Linde Material Handling

1346 series Electric Forklift Truck

Operating Instructions

Models E18S, E20S

1346 series – 13468011540 rev03 US – 8/2018

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 percent lower than those of their competitors.

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

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

Linde 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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5 Maintenance

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. 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.

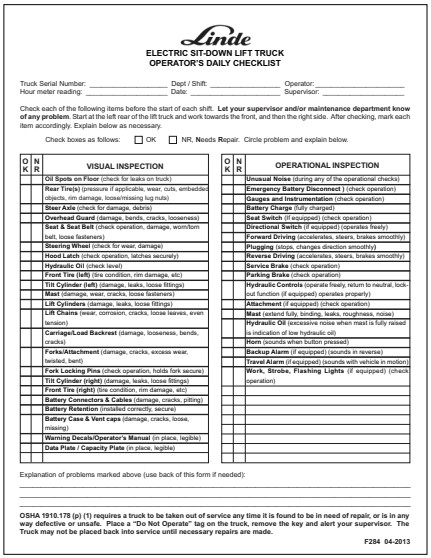
Do not remove, disable or modify any safeguards or other safety devices. These include any alarms, lights, mirrors, overhead guards, and load backrest extensions. If present, an overhead guard is intended to provide protection to the operator from falling objects, but cannot protect from every possible 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 standing on the floor plate with hands and feet inside the operator 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 operator compartment during operation.

Pedestrians

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

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

⚠ DANGER

Risk of injury!

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

⚠ WARNING

Risk of injury!

Do not walk under raised forks at any time.

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⚠ WARNING

Risk of injury!

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

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. Unless you can safely jump completely clear of the falling truck, there is no sure way to avoid injury during tipover or a fall from a dock or dockboard.

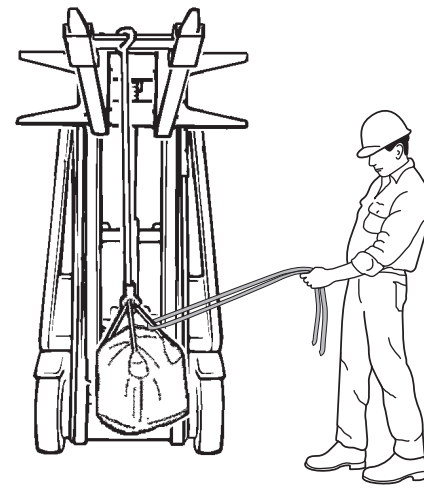
- Never exceed the lifting capacity listed on the data plate.
- Extreme caution should be taken when working around docks, dock boards and trailers.
- Travel with the load or forks close to the ground and tilted back. Watch for overhead obstructions. Perform all truck movements smoothly and at a speed 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.

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

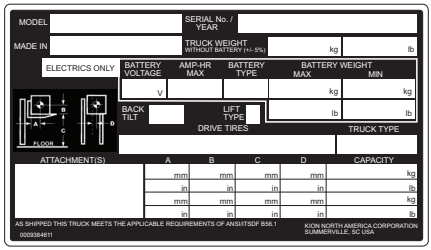
Data plate

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.



Voltage decal

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

Operator warning decal

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

WARNING **STAND-UP 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 from designated operating position. 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. 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.
6. 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.
7. LATERAL OR LONGINTUDINAL 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.
8. 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.

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9. 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.
10. 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.
11. NEVER OVERLOAD - Do not overload truck. Check capacity plate for load weight and load center information.
12. AVOID SUDDEN MOVEMENTS - Start, stop, travel, steer, and brake smoothly. Sudden movements can endanger yourself and others.
13. 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.
14. 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.
15. 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).
16. 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.
17. SLOW DOWN - Observe applicable traffic regulations. Yield right-of-way to pedestrians. Slow down & sound horn at cross aisles and whenever vision is obstructed.
18. WATCH PEOPLE - Do not allow anyone to stand or pass under lifting mechanism, directly behind truck or within rear swing area when turning.
19. WORK PLATFORMS - DO NOT LIFT OR CARRY PERSONNEL USING THE FORKS OF THE TRUCK, not even with a work platform. The truck is designed for transporting, warehousing and stacking of material, not personnel.
20. SHUT DOWN COMPLETELY - Before getting off truck, neutralize travel control, fully lower lifting mechanism and set the parking brake (if equipped). Also shut off power when leaving truck unattended. Block wheels if truck is parked on an incline.

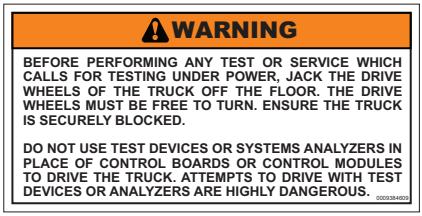
Failure to comply with these warnings will create an unreasonable risk of injury to yourself and others.

Trained operator warning decal

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

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.

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.

Operator warning decals

3

Overview

Technical Description

General

The 1346 series of forklifts are stand-up, counterbalanced electric models (ITA class 1). They are designed for handling loads up to:

3500 lbs for E18S

4000 lbs for E20S

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

There are two separate drive axle units - one on each side of the truck. Each drive axle is comprised of a drive motor and a reduction gear unit. These components are oriented transversely on a common axis with the gear units to the outside of each motor.

Drive motors

The drive motors are three-phase AC asynchronous motors. Each motor stator is attached to its axle housing as a unit.. Power modules for the drive motors are mounted to heat sinks on the front of the chassis. 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 mounted vertically to a bracket in the chassis. 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 motor at the steering axle assembly. The steering direction of the orbital motor 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

Each drive unit is equipped with an electromagnetic brake for parking and emergency stopping. Regenerative motor braking is used for routine service braking.

Electric braking utilizes a regenerative feature that activates whenever the accelerator(control handle) is released to neutral. This provides faster deceleration than simple coasting and puts energy back into the battery that would otherwise be wasted. A foot brake pedal is also provided. Releasing this pedal will also slow the truck via regenerative braking. More severe slowing is available by moving the control handle in the direction opposite that in which the truck is travelling. The degree of deceleration from the regenerative braking function is adjustable through system programming.

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).

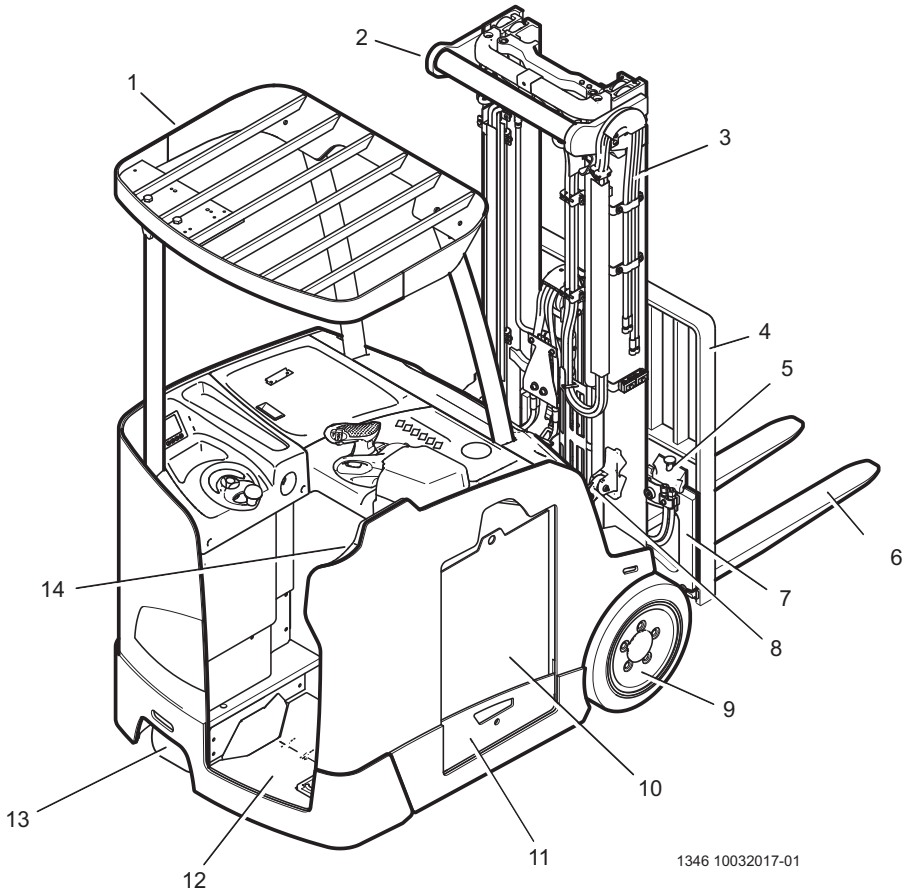
The triple mast maintains the inner and outer uprights of the simple and double masts, but has an intermediate upright added for additional height range. An additional pair of lift cylinders raises and lowers the intermediate upright in the same telescopic relationship to the other uprights as with the 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.

Electrical system

The 1346 utilizes a 36-volt electrical system. The hydraulic pump motor and drive motors are both brushless AC motors. Both drive motors are powered through dedicated power modules. A third power module is dedicated to the hydraulic pump motor. All three power modules are mounted to heat sinks across the front of the chassis. A pair of fans is mounted at the left edge of the chassis to cool the power modules.

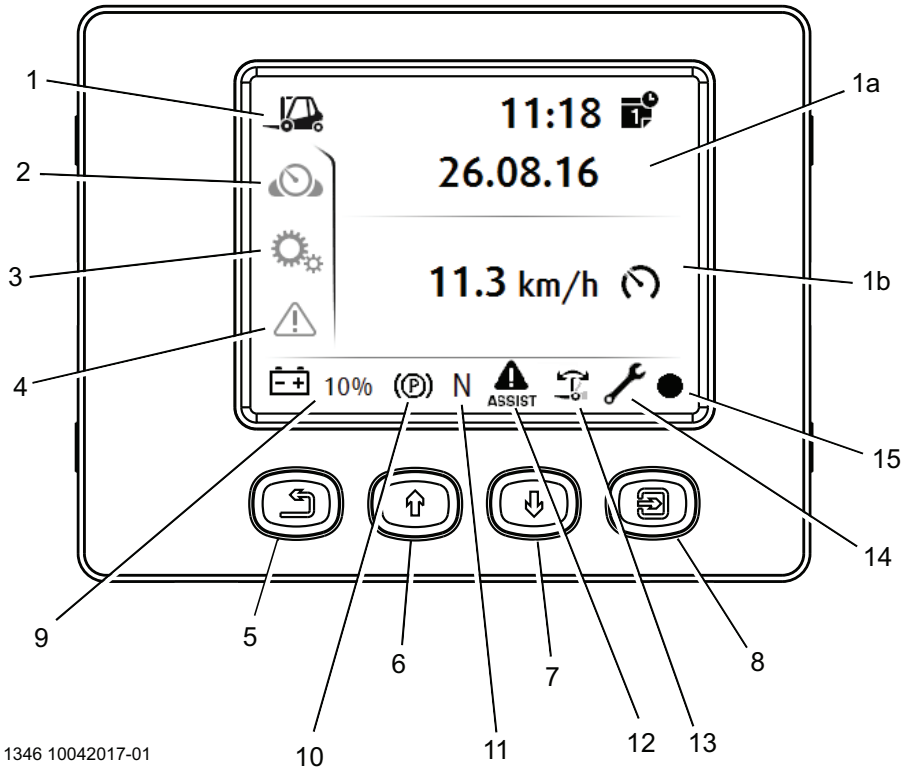
The power modules regulate current to the motors based on input from a main control unit. The main control unit processes signals from sensors, interlocks, and operator controls and generates the appropriate release and speed signals to the power modules through a CAN bus circuit. A second CAN bus circuit 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.

