Linde Material Handling

# Order picking truck

## Original instructions

Series 5231
48V, 80V

**K**

5231 804 2502 EN – 07/2018

## 5 Regular care and maintenance



## 6 Technical data



## 7 Special equipment

# 1

# Foreword

# Linde – Your Partner

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

The high quality of Linde products is also matched by the quality of our service. With ten production plants worldwide and an extensive network of sales partners, we are at your service round 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, of course, to appropriate finance options. Our leasing, hire or lease-purchase agreements provide you with the flexibility to tailor decision-making to your individual business requirements.

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# Rules for the operating company of industrial trucks

In addition to these operating instructions, a code of practice containing additional information for the operating companies of industrial trucks is also available.

This guide provides information for handling industrial trucks:

- Information on how to select suitable industrial trucks for a particular area of application
- Prerequisites for the safe operation of industrial trucks
- Information on the use of industrial trucks
- Information on transport, initial commissioning and storage of industrial trucks

## Internet address and QR code

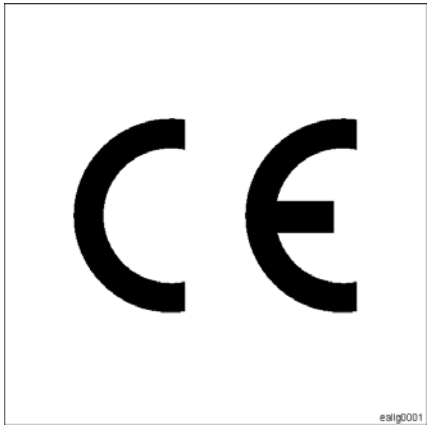
By entering the address
**www.linde-mh.com/VDMA**
in a web browser or by scanning the QR code, information can be accessed at any time.

# General

Our industrial trucks comply with applicable European regulations. Any other applicable country-specific regulations or operating conditions for the use of industrial trucks must also be observed.

The aim of this manual is to inform you about how to safely handle your industrial truck and how to keep it operational. It is therefore essential that operators, operating personnel and maintenance personnel familiarise themselves with, understand and adhere to the contents of this manual. The operability, performance and service life of the vehicle are dependent on:

- Proper use
- A daily inspection by the operator and
- Regular, appropriate maintenance work



# EC declaration of conformity

**Declaration**

Linde Material Handling GmbH

Carl-von-Linde-Platz

D-63743 Aschaffenburg, Germany

We declare that the machine

| | |
|---|---|
| Industrial truck | **according to these operating instructions** |
| Model | **according to these operating instructions** |

complies with the most recent version of machinery directive 2006/42/EC.

Personnel authorised to compile the technical documents:

see EC declaration of conformity

Linde Material Handling GmbH

# Safety instructions

Explanations of the terms used in this manual:

**⚠ DANGER**

**There is the risk of fatality to the operator.**

The procedures indicated should be complied with in full in order to avoid this danger.

**⚠ WARNING**

There is a hazard that could cause major damage to property or to the health of the operator.

The procedures indicated should be complied with in full in order to avoid this danger.

**⚠ CAUTION**

There is a risk of damage to property.

The procedures indicated should be complied with in full in order to avoid this danger.

**NOTE**

*Special attention is drawn to procedures and technical requirements that must particularly be observed.*

# Standard design and optional equipment

These instructions describe the

- intended use
- regular maintenance
- and prescribed maintenance

for industrial trucks in the standard design and for the optional equipment available at the time of going to print.

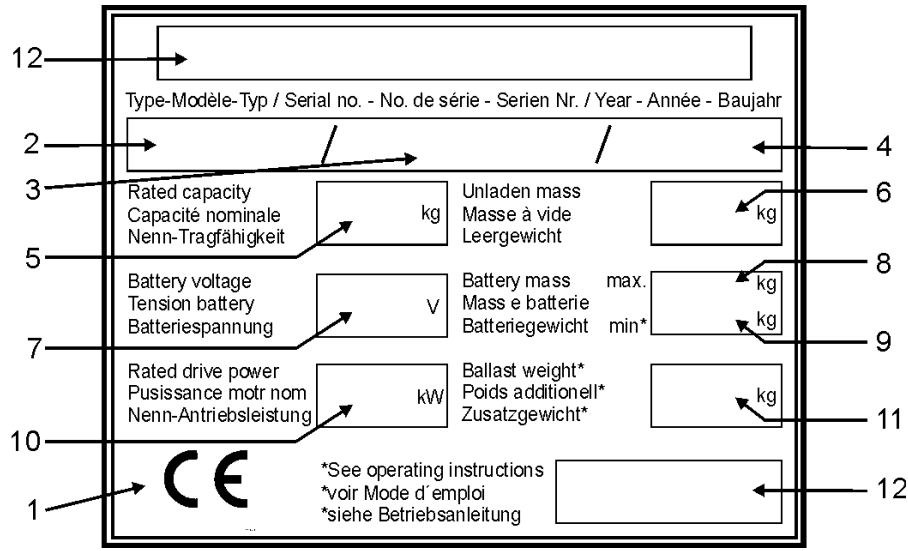
### Special versions and special equipment (UPA)

For industrial trucks in a customer-specific special version or with special equipment, additional order-related documentation is created and supplied if required.

# Truck identification, Factory nameplate

The nameplate is fitted in the area of the driving seat and contains the following details:

## Factory nameplate

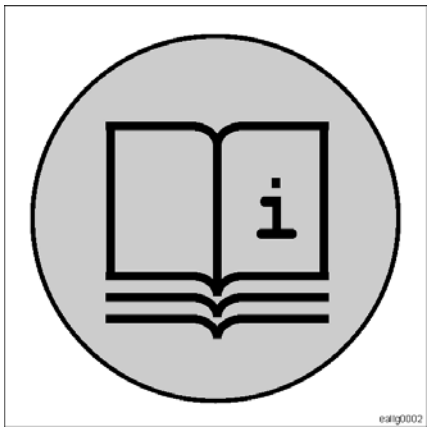



| | | | |
|---|---|---|---|
| 1 | CE symbol. The CE symbol confirms that the EU machine guidelines and all the relevant guidelines, which are valid for this product, have been met. | 5 | Nominal loading capacity |
| 2 | Truck type | 6 | Unladen weight |
| 3 | Truck serial number. This serial number must be given in the event of any queries. | 7 | Battery voltage |
| 4 | Year of manufacture | 8 | Maximum battery weight |
| | | 9 | Minimum battery weight |
| | | 10 | Rated drive power |
| | | 11 | Ballast weight |
| | | 12 | Name of manufacturer |

## Product documentation

This includes:

- Spare parts list
- Operating and maintenance manual
- Any additional documentation for the driver's seat
- Any additional documentation for an attachment
- Any additional documentation for the battery
- Any additional order-related documentation

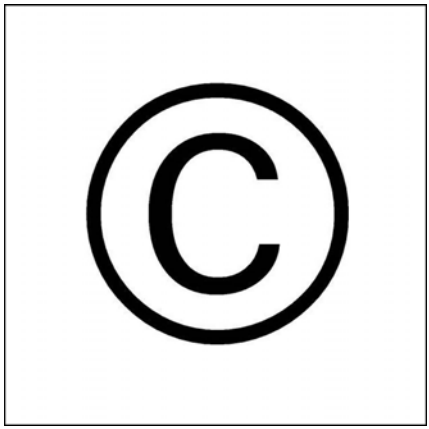


## Safe-keeping and passing on

- These operating and maintenance instructions must be kept safely so that the operator always has access to them.
- Documents can be ordered retrospectively. Please give the ID or the order number.
- If the truck is sold on, the complete documentation should be passed on along with the truck.

## Copyright and proprietary rights

This manual - and any excerpts thereof - may not be reproduced, translated or tansmitted in any form to third parties without the express written permission of the manufacturer.



# Form of address

Our products are suitable for use by male or female operators. However, these instructions use only the masculine form of address, hereinafter "operator", to simplify the text.

## Operator

The dimensions of the operator's compartment on our industrial trucks are designed in accordance with standard DIN EN ISO 3411 and are accordingly constructed for both female and male operators. This standard also stipulates ranges within which the operator's body weight and dimensions should lie. If these industrial trucks are operated by persons who do not meet these criteria, the following effects must be expected:

- The ergonomic conditions may be less favourable
- It may not possible for the operator to reach the pedals such as the accelerator pedal and brake pedal
- The useable height below the overhead guard may be too low
- The adjustment ranges for the steering wheel and seat adjuster may no longer be sufficient
- There could be a negative effect on the load-bearing capacity of the industrial truck

Please be sure to consult your responsible authorised service partner.

## Form of address

# 2

# Safety

# Working safely

- The industrial truck must be operated exclusively from the driver's compartment
- If industrial trucks are equipped for pedestrian mode or with external operating panels, the industrial trucks may be operated using these features; for further safety information for this purpose, refer to the relevant additional descriptions
- When driving without a load, lower the fork to floor height
- When driving with a load, the load must be lifted a few centimetres off the ground (clear of the ground, max. 500 mm)
- The driver must keep all body parts within the contours of the driver's compartment; the driver must refrain from sticking his head out to gain a better view and from reaching into the area of the moving lift mast because doing this is highly dangerous
- Aside from the driver, there must be no other person present on the industrial truck unless the industrial truck has additional equipment to enable operation with two persons
- Basically, it is the driver's duty to adapt his driving speed to the local conditions and the respective situation. When cornering in particular, attention must be paid to the overall height and the centre of gravity, which will be high as a result.
- When cornering and driving past parts of buildings that restrict visibility, use the horn to warn others that the industrial truck is approaching.
- When driving through doorways and under ceiling joists, take the height of the industrial truck into consideration.
- Multiple operations or other types of operations not described here, especially the blocking or disabling of operating devices, can cause damage to the industrial truck but also uncontrolled movements and are therefore prohibited
- The driver must secure the industrial truck against unauthorised use by removing and taking the switch key or by clearing the access information on the electronic access control system when leaving the industrial truck.

## Safe working environment

- People must not encroach into the working area (danger area) of the industrial truck; If a person does enter the danger area, all movements of the industrial truck must be stopped immediately and the person must be directed away from the area
- If there are marked roadways, the industrial truck must be moved only within these markings for safety reasons
- It is never permitted for anyone to stand beneath a raised load or driver's compartment.
- The condition of the floor surface influences the braking distance of the industrial truck. The driver must take account of this in his driving and braking style.
- If the area of application and work situation so require, the operating company must evaluate the potential hazards and provide appropriate personal protective equipment such as safety shoes, a safety helmet, safety gloves or protection goggles: responsibility for the selection and provision lies with the operating company; responsibility for use of the equipment lies with the operator

## Safe machine

- Essentially, all safety information located on the industrial truck must be observed
- Missing or illegible safety information must be replaced
- The openings in the area of the battery where gas may be released must not be covered or sealed. To prevent the formation of potentially explosive gas mixtures, an unrestricted air supply is required.
- Under no circumstances should openings be made in the battery's gassing area, which could allow the gas created during charging to enter the area of the driver's compartment.

**Operational safety takes priority over working speed!**

# Medical equipment, implants

**⚠ DANGER**

**Electromagnetic interference may occur on medical devices!**

Only use equipment that is sufficiently protected against electromagnetic interference.

Medical equipment, such as pacemakers or hearing aids, may not work properly when the truck is in operation. Individuals with active or non-active implanted medical devices must take it upon themselves to ensure that they are not exposed to dangerous electromagnetic radiation. Ask your doctor or the manufacturer of the medical equipment to confirm that the medical equipment is sufficiently protected against electromagnetic interference.

It is the responsibility of the company that operates the industrial truck to explain these dangers to employees in detail.

# Vibrations

The vibrations of the machine must be determined on an identical machine in accordance with the EN 13059 standard "Vibration measurements on industrial trucks".

| | |
|---|---|
| Weighted effective value of acceleration to which the body (feet or seat base) is subjected. | < 0.6 $m/s^2$ |
| Uncertainty K | 0.3 $m/s^2$ |

Tests have indicated that the amplitude of the hand and arm vibrations on the steering wheel or on the operating devices in the truck is less than 2.5 $m/s^2$. There are therefore no measurement guidelines for these measurements.

The personal vibration load on the driver over a working day must be determined by the operating company at the actual place of use in accordance with Directive 2002/44/EC, in order to consider all additional influences, such as driving route, intensity of use etc.

# Special safety information about load pick up

**Recognising danger is half the battle!**

- Before every load pick up, make sure that the load to be picked up does not exceed the load capacity of the truck (refer to the load capacity diagram) or the maximum permissible dimensions as specified on the datasheet. This also includes, of course, the accumulated weight of the picked goods
- Loads that are to be transported and stored must be packed securely
- The centre of gravity of the load must not change during acceleration, braking or during transport
- No parts must be allowed to fall
- If loads cannot be transported with the necessary level of safety, an appropriate container or means of securing the load must be employed to ensure safety
- Loads must always be transported in suitable containers or secure packaging
- Loads comprising loose packages may not be stacked higher than the top edge of the cab rail
- If very high loads that block the view of the roadway have to be transported, appropriate safety measures must be put in place; if necessary, a guide and traffic supervisor must be used
- Hanging or swinging loads must not be attached to and transported on the lifting accessories

# Safe handling of operating media

The following operating media are used in this truck:

- Gear oill
- Hydraulic oil
- Battery acid

The handling of these materials is governed by comprehensive safety regulations. The most important points include:


## For gear and hydraulic oil

**⚠ DANGER**

**Danger to life or danger of injury from hydraulic fluid escaping under pressure.**

If hydraulic fluid escapes under pressure, for example from a damaged pipe or through leaks in a component, it can easily penetrate the skin. By poisoning the surrounding tissue this can lead to the loss of the affected body part or even to death. Even if such injuries do not feel particularly painful or serious, a doctor must be consulted immediately. The cause of the injury must be described exactly and the treatment started promptly.

**ENVIRONMENT NOTE**

- Oils pose a threat to the water supply, and must accordingly always be transported and collected in regulation containers.
- Do not spill oil. Bind any spillages using suitable materials..
- Take care to dispose of oil-containing wastes correctly.
- Dispose of used oil correctly.

Personal protective gear

- Avoid all skin contact. Pay particular attention to prevent contact with oil emerging under pressure (hose breakage, leaks).
- Do not breathe in oil mist.
- If it is not possible to avoid contact with oils, personal protective gear such as protective gloves, protective goggles etc. must be worn.

## For battery acid

**⚠ DANGER**

**Danger of explosion**

- When charging batteries, an explosive gas mixture can be generated which can still remain present for a long period after completion of the charging process. Ensure adequate ventilation.
- Within a 2 metre area of charged batteries, smoking, fires and open flames are strictly prohibited.

