinks, and cooling fans with compressed air (if necessary).											
Check the main contactor and clean it and nearby components with compressed air.											
Hydraulics											
Check the hydraulic oil level.											
Check the hydraulic system for leaks.											
Check the bleeder valve on the hydraulic tank for correct operation.											
Check the hydraulic control valve for correct operation.											
Check the reeving hose carrier (optional equipment).											
Check the reeving hose pre-tension (optional equipment).											
Change the hydraulic system breather, pressure filter and suction filter.											
Mast											
Check condition, fastening, and function of mast, lift chains, cylinders, & stops.											
Check lift chain stretch and adjust chains if necessary.											
Clean and lubricate the lift chains.											
Clean and check the condition of the tilt cylinder clevis pins and bearings at the chassis and mast. Grease the bearings.											
Grease the mast pivot bearings.											
Check forks for wear or damage and check latch pin operation.											
Optional sideshifter only: Perform any common-interval maintenance in Sideshifter Maintenance section.											
Subsequent tasks											
Carry out functional test and test drive.											
Attach maintenance sticker.											

Maintenance at 6000 Hours

At operating hours										Carried out	
6000		12000		18000						✓	✖
Maximum interval											
Dependent on the driving style and operating conditions, but at least after 3, 6, 9, 15, and 18 years of service.											
Preparations											
Clean the truck (if necessary).											
Read out error log and delete.											
Check time and date settings on the indicator unit; adjust if necessary.											
Calibrate the drive potentiometer and joysticks.											
Enter the next maintenance interval.											
Final drive units											
Check both final drive/wheel hub gear units for leaks.											
Change the oil in both final drive/wheel hub gear units.											
Check fastening of the drive axle and the final drive/wheel hub gear units.											
Chassis											
Check the mounting fasteners of the OHG, steering axle, and counterweight.											
Check and grease seat rails (if necessary).											
Check for correct operation of the parking brake and readjust if necessary.											
Check wheel fasteners and tighten if necessary.											
Check the release of the multi-disc brake for the towing procedure: press the actuating lever at the brake valve several times.											
Clean the steering axle.											
Check condition of steer axle bearings. For E20P, also grease the tie rods.											
Controls											
Check pedals for smooth action and oil as required.											
Check the bellows on the joysticks.											
Electrics											
Check condition/secure positioning of cables, wiring, connections and connectors.											
Check tightness of conductor rail connections between the power modules and motors.											
Check the battery condition, acid level and acid density.											
Check power module cooling fans for correct operation.											

At operating hours										Carried out	
6000		12000		18000						✓	✖
Clean the drive and pump motor power modules, heat sinks, and cooling fans with compressed air (if necessary).											
Check the main contactor and clean it and nearby components with compressed air.											
Hydraulics											
Check the hydraulic system for leaks.											
Check the bleeder valve on the hydraulic tank for correct operation.											
Check the hydraulic control valve for correct operation.											
Check the reeving hose carrier (optional equipment).											
Check the reeving hose pre-tension (optional equipment).											
Change the hydraulic system breather, pressure filter and suction filter.											
Change the hydraulic oil.											
Check the hydraulic oil level.											
Mast											
Check condition, fastening, and function of mast, lift chains, cylinders, & stops.											
Check lift chain stretch and adjust chains if necessary.											
Clean and lubricate the lift chains.											
Clean and check the condition of the tilt cylinder clevis pins and bearings at the chassis and mast. Grease the bearings.											
Grease the mast pivot bearings.											
Check forks for wear or damage and check latch pin operation.											
Optional sideshifter only: Perform any common-interval maintenance in Sideshifter Maintenance section.											
Subsequent tasks											
Carry out functional test and test drive.											
Attach maintenance sticker.											

Sideshifter Maintenance (optional equipment)

The following maintenance items apply only to trucks equipped with the optional sideshifter.

Every 200 hours

- Check for loose or missing bolts, worn or damaged fasteners, hydraulic leaks or damaged fork position notches.
- Check the condition of the upper and lower sideshifter bearings.
- Inspect the lower retaining hooks for wear and proper clearance during operation. Tighten the lower hook bolts to 120 ft-lbs (165 Nm).

Every 600 hours

- Lubricate the upper and lower sideshifter bearings.

Every 2000 hours

- Measure the thickness of the upper and lower sideshifter bearings. Replace all bearings if any one is worn to 3/32 inch (2.5 mm) or less in thickness.