Truck Components



1	Overhead guard	8	Tilt cylinders
2	Mast	9	Drive wheel
3	Auxiliary hydraulic hoses (optional equipment)	10	Battery compartment
4	Load backrest extension	11	Battery retainer
5	Fork latch pin	12	Floor plate/Operator presence pedal
6	Fork arms	13	Steering tire and axle
7	Fork carriage	14	Operator backrest

Display Unit



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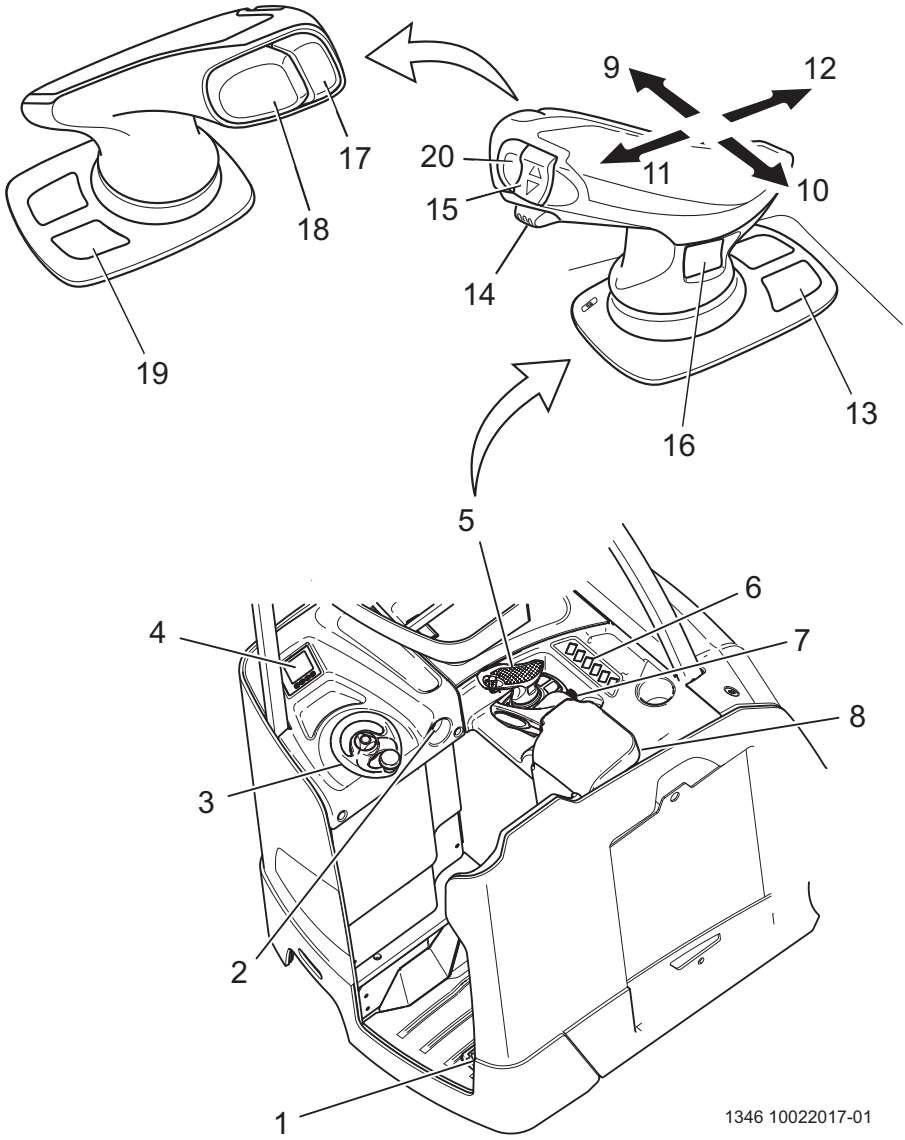
1	Status window icon (shown active above)	8	Enter key
1a	Status window upper section	9	Battery charge status
1b	Status window lower section	10	Parking brake active
2	Speed window icon	11	Travel direction (F, R, or N)
3	Settings window icon	12	Lift limit active
4	Faults window icon	13	Tilt memory active
5	Back key	14	Service due
6	Up/Increase scroll key	15	CAN communication indicator
7	Down/Decrease scroll key		

The display unit is located at the steering wheel and provides the driver with information about the truck. When the ignition switch is turned on, the display unit first conducts a self-test and then transmits information.

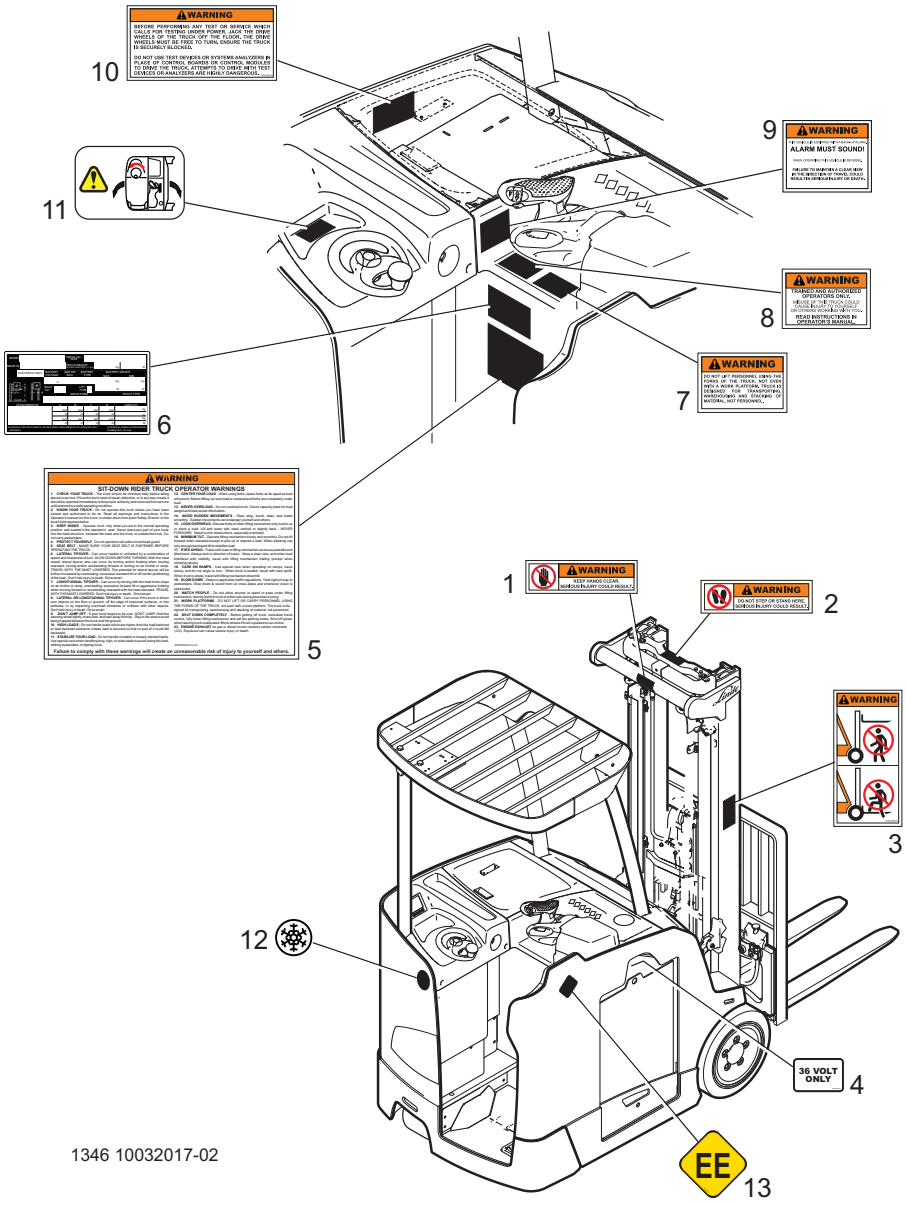
Controls



1	Brake pedal	11	Lift motion*
2	Key switch	12	Lower motion*
3	Steering wheel	13	Travel / Mast control symbol
4	Display unit	14	3rd function control (optional equipment)
5	Multfunction handle	15	Tilt control
6	Accessory switches, (optional equipment)	16	Tilt/3rd function symbol decal
7	Emergency stop button	17	Horn button
8	Armrest adjustment lever	18	Fourth function control (optional equipment)
9	Forward travel motion*	19	Fourth function symbol
10	Reverse travel motion*	20	Tilt memory button (optional equipment)

* The travel axis and mast control axis may be reversed as a special option. Always refer to the Travel / Mast control symbol.

Decal and Data Plate Location



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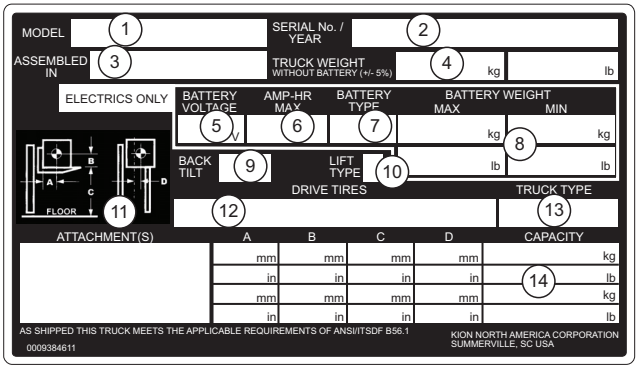
1 Warning Decal, Crushed Fingers
2 Warning Decal, No Step
3 Warning Decal, Personnel/Forks
4 Decal, 36 Volt
5 Warning Decal, Stand-up Rider
6 Data Plate
7 Warning Decal, Do Not Lift Personnel
8 Warning Decal, Trained & Authorized Operator
9 Warning Decal, Back-Up Alarm
10 Warning Decal, Service Work
11 Decal, Reverse Steering (optional equipment)
12 Decal, "Snowflake" (only on trucks equipped with optional cold storage protection)
13 Decal, "EE" (only on trucks equipped with optional EE rated protection for hazardous environments)

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) **ASSEMBLED 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

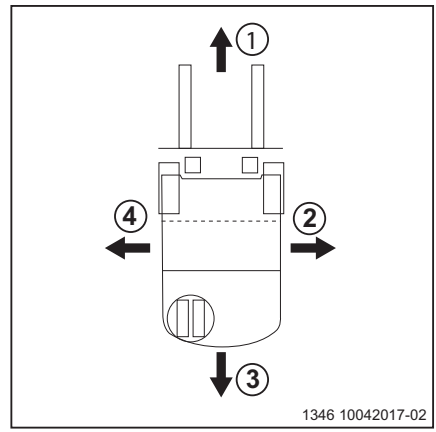
(11) **(Diagram)** – illustrates the dimensions A, B, C, and D used in CAPACITY chart (14).

(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.

Definition of directions



(1) Forward

(2) Right

(3) Reverse

(4) Left

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

Chassis Options

- Solid, cushion, or non-marking tires
- Battery rollers
- Anti-static strap (included with non-marking tires)

4

Operation

Unloading and Preparing a New Truck for Operation

Before placing a new truck into service, perform the Daily Maintenance Inspection as found in the Maintenance section.

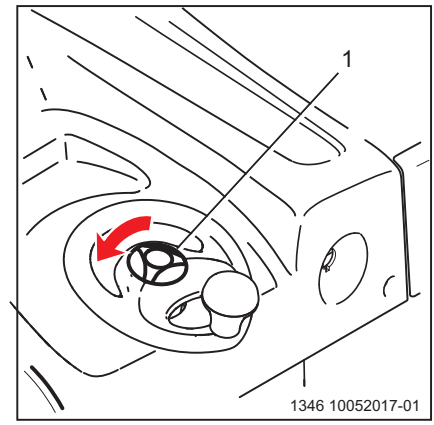
The truck can then be operated at full speed immediately upon being placed in service. However, during the first 50 operating hours, avoid subjecting the drive system or hydraulic system to high continuous loads.

⚠ 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.

Steering Wheel Height Adjustment

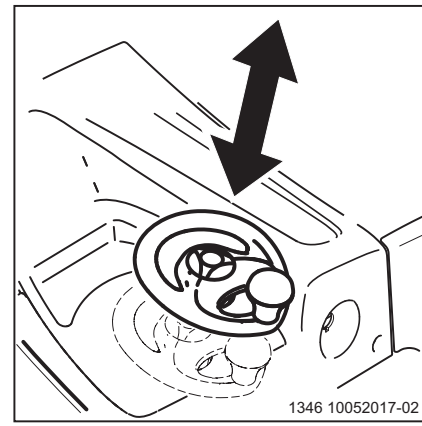


⚠ WARNING

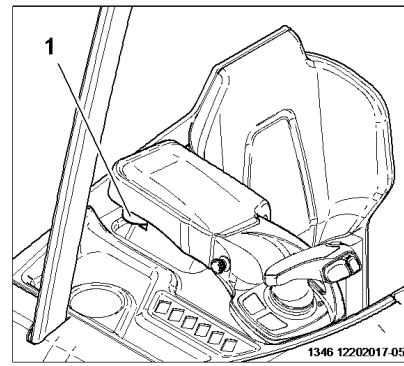
Driving with the height adjustment locking knob loose can cause a collision due to loss of control.