- Battery acid is poisonous. Always avoid breathing in vapours.
- Battery acid is caustic. Take all necessary precautions to prevent skin contact.
- Rinse off battery acid immediately using plenty of clear water.
- When handling battery acid, wear personal protective gear such as gloves and clothing as well as facial protection.
- Should skin contact still take place, rinse immediately using plenty of clear water and consult a doctor.
- Comply with the additional operating instructions supplied by the battery and the battery charger manufacturer.

## Risk assessment

Within the scope of validity of the CE guidelines, the operating company must create **operating instructions** on the basis of a risk assessment. The purpose of the risk assessment is to identify dangers and the associated risks that could occur due to the product or the application of the product in the specific place of use and under the application conditions at this place of use. We can help you to complete the risk assessment. The operating instructions are intended to warn against the identified dangers and provide information on possible remedial actions.

We recommend integrating these operating instructions into the operating procedures for the specific place of use.

## Residual risks

Despite observation of all pertinent safety regulations for the design and construction of our trucks and despite proper use by the operating company, residual risks can occur during operation. We refer to this specifically in the individual chapters.

Please heed all provided safety warnings.

## Regular testing

This industrial truck must be tested in accordance with our specifications by a specialist (expert) at least once per year or after any unusual incidents.

Our test instructions summarise all activities that must be performed for the purposes of detecting damage or defects that have an effect on safety. The requirements pursuant to FEM 4.004 are included in these test instructions.

A log must be created for the tests.

If defects are found, they must be rectified before the truck is next commissioned. If serious repairs are required (e.g. after an

accident), it may be necessary for another test to be carried out.

The operating company is responsible for checking whether the country in which this industrial truck is used requires regular safety checks to be carried out on the industrial truck by a specialist.

## Application area

The area of application must have sufficient floor load capacity. Ask the responsible sales representative about the relevant wheel loads and specific floor loads for your industrial truck. The floor must meet the guidelines specified by us. The condition of the floor surface influences the braking distance of the industrial truck. The driver must take account of this in his driving and braking style.

The industrial trucks described here are designed for the following application conditions (VDI 2695 category 1):

- Smooth, level roadways without major gradients up to a maximum of 3%
- normal work load, 50% capacity utilization; full load and half shift or half load and full shift.

Ambient temperature in accordance with EN 1175-1.

Series products in continuous operation are designed for an average ambient temperature range of +5°C to +25°C.

The maximum ambient temperature may increase briefly (for up to one hour) to up to +40°C.

**⚠ WARNING**

Restrictions in the applicational area.

The industrial trucks described here must **not** be used:

- in areas at risk from fire
- in areas at risk from explosions
- iin areas with atmospheres conducive to corrosion
- in atmospheres containing large amounts of dust
- In public road traffic
- In the cold store (see **cold store** special equipment)
- On surfaces that are not horizontal

Observe the applicable national regulations.

## Narrow aisle vehicles

Narrow aisle vehicles may only be operated in narrow aisles in accordance with the intended use, if suitable precautions have been taken (e.g. mobile or stationary protective equipment to EN 2006/42/EG and EN ISO 13849) which prevent the possibility of collisions occurring between persons and vehicles, or which prevent persons and other vehicles also being present at that time.

In Europe it is the owner's responsibility to ensure that EU guidelines and stipulations are complied with. The owner must conduct a risk analysis to prove that adequate protection is provided. On the basis of our experience, we offer to support the owner in this task.

## Original parts

Our original parts and accessories are specially designed for our vehicles. We would specifically point out that parts and accessories not supplied by us have also not been tested and approved by us. The incorporation and/or use of such products can consequently adversely affect the structurally predetermined properties of your vehicle and thus impair the active and/or passive drivingsafety. The manufacturers are in no way responsible

for any damage caused by the use of non-original parts and accessories.

## Directives and guidelines

In most countries, the national directives and guidelines for proper usage of these trucks must be observed. We therefore ask you to please contact the relevant authorities or speak to the authorised representatives for more information. You as the operator are responsible for this.

## Driver's licence

In most countries, a driver's licence is required to operate these trucks.

Please check whether a driver's licence is required to operate this truck in your country. This driver's licence serves as proof that comprehensive training has been completed. As the operating company, you are responsible for ensuring that this requirement is fulfilled.

We recommend that you contact your branch or specialist representative. They will be able to offer you the relevant training and tests required to obtain your driver's licence.

## Alterations to industrial trucks

Operating companies may only make alterations or arrange for alterations to be made to self-propelled industrial trucks if the industrial truck manufacturer has withdrawn from business and there is no business successor. However, operating companies must:

- Ensure that any alterations being made and all associated safety issues are planned, checked and performed by a specialist engineer for industrial trucks
- Have permanent records of the construction, test(s) and execution of the alterations
- Make and approve corresponding alterations to the signs stating the load capacity, information signs and adhesive labels as

well as in operating manuals and workshop manuals

- Mount a durable and easily visible label on the industrial truck providing details of the type of alteration or conversion, alteration or conversion date and name and address of the organisation entrusted with this task

## Personal protective equipment

For operation of our products, no personal protective equipment is required under normal application conditions.

However, it is possible that the use of personal protective equipment is required at the place of use due to the on-site circumstances or local or internal regulations.

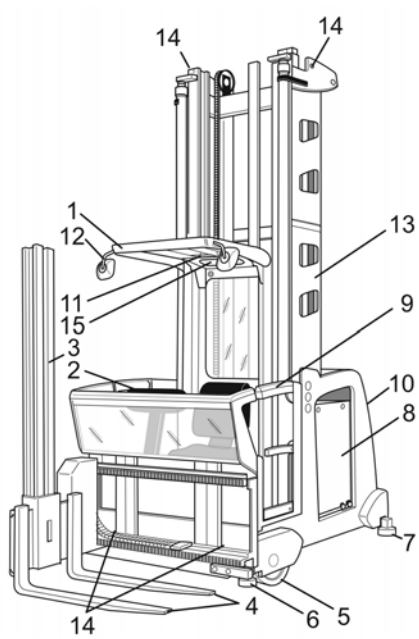
The national regulations valid at the place of use must be observed.

## Personal protective equipment

# 3

# Overview

# View of the truck




(1) Overhead guard

(2) Operating panel

(3) Auxiliary lift mast

(4) Load forks

(5) Load wheel

(6) Front guide rollers

(7) Rear guide roller and support screws

(8) Battery compartment or battery compartment doors*

(9) Barrier or cab doors*

(10) Control compartment

(11) Working spotlights*

(12) Rear-view mirror

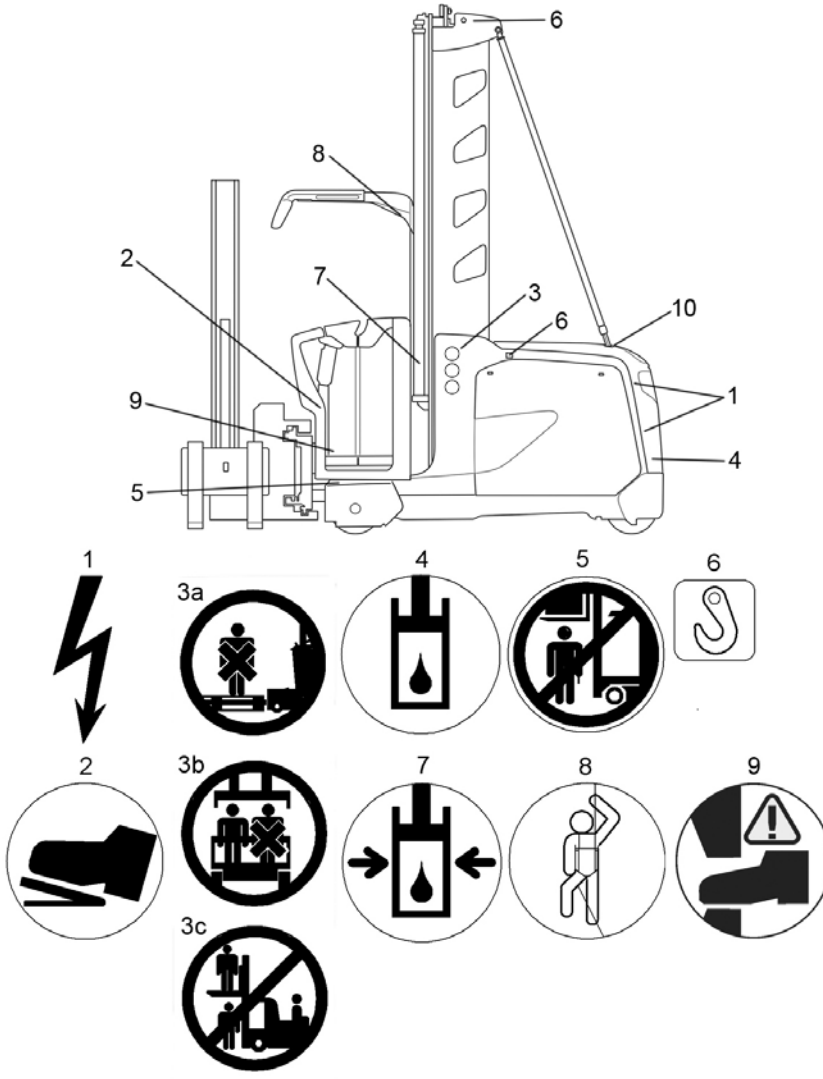
(13) Lift mast

(14) Lifting points for crane-loading

(15) Abseil system

* Option

# Standard design of labelling




1 Danger! High voltage
2 Foot switch
3 a. Do not transport people on the load or on the load support.
b. The driver's compartment is approved for use by one person only
c. It is not permitted for people to sit or stand on the load, on the load support, underneath a raised load or to be carried as passengers.
4 Oil tank

5 It is not permitted for people to sit or stand underneath a raised load, or underneath a raised driver's platform.
6 Lifting point for crane loading
7 The container is under hydraulic pressure, hydraulic cylinder.
8 Storage space for the abseil system
9 Risk of crushing feet
10 Disconnect the battery male connector before removing the control compartment hood. (Only for the 80-V version)

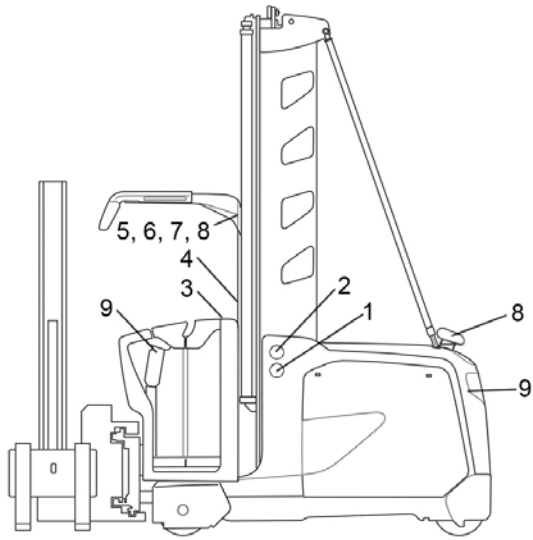
A number of information signs are fitted on every industrial truck depending on the family to draw attention to hazards, technical data or requirements.

These signs must always be present in full and must always be legible.

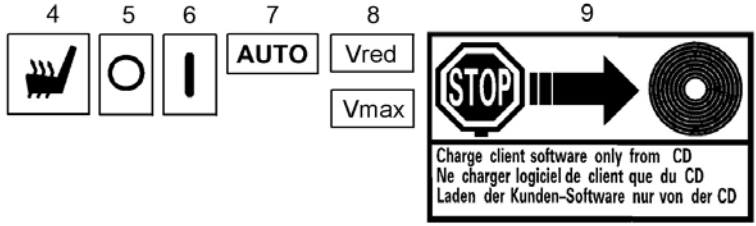
**NOTE**

*The section entitled "Labelling for special equipment" provides details of further information signs that may also be required based on the order.*

# Labelling for special equipment








1 It is not permitted for people to sit or stand on the load or the load support, or to be carried as passengers
2 It is not permitted for people to sit or stand underneath a raised load, or underneath a raised driver's compartment
3 Risk of crushing hands
4 Seat heater on/off switch
5 Switch in "switched off" position
6 Switch in "switched on" position
7 Switch in "automatic mode" position

8 The speed of the truck is limited based on the order.

9 Truck with customised software. Only the customer's special version and not the standard software may be installed in the truck control unit.

The pictograms shown here replace the pictograms for the standard version or are fitted in addition to the standard pictograms.

# Intended use

The order picker truck is designed for narrow aisle operation. It permits pallets to be entered into and removed from storage, as well as order picking from the rack compartments.

Observe the instructions in the paragraph "safety".

The maximum load that can be lifted is specified on the loadbearing information plate (load diagram) and must not be exceeded.

Use for other purposes is prohibited.

If this truck is to be used for work which is not described in these instructions or does not appear in the guidelines for the specified and proper use of industrial trucks, and if it has to be converted and retrofitted for this purpose, it is necessary to be aware that modifications to the original construction can impair the driving behaviour and stability of the truck and are therefore not permitted without our agreement.

Add-on parts and modifications (e.g. the welding-on of parts or the creation of openings) could weaken the supporting structure and are therefore only permitted after acceptance by our design department. Functional changes through modifications to the electrical system or the software also require our acceptance and release.

**Before any such work is done you should therefore make contact with the branch office or the specialist representative in your area.**

# Description of truck

Instructions on operation of the individual functions are provided in the respective chapters.

## General information

The operator can put himself and the load suspension device (swivel fork) into the most suitable working height by raising the operator's cabin. The auxiliary lift can be used to serve the highest rack level and to set a

favourable deposit height when carrying out order picking work. The auxiliary lift must always remain in the lowest position when travelling.

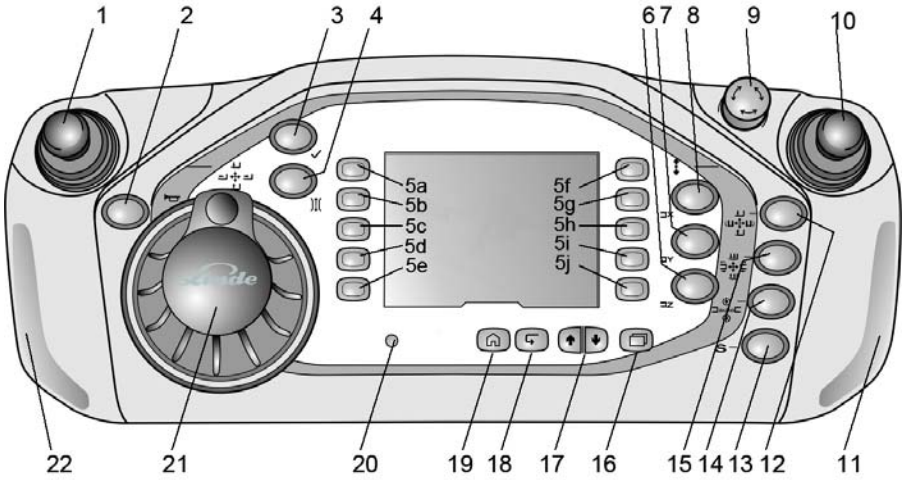
Outside the aisles (transfer aisle), the industrial trucks can be driven freely with the load lowered (transportation mode). The load must be lifted only sufficiently high (clear of the ground) that no part of the load touches the ground.