Scheduled Maintenance Summary

DESCRIPTION	1000 hrs	3000 hrs	6000 hrs
Clean the truck	•	•	•
Read out error log and delete	•	•	•
Check time and date settings; adjust if required	•	•	•
Calibrate the drive potentiometer and joysticks	•	•	•
Enter the next maintenance interval	•	•	•
Check both final drive/wheel hub gear units for leaks	•	•	•
Check the drive axle and final drive/wheel hub gear unit fasteners	•	•	•
Check the OHG, steering axle, and counterweight fasteners	•	•	•
Check and grease the seat rails if necessary	•	•	•
Check parking brake operation; adjust if required	•	•	•
Check wheel fasteners and retighten if required	•	•	•
Check the brake release valve for towing	•	•	•
Clean the steering axle; For E20P, also grease the tie rods	•	•	•
Check steer axle bearing condition	•	•	•
Check pedal action for smoothness; oil if required	•	•	•
Check joystick bellows condition	•	•	•
Check condition/secure positioning of cables, wiring, connections and connectors	•	•	•
Check conductor rails between power modules and motors for tightness	•	•	•
Check battery condition, acid level and density	•	•	•
Check power module cooling fan operation	•	•	•
Clean power modules, heat sinks, and fans with compressed air	•	•	•
Check and clean main contactor and nearby components	•	•	•
Check hydraulic oil level	•	•	•
Check hydraulic system for leaks	•	•	•
Check hydraulic tank bleeder valve operation	•	•	•
Check hydraulic control valve operation	•	•	•
Check reeving hose carrier condition (optional equipment)	•	•	•
Check reeving hose pre-tension (optional equipment)	•	•	•
Check condition, fastening, and function of mast, lift chains, cylinders, and stops	•	•	•
Check lift chain stretch and adjust chains if necessary	•	•	•
Clean and lubricate the lift chains	•	•	•
Clean and check the tilt cylinder pins and bearings at the chassis and mast; Grease the bearings	•	•	•
Grease the mast pivot bearings	•	•	•
Check forks for wear or damage and check latch pin operation	•	•	•
Optional sideshifter only: Perform applicable items in Sideshifter Maintenance section	•	•	•
Perform test drive	•	•	•
Attach maintenance sticker	•	•	•
Change final drive/wheel hub gear unit oil		•	•
Change the hydraulic system breather, pressure filter, and suction filter		•	•
Change the hydraulic oil			•

Fluids and Lubricants

Capacities

Assembly	Fluid or Lubricant	Capacity
Hydraulic system	Hydraulic oil	All masts except below: approx. 12.2 qts (11.5 l) For triple masts over 225 in (5700 mm) of lift ht: approx. 14.8 qts (14 l)
Final drive units	Gear oil	approx. 8.5 ozs (250 cc) for each unit

Fluid and Lubricant Specifications

Hydraulic Oil

Original equipment specification

The following grades of hydraulic oil are supplied from the factory as original equipment:

ISO-L-HV 46 as per ISO 6743-4 (for standard trucks)
ISO-L-HV 32 as per ISO 6743-4 (for cold storage trucks)

Other hydraulic oil grades are acceptable based on operating temperature range as follows:

Standard (mean continuous oil temperature 104°F (40C) to 140°F (60C))
ISO-L-HM 46 as per ISO 6743-4

Heavy duty (mean continuous oil temperature over 140°F (60C))
ISO-L-HM 68 as per ISO 6743-4

Light duty (mean continuous oil temperature below 104°F (40C))
ISO-L-HM 32 as per ISO 6743-4

NOTE

Operation across one or more of the above ranges can be covered by one of the following multi-grade hydraulic oils (ie oils having a high viscosity index).

ISO-L-HV 46 as per ISO 6743-4 (this grade is supplied from factory)

CAUTION

If incorrect hydraulic oils are used or mixed, damage to hydraulic components can result.

Use only oils meeting the above specifications.

Bio-hydraulic oil

Fast biodegradable hydraulic fluid Aral Forbex© SE 46

CAUTION

Bio-oils are not compatible with conventional oils. Mixing bio-oil with mineral- or petroleum-based oil may cause extensive damage.

Do not mix bio-oils with other oils.

CAUTION

If unapproved bio-oils are used or mixed with approved oils, extensive damage may result.

Unapproved bio-oils must not be used.

No recommendations for other fluids from other manufacturers can be made at the present time. Recommendations made by oil vendors should also be agreed with by your authorized dealer, however manufacturer's approval only exists for the oils specified above.

Final Drive Unit Gear Oil

Preferably SAE 80W-90 API GL4
also suitable SAE 80W-90 API GL5

Grease

EP (extreme pressure) lithium-based grease with MoS2 rated to 284 °F (140C).

NOTE

Do not mix non-lithium-based greases with lithium-based greases.