Adjust the steering wheel height only when the vehicle is stationary.

- Loosen the locking knob (1) by turning it counter-clockwise (red arrow).
- Lift or lower the steering wheel into the desired position.
- Tighten the locking knob by turning it clockwise.



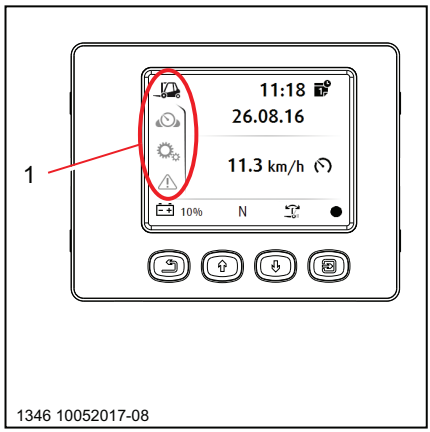
Armrest Adjustment



The armrest can be adjusted vertically to suit the operator using the lever (1).

- Pull upward on the adjusting lever (1) to unlock the adjustment mechanism.
- Push down or lift up on the armrest assembly until a comfortable position is found.
- Release the adjusting lever.

Operating the Display Unit



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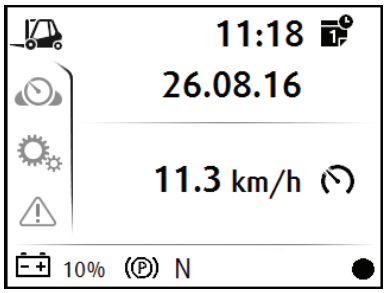
Information in the display unit is shown or configured through four main windows. These windows are represented by four symbols (1) down the left side of the screen. The current window symbol will be highlighted and the others dimmed.

Status Window (Forklift symbol)
Speed Window (Dial symbol)
Settings Window (Gears symbol)
Faults Window (Warning symbol)

The Status window appears by default at start-up after a brief display of a logo window and truck hour window. The other windows may be accessed by using the scroll keys and pressing the enter key when the desired window symbol is highlighted. Always use the back key to return to the previous window.

If an operating condition is not satisfied, a pop-up window with a status message will appear. It will clear automatically when the condition is satisfied.

Status Window



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This window is the default window after the start sequence is complete. The window is divided into an upper section and a lower section. Each section displays one of six available data sets. These data sets are as follows:

Time and date
Battery charge state
Service hours
Battery service hours
Truck speed
Key switch hours

The operator can choose which of these will display in the upper and lower sections.

➢ To select a data set for display, press the enter key and use the scroll keys to highlight the upper or lower section as desired.

➢ With the desired section highlighted, press the enter key again. The highlighted section will begin to flash.

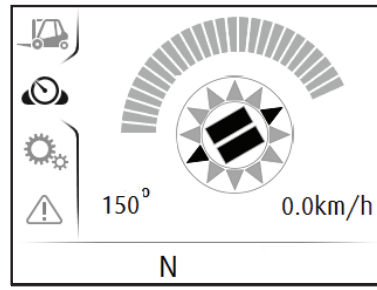
➢ Use the scroll keys to scroll through the data set options until the desired option appears.

➢ Press the enter key a third time to select the displayed option.

The selected data will now appear in the selected (upper or lower) section of the status window whenever the truck is on.

Speed Window

To select the speed window, scroll down to the dial symbol. This window displays the truck speed and steering angle.



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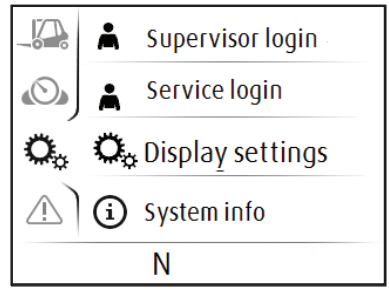
Settings Window

To select the settings window, scroll down to the gears symbol and press the enter key. The settings window has four sub-menus:

1 Supervisor login - for supervisor access
2 Service login - for service access
3 Display settings - explained below
4 System info - read-only values for software version



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These menus are selected with the scroll keys and the enter key.

Display settings

This menu allows the display to be configured as follows:

Language - four choices - highlight with scroll keys and press the enter key.
Units - Imperial or metric - highlight with scroll keys and press the enter key.
Date format - three choices - highlight with scroll keys and press the enter key.
Date - highlight month, day, or year with the scroll keys and press the enter key to make the value flash, then edit with scroll keys.

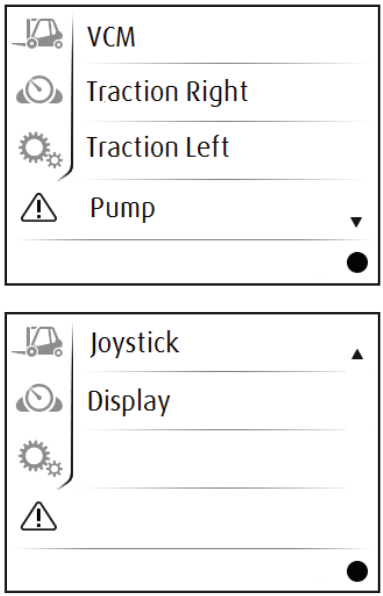
Press the enter key again to accept the new value.
Time - highlight hour, minute, or second with the scroll keys and press the enter key to make the value flash, then edit with scroll keys. Press the enter key again to accept the new value.
Backlight - as a percentage - press the enter key to make the value flash, then edit with scroll keys. Press the enter key to accept the new value.
Restore - restores default display settings.

Faults Window

To select the faults window, scroll down to the warning symbol and press the enter key. The faults window has two sub-menus:

VCM (vehicle control)
Traction Right
Traction Left
Pump
Joystick
Display

If there are active faults, a +++ symbol will be displayed by the relevant menu. Also a plus sign will be present beside the faults window triangle icon at the main level. Use the scroll keys to highlight a choice and press enter. Each choice has two sub-menus (Active error codes and Stored error codes). If an active fault is present, a pop-up window will appear. It may be cleared by pressing the back key. The first fault in the list will be highlighted. Press enter to read the fault description.



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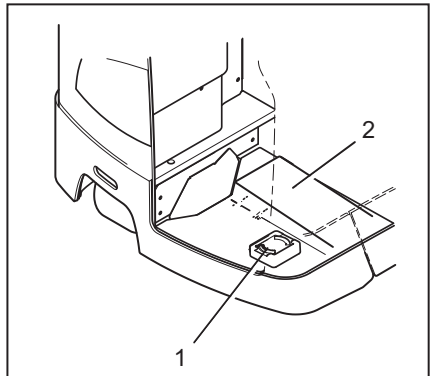
Turning the Truck On and Off ▷



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Switching the Truck On

The multifunction lever must remain in the neutral, released position throughout the startup sequence.

- ➢ Ensure that the emergency stop switch is released. Twist to release if necessary.
- ➢ Insert the key in the key switch and turn it clockwise.

The electrical system is switched on.

- ➢ Check display unit.

NOTE

The truck is equipped with a brake pedal (1) and an operator presence pedal (2) within the floor plate. Both pedals must be cycled after the key is turned on. If either pedal was pressed at start up, release it and then step on it again. Once start up is complete, both pedals must be pressed to operate the truck.

NOTE

After the key switch has been switched on, the display unit performs a self-test. All indicator lights are extinguished on the display unit after approximately 4 seconds.

The truck is now ready for use.

Driving

⚠ WARNING

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

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

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

NOTE

The operator's weight must remain on both the brake pedal and operator presence pedal while driving or the travel function will be disabled.

➢ Slightly raise fork arms and tilt lift mast back.

Forward motion

➢ Note the symbol in position (1) on the multifunction handle. The handle has two axes of operation. One controls travel and the other controls the mast. The standard assignment is shown with symbol A. These axes may be reversed through programming. If this is the case, the assignment is shown with symbol B.

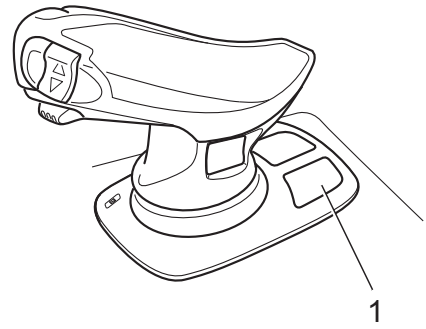
⚠ WARNING

Inadvertent travel operation can cause injury.

Always observe the symbol on the multifunction handle to verify handle function.

➢ Move the multifunction handle in the designated forward direction. For standard configuration this will be toward the left side of the truck. For optional configuration, move it toward the forks.

The direction contactor should close with an audible sound and the parking brake symbol in the display should go out. The driving speed of the forklift truck will increase the further the handle is moved.



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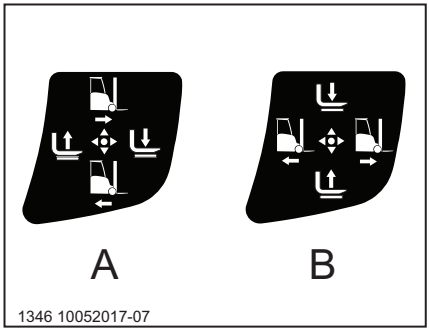

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NOTE

The maximum acceleration rate is set by the main control unit.

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

Reverse motion

- Move the multifunction handle in the designated reverse direction. For standard configuration this will be toward the right side of the truck. For optional configuration, move it toward the rear.

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

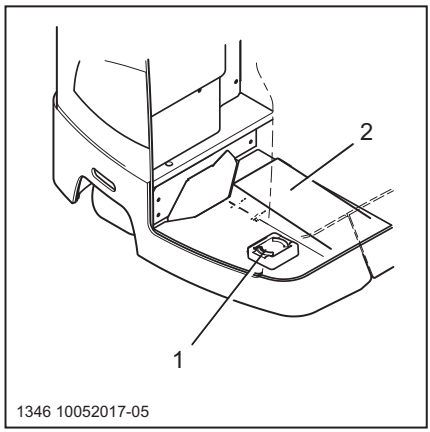
Changing direction

- Move the multifunction handle to the opposite direction of travel.

The truck will be electrically braked until stationary. If the handle is not released, the truck will then accelerate in the new direction.

Braking

The truck has electric braking built in to the motor control equipment as well as an electromagnetic parking brake in each drive unit. Electric braking is controlled by the position of the multifunction handle. Electric braking can also be applied by releasing a brake pedal on the floor plate.



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Electric braking

There are two modes of electric braking. The first mode activates when the truck is in motion and the multifunction handle is simply released to the neutral position as if coasting. The second mode activates when, after the handle is released, it is moved further in the opposing direction. The braking force is greater with the second mode than with the first. The second mode is sometimes referred to as "plugging". Both modes are regenerative and therefore convert truck momentum back into energy to recharge the battery. The amount of braking force that occurs in each of these modes is adjustable in the truck control program. 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.

➢ While travelling, release the multifunction handle.

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

NOTE

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

➢ While travelling, move the multifunction handle to the opposite direction until the truck has been electrically braked to a stop.

The truck will slow to a stop faster than if the handle is simply released. After stopping,

the truck will accelerate in the new direction unless the handle is then released.

Brake Pedal

The brake pedal (1) can also be used to slow the truck. It is located on the floor plate and is intended to be operated using the left foot. Releasing the pedal will slow the truck with maximum regenerative braking. During operation other than braking, the pedal must remain depressed for the travel function to operate.

Operator Presence Pedal

An operator presence pedal (2) is located on the floor plate and is intended to be operated using the right foot. This pedal must remain depressed during truck operation. Releasing the pedal will disable drive and hydraulic functions. If the truck is moving, it will brake to a stop and the parking brake will engage.

Parking Brake

The truck is equipped with an electromagnetic parking brake in each drive unit. These brakes are fully automatic. They will engage whenever the truck is switched off or remains at rest for more than one second. If the truck is on, the parking brake symbol will appear in the display unit whenever the parking brake is engaged.

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.