Within the aisles, the narrow aisle trucks are guided mechanically or inductively*.

The steering of the truck is realized by a freely programmable controller (CAN BUS). All movements (driving, lifting/lowering the cab lift, lifting/lowering the auxiliary lift, swivelling the fork, pushing the fork) are infinitely adjustable. Operating errors can be prevented to a large extent by means of safety circuits.

* Option

# Operating panel




(1) Operating lever for hydraulics (in conjunction with the selection keys)

(2) Horn

(3) Enable button (for example, as a brake release button in an automatic braking system, as an override for the intermediate lift cut out and to acknowledge errors that can be acknowledged)*. Flashes red when it needs to be pressed.

(4) Manual-automatic two-way switch for inductive guidance*

(5a) Eco mode selection key

(5b) Reserved for option

(5c) Reserved for option

(5d) Reserved for option

(5e) Navigation* selection key

(5f) Lift height preselector* selection key

(5g) Reserved for option

(5h) Reserved for option

(5i) Work light* selection key

(5j) Fan* selection key

(6), (7), (8) Selection keys for additional hydraulic functions*

(9) Emergency off switch

(10) Operating lever for driving

(11) Sensor surface for two-hand operation of the main lift or for shifting in the aisle

(12) Selection key for lifting or lowering the auxiliary lift or for swivelling the forks.

(13) Reserved for special functions

(14) Selection key for automatic functions, e.g. fork cycle

(15) Selection key for lifting or lowering the cab lift and auxiliary lift at the same time. Hold this button while **pulling** or **pushing** operating lever (1). Alternatively: Selection key for synchronously swivelling the forks 180° to the left or right. Hold this button while simultaneously moving operating lever (1) to the **right** or to the **left**.

(16) Selection of a menu display

(17) Selection within a menu

(18) Go back one step in the menu or confirm a selection

(19) Back to the main menu

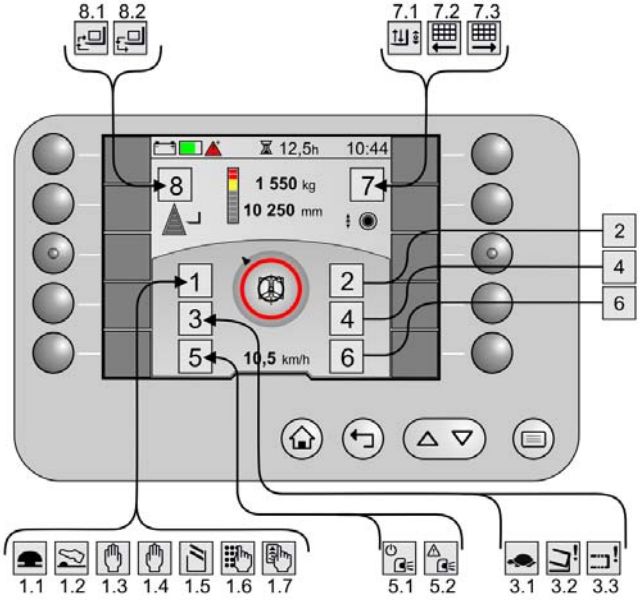
(20) Light sensor for automatically illuminating the display lighting

(21) Steering knob or steering wheel

(22) Sensor surface for two-hand operation within the aisle

*Option

# Displays

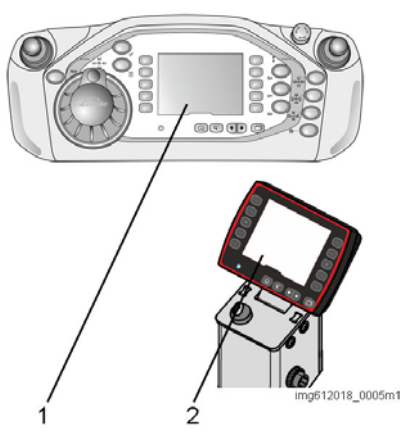



| | | | |
|---|---|---|---|
| 1.1 | Emergency off switch pressed | 4 | Not used |
| 1.2 | Foot switch required | 5.1 | *MPSE in operation |
| 1.3 | Two-hand operation on the left required | 5.2 | *MPSE has detected a fault |
| 1.4 | Two-hand operation on the right required | 6 | Not used |
| 1.5 | Barrier open | 7.1 | *Navigation, combination operation |
| 1.6 | PIN entry expected | 7.2 | *Navigation, destination is located on the left-hand side |
| 1.7 | RFID entry expected | 7.3 | *Navigation, located on the right-hand side |
| 2 | Not used | 8.1 | Remove from stock with a fork cycle |

| | | | |
|---|---|---|---|
| 3.1 | Creep speed active | 8.2 | Place into stock with a fork cycle |
| 3.2 | Turret head not in the end position | | |
| 3.3 | Telescopic fork not in the end position | | |

At points marked 1 - 8, the pictograms shown appear depending on the situation and the options available.

# Operating display




1 Display in the operating panel
2 Display in the case of split operation

**NOTE**

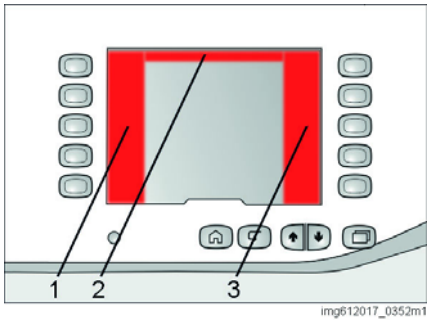
*To emphasise the functionality, the following images have been simplified.*

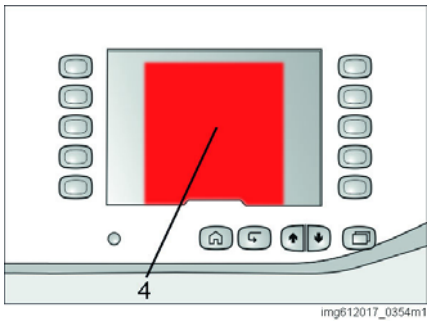
## Function

Operating statuses and information relevant for operation are shown on the display. Using the display, it may be possible to switch functions on and off or to switch between defined statuses.

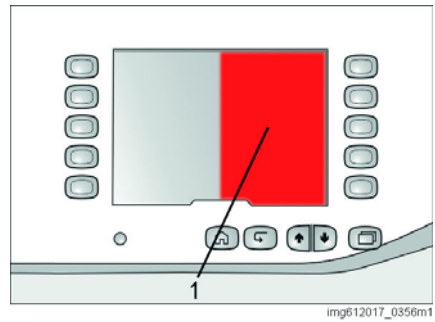
The display is presented in colour and is graphical. The content is divided into four parts:

- Left-hand menu bar (1)
- Right-hand menu bar (3)
- Top status bar (2)
- Central information area (4)



Half of the display can be occupied by a message window (1). This window is automatically inserted from the right-hand side. The information which was previously displayed centrally is then shown in the left-hand section of the display. The elements may sometimes overlap.



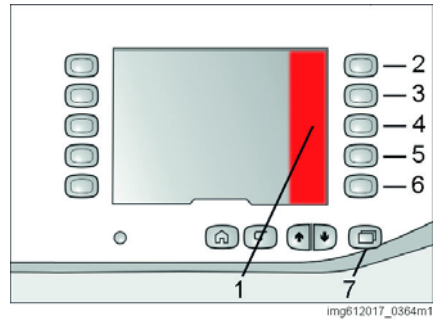

This message window has various content:

- Messages relevant to operation
- Messages with error numbers
- Target position (drive order) and actual position for navigation

If the settings are modified, a special form of the message window appears. This message informs you that the changed settings are being saved. An acoustic signal accompanies the display of this message. The message disappears after four seconds.

## Menu structure

As soon as the button (7) is actuated, the menu bar (1) opens. From this point the structure is always the same. There is also no change to the structure when you select a different language. The symbols also remain the same.

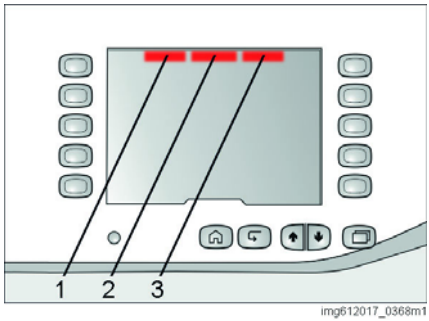



The menu levels are as follows:

| | | |
|---|---|---|
| **Industrial truck** (2) | | |
| | Power-saving feature | |
| | Navigation | |
| **Lighting** (3) | | |
| **Life height preselection** (4) | | |
| | Used lift heights | |
| **Fans** (5) | | |
| **Settings** (6) | | |
| | Truck information | |
| | | Production number |
| | Display settings | |
| | | Time |
| | | Date |

| | | |
|---|---|---|
| | Language | |
| | Status bar | |
| | | Left field |
| | | Centre field |
| | | Right field |
| | Truck settings | |
| | Lift height preselection | |
| | | Approach lift heights |
| | | Enter lift heights |
| | | Clear lift heights |
| | Service | |
| | Message list | |

## Top status bar



img612017_0368m1

The status bar at the top of the display is divided into three fields:

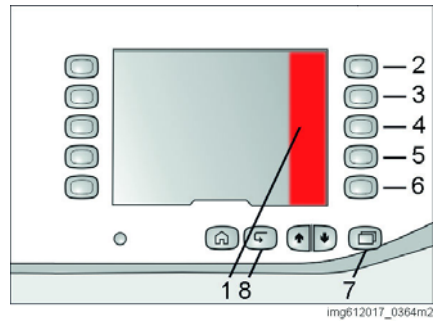
- Left field (1)
- Centre field (2)
- Right field (3)

The status bar can display the following information:

| Information | Display format |
|---|---|
| Battery charge level (charge state) | Graphical |
| | % |
| Operating hours | h |
| Time | hh:mm |
| Date | dd.mm.yy |
| Next maintenance interval | h |

The status bar can be configured individually.

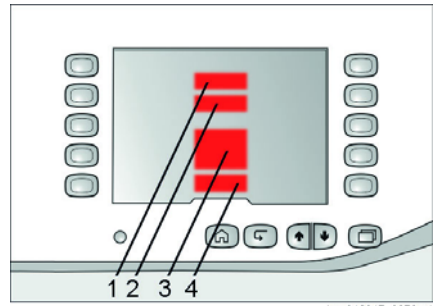
### Procedure



img612017_0364m2

- Push button (7). The menu in area (1) opens.
- Press key sequence (6), (3) and (5).
- Select the status bar field using button (2), (3) or (4).
- In the list, use buttons (2) to (6) to select the desired information.
- Exit the list by pressing button (8).

## Central information area



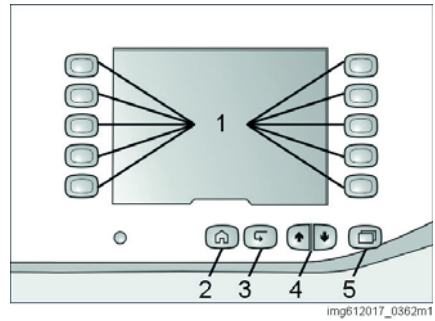
img612017_0370m1

The central information area simultaneously shows four values that are relevant for operation:

- **Weight** (1):
  The maximum permissible weight for the current lift height. If the optional weight measurement is available, the current weight of the load being lifted.
- **Lift height** (2):
  Current height of the fork arms (upper edge)
- **Type of guidance and steering angle** (3)
- **Driving speed** (4)

This part of the display cannot be parameterised.

## Operation



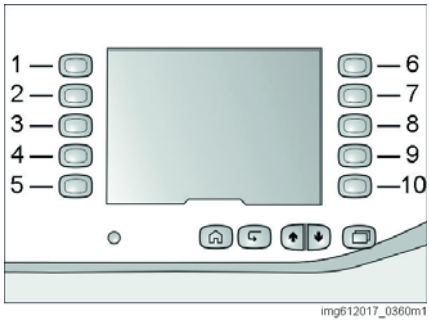
img612017_0362m1

The display is operated using 15 membrane switches. The function of buttons (2) to (4) is fixed. Button (5) has two functions.

| Item number | Function |
|---|---|
| 2 | Changes the view back to the main page |
| 3 | Changes the view back to the next-highest menu |
| 4 | If an arrow is displayed at the upper or lower edge of the right-hand menu bar, the content can be changed using these two push buttons. |

| | |
|---|---|
| 5 | Changes the view to the main page with the menu shown in the right-hand menu bar. |
| | If a settings page is displayed, the current setting can be saved. |

The function of membrane keys (1) to (10) is shown directly next to the keys in the display. The function of the buttons changes depending on the menu that is displayed. ▷



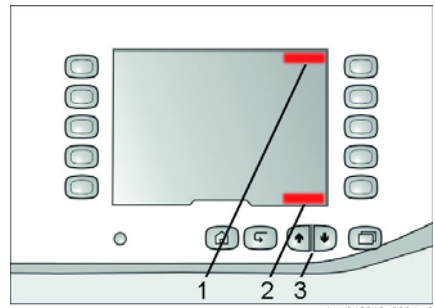

The layout of the main page is always the same when the industrial truck is delivered ex works.

| Item number | Function |
|---|---|
| 1 | The energy-saving mode of the industrial truck is activated or deactivated. |
| 5 | The navigation information is shown or hidden. For this, the key switch for the navigation must be set to AUTO. Otherwise, the symbol is greyed out and therefore cannot be selected.* |
| | If the button is pressed and held when a drive order is active, the drive order is deleted.* |
| 6 | The right-hand menu bar with the available data regarding height preselection opens. If the symbol is greyed out, the industrial truck is equipped with the navigation option and the key switch for navigation is set to AUTO.* |
| 9 | Switch the work light* on/off |
| 10 | Switch the fan* on/off |
| | * Option |

If a function or button is selected, this is indicated with a coloured bars (1) next to the button. If the function is deselected, this coloured bar is no longer present. ▷

## Scrolling through the menu bar

If an arrow appears in area (1) or (2), then the list contains additional entries. The arrow keys (3) can be used to scroll through the menu. If there is no longer an arrow in area (1), the start of the list has been reached. If there is no longer an arrow in area (2), the end of the list has been reached.