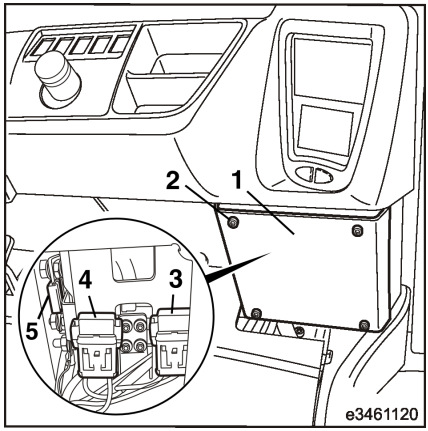
Chain Spray

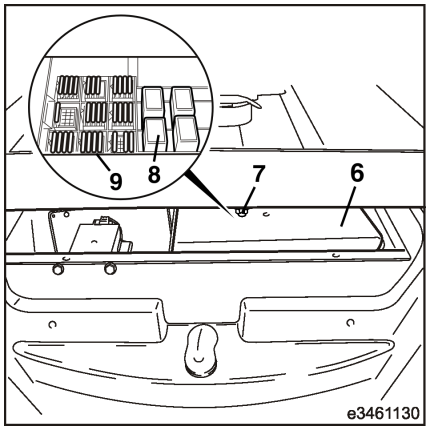
Use a high-quality commercially available penetrating chain spray specifically intended for forklift mast chains. Chains may also be lubricated with SAE 30 motor oil.

Troubleshooting

Fuses

The fuses for this truck are located in two different places. The motor fuses and transformer fuses are located on the main contactor board below the dash on the right-hand side. They can be accessed by removing the four cover nuts (2) and the contactor board cover (1). Fuses(9) and relays (8) for auxiliary equipment (fans, lights, horn, etc.) are located in a fuse box (6) in the electrical compartment in the counterweight.





Motor and Transformer Fuses

The two motor fuses, 1F1 (355A) for the drive motors and 2F1 (300A) (5), for the pump motor, are mounted to side of the main contactor.

The main fuse (4) for the electrical system F1 (30A) and the lighting transformer fuse (3) 9F90 (30A) are also located on the contactor board.

⚠ WARNING

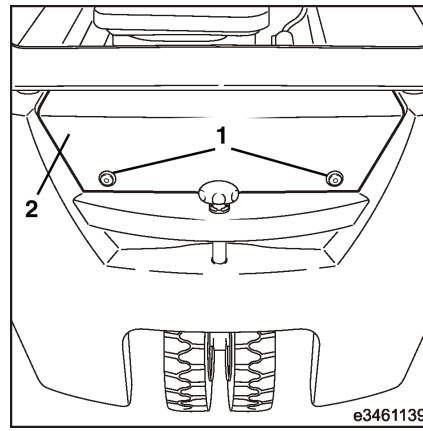
The motor fuses carry very high currents which can cause fire or injury if inappropriately handled or incorrectly installed.

Only trained service personnel should inspect or replace these fuses. The specific installation sequence of cables, hardware, and fuses onto the fuse terminals is vital for proper functioning of the fuses. Incorrect installation sequence of these parts can cause premature fuse failure, overheating, or fire. Refer to the service manual for the motor fuse installation procedure.

Control Fuses

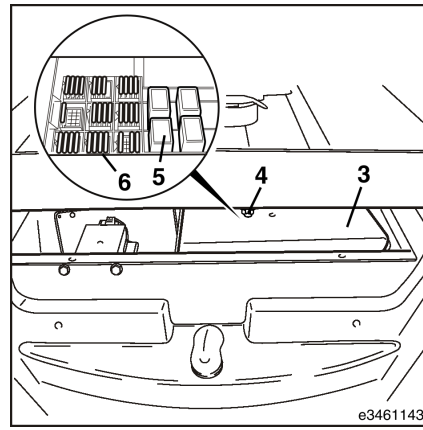
Proceed as follows to access the fuses:

➢ Remove the rear cover (2) from the truck by undoing the screws (1). ▷



➢ Remove the cover screw (4) from the housing cover (3) and remove the cover. ▷

➢ Remove the relevant fuse from the fuse block and check it; change if necessary.