⚠ WARNING

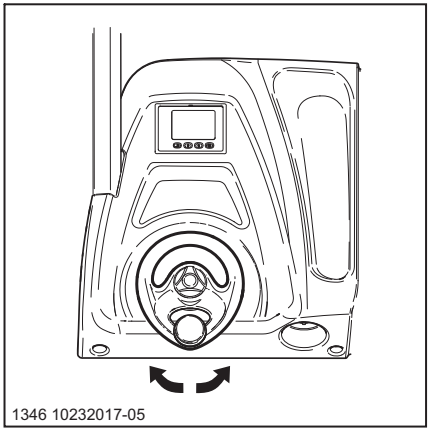
Some trucks may be equipped with a reverse steering option that produces steering motion opposite that of standard trucks.

Always operate the truck at low speed until familiarity with the steering system is ensured.

Reverse Steering (optional equipment)

The truck may be equipped with an optional reverse steering arrangement. On trucks equipped with the reverse steering option, steering wheel motion will produce steering direction opposite that described above. Turning the steering wheel clockwise will produce a left turn. Moving it counter-clockwise will produce a right turn.

On trucks equipped with the reverse steering system, a special reverse steering decal (1) will be present.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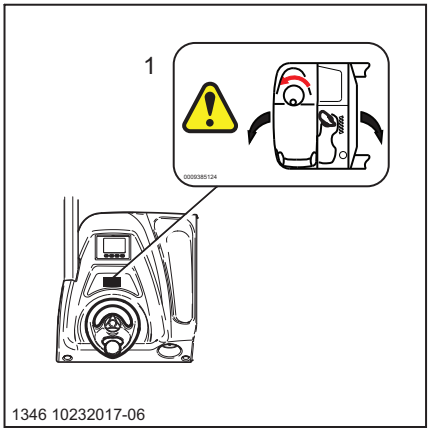

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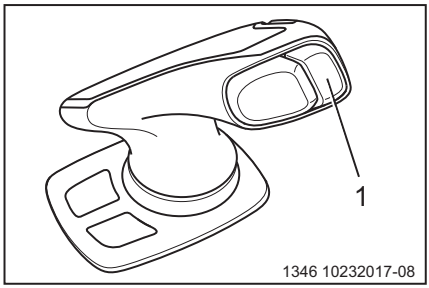
Horn

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

➢ Press the horn button (1) on the multifunction handle to sound the horn.



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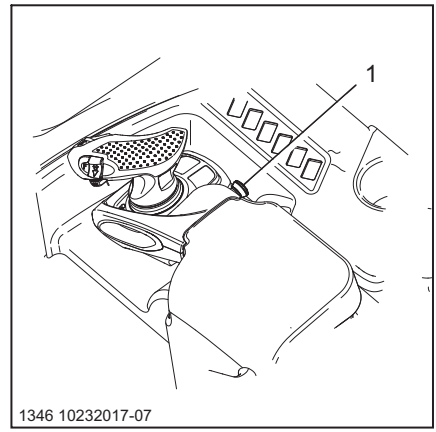
Emergency Stop Switch

Pushing the emergency stop button (1) in will interrupt drive and hydraulic function. The emergency stop switch will open and the electromagnetic parking brakes will be immediately applied. The truck will decelerate to a stop. Also, increased effort will be required to turn the steering wheel.



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⚠ WARNING

If the emergency stop switch is operated while in motion, the truck will decelerate without power assisted steering. More effort will be required for steering. Stopping distance may be longer than normal. For these reasons there may be an increased risk of collision.

Always be prepared to increase the steering effort if the emergency stop button is pressed.

⚠ WARNING

The emergency stop switch will not isolate the entire electrical system. In order to remove power from the entire truck electrical system, the battery must be disconnected at the battery connector.

Always disconnect the battery at the battery connector before any maintenance, repair or other activity requiring a completely de-energized truck.

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.

To resume operation, ensure that the multi-function handle is released to the neutral position. Twist the emergency stop button slightly until it springs out to the normal position.

Fork Position Adjustment

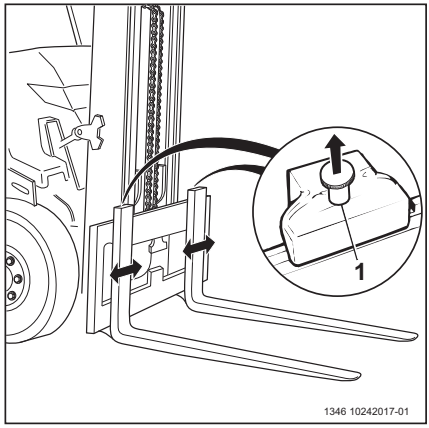
⚠ WARNING

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

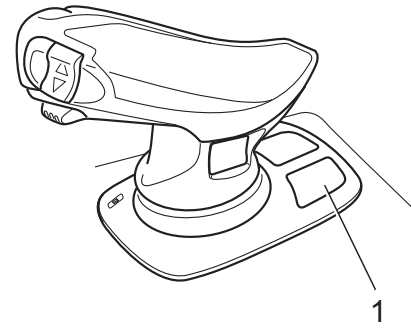
⚠ WARNING

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.

NOTE

The operator's weight must remain on the operator presence pedal or the hydraulic functions will be disabled.



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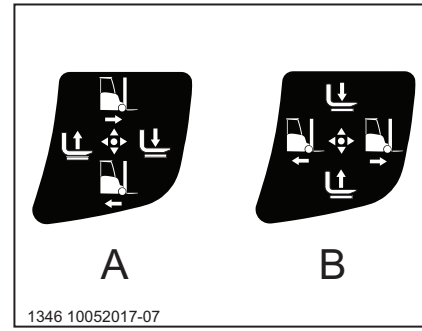

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Mast Operation

Raising the mast

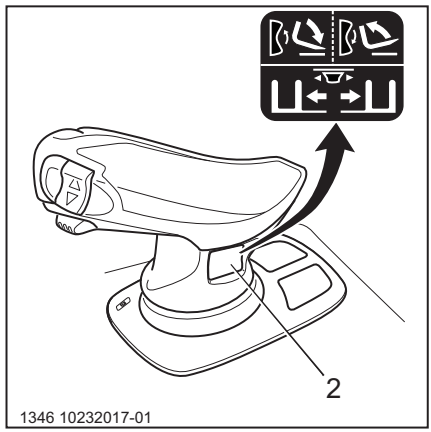
- Note the symbol in position (1) on the multifunction handle. The handle has two axes of operation. One controls travel and the other controls the mast. The standard assignment is shown with symbol A. These axes may be reversed through programming. If this is the case, the assignment is shown with symbol B.
- Move the multifunction handle in the designated lifting direction. For standard configuration this will be toward the rear. For optional configuration, move it toward the right side of the truck.

Lowering the mast

- Move the multifunction handle in the designated lowering direction. For standard configuration this will be toward the forks. For optional configuration, move it toward the left side of the truck.

Tilt and 3rd Function

Note the symbol in position (2) on the multi-function handle. The symbols above the line refer to tilt control. The symbols below the line refer to sideshift or other 3rd function control.

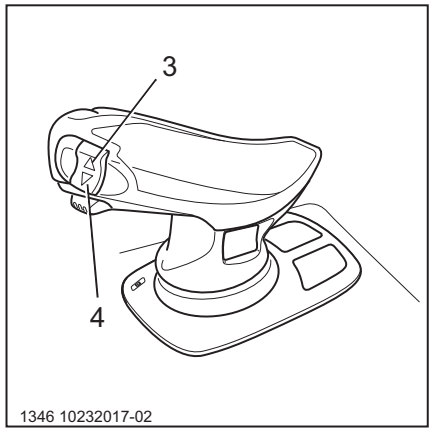


Tilting Forward

➢ Press the button (3).

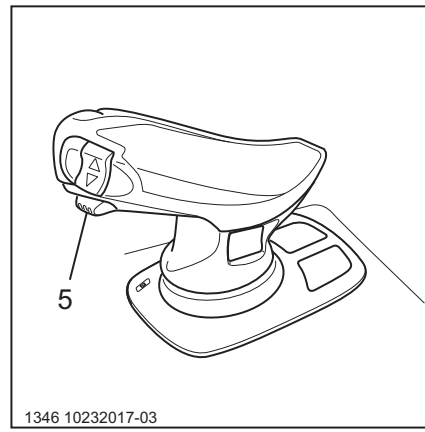
Tilting Back

➢ Press the button (4).



Operating the Sideshift or 3rd function (optional equipment)

- Push the side shift button (5) to the left to move the fork carriage to the left.
- Push the side shift button to the right to move the fork carriage to the right.



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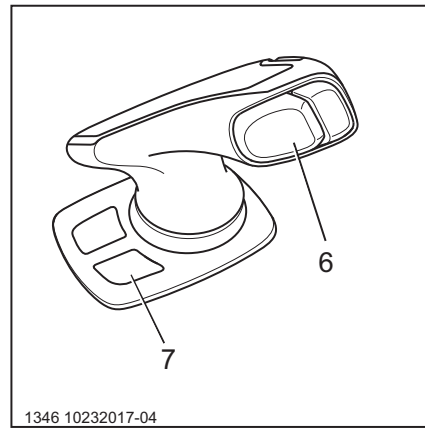
Operating the 4th function (optional equipment)

The fourth function is operated with a toggle switch (6) on the side of the multifunction handle opposite the tilt and side shift switches. A variety of attachments may be present as fourth function. If a fourth function is present, the symbol in position (7) will describe its operation.



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Lights and Back-Up Alarm

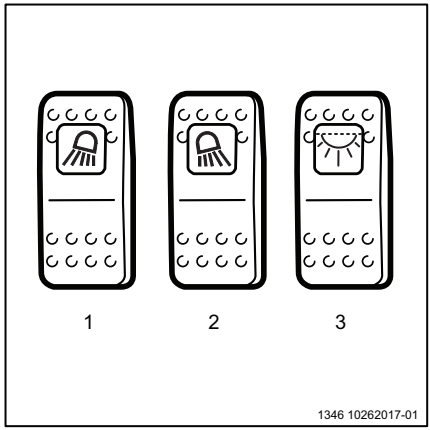
The truck is equipped with two headlights and a flashing beacon as standard equipment. Additionally, a dome light, a rear work light, and/or a rear spotlight are available as individual options. Lights may be configured to operate from a switch on the dash or continuously whenever the key switch is on. 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 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.



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 (1) is used to turn the front working headlights (4) on and off.

The toggle switch (2) is used to control the rear work lights (5). In its center position, this switch will allow the rear 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.

The toggle switch (3) is used to turn the optional dome light (6) on and off.

NOTE

The other toggle switch positions are provided for optional additional functions.

Lighting Arrangement

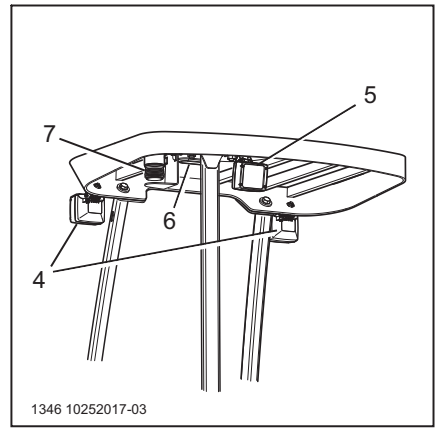
The lights (and the optional back-up alarm) are mounted to the overhead guard.

(4) Front work lights

(5) Rear work light or spot light (one or two optional)

(6) Dome light (optional)

(7) Flashing beacon

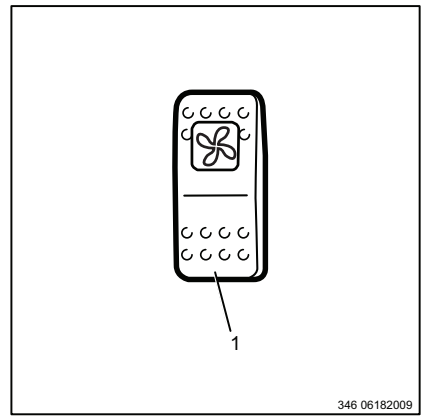


Back-Up Alarm

A back-up alarm (optional) is configured to automatically operate when the truck is travelling in reverse. This alarm unit is mounted to the lower left front of the chassis. The alarm can also be configured to operate as a motion alarm. In this case it will operate in both forward or reverse.

Fan (optional equipment)

A cooling fan for the operator is available as an option. The fan is mounted to the overhead guard at the rear support leg. Use toggle switch (1) to turn the fan on or off.