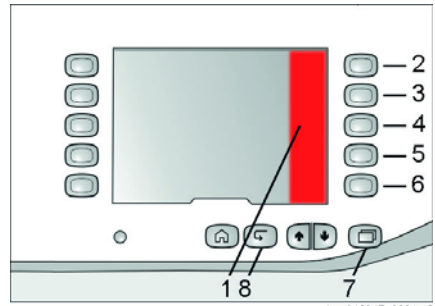
img612018_0004m2

## Changing the language

The texts are available in 25 languages. The language can be set using a fixed key combination. This combination is the same for all languages.

### Procedure

- Push button (7). The menu in area (1) opens.
- Press key sequence (6), (3) and (4).
- Use buttons (2) to (6) to select the desired language in the list.



img612017_0364m2

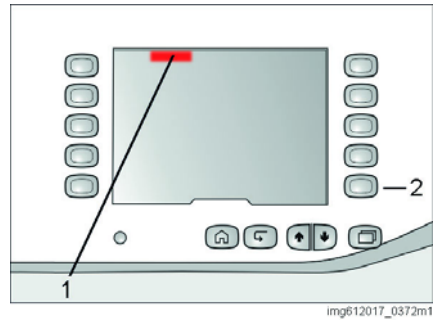
**NOTE**

*Only five languages are shown here. The other 20 languages can be found by scrolling. See "Scrolling through the menu bar"*

- Exit the list by pressing button (8).

## Message list

Currently displayed error numbers can be hidden using push button (2). A warning symbol (1) remains in the status bar with the quantity of current errors. The hidden errors can be displayed in the message list. The errors are only displayed in the list until the cause is rectified. All other errors can be read out using the diagnostic software.



img612017_0372m1

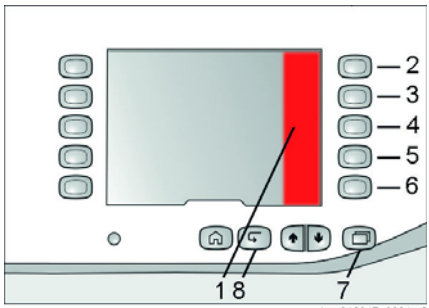
### Procedure

➢ Push button (7). The menu in area (1) opens.

➢ Press key sequence (6), (5) and (2).

The message list shows all of the current error numbers.

➢ Exit the list by pressing button (8).



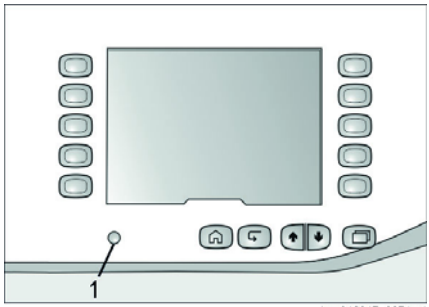
img612017_0364m2

### Brightness setting

The brightness is automatically adjusted by a light sensor (1) below the display.

**NOTE**

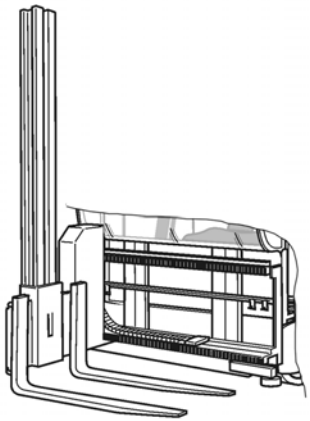
*For the automatic brightness feature to function correctly, the sensor must not be covered or contaminated.*



img612017_0374m1

## Swivel shift fork

The movements of the turret head are automatically braked before the turret head reaches its mechanical stop. The end positions are signalled to the controller by switches. The industrial truck drives at the maximum speed approved for the lift height only if the turret head is located in the right or left end position. If either the swivel or reach movement does not reach the end position, the industrial truck drives only at positioning speed and the lifting and lowering speed of the main lift is reduced.



The **tortoise** symbol appears in the display.

Once the turret head has reached one of the two end positions, the operator is notified by an acoustic signal.

# 4

# Operation

# General commissioning

## Commissioning

If the vehicle is delivered only partially assembled, ensure before commissioning that the whole truck has been professionally assembled. All hydraulic and electrical connections have to be checked. The connections, which must be disassembled for shipping should be reassembled carefully. All nuts and bolts must be tightened to the appropriate torque. After the oil levels on the hydraulic tank and gear box have been checked, commissioning can begin. This commissioning should be done professionally be our service personnel. Before starting work, work through the **Checklist before starting work**.

## Weights of the units

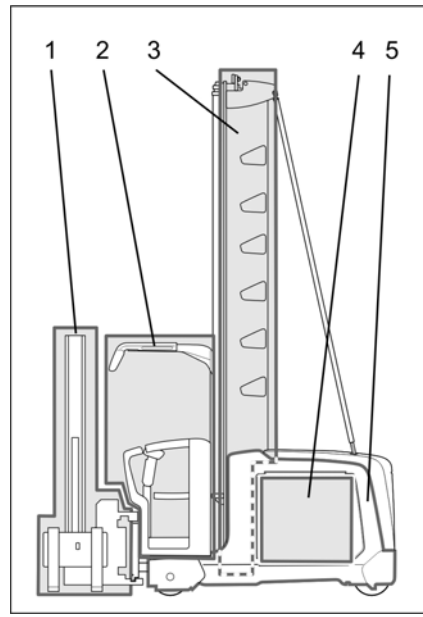
Industrial trucks are mainly transported in a disassembled state and must be assembled on site. You must ascertain the weight of the individual units in order to assemble the truck safely and to select a suitable harness. Our industrial trucks are constructed using a modular system. Our trucks also have numerous customer-specific characteristics. For this reason, it is difficult to specify the correct weight for each unit and for each variant. The information and table for the lift masts below provide rough guidelines. For safety reasons, always add a generous margin when rounding up the determined value.

## Delivery in units

Specified weights apply only to the standard design. Determine or request the weights of special designs.

Narrow aisle trucks can be disassembled into the following units: attachment, driver's cab including carriage, lift mast, battery and chassis.

When assemblies comprised of multiple complete units are transported, the weights of the individual units must be added together so that a suitable hoist can be selected. When hooking on the units, ensure that the overall centre of gravity can be moved relative to the individual units.




1 Attachment
2 Driver's cab incl. carriage
3 Lift mast
4 Battery
5 Chassis

## Weight of the attachment

A standard attachment (europallet) with a turret head weighs approximately 800 kg.

If another attachment is fitted, determine the weight of the additional attachment, e.g. by weighing the attachment.

## Weight of the driver's cab

A standard driver's cab including carriage weighs approximately 660 kg. Take into account the additional weight of attachments, for example the weight of order-picking platforms.

A standard cold store cab including carriage weighs approximately 800 kg.

If another driver's cab is fitted, determine the weight of the additional driver's cab, e.g. by weighing the driver's cab.

## Weight of the lift mast

The weight of the lift mast depends on its design and overall height. The following table shows the expected maximum weights depending on the overall height.

| Overall mast height | Weight |
|---|---|
| <3 m | <1600 kg |
| <4 m | <2,300 kg |

| Overall mast height | Weight |
|---|---|
| <5 m | <2,900 kg |
| <6 m | <3,500 kg |
| >6 m | <4,300 kg |

### Weight of the battery

The weight of the battery is specified on the nameplate on the battery.

**NOTE**

*The installed battery must as a minimum weigh the value stipulated on the nameplate on the truck. Compare the information on the nameplate on the battery with the information on the nameplate on the truck. If ballast weights are installed, the weight of the ballast weights must be taken into account.*

### Weight of the chassis

The weight of the chassis depends on its design and the fitted equipment.

## Transporting and loading

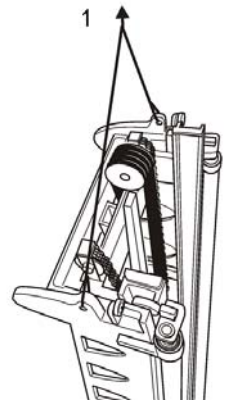
### General ▷

Depending on the overall height, the industrial truck can be delivered as a complete unit or unassembled. In each case, determine the weights of the components or the complete truck (delivery papers) and provide suitable hoists and harnesses.

ealig0025

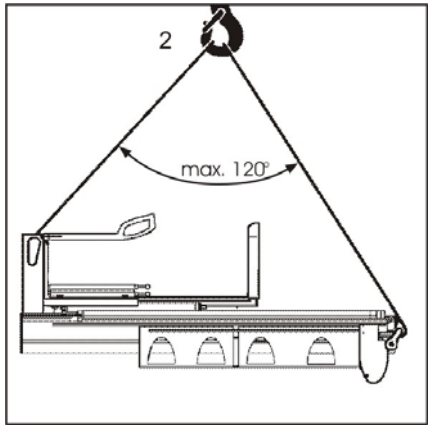
## Hooking on the lift mast ▷

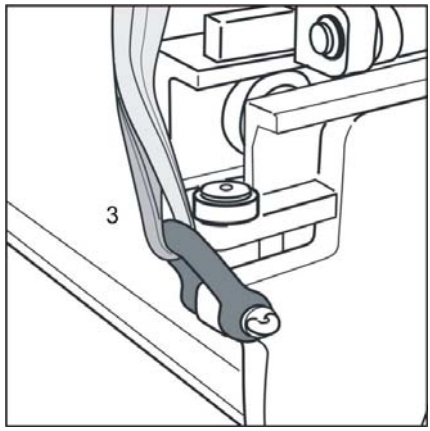
To hook the lift mast onto the crane hook, use the bores intended for this purpose at the top end of the lift mast (1). Harnesses suitable for this purpose must be used (shackle or lifting device). If necessary, the individual parts of the lift mast must be lashed to each other during this process to prevent them from separating unintentionally and thus shifting the centre of gravity.



### Hooking the lift mast on horizontally ▷

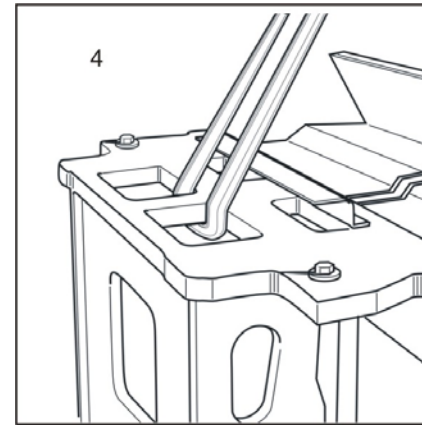
If the lift mast needs to be crane-loaded in a horizontal position (2), suitable shackles must be used in the indicated bores at the top end of the mast (3).



### Lift mast, lower lifting point

At the lower end, a textile strap can be wound around the middle crosspiece in the beam support of the cab (4).

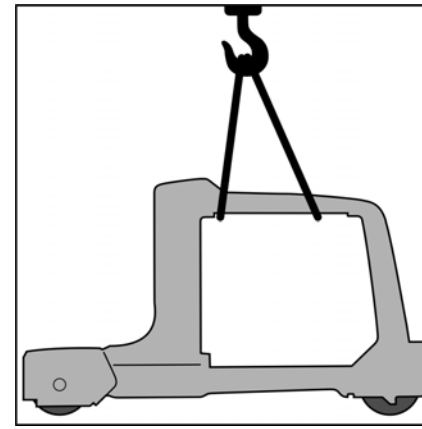



### Loading the chassis

Electronic elements such as sensors and antennas can be installed at different places in the chassis according to the truck design. The ground clearance of these elements is very low. As a result, particularly when mounting the chassis on a forklift truck fork and when fitting supports, make sure that no pressure is applied to these elements. Before mounting on a forklift truck fork or before fitting a support, perform a visual inspection to determine whether and where such elements should be mounted on the industrial truck in question.

### Hooking the chassis on

The cross beams above the battery compartment serve as lifting points for the chassis. To protect the paintwork of your industrial truck, we recommend that you always use textile slings. Shims protect the harnesses against sharp edges.



**⚠ WARNING**

If the chassis is to be moved using the crane, always remove the battery.

**NOTE**

*The chassis must always be mechanically braked unless the industrial truck is actually in operation.*

**⚠ WARNING**

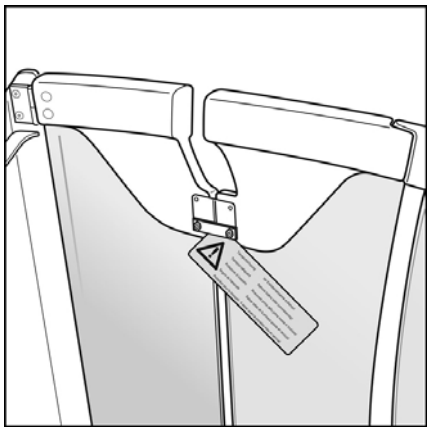
Hydraulic oil can escape through disconnected hydraulic connections.

## Transportation safety device on glass doors

Cab doors made of glass* are supplied with a transportation safety device. This transportation safety device prevents the glass doors from inadvertently opening during transportation and becoming damaged as a result.

➢ Remove and dispose of the transportation safety device.

*Option



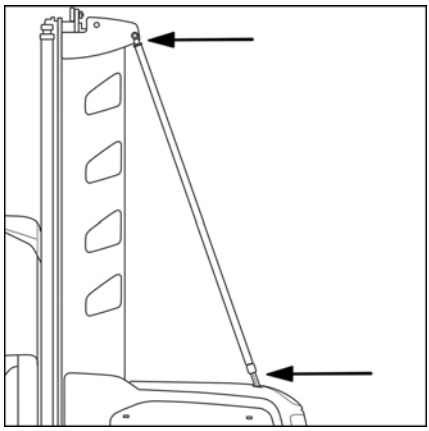
## Mast bracing

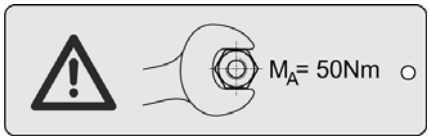
Mast bracing may be required depending on the configuration of the order picking truck.

Once the mast bracing has been installed, it must be adjusted according to factory specifications and tightened to the specified torque.

The screw connection at the upper mounting position on the mast bracing must be tightened to 195 Nm.

The lower mounting position is marked with a label. This label specifies the torque as 50 Nm.



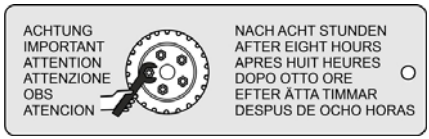



## Wheel nuts

**⚠ WARNING**

Wheel nuts can loosen after initial commissioning.

After the first eight operating hours, tighten the wheel nuts to 195 Nm.