NOTE

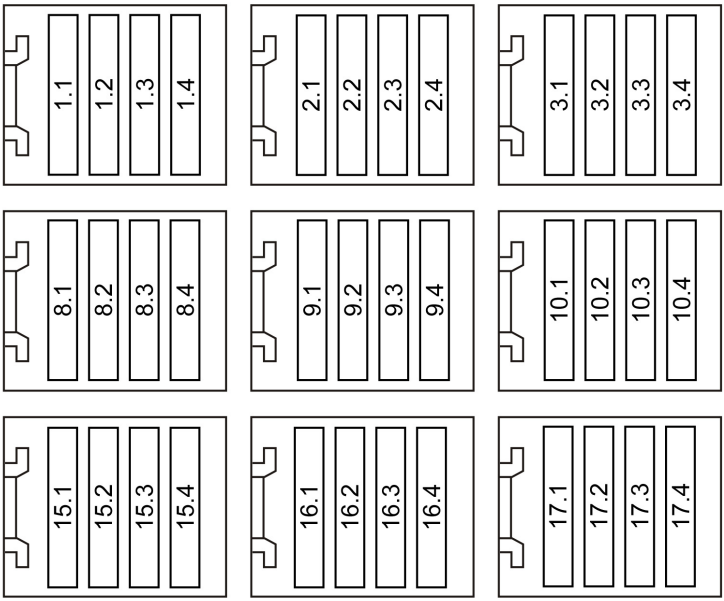
Use only genuine Linde spare fuses.

CAUTION

If the incorrect fuses are used, there is a risk of fire.

Blade fuses with nominal voltages of 32 V, 58 V and 80 V are used. Observe the nominal voltage when changing fuses. Use only genuine Linde spare fuses with a high voltage rating.

Fuse Slot Assignment



346090908-1

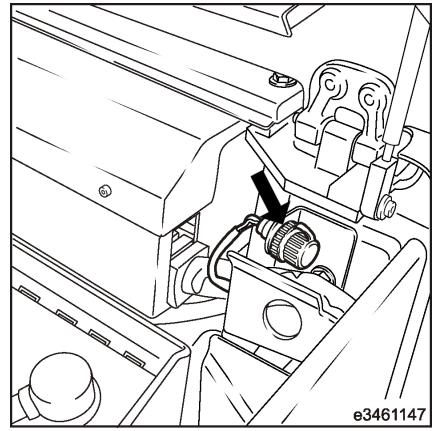
Fuse	Slot	Value	Function
5F43	1.1	5 A / 32 V	Left front working headlight
5F44	1.2	5 A / 32 V	Front right working headlight (standard) and tail light (optional)
5F20	1.3	5 A / 32 V	Brake light (optional)
5F40	1.4	5 A / 32 V	Rear working headlight (optional)
4F50	2.1	5 A / 32 V	Flashing beacon / back-up alarm (optional)
6F60	2.2	5 A / 32 V	Fleet Manager voltage supply (optional)
6F61	2.3	5 A / 32 V	Fleet Manager relay output (truck can be driven) (optional)
9F70	2.4	15A / 32 V	Seat heater (optional)
9F1	3.1	2 A / 58 V	Drive axle fan 9M1
9F2	3.2	2 A / 58 V	Drive axle fan 9M2

Fuse	Slot	Value	Function
9F3	3.3	2 A / 58 V	Drive axle fan 9M3
9F4	3.4	2 A / 58 V	Chassis fan 9M4
9F5	8.1	2A/58V	Contactor fan (optional)
9F91	8.2	1 A / 32 V	70 A relay coil for relay 9K90
4F1	15.1	2A / 58 V	Horn
F2	15.2	15 A / 80 V	Voltage supply for key switch
F3	15.3	2 A / 80 V	Discharge indicator battery voltage
F4	15.4	5 A / 32 V	Voltage transformer 13 V output
2F7	16.1	2 A / 58 V	Capacitor voltage test lead 2A1
2F6	16.2	5 A / 80 V	Charging circuit
F7	16.3	10 A / 80 V	Charging circuit
1F8	16.4	5 A / 80 V	Charging circuit
1F9	17.1	2 A / 58 V	Capacitor voltage test lead 1A1
2F210	17.4	2 A / 58 V	Accumulator charging valve solenoid coil 2Y10

Diagnostic Connector

The diagnostic connector (see arrow) provides an interface with diagnostic software on a laptop computer. The software allows review/editing of performance parameters, readout of fault codes, and resetting of maintenance intervals.

The diagnostic connector is located on the left-hand side of the truck at a holding bracket on the counterweight. It is only accessible after opening the battery cover.

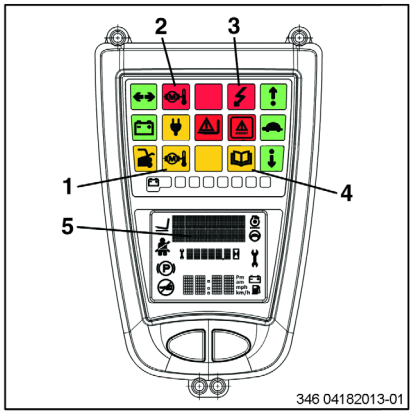


- ➢ Open the battery cover.
- ➢ Remove the cap from the diagnostic connector.
- ➢ Connect the diagnostic cable.

NOTE

After completing the diagnostics, the cap must be screwed back onto the diagnostic connector to prevent moisture from entering.