Tilt Memory (optional equipment)

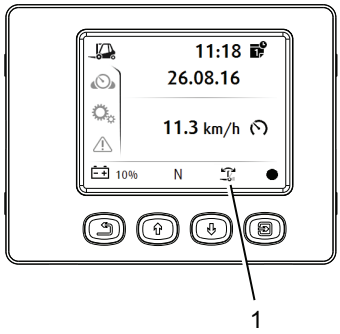
The tilt memory option allows the mast to be rapidly and consistently tilted to a pre-set angle.

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 button (3) as during normal tilting. Tilt motion is therefore under operator control at all times.*



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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) on the multifunction handle for more than 2 seconds.

The angle of tilt is now stored in the system memory. The tone sounds and a confirmation message appears in the display.

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.

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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.

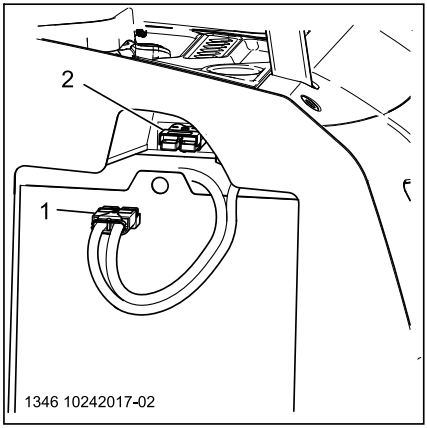
- Briefly depress button (2) on the multifunction handle. The lamp in the button comes on and the tilt memory function is now active. Do not hold the button down or the reference angle will be reset.
- Operate the tilt button (3) in the direction of the pre-set reference angle. When the mast reaches the pre-set reference angle, tilting will stop automatically.

NOTE

The tilt memory function will apply regardless of tilt direction.

- If further tilting is desired, release button (3) briefly and then press it again to override the memory.
- To deactivate the tilt memory function, press button (2) briefly. The symbol (1) in the display will disappear.
- The mast can now be tilted normally with the tilt button.
- Briefly depress button (2) again to reactivate the tilt memory function as required.

Changing the Battery



⚠ WARNING

Specialized training is required to handle batteries safely.

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

The truck is equipped with battery rollers so that the battery can be changed using conventional battery stands with rollers.

⚠ WARNING

If any battery handling equipment (lifting equipment or stands) used to change a battery has insufficient load carrying capability, 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.
- ➢ Switch off the key switch.
- ➢ Press the emergency stop button.
- ➢ Pull the battery plug (1) out of the battery socket (2).

⚠ 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.

- ➢ Position a battery stand beside the truck to receive the battery. Ensure that its height

is even with the bottom of the truck battery. Batteries may be removed or installed from either side of the truck.

- Remove the battery retainer from the side on which the battery is being removed. If necessary, loosen the lateral adjustment stop on the right-hand battery retainer to unload the battery retainers.
- Ensure that the battery cable is free and not in danger of becoming pinched during removal.
- Grasp the battery and slowly slide it out onto the battery stand.
- Check the battery for leaking acid, cracked housing or raised plates.
- Check that the battery plug and cable are in good condition and store 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.

- Position a new battery on a stand at proper height beside the truck.
- Ensure that the battery retainer on the opposite side is in place.
- Carefully slide the replacement battery into the battery compartment. Ensure that it is firmly against the opposite retainer.
- Install the remaining battery retainer. Adjust the lateral adjustment stop if necessary to ensure the battery is secure.
- Plug the battery plug (1) into the battery connector socket(2).

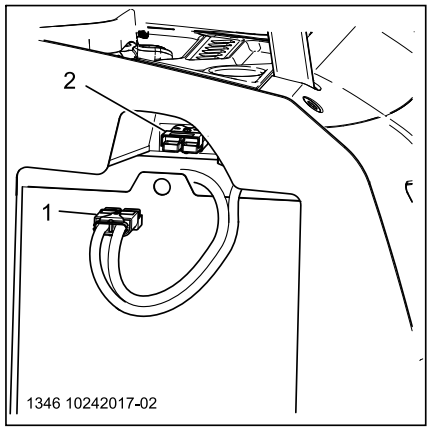
➢ Twist the emergency stop button slightly until it springs out. The truck is now ready for service.

⚠ 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.

Manual Lowering of Fork Carriage

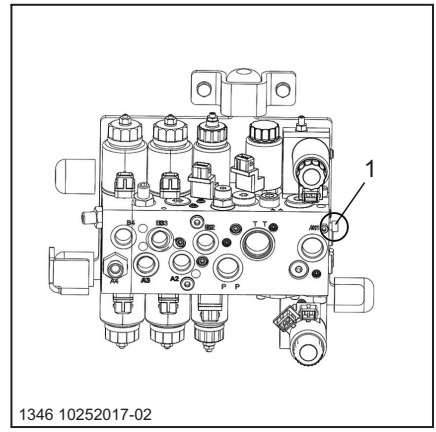
If a malfunction occurs in the hydraulic system, the fork carriage can be lowered manually.

For this purpose, a manual lowering screw (1) is located on the side of the control valve block. A 4 mm Allen wrench is necessary to turn the screw.

⚠ 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.



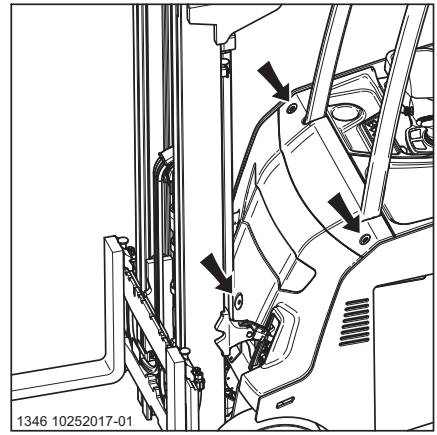
In order to access the manual lowering screw , the front cover must be removed.

➢ Unscrew the three mounting screws (arrows)) on the front cover and remove the cover.

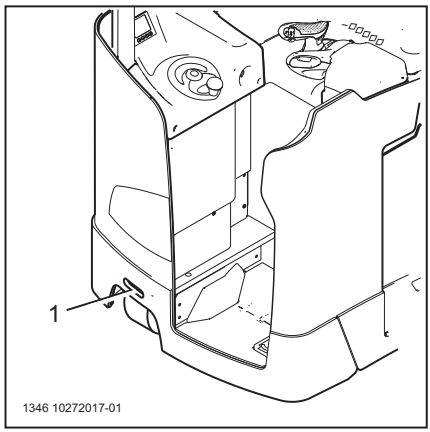
➢ Slowly turn the emergency lowering screw (1) approximately one and one half turns counter-clockwise. The carriage will begin to lower slowly.

➢ After the lowering is complete, turn the screw back in clockwise and tighten to 11 ft-lb (15 Nm). This must be done to restore normal mast operation.

➢ Reinstall the front cover.



Towing the Truck



- 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 tie-down hole (1) at the rear of the chassis.
- Switch the truck on.
- A driver must steer the truck during towing.
- Do not exceed the permissible running speed when towing the truck.

Brake release with non-functional electrical system

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.

If the electrical system is not functional, the truck battery may be used to release the parking brake. A special Linde adapter harness is required to bypass the truck electrical system and connect directly to the parking brake coils.

- Switch the truck off and disconnect the battery.

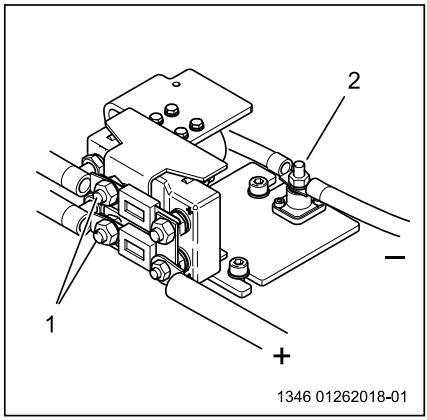
⚠ WARNING

Connecting to the electrical system while the battery is connected can result in injury or damage.

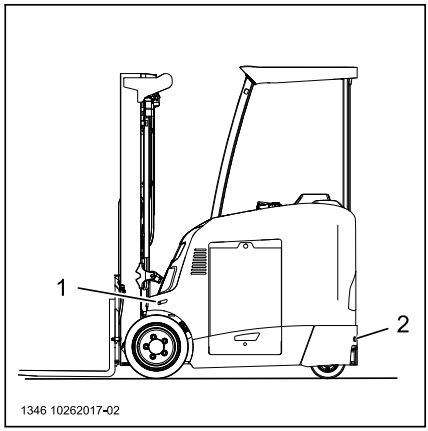
Always disconnect the battery before connecting to the truck electrical system.

- Remove the clipboard panel.
- Locate wiring connectors 1X3 and 1X4 near the fuse box.
- Separate the connectors and connect the adapter harness.

- At the opposite end of the harness, connect the positive wire to either one of the fused positive terminals (1) at the contactor. Ensure correct polarity as indicated on the harness. Connect the negative wire of the harness to the negative terminal post (2). ▷
- Reconnect the battery.
- The brake should release upon connection and the truck may be towed.



Securing the Truck for Transport



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

⚠ WARNING

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

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

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

⚠ WARNING

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

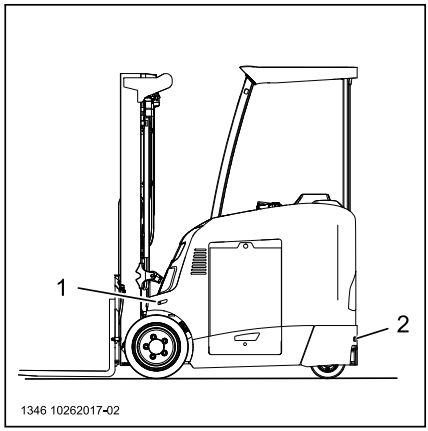
Read and understand all safety information in Section 2 before driving the truck onto a transport vehicle. Remain aware of truck position at all times especially if turning. If possible, align the truck with the transport vehicle so that it can be driven straight onto it without turning. Drive very slowly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

- ➢ Once the truck is in position, lower the mast completely.
- ➢ Disconnect the battery.
- ➢ Attach lashing straps or tie-downs to the front of the truck at the holes (1) in each side of the chassis above the front wheels.
- ➢ Attach lashing straps or tie-downs to the rear of the truck at the hole in the chassis (2) just above the rear wheel.

- 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 tie-down holes above each front wheel (1) and at the rear (2) to provide a three-point lifting arrangement.
- Adjust the slings and lifting device so that they will not contact the overhead guard during the lifting process. Use a spreader bar if necessary to avoid contact between the overhead guard and any lifting slings or other equipment.

⚠ 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.

Long term storage

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 cooling fins on drive axles or electric motors. On motors or other electric components, remove caked deposits from cooling fins and heat sinks with a cloth.

Clean all oil filler openings and the surrounding areas. Always clean grease fittings 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 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.

Operator Inspection and Maintenance

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 STAND-UP COUNTER BALANCE 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, Chain, or other mechanism (check for damage, debris)
		Overhead Guard (damage, bends, cracks, looseness)
		Steering Wheel (check for wear, damage)
		Speed Control Handle (check for wear, damage)
		Front Tire (left) (tire condition, rim damage, etc)
		Tilt Cylinder (left) (damage, leaks, loose fittings)
		Hydraulic Oil (check level)
		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 Stop Switch (check operation)
		Gauges and Instrumentation (check operation)
		Battery Charge (fully charged)
		Operator Presence 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 retention

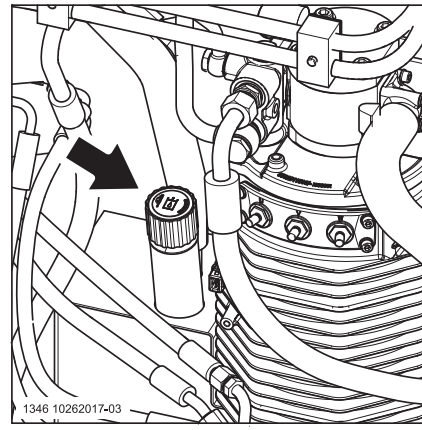
Ensure that all battery retention devices are in place, undamaged, and hold the battery firmly.

Check battery connector

Inspect the battery connector and its cables for damage.