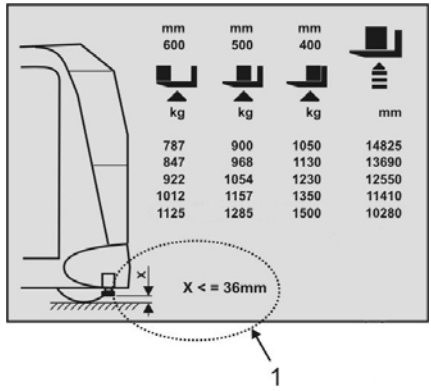


## Support screws

The setting of the support screws must be checked during initial commissioning and each time maintenance is performed.

The setting dimension (1) is dependent on the application of the truck and can be taken from the load capacity diagram.

▷



## Safe handling of the traction battery

The dangers described below can arise individually or collectively depending on the type of battery in use.

### Batteries with liquid electrolyte

**⚠ DANGER**

**Risk of explosion**

- An explosive gas mixture can form when charging batteries. This gas mixture can remain in the atmosphere for a lengthy period of time even after the charging process has finished.
- The gas mixture formed when charging batteries must not enter the driver's compartment.

- Pay particular attention to the risk of explosion in the void above the battery when the battery has been freshly charged.
- The openings in this void facilitate the exchange of air and these openings must not be covered or be closed.
- Do not create any openings in the battery compartment that allow the explosive gas mixture to enter the driver's compartment.
- Ensure that the room or area in which the battery is being charged is well ventilated.
- Smoking, fire and open flames are forbidden in an area of 2 m around the charged battery.
- Battery acid is toxic. Do not inhale vapours.
- Battery acid is corrosive. Avoid skin contact.
- Rinse off spilled or splashed battery acid immediately with plenty of clean water.
- When handling battery acid, wear personal protective equipment such as protective gloves and a protection suit as well as face protection.
- If contact with acid is made despite these measures, rinse immediately with plenty of clean water and consult a doctor.
- Observe the additional operating instructions of the battery manufacturer and the battery charger manufacturer.

## 80-V version

**⚠ WARNING**

In the 80-V version, there is risk of electric shock if the live connections are touched.

Before removing the control compartment cover or the battery compartment cover, disconnect the battery male connector.


## Handling the battery

The installation, removal and transport of traction batteries always involves the handling of heavy weights.

**⚠ WARNING**

Risk of crushing of fingers, risk of crushing of hands and feet, risk of damage to property

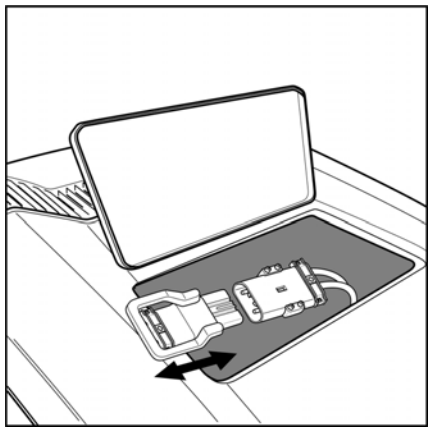
- When heavy weights are being handled, there is a risk of limbs or bodies becoming trapped or crushed. To avoid this, operate lifting gears and changeover frames with the utmost care. Prevent heavy weights from bumping against the machine or equipment.
- Be aware of pinch points and shear points when inserting the battery into or removing the battery from the battery compartment. Ensure that you keep your fingers, hands and feet out of any areas where they could be at risk from one of the abovementioned points of constriction. These points of constriction occur regardless of the tool being used (truck, crane or changeover frame).
- Provide support staff with accurate instructions.
- Remove passers-by and spectators from the danger area.
- Set down the disconnected battery cable on the battery in such a way that prevents the cable from becoming trapped or torn off.

## Battery compartment cover

The battery compartment cover covers the entire battery compartment. The cover is held by four clamping holders.

The cover can be removed by applying light pressure from underneath near the corners.

All that is needed to operate the battery male connector is to open the service flap.



**NOTE**

*As an option, the industrial truck can be equipped with lateral battery compartment doors.*

## Installing the battery

The battery must fill the installation space with just a few millimetres of play. This will ensure that the battery does not slip or tip over during travel and that the function of the battery lock is guaranteed. If a lighter battery is used temporarily, you must compensate for the weight difference using a fixed ballast, and the size difference must be equalised using shims. In this case, the specifications on the nameplate of the industrial truck must be changed or updated. These narrow aisle trucks are equipped with an integrated battery discharge indicator that is set for normal wet lead batteries (PzS) as standard. If a different battery type or different battery capacity is used, the authorised service partner must adapt the battery discharge indicator.

**NOTE**

*The voltage and weight of the battery must satisfy the requirements set out on the truck's nameplate. Therefore, you need to compare the nameplates on the truck and battery.*

### Battery type and battery charger

Wet lead batteries, gel batteries or lithium-ion batteries can be used as traction batteries. Because the various types have different

structures, suitable battery chargers must be used.

**NOTE**

*Batteries are subject to special charging, maintenance and handling instructions. Observe the instructions from the respective manufacturer.*

**⚠ WARNING**

Risk to life

Lithium-ion batteries may only be used in industrial trucks that have a design and a controller intended for use with such batteries. Check with the authorised service partner before using a lithium-ion battery.

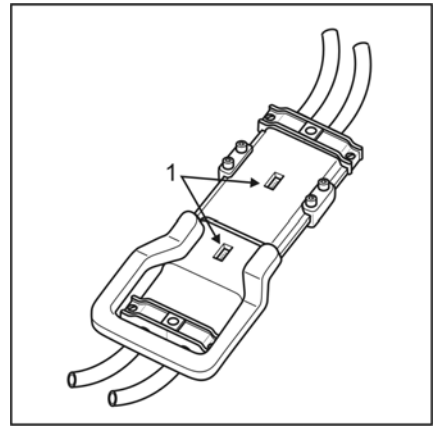
**⚠ CAUTION**

Risk of damage to property

Incorrect battery chargers can cause total battery failure.

## Start-up

If your industrial truck is equipped with a Euro battery plug, make sure that the voltage index pin is in the correct position. The set voltage can be read through a display window (1).




**⚠ WARNING**

Risk of accident

Risk of injury from crushing and shearing points

**⚠ WARNING**

Risk of short circuit

Do not clamp or crush battery cables.

Before starting each shift, check that the battery lock is in good working order and that it functions correctly.

Before using the battery for the first time, a proper commissioning procedure must be performed. If the battery was obtained

separately to the industrial truck, check the following:

- The nominal voltage
- The minimum required weight
- The model and design of the battery male connector fitted
- The minimum required cross-section and the connection type of the battery cable

**⚠ CAUTION**

Risk of damage to property

Observe the information and guidelines from the battery manufacturer.

## Permitted batteries

Only batteries with trays constructed in accordance with EN1175-1 may be used for operation of the industrial trucks.

## Battery commissioning

Proper commissioning must be performed if the industrial truck was ordered without a battery or if it was supplied with a dry pre-charged battery because it had to be transported over a long distance (e.g. from overseas). Observe the information and guidelines from the battery manufacturer. If the battery was obtained separately to the industrial truck, the nominal voltage, the required minimum weight and the attached battery male connector must be checked particularly carefully.

**⚠ WARNING**

Observe the safety regulations for handling battery acid.

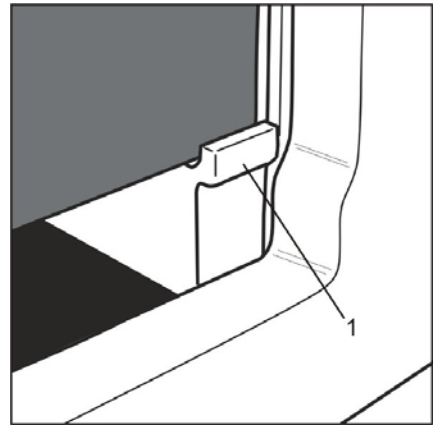
**⚠ CAUTION**

Risk of short circuits

Take care not to jam or crush the battery cable.

# Replacing the battery

## Battery replacement using forklift truck ▷




The battery rests in a recess (1) as standard. The battery is intended to be replaced using a truck. The truck used must be suitable for this purpose.

- The fork must be of sufficient length for the prevailing load centre of gravity.
- The load capacity must correspond to the weight of the battery fitted.
- The external width of the fork must be adjusted to the insertion opening.
- Adjust the fork tilt such that the battery does not come into contact with the industrial truck when the battery is removed.
- The battery is not provided with a latch.

**⚠ WARNING**

Risk of accident, risk of crushing

Observe the information in the section entitled **Safe handling of the traction battery**.

Make sure that all four corners of the battery are within the recess.

## Battery replacement with change frame

The industrial truck can be optionally equipped with roller channels so that the battery can be replaced using a crane or battery change frame.

When using a battery change frame, observe the corresponding operating instructions for the change frame.

**NOTE**

*If your industrial truck is equipped with roller channels, the battery is secured in position with a battery lock. Observe the information in the section entitled **Battery lock** in particular.*

**⚠ WARNING**

Risk of damage to property, risk of crushing

Observe the information in the section entitled **Safe handling of the traction battery**.

Before starting each shift, check that the battery lock is in good working order and that it functions correctly.

## Function check

Before releasing the truck for its intended use, a thorough function check should first be carried out. For this, see the **Checklist before starting work**.

If, after having done the checks before starting work any defects, regarding operating or traffic safety are discovered, then steps have to be taken immediately to properly and professionally repair theses defects. It is prohibited to continue using the truck until it is repaired.

If your truck is equipped with any special features, these should also be tested carefully. A descritption of the optional attachments see **Optional Equipment**.

# Daily commissioning

## Checklist before starting work

**Before starting work, the driver must make sure that the truck is in a safe operating condition.**

**⚠ CAUTION**

If any defects that could influence operational and road safety are found during the daily pre-shift check, a course of action must be taken immediately to ensure that appropriate repairs are carried out. It is prohibited to continue operating the truck until repairs have been performed.

### Function checking the brake system

- ➢ Check the brake function after releasing the foot switch.
- ➢ Examine the area around the foot switch for foreign objects.
- ➢ Check the brake function after activating the emergency off switch.
- ➢ Check the function of the reverse brake. The braking and subsequent acceleration processes must be gentle and not subject to jerky movements.
- ➢ Check the "end of aisle automatic braking"* system function.
- ➢ Perform further order-related brake function checks.

### Function checking the steering system

- ➢ Check that the steering turns freely.
- ➢ Check that the maximum steering angle of approx. 90° to the left and right is achieved.

### Checking all operating devices

- ➢ Check that the levers and push buttons are in good working order.
- ➢ Check that all operating levers and push-buttons return automatically to the neutral position.
- ➢ Check that all the operating devices are in good condition.
- ➢ Check that all the operating devices are operating correctly.

### Checking the access control

- ➢ Check that the switch key can be pulled out when it is in the 0 position.
- ➢ Check that the industrial truck cannot be operated when the switch key is removed.
- ➢ If electronic access control* is fitted: check for correct function.

### Checking the lifting accessory

- ➢ Visually check the forks for cracks.
- ➢ Visually check the forks for deformation.
- ➢ Check the function of the fork safety device*.
- ➢ Check that the locking pin moves easily and latches automatically.
- ➢ Visually check the fork carriage for deformation.
- ➢
- ➢ Visually check the load chains for damage.

### Checking the overhead guard

- ➢ Visually check the overhead guard for deformation.
- ➢ Visually check the overhead guard cover* for condition and contamination.

### Checking the wheels

- ➢ Examine the wheels for foreign objects.
- ➢ Check the condition of the drive wheel and load wheels.

### Checking the cab doors, the barriers and the emergency off switch

- ➢ Make sure that when the emergency off switch is actuated, neither the traction nor any hydraulic function can be activated.
- ➢ Make sure that when the barrier or cab door* is open neither the traction nor any hydraulic function can be activated.

Driver's cab with glass doors and front panel glazing or all-rounding glazing:

- Check that there are no chips or cracks in the glazing.
- Check all parts of the glazing for contamination. Clean the glazing if necessary.

**Other checks**

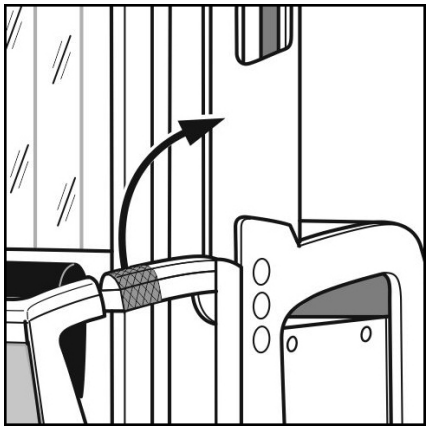
- Check the function of the horn.
- Check the function of all other warning devices*.
- Check the function of the lighting devices.
- Check that all covers and flaps are closed.
- Check that the battery lock is in perfect condition and operates correctly (shut the truck off if the lock is not correctly latched*).
- Check special equipment and special functions according to the order to make sure they are in perfect condition and operate correctly.

* Option

# Access to the driver's compartment

## Access to the driver's compartment

### Barriers



**⚠ DANGER**

**Risk of crushing**

Only the area of the handle indicated must be used for opening and closing the barriers.

**⚠ WARNING**

Risk of falling

When climbing in and out, it is important to note the difference in height between the floor of the driver's compartment and the ground.

**NOTE**

*The barriers are monitored by electrical means. The industrial truck is only ready for operation when the barriers have been correctly closed.*

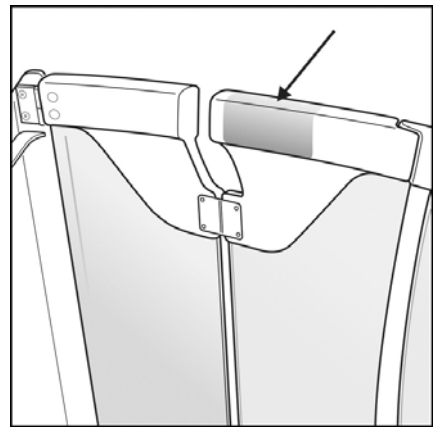
The barriers comprise an upper section (stomach bar), a centre section (knee bar) and a lower section (foot bar). The three sections are connected to each other by mechanical means.

Only the section of the stomach bar that is furthest forward may be used to open and close the barrier.

### Doors

The glass doors feature a recess on the inside of the handle. Only this area of the handle may be used to open and close the glass doors.

The glass doors feature a folding hinge in the centre. To open the door, the handle must be pushed towards the centre of the cab at the point shown. The door is closed by performing the action in the opposite direction.



**⚠ DANGER**

**Risk of crushing**

Only the area of the handle indicated may be used to open and close the glass door.

**⚠ WARNING**

Risk of falling

When climbing in and out, it is important to note the difference in height between the floor of the driver's compartment and the ground.

**NOTE**

*The glass doors are monitored by electrical means. The industrial truck is only ready for operation when the doors have been correctly closed.*

# Operating devices

## Initial driving exercises

**⚠ WARNING**

Before starting work, the **Checklist before starting work** must be completed.