Malfunction Indicator Lights



⚠ CAUTION

If one of the following fault indicator lights on the indicator unit comes on and the buzzer sounds during operation, a malfunction has occurred.

Appropriate action should be taken as explained in the table below.

A malfunction may be accompanied by a fault code in text field (5). A list of fault code explanations is given in the service manual.

Warning light (1) lights up. Travel speed or hydraulic speed is limited.	
Cause	**Remedy**
A drive motor or pump motor is approaching the temperature limit	Allow motors to cool down as soon as possible

Warning light (2) lights up. Travel speed is further limited or stopped and/or hydraulic operation is locked out.	
Possible cause	**Remedy**
A drive motor or pump motor is too hot	Allow motors to cool down

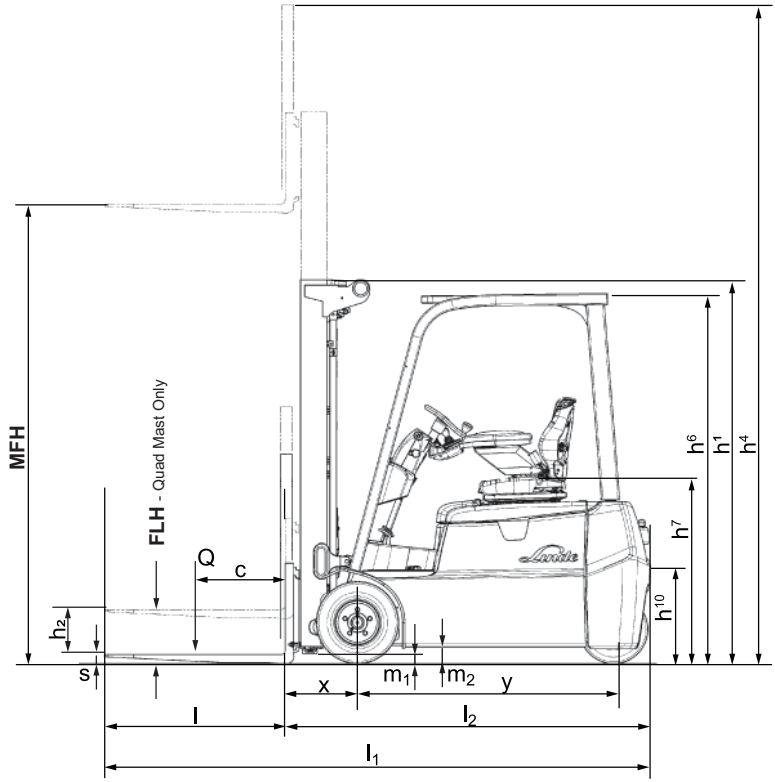
Warning light (3) lights up.	
Possible cause	**Remedy**
Error in electrical control system.	Contact your authorized dealer.

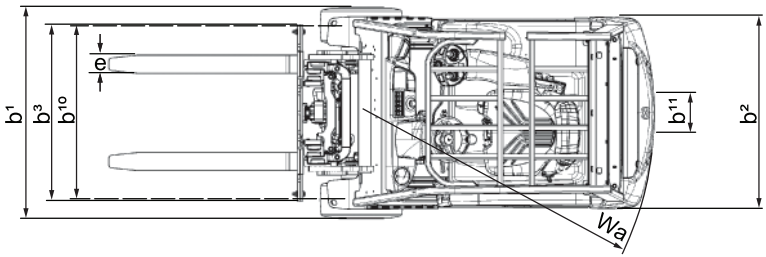
Warning light (4) lights up.	
Possible cause	**Remedy**
Operating control(s) (ie pedals, hydraulic levers, armrest, seat switch) out of correct position during start sequence or operation. Faulty harness connection to pedal group (beneath floorplate).	Check control positions and harness connection to pedals. If the fault cannot be remedied, contact your authorized dealer.

6

Technical data

Specifications





General	E 18	E 20, E 20P
Manufacturer (code designation)	Linde	Linde
Manufacturer's model designation	E 18 (3500 lbs)	E 20 / E 20P (4000 lbs)
Drive: electric, diesel, gas, LPG	Electric	Electric
Operation: manual, accompanied, standing, seated, order picking	Seated	Seated
Nominal load capacity (Q) (May be downrated for certain masts or attachments. Always refer to vehicle data plate.)	3500 lbs	4000 lbs
Load center of gravity distance (c)	24 in (nom) (600 mm)	24 in (nom) (600 mm)
Load distance (x)	15.35 in (390 mm)	15.35 in (390 mm)
Wheelbase (y)	55.91 in (1420 mm)	55.91 in (1420 mm) 61.06 in (1551 mm) for E20P