Check hydraulic oil level

- Park the truck on level ground. Ensure that hydraulic system oil is cool.
- Lower the fork carriage completely.
- A dipstick is attached to the underside of the breather filter cap (arrow) on the hydraulic oil tank. Pull out the cap and withdraw the dipstick from the tank.



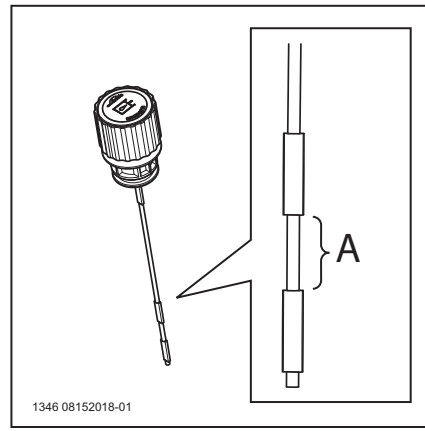
NOTE

The tank is slightly pressurized so a small amount of air may be heard escaping.

- Wipe the dipstick with a clean cloth.

The dipstick has two flat sections on it. The oil level should be in the narrow portion of the dipstick between the flat sections (range A).

- Insert the dipstick back into the tank and seat the breather cap fully.
- Remove it again and observe the oil level. If necessary, add hydraulic oil through the dipstick tube until the level is correct.



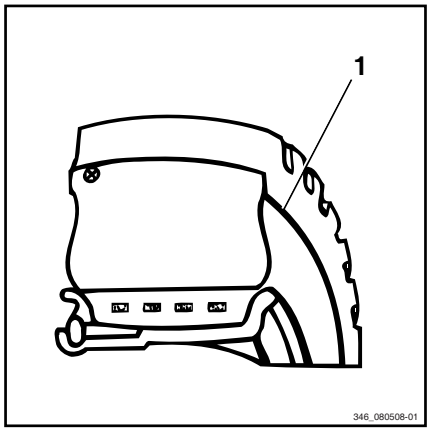
WARNING

Hydraulic oil is flammable.

Do not allow hydraulic oil to contact hot components. Use care when adding oil to avoid spilling.

- Reinstall the dipstick when finished and seat the breather cap fully.

Check 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 wheels:	155 ft-lb (210 Nm)
Steer wheels:	92 ft-lb (125 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 steering axle

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

Check for lubricant leakage at the top of the steering spindle as well as the inside and outside of both steer wheel hubs.

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 multifunction handle bellows

Inspect the flexible bellows on the multifunction handle 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.

Operational checks

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

- Emergency stop button
- Parking brake
- Operator presence switch
- Multi-function display/battery discharge indicator
- Working lights
- Horn
- Forward and reverse travel
- Back-up alarm if equipped
- Brake pedal

- Electric braking (if applicable)
- Mast, tilt, and any other hydraulic functions (operate through complete range of motion)

⚠ CAUTION

Excessive noise during hydraulic function operation indicates low hydraulic fluid.

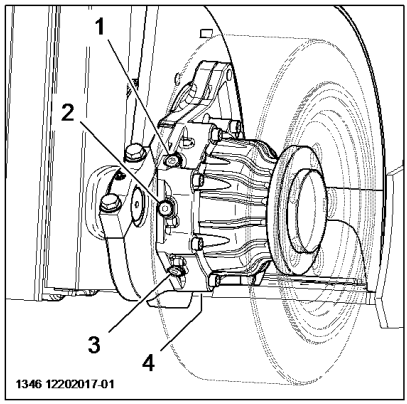
This condition must be checked and corrected immediately to avoid damage to the hydraulic pump.

Routine Lubrication and Inspection

Routine Lubrication and Inspection Intervals

The items in this section must be performed based on usage and environment. They do not need to be performed daily but may require completion more frequently than the major scheduled maintenance intervals. These intervals can often be based on maintenance experience by those familiar with equipment in the given environment. Intervals given herein for specific items however must not be exceeded in any case. Your Linde dealer will be able to provide application-specfic interval recommendations if required.

Checking Gear Oil Level



The truck has two separate gear units, one on each side of the truck. Each gear unit has four plugs on the forward part of the housing as described below:

- 1 Filler plug
- 2 Level plug
- 3 Not used
- 4 Drain plug (magnetic)

➢ Park the truck and raise the fork carriage enough to allow access to the drive units. Secure the carriage against unexpected lowering.

➢ Turn off the truck and apply the parking brake.

➢ Clean the area around the level plug (2) and remove it.

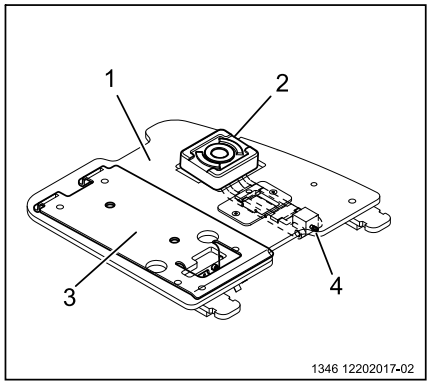
Oil level must reach the bottom of the level plug opening.

Add gearbox oil as required via filler plug (1).

➢ Install the level plug and tighten to 17 ft-lbs (23 Nm). Tighten the filler plug to the same torque value if removed.

➢ Repeat this procedure for the other side of the truck.

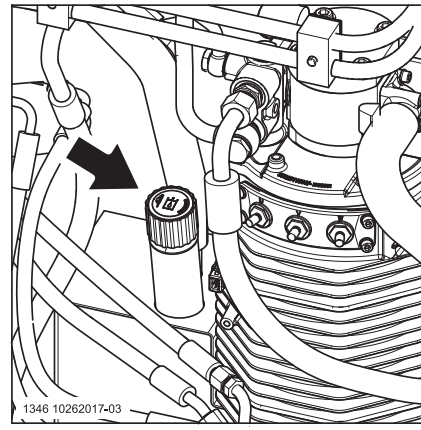
Checking Pedals



The floor plate assembly consists of the floor plate (1), the brake pedal (2), and the operator presence pedal (3).

- Ensure the truck is switched off.
- Remove the rubber floor mat. Inspect it for damage or oil contamination and clean or replace it as necessary.
- Lift the right side of the floor plate up enough to access the wiring connectors 1S1 (brake pedal switch) and !S2 (operator presence switch). If the connector markings are not legible, mark the connectors as necessary and disconnect the wiring.
- Lift out the floor plate assembly. Note the position of the two floor plate springs in the chassis and inspect them for damage.
- Inspect the pedals for smooth operation and spring return. Ensure that the switch for each pedal activates approximately mid-way through the range of motion.
- Lubricate the brake pedal pivot bushings at the grease fitting (4).
- To install the floor plate assembly, align the tabs with the slots in the chassis.
- Reconnect the wiring connectors.
- Ensure the floor plate springs are in place and lower the floor plate assembly into position. Ensure that the floor plate assembly has free movement and strong spring return.
- Replace the floor mat.

Hydraulic Tank Pressure Valve Test ▷



The breather filter (arrow) is equipped with a bleeder valve that permits a slight over pressure in the tank.

- ➢ Switch on the truck.
- ➢ Extend the lift mast to the stop and lower it again; repeat this step several times.
- ➢ Switch off the truck.
- ➢ Release the breather filter by slowly rotating the dipstick assembly a half-turn counter-clockwise.

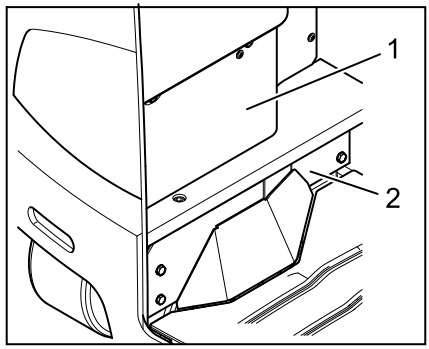
It must be possible to hear air escaping from the tank.

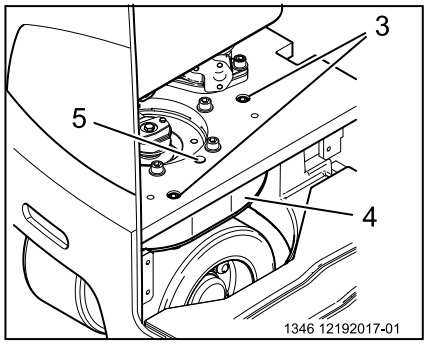
- ➢ If air cannot be heard escaping, the breather filter must be replaced.

Steer Axle Lubrication

The steering axle is accessible for lubrication by removing three covers.

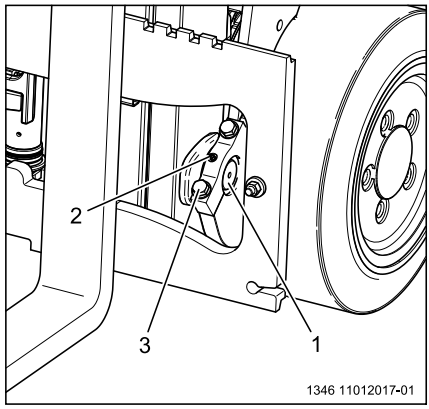
- Remove the upper cover (1) (five screws) in the operator compartment.
- Remove the lower cover (2) (four screws).
- Remove the two gear cover screws (3) and allow the gear cover (4) to rest on the steer tires. It is not necessary to remove the gear cover from the truck.
- Apply grease to the teeth of the steering gears.
- Lubricate the steering bearing at the grease fitting(5).
- Reinstall the lower cover and slowly operate the steering through its full range to distribute the grease.
- Reinstall the remaining covers. Tighten all screws to 59 ft-lbs (80 Nm).





Lubricating Mast Bearing Blocks

- Lubricate the bearing (1) through the fitting (2).
- Check the bearing for wear and replace if necessary.
- Check tightness of the mounting bolts (3). Proper torque is 144 ft-lb (195 Nm).



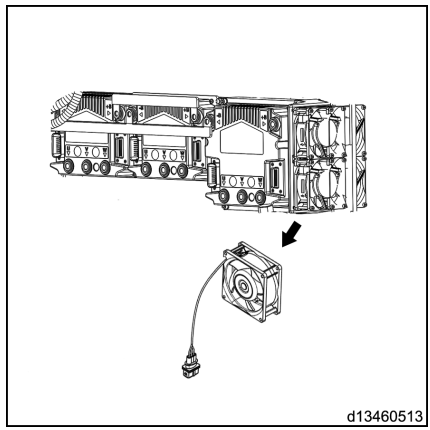
Testing and Cleaning the Fans

The truck is equipped with two fans to the left of the power modules. Remove the front cover to access the fans.

The fans must be cleaned and checked for normal operation periodically.

The fans should be cleaned with oil-free compressed air and/or cleaning solvent. The truck must be switched off while cleaning the fans.

Operation of the fans can be confirmed by switching on the key switch. The fans should run at constant speed when the key is switched on.



NOTE

The fans can also be activated using a laptop computer equipped with Linde diagnostic software.

Adjusting and Lubricating Lift Chains

Lift Chain Lubrication

NOTE

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

- Apply Linde chain spray to each chain and guide surfaces.

Lift Chain Adjustment - Standard Mast

NOTE

The lift chains stretch during operation and therefore must be periodically readjusted on the right-hand and left-hand sides.

- Tilt the mast to the vertical position and lower it completely.
- Check that the forks do not contact the floor.
- Measure the distance that the lower carriage roller protrudes from the bottom of the inner upright.

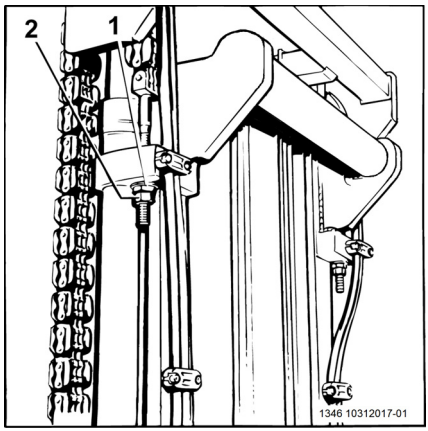
The lower guide roller of the fork carriage must not protrude more than one inch (25 mm) from the bottom of the inner mast guide rail. If the roller protrudes farther or the forks contact the floor then the lift chains must be adjusted to pull the carriage back upward. Both chains must be adjusted so that chain tension remains equal.

⚠ WARNING

Chains that are stretched more than 3% must be replaced regardless of adjustability.