Observe all safety instructions.

### Speeds

The driver must adapt the driving speed according to the situation. When cornering in particular, attention must be paid to the overall height and the centre of gravity, which will be high as a result.

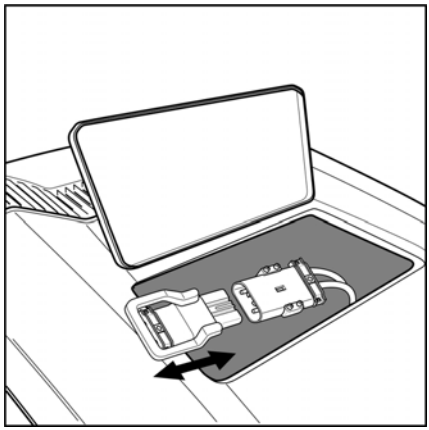
## Initial driving exercises

**⚠ WARNING**

Risk of accidents

In order to become familiarised with the driving and braking characteristics of these trucks, driving exercises must first be carried out in a flat, obstacle-free area of the warehouse.

## Switching on the controller



Plug in the battery male connector.

To do this, open the flap behind the lift mast.

Get into the cab and close the barriers/cab doors.

**NOTE**

*Barriers/cab doors are monitored by monitoring switches to ensure that they are completely and correctly closed.*

**⚠ WARNING**

Never climb on to or jump on to a moving truck

Unlock the emergency off switch by turning it clockwise.

Switch on the key switch or activate the electronic access control.

**NOTE**

*Optionally, these trucks can also be equipped with an electronic access control (PIN code, RFID chip, magnetic card system). See also the section entitled "**Special equipment**".*

If the truck is in an error-free state, the indicator for normal operation appears on the operation status display (see also the keyword "operation status display").

The working spotlights* are switched on.

If the controller is switched on when the barriers are closed, the foot switch must be actuated once to enable the functions.
To drive, the foot switch must be actuated and held down so that the parking brake is released.
If one of the barriers is opened and then closed again when the controller is switched on, the foot switch must be actuated again once.
This switching ensures that the industrial truck can be operated only if the operator is in the cab and all barriers are closed.

* Option

## Adjusting the position of the operating panel

**⚠ WARNING**

The clamping device that is released for the settings described below must be retightened before starting work.

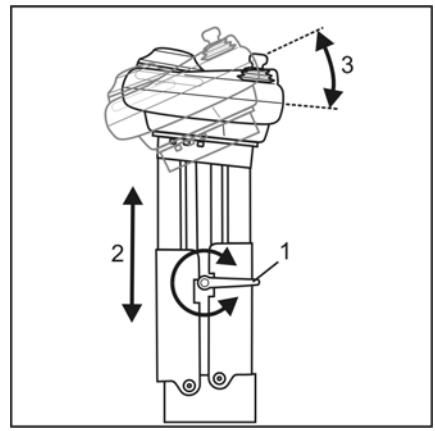
In order to be able to optimally adapt the operating panel to driver requirements, the panel can be adjusted by height, by tilting the console and by tilting the operating panel. The position of the clamp lever can be changed by means of an integrated latching mechanism. To do this, pull out the handle of the clamp lever (1) on its axle, turn it to the required position and allow it to engage again.

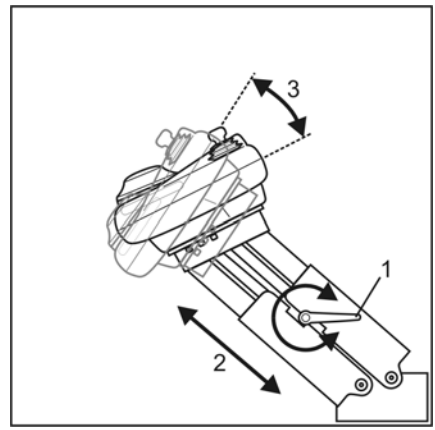
### Adjustment

Release the clamp lever (1) by turning it to the left. Keep hold of the operating panel with the other hand while doing this. If the clamping device comes loose, move the operating panel into the required position with both hands and hold it there. The setting is continuously variable. Retighten the clamp lever.

➢ Adjust height (2).

➢ Adjust tilt (3).



## Adjusting the driver's seat


**⚠ WARNING**

Risk of accident

Only apply settings in a stationary truck.

### Adjusting the height of the driver's seat

Place body weight on driver's seat. Pull lever (1) and move the driver's seat to the required height by applying to it or removing pressure. Release the lever.

### Setting the driver's seat to the horizontal position*

Pull the handle (2) and move the seat into the required position. The mechanism must noticeably engage.

### Tilting the seat surface

Pull handle (3) and move the seat surface into the required tilt position. The mechanism must noticeably engage.

### Folding the driver's seat away

If the driver's seat is disruptive when operating the truck in a standing position, it can be folded up and away (4). The folded-up seat surface is upholstered and can therefore be used for leaning on.

# Driving

## Braking, driving and steering

### Releasing the brake

After entering the driver's cab, close the barriers or cab doors. Pressing the foot switch (1) once confirms your presence. If the drive switch is also actuated when the foot switch is actuated, the electromagnetic parking brake is released.


**NOTE**

*The foot switch must be pressed again after each time the barriers or doors are opened and closed. The ancillary movements can only be used when the industrial truck is at a standstill and the foot switch is not actuated.*

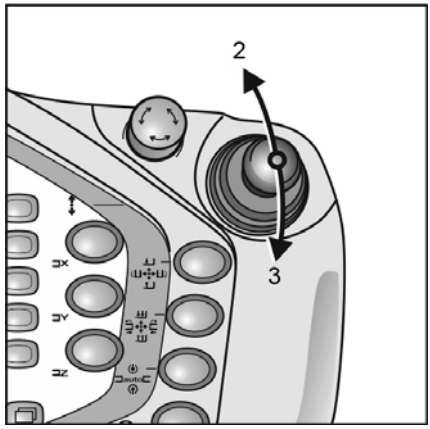
### Braking

Releasing the foot switch while driving triggers the electrical reverse current braking. The industrial truck is braked to a standstill. Then the electromagnetic parking brake is activated.

Releasing the operating lever for driving or the left-hand sensor surface while driving triggers the electrical reverse current braking. The industrial truck is braked to a standstill.

There are functions that only work when the industrial truck is at a standstill. Therefore, it can be necessary to release the foot switch in order to use these functions. The corresponding pictogram appears on the display.

## Driving




The drive direction and the driving speed are selected using the right-hand operating lever.

Move the operating lever in the direction of the fork (2) until the required driving speed in the fork direction has been reached.

Move the operating lever in the direction of the lift mast (3) until the required driving speed in the direction of the lift mast has been reached.

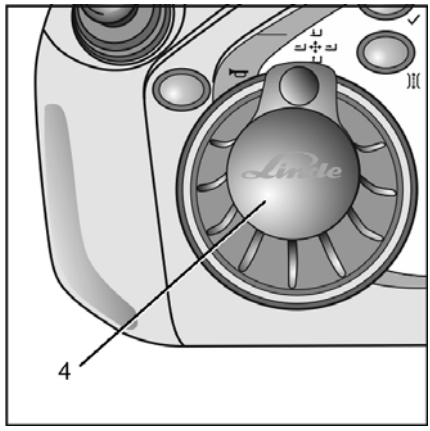
If the operating lever is switched from one drive direction directly to the other, the industrial truck is braked and accelerated in the opposite direction.

## Speed

The controller limits the driving speed depending on the driving situation and any options installed. It is always possible to have the speed restricted by the authorised service centre, but not to increase it. The operator can continuously control the speed within the permitted range.

The authorised service centre can configure the acceleration and braking characteristics.

## Steering

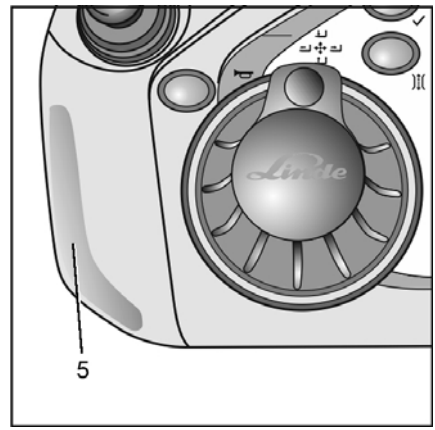



The operator's left hand is used to actuate the steering knob (4) and thus determines the course the truck takes. The steering knob has a mechanical detent in the straight-ahead position. From there, the steering knob can be turned approx. 135° to the right and to the left. The steering turntable rotates by 90°.

If the industrial truck is being directed by a guidance function (MZF or IZF), the steering knob must be in the straight-ahead position.

## Two-hand driving operation

Operation of the industrial truck with two hands is required within the aisles once the controller has detected the corresponding sensor system. To drive, you also need to touch the sensor surface on the left-hand end of the operating panel (5) with your left hand.




## Simultaneous functions

Different functions can be combined. For this purpose, more than two operating devices may need to be actuated at the same time.

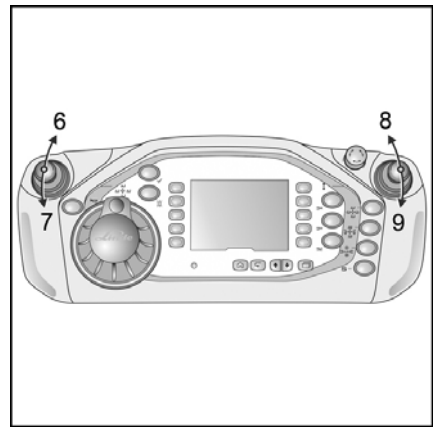
## Driving and main lift

In order to execute the two functions driving and main lift simultaneously, both operating levers must be moved accordingly. Moving the left-hand operating lever in the direction of the fork (6) activates lowering of the main lift. Moving this operating lever in the direction of the lift mast (7) activates lifting. The degree of activation is always infinitely variable.

The drive direction and the driving speed are selected using the right-hand operating lever.

Move the operating lever in the direction of the fork (8) until the required driving speed in the fork direction has been reached.

Move the operating lever in the direction of the lift mast (9) until the required driving speed in the direction of the lift mast has been reached.



### Driving and auxiliary lift

In order to execute the two functions driving and auxiliary lift simultaneously, both operating levers must be moved accordingly.

Press the button (10) to select the auxiliary lift.

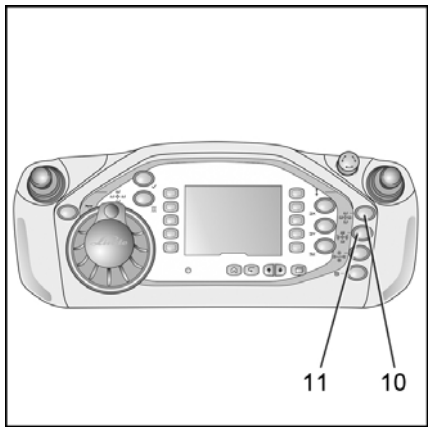
The degree of activation is always infinitely variable.

### Driving, main lift and auxiliary lift

In order to execute the functions driving, main lift lifting and auxiliary lift lifting, or driving, main lift lowering and auxiliary lift lowering simultaneously, both operating levers must be moved accordingly.

In addition, press the button (11) to select the combination of main lift and auxiliary lift.

The degree of activation is always infinitely variable.




## Types of guidance

The industrial trucks can be designed for:

- Driving without guidance
- Driving with mechanical rail guidance*
- Driving with inductive guidance*
- And combinations* of these

*Option

### Driving without guidance

In standard trucks, the operator's right hand selects the driving speed and drive direction. The operator's left hand is used for steering and thus determines the course the truck takes.

### Mechanical rail guidance (MZF)*

The industrial trucks can be guided **mechanically** when travelling within aisles. To achieve this, a rail system is installed on the floor of the warehouse. Two-hand operation is required to make use of the guidance system. The operator's right hand selects the driving speed

and drive direction. The operator's left hand is used to actuate a sensor or a function.

More detailed information can be found in the relevant dedicated chapter.

### Inductive guidance (IZF)*

The industrial trucks can be guided **inductively** when travelling within aisles. To achieve this, a wire is embedded into the floor; this wire is live with current. The magnetic field generated by this wire is detected by sensors in the industrial truck and used to guide the truck. Two-hand operation is required to make use of the guidance system. The operator's right hand selects the driving speed and drive direction. The operator's left hand is used to actuate a sensor or a function.

More detailed information can be found in the relevant dedicated chapter.

*Option

## Mechanical guidance MZF

The mechanical guidance consists of one or two rails on or between which the industrial truck is guided with a maximum permissible play of 5 mm. When guidance is active, the controller automatically adapts the maximum possible driving speed to match the lift height.

### Entering the aisle

To enter rail guidance, the industrial truck must be positioned as centrally as possible and aligned with the aisle in front of the entry funnel. The more accurate this positioning, the faster and more precisely the industrial truck will be led into the guide. Once the industrial truck has entered the guide, the side rail switches are activated. When the rail switches detect the rail guidance, the MZF mode of operation is automatically selected.

Instead of the "steering wheel" symbol, the symbol for "guidance" appears in the display.

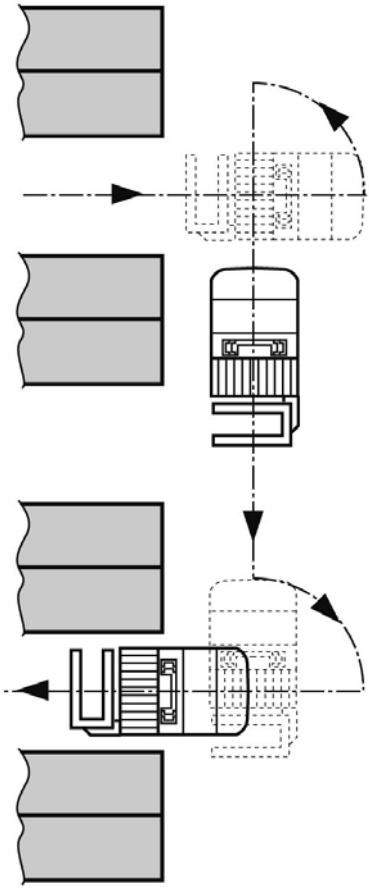
## Exiting the aisle

The industrial truck must be driven completely out of the aisle. The sensor system for the aisle detection recognises the location of truck and re-enables the steering.

## Changing the aisle ▷

If the industrial truck needs to be driven out of one aisle and into another, the following notes must be observed:

- Drive the industrial truck completely out of the aisle.
- Slowly drive out of the aisle and beware of any people or other industrial trucks in the transfer aisle.
- Once the industrial truck is outside the rail, the steering is reactivated by the rail switch.
- The industrial truck can then be turned 90° on the spot and driven to the target aisle.