Weights	E 18	E 20, E 20P
Service weight with minimum battery	Refer to vehicle data plate	Refer to vehicle data plate

Wheels and tires	E 18	E 20, E 20P
Tire type, front and rear	Cushion (SE is optional)	Cushion (SE is optional)
Tire size, front (cushion)	18x7x12-1/8 in	18x7x12-1/8 in
Tire size, rear (cushion)	15x5x11-1/4 in	15x5x11-1/4 in 16x6x10.5 in for E20P
Number of wheels, front / rear (x = driven)	2 x / 2	2 x / 2
Track width, front (cushion) (b10)	35.04 in (890 mm)	35.04 in (890 mm)
Track width, rear (cushion) (b11)	6.61 in (168 mm)	6.61 in (168 mm) 29.80 in (757 mm) for E20P

Dimensions	E 18	E 20, E 20P
Tilt angle, forward / backward Tilt angle, forward / backward (Quad mast)	6.0 / 5.0 degrees 2.0 / 3.0 degrees	6.0 / 5.0 degrees 2.0 / 3.0 degrees
Mast height, fully lowered (h1)	See "Mast Heights" table	See "Mast Heights" table
Free lift stroke (h2) or FLH for quad	See "Mast Heights" table	See "Mast Heights" table
Lift height (MFH)	See "Mast Heights" table	See "Mast Heights" table

Dimensions	E 18	E 20, E 20P
Extended height (h4)	See "Mast Heights" table	See "Mast Heights" table
Height to top of the standard OHG (h6)	80.5 in (2045 mm)	80.5 in (2045 mm)
Seat height (h7)	38.9 in (988 mm)	38.9 in (988 mm)
Coupling height (h10)	23.03 in (585 mm)	23.03 in (585 mm) 22.72 in (577 mm) for E20P
Overall length (l1)	121.65 in (3090 mm)	121.65 in (3090 mm) 127.95 in (3250 mm) for E20P
Length including fork back (l2)	79.53 in (2020 mm)	79.53 in (2020 mm) 85.83 in (2180 mm) for E20P
Overall width, cushion tires / SE tires	42.05 in / 46.14 in (1068 mm / 1172 mm)	42.05 in / 46.14 in (1068 mm / 1172 mm)
Fork arm dimensions (s x e x l)	1.5 x 4 x 42 in (40 x 100 x 1070 mm)	1.5 x 4 x 42 in (40 x 100 x 1070 mm)
Carriage class per ANSI/ITSDF B56 11-4-2005	II A	II A
Carriage width (b3)	38.58 in (980 mm)	38.58 in (980 mm)
Ground clearance beneath mast, with load (m1)	2.95 in (75 mm)	2.95 in (75 mm)
Ground clearance, center of wheelbase (m2)	3.35 in (85 mm)	3.35 in (85 mm)
Aisle width (Ast) (Must add load length and desired clearance)	80 in (2032 mm)	80 in (2032 mm) 85.75 in (2178 mm) for E20P
Turning radius (Wa)	63.78 in (1620 mm)	63.78 in (1620 mm) 70.39 in (1788 mm) for E20P

Performance data	E 18	E 20, E 20P
Maximum driving speed (both with or without load)	8.7 mph (14 km/h) for 36 V	8.7 mph (14 km/h) for 36 V
	10 mph (16.1 km/h) for 48 V	10 mph (16.1 km/h) for 48 V
Lifting speed (36V)	59 fpm (0.30 m/s) with load 89 fpm (0.45 m/s) without load	56 fpm (0.28 m/s) with load 89 fpm (0.45 m/s) without load
Lifting speed (48V)	60 fpm (0.30 m/s) with load 102 fpm (0.52 m/s) without load	60 fpm (0.30 m/s) with load 102 fpm (0.52 m/s) without load