If chains require adjustment, always check the chains using a wear gauge. Replace all chains if any one is stretched 3 % or more.

- Loosen the lock nut (2).
- Adjust each chain using the adjustment nut (1) of the chain anchor.
- Tighten the locknut (2).



⚠ CAUTION

When extending the lift mast, it must not touch the end stops.

Fully extend the lift mast and check the clearance to the end stops.

Lift Chain Adjustment - Double Mast

- Tilt the mast to the vertical position and lower it completely.
- Check that the forks do not contact the floor.
- Measure the distance that the lower carriage roller protrudes from the bottom of the inner upright.

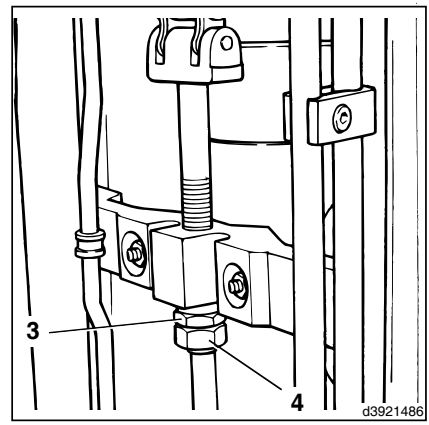
The lower guide roller of the fork carriage must not protrude more than one inch (25 mm) from the bottom of the inner mast guide rail. If the roller protrudes farther or the forks contact the floor then the lift chain must be adjusted to pull the carriage back upward.

⚠ WARNING

Chains that are stretched more than 3% must be replaced regardless of adjustability.

If chains require adjustment, always check the chains using a wear gauge. Replace all chains if any one is stretched 3 % or more.

- Loosen the lock nut (4).
- Adjust the chain using the adjustment nut (3) of the chain anchor.
- Tighten the locknut (4).



⚠ CAUTION

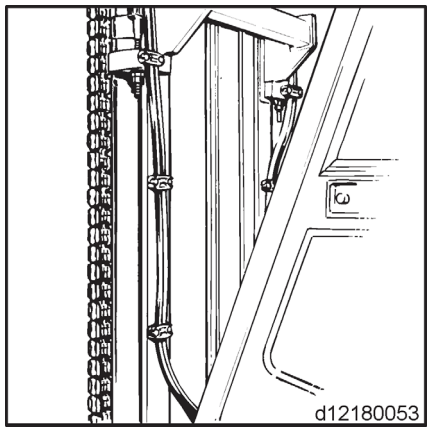
When extending the lift mast, it must not touch the end stops.

Fully extend the lift mast and check the clearance to the end stops.

Lift Chain Adjustment - Triple Mast

The triple mast has both primary and secondary chains. There are two secondary chains and one primary chain. The secondary chains are adjusted in the same manner as for the standard mast except that the protrusion of the roller on the bottom of the inner upright is being adjusted with these chains, not the carriage roller. The carriage roller protrusion is adjusted with the primary chain the same as for the double mast. Both adjustments must be checked on a triple mast.

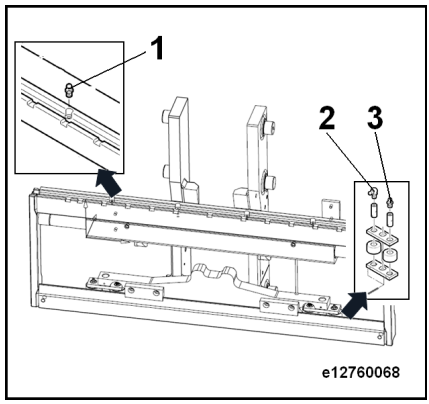
Checking Reeving Hose Preload (optional equipment)



Preload tension must be maintained in any section of hose which operates over a sheave. Proper tension is necessary to prevent hoses from jumping the sheave.

- The reeving hoses should be preloaded 0.2 - 0.4 in (5-10 mm) per meter of original length.
- Move the hoses between the retaining clips and secure to obtain the required preload.

Lubricating the Sideshifter (optional equipment)



- Check cylinders and fittings for leakage and have repairs made as necessary.
- Clean the sideshifter according to the section "Cleaning the Truck".
- Check hydraulic hoses for abrasion.
- Adjust the forks so that the grease fittings on the top rail (1) and the lower grease fittings (2 and 3) are accessible.
- Lubricate the sideshifter at all of the grease fittings.

NOTE

The sideshifter must always be lubricated after any cleaning.

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. Tasks listed under successive intervals are not cumulative; only the additional tasks required are listed under successive intervals.

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.

Scheduled Maintenance Chart

Preparations
Clean the truck (as required).
Read and clear the error memory.
Enter the next service interval.

One-Time maintenance at 100 hours
Change the gear oil in each drive unit. Clean magnetic plugs if necessary.

Maintenance every 1000 hours, but at least every 12 months. (Exceptions in brackets)
Transmission system
Check drive axle and reduction gearbox fasteners.
Check for leaks and check the mounting between each reduction gearbox and its drive motor.
Change the gear oil in each drive unit. Clean magnetic plugs if necessary.
Visually inspect each gearbox for leaks.
Chassis, bodywork and fittings
Check other bearings and connections and lubricate if necessary.
Check the installation and tightness of the chassis, counterweight, overhead guard, drive axle, steering axle, tilt cylinder and tilt cylinder support. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Chassis frame
Check wheel fasteners and tighten if necessary.
Clean and lubricate the steering axle.
Controls
Check operation of multifunction lever.
Check that braking system is working normally, and adjust if necessary.
Check the multifunction lever bellows. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Check that the horn is working correctly.
Check the pedal group for ease of movement, and lubricate.
Electrical system
Check the mounting and function of the tilt angle sensor. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Check tightness of conductor bar and cable connections on the power modules. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).

Maintenance every 1000 hours, but at least every 12 months. (Exceptions in brackets)
Check fan operation; check for dirt and clean if necessary.
Check for dirt on the drive units, power modules, and hydraulic pump motor and clean if necessary.
Check the main contactor and clean it and nearby components with dry, compressed air.
Check the condition and secure positioning of electric cables, plug connectors and cable connections. Ensure they are secure from chafing. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Check the truck battery in accordance with manufacturer guidelines.
Check the operator presence switch operation.
Hydraulic system
Visually inspect the hydraulic system for leaks.
Check the bleeder valve on the hydraulic tank for correct operation.
Check the hydraulic oil level.
Check the hydraulic control valve for correct operation.
Mast
Lubricate the mast pivot bearings.
Check the tightness of the mast pivot bearing cap bolts to the axle and tighten if necessary. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Check the operation and installation of the mast, lift chain, lift cylinder and limit block. (Once after 1000 hours, again after 3000 hours and then every 3000 hours).
Adjust length of the lift chain, clean and apply chain spray.
Check forks for wear and damage and check latch pin operation.
Lubricate tilt cylinder pivot bearings. Check tilt cylinder mounting and tighten if necessary.

Optional equipment
Clean and lubricate the sideshifter and attachments and check operation and wear (in accordance with manufacturers' procedures).
Check the preload of the double hoses for the attachments and adjust if necessary.
Check the condition of the antistatic belt and ground (only when using tires that are not antistatic).

Additional maintenance every 3000 operating hours, but at least every 3 years. (Exceptions in brackets)
Chassis, bodywork and fittings
Check the installation of the chassis, counterweight, overhead guard, drive axle, steering axle, tilt cylinder and tilt cylinder support.
Check the locking mechanisms on the battery side door and the battery hood, and replace if necessary.

Additional maintenance every 3000 operating hours, but at least every 3 years. (Exceptions in brackets)
Control system
Check multi function lever bellows.
Electrical system
Check the mounting and function of the tilt angle sensor.
Check tightness of conductor bar and cable connections on the power modules.
Check the condition and secure positioning of electric cables, plug connectors and cable connections. Ensure they are secure from chafing.
Hydraulic system
Replace the breather filter, pressure filter and suction filter.
Mast
Check the operation and installation of the mast, lift chain, lift cylinder and limit block.
Check the tightness of the mast pivot bearing cap bolts to the axle and tighten if necessary.
Check the mast pivot bearings for wear, and replace if necessary.
Check the tilt cylinder bearings for wear, and replace as required.

Additional maintenance every 6000 operating hours, but at least every 3 years. (Exceptions in brackets)
Hydraulic system
Change the hydraulic oil and replace the breather filter, pressure filter and suction filter.

Subsequent tasks
Check and adjust the date and time of the display unit.
Carry out a functional test and test drive.
Attach the maintenance label.

Sideshifter Maintenance Intervals

NOTE

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

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 500 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.

Fluids and Lubricants

Capacities

Assembly	Fluid or Lubricant	Capacity
Hydraulic system	Hydraulic oil	approx. 16.9 qts (16 l) All single and double masts; Triple masts h3 ≤ 4770 mm approx. 19 qts (18 l) Triple masts h3 > 4770 mm and ≤ 6220 mm; All quad masts
Final drive units	Gear oil	approx. 0.4 qts (0.4 liter) for each unit

Fluid and Lubricant Specifications

Original equipment specification

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

ISO-L-HM 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

For cold storage only:

Light duty (mean continuous oil temperature below 104°F (40C))
ISO-L-HV 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

⚠ CAUTION

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

Use only oils meeting the above specifications.

Final Drive Unit Gear Oil

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.

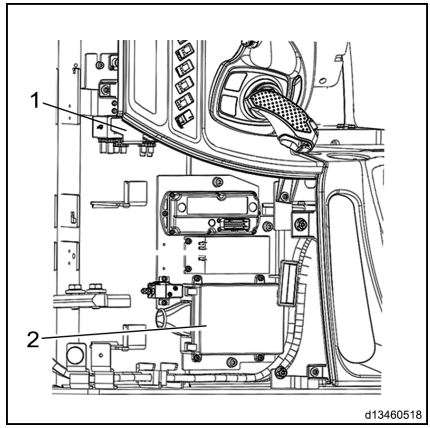
Chain Spray

Use a high-quality commercially available penetrating chain spray specifically intended for forklift mast chains.

Troubleshooting

Fuses

The truck fuses are located beneath the electrical compartment cover. The main fuses are attached to the main contactor (1). Control fuses are located in a separate fuse and relay box (2).



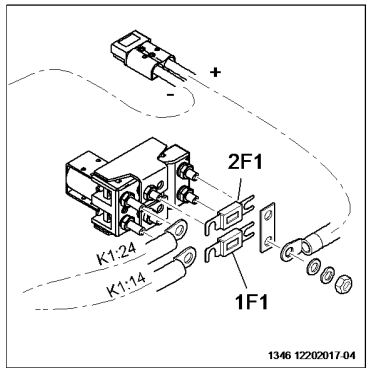
Main Fuses

The truck has the following main fuses:

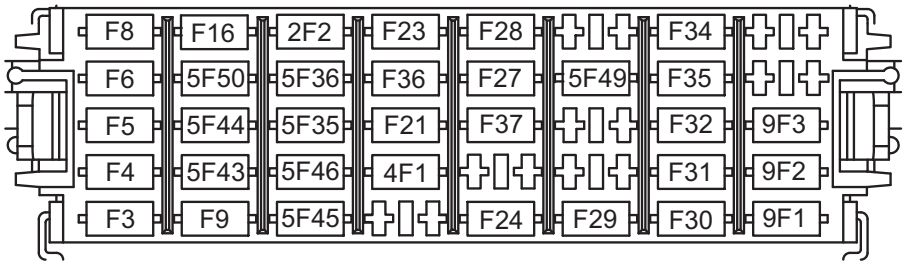
- 1F1 (500A) (425A for EE trucks) protects the drive motors and controllers
- 2F1 (300A) protects the pump motor and controller

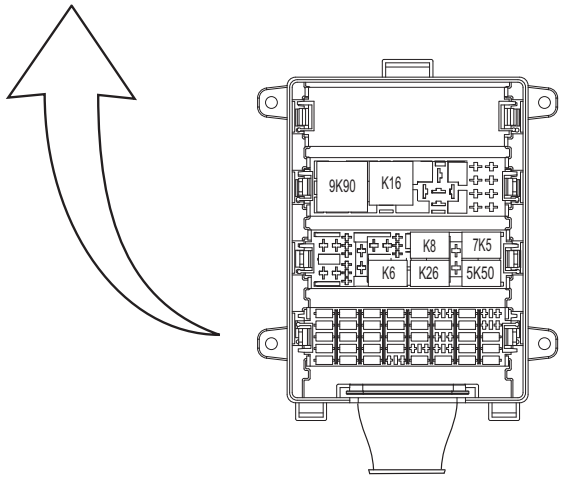
Control Fuses

The control fuses are contained in one block in the control fuse box. Fuse identification and amperage is listed in the following illustration and table.