# Picking up a load

## Moving the load

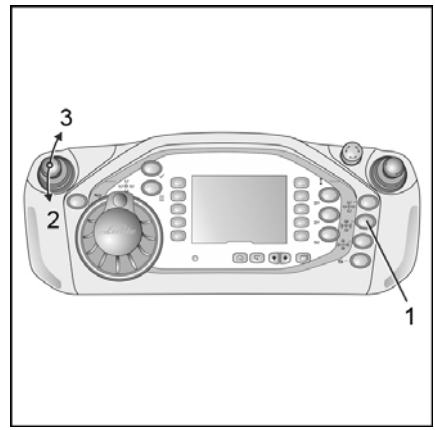
### Main lift and auxiliary lift

The main lift and the auxiliary lift can be lifted and lowered together. The lift height display will be synchronised.

Pressing button (1) and moving the left-hand operating lever in direction (2) or (3) triggers the infinitely joint lifting or lowering of the main lift and auxiliary lift.

**NOTE**

*This combined hydraulic function can still be combined with the driving function. To do this, move the right-hand operating lever as well.*




### Ancillary movements

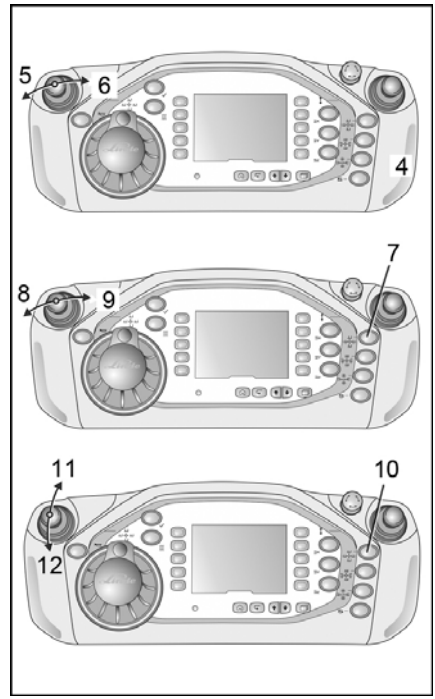
All movements of the load apart from the main lift are categorised as ancillary movements. Standard functions are:

- Sliding the fork.
- Swivelling the fork.
- Lifting the auxiliary lift.

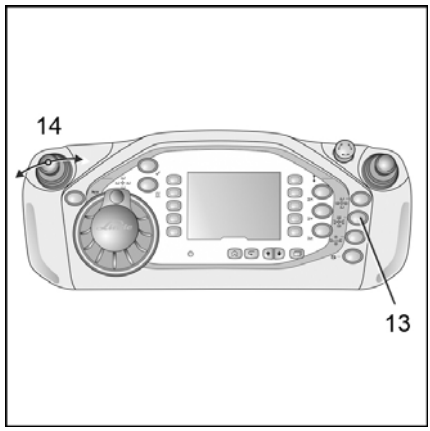
Touch the right-hand sensor surface(4) and move the left-hand operating lever in the direction (5) or (6) to trigger the reach movement to the left or right.

Pressing button (7) and moving the left-hand operating lever in direction (8) or (9) triggers the swivel-shift movement to the left or right.

Pressing button (10) and moving the left-hand operating lever in direction (11) or (12) triggers the lifting or lowering of the auxiliary lift.



### Swivelling and sliding the swivel fork 180° synchronously




Pressing selection key (13) and moving the left-hand operating lever (14) to the right or left triggers the synchronous movement. This movement can be interrupted at any time or continued in the opposite direction. To do this, release the operating lever or the selection key.

**NOTE**

*The synchronous movement only starts when the turret head is in one of its end positions. When the synchronous movement reaches the end, an acoustic signal is sounded. Always carry out the synchronous movement until the end. The swivel fork is then in its right or left end position.*

### Swivelling and sliding the swivel fork 90° synchronously

This function moves the turret head to the front position through a synchronised movement involving shifting and swivelling. This means that the swivelling function automatically stops at a swivel angle of 90 and the sideshift automatically stops in a central position in front of the cab. This function makes it easier to pick up loads at the front of the truck.

Option

See the chapter entitled "Special equipment".

### Fork cycle

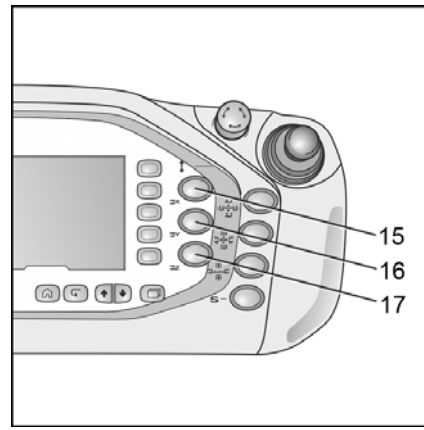
This function enables an increase in handling performance through automation of load pick up and load deposit. The details of the fork cycle function depend on the design of the industrial truck.

Option

See the chapter entitled "Special equipment".

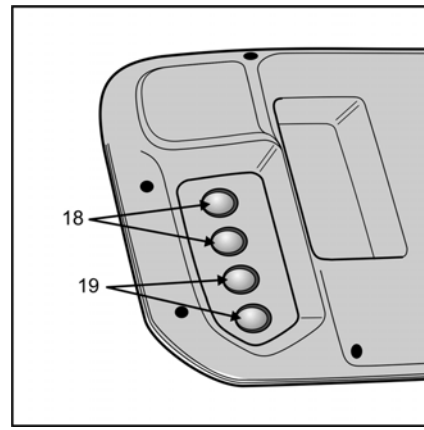
## Hydraulic special functions

Additional hydraulic functions are available as an optional extras. Buttons (15)(16)(17) are provided for operation of these additional functions. See the chapter entitled "Special equipment".




## Underside of the operating panel

On the top of the operating panel, there are four buttons on the right-hand end that are operated using the thumb on your right hand. There are also four buttons (18) and (19) on the underside of the operating panel. These buttons can operated using your other fingers on the same hand. The functions of the buttons on the underside of the operating panel are identical to the buttons directly above them on the top of the operating panel. If the button on the underside of the operating panel is pressed, the illuminated ring for the button above it on the top of the operating panel is activated.




**NOTE**

*The two lower buttons on the right-hand side of the operating panel are primarily assigned on an order-specific basis. If the industrial truck is not equipped with options, the buttons on the top and underside of the operating panel (19) do not have a function.*

## Load capacity diagram

Depending on the job, a load capacity diagram may be generated and mounted in the cab. To ensure that the stability of the industrial truck is not jeopardised in any way, the load capacity diagram and the load capacity restrictions specified on this diagram for certain application conditions must be observed.

This also applies to the increasing weight of the commissioned goods.

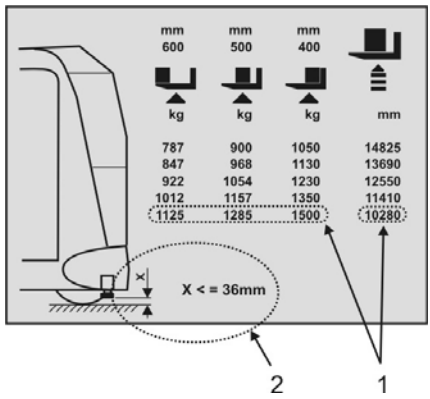
Example for an industrial truck with a lift height of 10280 mm (1)

Distance between the load centre of gravity and the fork back

| | |
|---|---|
| 400 mm | Max. load: 1500 kg |
| 500 mm | Max. load: 1285 kg |
| 600 mm | Max. load: 1125 kg |

The load capacity of the truck decreases as the lift height increases and the load centre of gravity distance grows larger.

The data for the current situation must be taken from the load capacity diagram.




### NOTE

*This industrial truck can also be equipped with the **intelligent load capacity diagram** as an option. Descriptions of this option can be found in the chapter entitled **Special equipment**.*

The support screws may only be adjusted by authorised service personnel. The setting dimension X on the load capacity diagram must be observed.

### WARNING

Risk of accident

The specified setting dimension X (2) for the support screws must be checked every 6 months by authorised service personnel and adjusted if necessary

## Adjustable fork arms

The standard design features forged fork arms that are manually adjustable. Pallets with different dimensions can therefore be picked up.

As an option, this industrial truck can also be equipped with hydraulically adjustable fork arms. The distance between the fork arms must be sufficient so that the load cannot fall and that there is support centrally below the load centre of gravity. Adjust the fork arms accordingly and lock in position.

➢ To do this, lift the locking lever, move the fork arms to the desired position and allow the locking lever to engage again (1).

**NOTE**

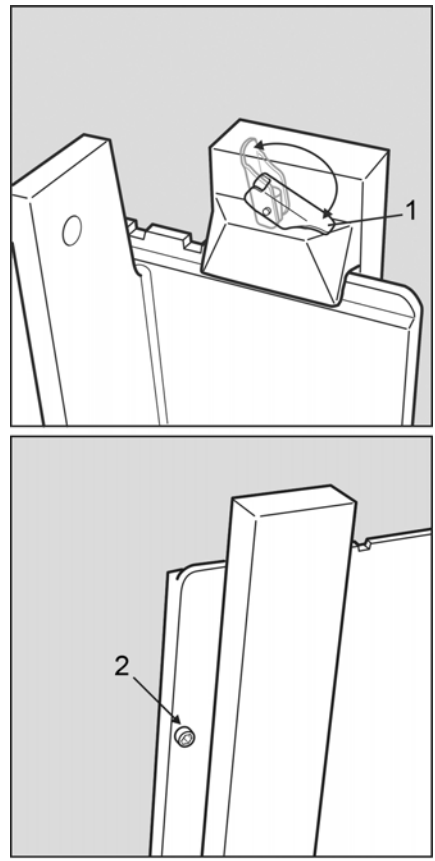
*If the locking lever is engaged, it is no longer possible to move the fork arms laterally.*

**⚠ CAUTION**

Risk of accident

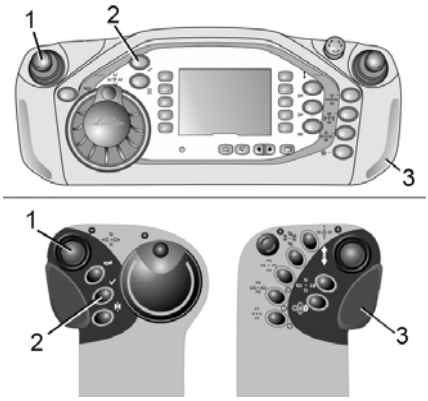
The side fork arm locking device (2) must be present and must be in perfect working order. Otherwise the fork arms can be pushed out of the carrier by lateral forces and fall.

* Option



# Emergency operation

## Emergency lowering via the operating panel ▷




In certain circumstances, the truck control unit prevents further lowering of the cab. (chain breakage or slack chain situation, or faults with chain monitoring, faulty height measuring system, faulty rev sensor on the pump motor).

In these situations, the operator can select the **emergency lowering function** via the operating panel and the cab will lower to the ground without further assistance.

- Do not actuate the foot switch.
- Push the operating lever for hydraulics (1) forwards while touching the right-hand sensor surface (3) (main lift lowering function).
- Wait six seconds. The enable button (2) then flashes in red.
- Leave the main lift lowering function selected while pressing the enable button. The main lift will slowly be lowered.

## Emergency lowering

### Emergency lowering function for the driver's cab

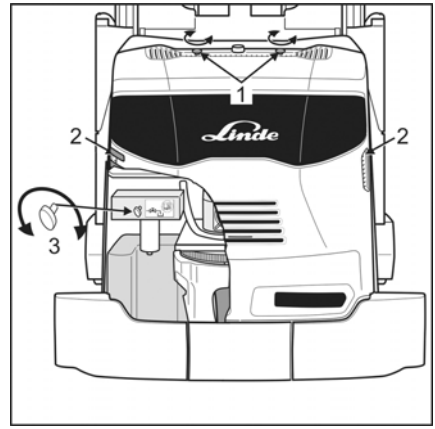
If a technical defect causes the industrial truck to shut down when the driver's cab is raised, or if an operator in the raised cab becomes incapable of operating the industrial truck (e.g. falls unconscious), the driver's cab can be lowered by a second person on the ground using the hand-operated emergency lowering valve.

## Removing the control compartment hood ▷

**⚠ DANGER**

**Danger of electric shock (80-V version)**

Disconnect the battery male connector before removing the control compartment hood.




- ➢ Open the two screw plugs (1).
- ➢ Hold the hood at the ventilation openings (2), lift it off and then place it to one side. The hood is very lightweight and can therefore be removed by hand without using any tools.
- ➢ The emergency lowering valve (3) is located in the control compartment and can be accessed once the cowling has been opened.

**⚠ DANGER**

**Risk of physical injury**

If the emergency lowering function has to be used because the operator has fallen unconscious, make sure that all parts of the operator's body are fully within the driver's cab so that there is therefore no risk he may be injured during the lowering procedure.

The operator of the emergency lowering valve must be certain that the moving components of the lift mast are immediately set in motion on opening the valve. Special attention must be given to the cab, the chains and the inner masts of the lift mast. All of the load chains in the lift mast must remain taut throughout the whole of the lowering procedure. If the components of the lift mast are not immediately set in motion after opening the emergency lowering valve, close the valve immediately.

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

If a movement like the one described cannot be detected immediately or if one of the chains has slackened, a mechanical jam at the lift mast is suspected.

The emergency lowering procedure must then be stopped immediately by closing the emergency lowering valve. The operator must then be retrieved some other way. For example, a second turret truck could be used if suitable, or an elevating work platform. The authorised customer service team must determine the cause of the fault and the means of rectifying it.

If, as described above, it is suspected that the lift mast is mechanically jammed, the abseil system must not be used. The resulting vibrations could cause the mechanical jam to be released, which could create a further hazard should the cab subsequently drop.

- Apart from the emergency lowering valve, it is not permitted to adjust any other screw.
- Close the valve again once the emergency lowering process has been fully completed.

## Securing the load support

In order to secure the load support against lowering during maintenance work, the lowering movement can be locked by closing the shut-off valves. A notch in the block section indicates the valve position.