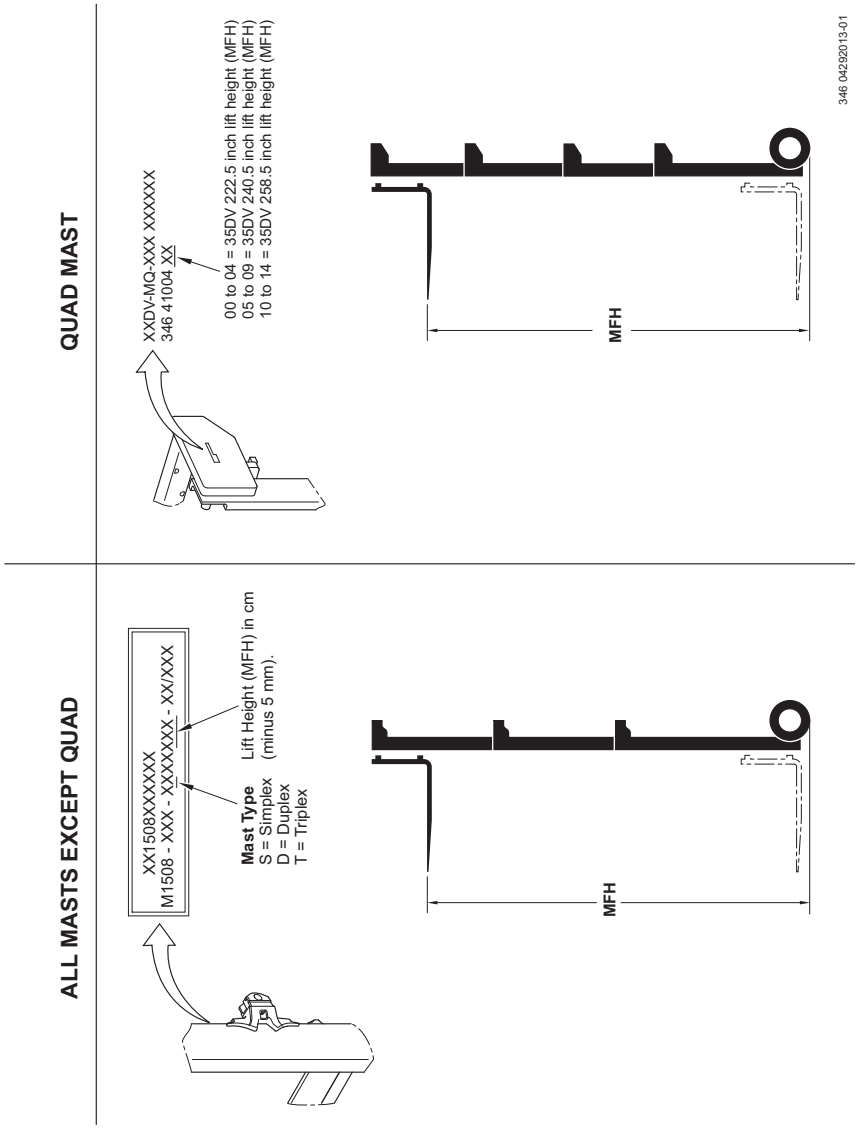
Performance data	E 18	E 20, E 20P
Lowering speed (applies to both 36V and 48V models)	96 fpm (0.48 m/s) with load 78 fpm (40 m/s) without load	96 fpm (0.48 m/s) with load 78 fpm (40 m/s) without load
Sustained pulling force (both with or without load)	1663 lbs (7,392 N) for 36 V	1663 lbs (7,392 N) for 36 V
	2068 lbs (9,192 N) for 48 V	2068 lbs (9,192 N) for 48 V
Maximum pulling force, 5 minute rating (both with or without load)	2450 lbs (10,889 N) for 36 V	2450 lbs (10,889 N) for 36 V
	2200 lbs (9,778 N) for 48 V	2200 lbs (9,778 N) for 48 V
Service brake type	Wet disc	Wet disc

Drive Motors and Battery	E 18	E 20, E 20P
Drive motor power rating (60 min)	2x 5.54 hp (4.13 kW) for 36 V	2x 5.54 hp (4.13 kW) for 36 V
	2x 6.16 hp (4.59 kW) for 48 V	2x 6.16 hp (4.59 kW) for 48 V
Lift motor power rating (15%)	12.06 hp (8.99 kW) for 36 V	12.06 hp (8.99 kW) for 36 V
	13.4 hp (9.99 kW) for 48 V	13.4 hp (9.99 kW) for 48 V
Nominal battery voltage	36 V / 48 V	36 V / 48 V
Maximum battery capacity (6-hour rating)	1000 A-hrs for 36 V 700 A-hrs for 48 V	1000 A-hrs for 36 V 700 A-hrs for 48 V
Battery compartment dimensions without shims or side spacer (length x width)	25.0 x 39.0 in for 36 V (635 x 990 mm)	25.0 x 39.0 in for 36 V (635 x 990 mm)
	24.0 x 39.0 in for 48 V (611 x 990 mm)	24.0 x 39.0 in for 48 V (611 x 990 mm)
Battery compartment height	25.9 in (658 mm) standard 25.6 in (652 mm) with slides 23.6 in (601 mm) with rollers	25.9 in (658 mm) standard 25.6 in (652 mm) with slides 23.6 in (601 mm) with rollers
Minimum battery length (with 1/2 in (12.7 mm) clearance and no shims installed. Smaller batteries may be accommodated with shims as long as total clearance does not exceed 1/2 in.)	24.5 in (622 mm) for 36 V	24.5 in (622 mm) for 36 V
	23.5 in (598 mm) for 48 V	23.5 in (598 mm) for 48 V
Maximum battery length (with 1/4 in (6.3 mm) clearance and no shims installed.)	24.75 in (629 mm) for 36 V	24.75 in (629 mm) for 36 V
	23.75 in (605 mm) for 48 V	23.75 in (605 mm) for 48 V