Control Fuse Arrangement





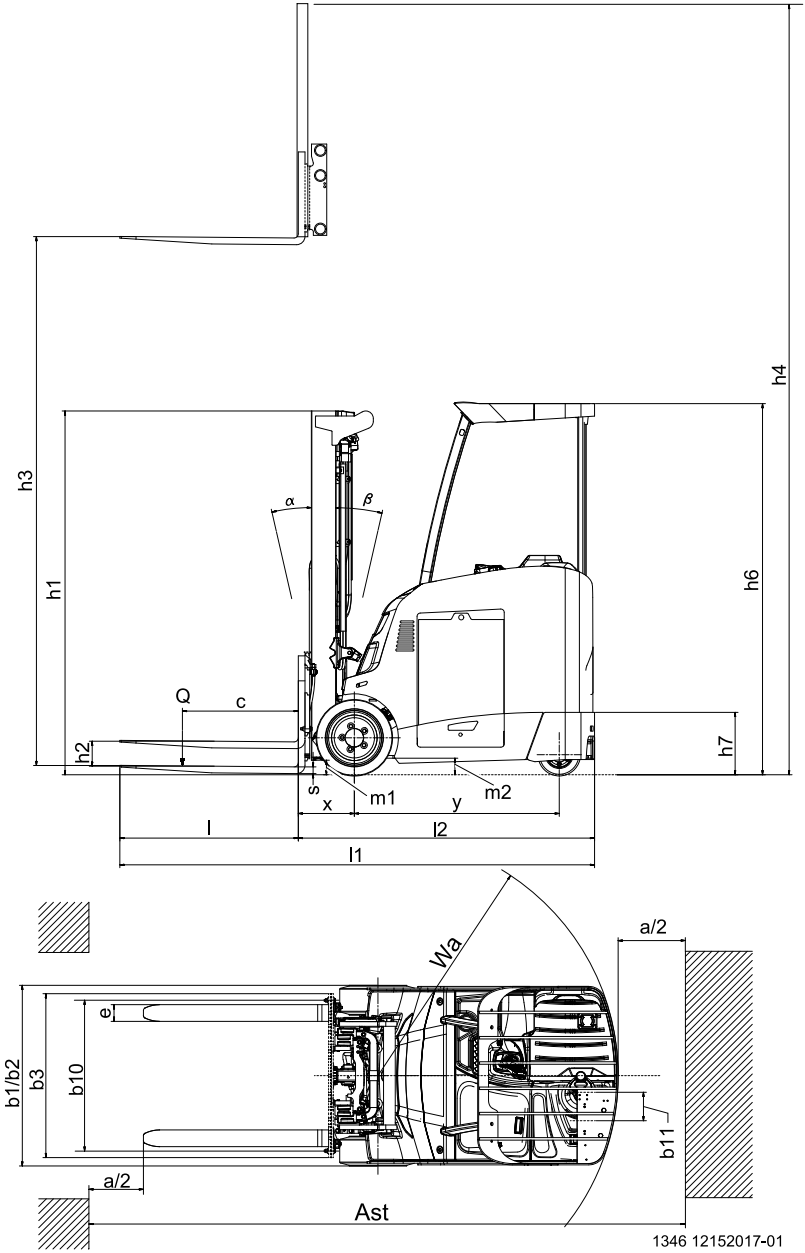
1346 12202017-03

F3	10A/58V Key switch (S1)
F4	2A/32V Display (6P1)
F5	5A/58V External 36V supply (X2)
F6	2A/58V Emergency switch (7S5)
F8	5A/32V External 12V supply (X2)
F9	10A/58V Hydraulic controller (2A2)
5F43	5A/32V Pos3.working light
5F44	5A/32V Pos4.working light
5F50	5A/32V Reverse buzzer
F16	2A/58V IO system supply (X16)
5F45	5A/32V Pos7.working light
5F46	5A/32V Blue/Red spot light
5F35	5A/32V Blinking warning light
5F36	5A/32V OHG fan
2F2	2A/32V Joystick (2B3)
4F1	5A/58V Horn (H1)
F21	2A/32V Right speed sensor (1B1)
F36	5A/58V Discharge unit A1 fuse K1:14
F23	2A/32V Steering angle sensor (1B3)
F24	2A/32V Left speed sensor (1B4)
F37	5A/58V Discharge unit A1 fuse K1:11
F27	2A/32V Pump speed sensor (2B1)
F28	2A/32V Fan for pump controller (2A1)
F29	2A/32V Safety valve (2Y9)
5F49	2A/32V Operating light
F30	2A/58V Heigh sensor for tilt / speed limit(4B1)
F31	2A/58V Main contactor (K1)
F32	2A/32V Rever relay (5K50)
F35	2A/32V Brake pedal switch(1S2)
F34	2A/32V Fan for traction controller left
9F1	2A/32V 12V supply (via relay)reserve1
9F2	5A/32V 12V supply (via relay)reserve2
9F3	5A/32V 12V supply reserve2

6

Specifications

Dimensions


h4
h3
h1
h6
α
β
Q
c
h2
h7
s
x
m1
y
m2
l
l2
l1
Wa
a/2
e
b1/b2
b3
b10
b11
a/2
Ast
1346 12152017-01

Specifications E18S and E20S

General	E18S	E20S
Manufacturer (code designation)	Linde	Linde
Manufacturer's model designation	E18S	E20S
Drive: electric, diesel, gas, LPG	Electric	Electric
Operation: manual, accompanied, standing, seated, order picking	Standing	Standing
Nominal load capacity (Q) (May be downrated for certain masts or attachments. Always refer to vehicle data plate.)	3500 lbs (1591 kg)	4000 lbs (1818 kg)
Load center of gravity distance (c)	24 in (nom) (600 mm)	24 in (nom) (600 mm)
Load distance (x)	13.2 in (335 mm)	13.2 in (335 mm)
Wheelbase (y)	46.2 in (1174 mm)	48.2 in (1225 mm)

Weights	E18S	E20S
Service weight with minimum battery	Refer to vehicle data plate	Refer to vehicle data plate

Wheels and tires	E18S	E20S
Tire type, front and rear	Cushion	Cushion
Tire size, front	18x8x12	18x8x12
Tire size, rear	10x5x6-1/2	10x5x6-1/2
Number of wheels, front / rear (x = driven)	2 x / 2	2 x / 2
Track width, front (cushion) (b10)	35.5 in (902 mm)	35.5 in (902 mm)
Track width, rear (cushion) (b11)	6.7 in (170 mm)	6.7 in (170 mm)

Dimensions	E18S	E20S
Tilt angle, forward / backward	7.0 / 5.0 degrees	7.0 / 5.0 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
Extended height (h4)	See "Mast Heights" table	See "Mast Heights" table
Height to top of the standard OHG (h6)	88.0 in (2235 mm)	88.0 in (2235 mm)
Floor height (h7)	7.9 in (200 mm)	7.9 in (200 mm

Specifications E18S and E20S

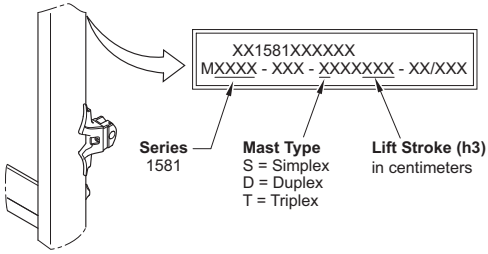
Dimensions	E18S	E20S
Overall length (l1) (42 inch forks)	109.9 in (2792 mm)	111.9 in (2842 mm)
Length to fork face (l2)	67.9 in (1725 mm)	69.9 in (1775 mm)
Overall width	42.8 in (1088 mm)	42.8 in (1088 mm)
Carriage class per ANSI/ITSDF B56 11-4-2005	II A	II A
Carriage width (b3)	38.6 in (980 mm)	38.6 in (980 mm)
Ground clearance beneath mast, with load (m1)	3.1 in (78 mm)	3.1 in (78 mm)
Ground clearance, center of wheelbase (m2)	3.8 in (98 mm)	3.8 in (98 mm)
Aisle width (Ast) (includes 7.8 inches (200 mm) clearance) 40 inch x 48 inch pallet (crossways)	121 in (3082 mm)	123 in (3127 mm)
Aisle width (Ast) (includes 7.8 inches (200 mm) clearance) 48 inch x 40 inch pallet (lengthways)	127 in (3235 mm)	129 in (3280 mm)
Turning radius (Wa)	55.1 in (1400 mm)	56.9 in (1445 mm)

Performance data	E18S	E20S
Maximum driving speed (with/without load)	7.0 mph (11.3 km/h) with/without load	7.0 mph (11.3 km/h) with/without load
Lifting speed	70 fpm (0.36 m/s) with load 108 fpm (0.55 m/s) without load	70 fpm (0.36 m/s) with load 108 fpm (0.55 m/s) without load
Lowering speed	82 fpm (0.42 m/s) with load 78 fpm (0.40 m/s) without load	82 fpm (0.42 m/s) with load 78 fpm (0.40 m/s) without load
Maximum drawbar pull	2174 lbs (9,663 N)	2174 lbs (9,663 N)
Maximum gradeability	17% with load 20% without load	17% with load 20% without load
Acceleration time	7.5 s	7.5 s
Service brake type	Regenerative	Regenerative

Drive Motors and Battery	E18S	E20S
Drive motor power rating (60 min)	5.1 hp x 2 (3.8 kW x 2)	5.1 hp x 2 (3.8 kW x 2)
Pump motor power rating (15%)	14.0 hp (10.5 kW)	14.0 hp (10.5 kW)
Nominal battery voltage	36 V	36 V
Maximum battery capacity (6-hour rating)	875 A-hrs	1000 A-hrs

Miscellaneous	E18S	E20S
Drive type	AC	AC
Working pressure for attachments	2175 psi (150 bar)	2175 psi (150 bar)
Flow rate for attachments	8.5 gpm (32 lpm)	8.5 gpm (32 lpm)
Maximum noise level (average at driver's ear)	68 dB (A)	68 dB (A)

Mast Heights



1346 08132018-02

Single, Double, Triple Masts

Mast heights are listed by lift stroke h3. This number is found in the mast identification code as shown above. Note that it is given in centimeters in the code, so a zero must be added to match the table below. Mast height dimensions in inches are rounded to the nearest 1/2 inch conservatively, ie h1 and h4 are rounded up; h2 and h3 are rounded down. Metric mast height dimensions (mm) are design values.

Single and double masts are not available at the time of this printing.

Mast heights - Triple - 1581 Series				
Lift stroke (h3)	Free lift stroke (h2)	Mast height, fully lowered (h1)	Extended height (h4) (with 48 inch LBR)	Tilt angle forward / back See Note 1.
181.9 in (4620 mm)	59.7 in (1517 mm)	83.7 in (2125 mm)	231.7 in (5886 mm)	7 deg / 5 deg
176.0 in (4470 mm)	61.6 in (1567 mm)	85.6 in (2175 mm)	237.6 in (6036 mm)	7 deg / 5 deg
193.7 in (4920 mm)	63.6 in (1617 mm)	87.6 in (2225 mm)	243.6 in (6186 mm)	7 deg / 5 deg
205.5 in (5220 mm)	67.5 in (1717 mm)	91.5 in (2325 mm)	255.4 in (6486 mm)	7 deg / 5 deg
215.4 in (5470 mm)	73.5 in (1867 mm)	97.4 in (2475 mm)	265.2 in (6736 mm)	7 deg / 5 deg
233.1 in (5920 mm)	79.4 in (2017 mm)	103.3 in (2625 mm)	282.9 in (7186 mm)	7 deg / 5 deg
244.9 in (6220 mm)	83.3 in (2117 mm)	107.3 in (2725 mm)	294.7 in (7486 mm)	7 deg / 5 deg

Note 1. If equipped with optional bottler's tilt, then angle is 9 degrees forward and 4 degrees back. Bottler's tilt is available on all masts except quad. Other tilt angles are available as options.

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

V

W

KION North America Corporation

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