Drive Motors and Battery	E 18	E 20, E 20P
Minimum battery width (with 1/2 in (12.7 mm) clearance and side spacer installed)	38.1 in (967 mm) for 36 and 48 V	38.1 in (967 mm) for 36 and 48 V
Maximum battery width (with 1/4 in (6.3 mm) clearance and side spacer removed)	38.75 (984 mm) for 36 and 48 V	38.75 (984 mm) for 36 and 48 V
Maximum battery height with 0.2 in (6 mm) clearance (subtract 1.4 in (34 mm) for covered battery)	25.7 in (652 mm) standard 25.4 in (646 mm) with slides 23.4 in (595 mm) with rollers	25.7 in (652 mm) standard 25.4 in (646 mm) with slides 23.4 in (595 mm) with rollers
Minimum battery weight	2155 lbs (977.5 kg)	2155 lbs (977.5 kg)

Miscellaneous	E 18	E 20, E 20P
Working pressure for attachments	2465 psi (171 bar)	2465 psi (171 bar)
Flow rate for attachments	8.45 gpm (32 lpm)	8.45 gpm (32 lpm)

Mast Heights



Height Dimensions

Mast height dimensions in inches are rounded to the nearest 1/2 inch conservatively, ie h1 and h4 are rounded up; h2 and MFH are rounded down. Metric mast height dimensions (mm) are design values. For quad masts, English dimensions are design values. If a mast serial number indicates a height not listed below, then the mast has a custom height and is outside the scope of this manual.

Mast heights - Simple			
	Standard Available Mast Sizes - Simple		
Mast height, fully lowered (h1)	79.7 in (2022 mm)	83.6 in (2122 mm)	91.5 in (2322 mm)
Free lift stroke (h2)	N/A	N/A	N/A
Lift height (MFH)	122 in (3100 mm)	129.9 in (3300 mm)	145.6 in (3700 mm)
Extended height (h4) (with 48-inch LBR)	170 in (4318 mm)	177.9 in (4519 mm)	193.6 in (4918 mm)

Mast heights - Double		
	Standard Available Mast Sizes - Double	
Mast height, fully lowered (h1)	79.7 in (2022 mm)	91.5 in (2323 mm)
Free lift stroke (h2)	55.0 in (1399 mm)	66.9 in (1699 mm)
Lift height (MFH)	117.0 in (2970 mm)	140.5 in (3570 mm)
Extended height (h4) (with 48-inch LBR)	165.0 in (4189 mm)	188.5 in (4789 mm)

Mast heights - Triple								
	Standard Available Mast Sizes - Triple							
Mast height, fully lowered (h1)	77.1 in (1958 mm)	79.1 in (2008 mm)	83.6 in (2123 mm)	87 in (2208 mm)	91 in (2308 mm)	94.9 in (2408 mm)	102.7 in (2608 mm)	106.6 in (2708 mm)
Free lift stroke (h2)	53.5 in (1358 mm)	55.4 in (1408 mm)	59.9 in (1523 mm)	63.3 in (1608 mm)	67.2 in (1708 mm)	71.2 in (1808 mm)	79 in (2008 mm)	83 in (2108 mm)
Lift height (MFH)	168.3 in (4275 mm)	174.2 in (4425 mm)	188 in (4775 mm)	197.8 in (5025 mm)	209.6 in (5325 mm)	213.6 in (5425 mm)	237.2 in (6025 mm)	249 in (6325 mm)
Extended height (h4) (with 48-inch LBR)	216.3 in (5494 mm)	222.2 in (5637 mm)	236 in (5995 mm)	245.8 in (6244 mm)	257.6 in (6544 mm)	261.6 in (6645 mm)	285.2 in (7244 mm)	297 in (7544 mm)

Mast heights - Quad			
	Standard Available Mast Sizes - Quad		
Mast height, fully lowered (h1)	78.5 in (1994 mm)	83.0 in (2108 mm)	89.0 in (2261 mm)
Free lift (FLH)	55.0 in (1397 mm)	59.0 in (1499 mm)	65.0 in (1651 mm)
Lift height (MFH)	222.5 in (5651 mm)	240.5 in (6109 mm)	258.5 in (6566 mm)
Extended height (h4) (with 48-inch LBR)	270.5 in (6871 mm)	288.5 in (7328 mm)	306.5 in (7785 mm)

NUMBERS AND SYMBOLS

A

B

C

D

E

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