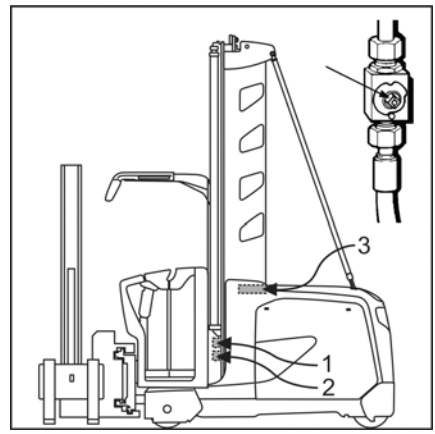
- The notch is pointing in the direction of the connected line = flow open
- The notch is at a right angle to the direction of the connected line = flow blocked

**⚠ DANGER**

**Risk from lowering of the lift mast or driver's cab**

- ➢ The pressure in the hydraulic system must be released before any work is carried out on it. The load support must also be lowered to the ground.
- ➢ Before a person can go underneath the raised driver's cab, an additional mechanical safety device must be installed. For example, fit a suitably strong brace around the bridge pieces on parts of the lift mast or place a suitably strong jack stand underneath the driver's cab.
- ➢ Lock all existing shut-off valves. There is a valve for each main lift cylinder (1), one for each free lift cylinder* (2) and two additional valves for the hydraulic lines for the attachment (3).

*Option




## Emergency operation

If the entire truck control unit or part of it fails, the industrial truck can be moved out of the working area by means of the relevant emergency operation mechanism.

**⚠ WARNING**

- ➢ Only tow at creep speed
- ➢ There must always be an operator in the industrial truck that is being towed.
- ➢ There must not be anyone in the danger area of the trailer train.
- ➢ In order to prevent strong lateral forces and therefore the risk of tipping, always leave plenty of space when driving round corners.
- ➢ The vehicle used for towing must always be driven carefully and be able to brake gently and in good time.

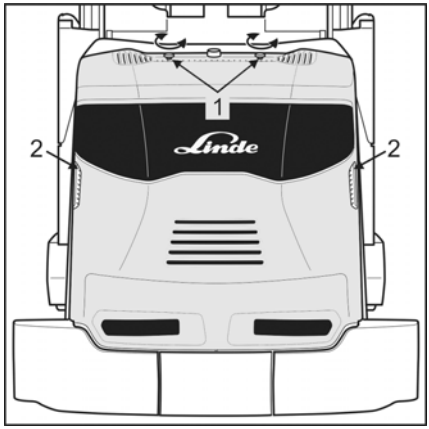
## Removing the control compartment hood ▷

**⚠ DANGER**

**Danger of electric shock (80-V version)**

Before the control compartment hood is removed, the battery male connector must be disconnected.

- ➢ Rotate the two screw plugs (1) in a clockwise direction and remove them.
- ➢ Grasp the hood at the ventilation openings (2) and lift it off. Put it aside.

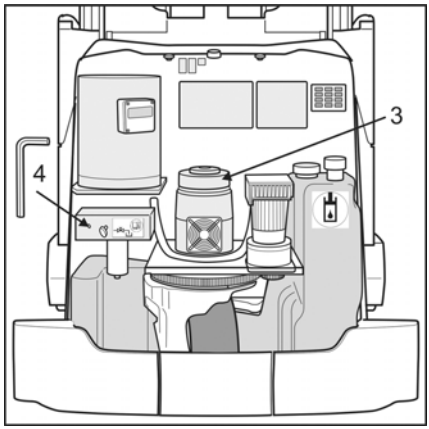



## Releasing the brake mechanically ▷

**⚠ WARNING**

If the brake (3) has been mechanically disabled as described below, a suitable tow bar must be used for towing or a second industrial truck must be coupled to the industrial truck so that it can take over the braking.

Before the truck is put back into service, restore the brake system to perfect working order.




### Traction motor brake

#### 1. option

Disassemble the brake blocks. To do this, remove three mounting screws. Place the brake blocks to one side.

#### 2. option

Tighten the brake anchor plate. To do this, screw two screws (M5X20) into the bores provided and tighten them.

### Load wheel brake*

To release the load wheel brake, the hydraulic line must be depressurised. To do this, open a threaded pin on the valve block by turning it anti-clockwise (three turns). This threaded pin (4) is wrench size 4 mm.

**NOTE**

*Once the hydraulic line to the load wheel brake has been depressurised by turning the threaded pin (4), no hydraulic functions may be selected. If any hydraulic functions were to be selected, an error message would appear in the display.*

* Option

## Towing with operational steering

If the steering of the industrial truck is still operational, once the brake has been released the industrial truck can be towed either with a rope or with the tow bar.

## Towing with non-operational steering

**⚠ WARNING**

Emergency steering movements may be carried out only when the truck is at a standstill.

Make sure that the industrial truck is switched off.

These industrial trucks are equipped with a mechanical emergency steering device. A shaft with a pinion gear is provided for this purpose.

- ➢ Perform the required steering movement using a socket wrench or box-end wrench.
- ➢ Before the industrial truck is recommissioned, the pinion shaft must be fixed back in its original position.

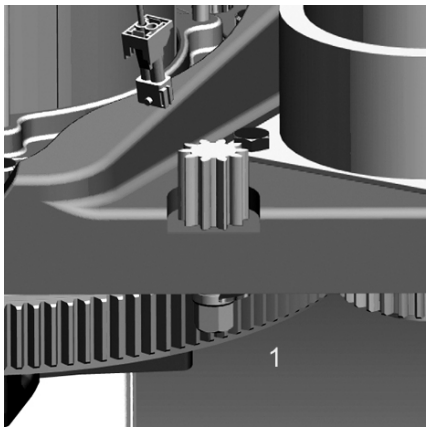
### Activating the emergency steering device

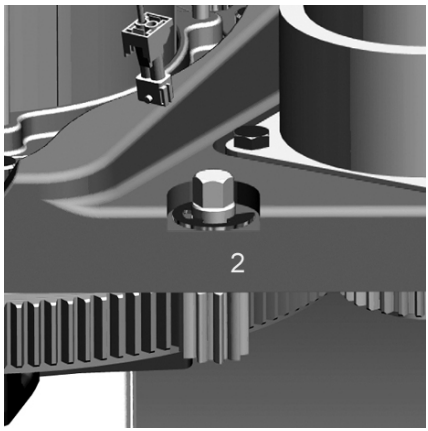
#### 48-V version

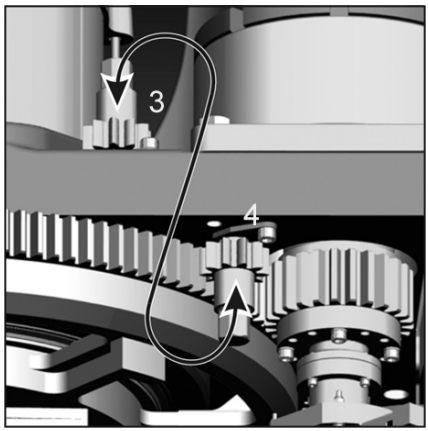
- ➢ Using a suitable tool, e.g. a screwdriver, remove the lock washer (1). When doing so, make sure that the lock washer does not jump off.
- ➢ Insert the pinion shaft into the same bore (2) from below. Insert the lock washer from above into the shaft groove.

#### 80-V version

- ➢ Remove the screw and the holding plate (3).
- ➢ Insert the pinion shaft into the bore provided from below and hold it in position with the holding plate and screw (4).



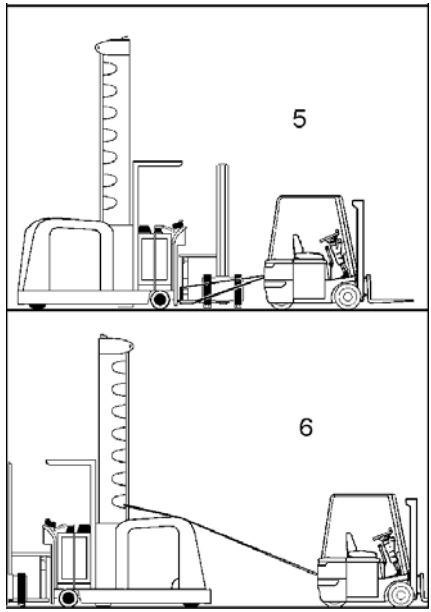



## Attachment points

▷

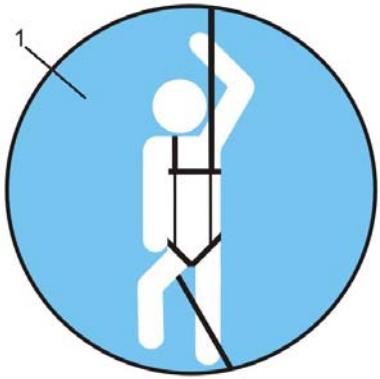
(5) for towing with the drive unit leading,

(6) for towing with the fork leading



## Emergency abseil system

### Exiting the raised driver's compartment in the event of an emergency ▷




**NOTE**

*An emergency abseil system is only required if the driver's compartment can be raised higher than 3000 mm above the ground.*

**NOTE**

*Two versions are available. As standard, a system is supplied that includes a safety harness designed for people up to a height of approximately 2 m. For larger operators, a variant is available as an option that includes a safety harness that can be adjusted up to size XXL.*

The storage location for the emergency abseil system is marked with an adhesive label (1).

**⚠ DANGER**

**Risk of falling**

- Before using the very narrow-aisle truck, the operator must be instructed in using the abseil system by a technical expert.
- The operating instructions located in the rucksack must be read and followed.
- Before each use, the user has to carry out a visual inspection to make sure that the abseil system is in a perfect condition and is ready to use.
- Before each use, the safety harness must be checked to make sure it is in the initial position. In addition, the free rope length between the lifting point in the overhead guard and the safety harness chest eyelet must be adjusted correctly. Only a little slack rope is permitted between the lifting point and the safety harness chest eyelet.
- If additional bores are created on the front edge of the overhead guard, a redirecting point for the rope can be provided. This redirecting point routes the rope in a more favourable position for the person abseiling. The carabiner, which is also included in the scope of delivery, is hooked into this bore. The rope is then guided through this carabiner. Carabiners must always be closed.
- Abseiling exercises are only permitted under the supervision of an expert.
- In Germany, the abseiling procedure must be practised at least once a year. We recommend these practice exercises for other countries, even if they have not explicitly been made compulsory.
- No changes may be made to the emergency abseil system.
- Only abseil systems that meet the requirements of the standards may be used.
- The emergency abseil system may only be used for its proper purpose of rescuing a person from the cab of a turret truck.
- Once the exercises are complete, the emergency abseil system must be correctly repacked, sealed and stowed away by a technical expert.
- At the end of the maximum permissible service life (replacement state of wear), the abseil system must be disposed of and replaced by a new system.

The emergency abseil system is installed in the driver's cab and is ready for use.

The safety harness, the descender device and the rope are located in the rucksack.

The upper end is attached to the eyelet provided in the overhead guard via a carabiner.

The rucksack itself is sealed using a plastic seal.

The original system must not be used for practice, because this causes a certain amount of wear and the seal no longer serves as a monitoring element.

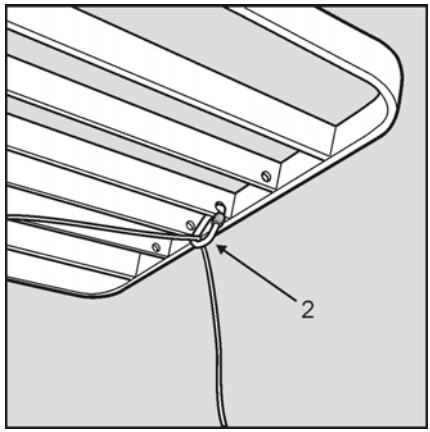
A figure-of-eight knot is tied on the other end to protect it from unthreading. This knot is secured with a cable tie.

### Operating instructions

The rucksack contains the operating instructions for the system. These instructions must be observed and must not be removed under any circumstances.

### Redirecting point for the rope

In order to bring the person abseiling into a more favourable position, the rope can be redirected with an additional carabiner in most versions of the overhead guard. This additional carabiner is attached to the safety harness chest eyelet area. To redirect the rope, the carabiner is detached from its original position and reattached in a bore provided in a strut on the overhead guard (2).




### Testing

A technical expert must check the abseil system at least once a year to confirm that it is in perfect condition and functions correctly. To perform this check, remove the seal to ensure that the system can be removed. Once the check has been successfully performed, seal the rucksack using the next seal. The maximum number of seals required is included in the rucksack.

### Replacement state of wear

The maximum permissible service life for this abseil system is restricted to eight years. During this time, only minimal use is permitted

and the system must be stored in optimum conditions.

Once the last numbered seal has been used, the entire system must be replaced.

### Two-person cab

Industrial trucks which feature a cab that permits two operators must also be equipped with two abseil systems.

In such trucks, it must be ensured that only the suspension points approved by the manufacturer are used.

### Different operators

If an industrial truck is used by multiple persons, e.g. in multi-shift use, it may be indicated that several preset abseil systems must be kept on hand. This is particularly sensible if the different operators are of widely varying heights and/or weights and the safety harness would therefore have to be adjusted to a significant degree.

In such trucks, it must be ensured that only the suspension points approved by the manufacturer are used.

# Parking, decommissioning

## Parking and leaving the truck

**NOTE**

It is the operator's duty to remove the ignition key when he leaves the truck, thus securing the truck against unauthorised use. If the truck is equipped with an electronic access control, it must be reset and/or the device for controlling access must be removed. Where possible, the truck should be parked at the start of a racking aisle or in a loading bay. If there are parking spaces, the truck must be parked there. The fork is to be lowered to the floor as far as possible, and if there is one, the tilt attachment must tilt towards the floor to reduce the risk of stumbling.

## Decommissioning

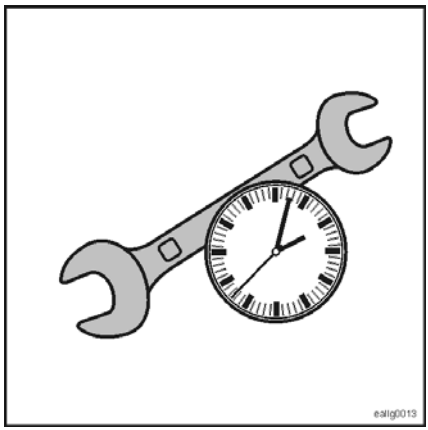
**ENVIRONMENT NOTE**

If the industrial truck described here has to be taken out of operation, make sure that all components are disposed of in accordance with the valid guidelines. The used consumables in particular are to be recycled or disposed of correctly.

# 5

# Regular care and maintenance

# Regular care and maintenance




NOTE

- *The regular care and maintenance of the industrial truck will ensure that the truck is ready for operation and will maintain its value.*

**WARNING**

Risk of injury and damage to property

- Appropriate precautions for safe working must be taken for all care and maintenance work.
- As well as the usual occupational safety regulations, the safety information specifically outlined in this brochure must also be adhered to.
- Whenever you are working on the hydraulic system, ensure that the entire system is depressurised. This is particularly important when working on industrial trucks with built-in accumulators.
- For all care and maintenance work (except functional tests), disconnect the battery male connector.
- Only electricians from the respective service partner may perform work on the electrical system.

To ensure the safe operation of your industrial truck over a long period of time, it is absolutely essential that the machine **is maintained regularly**.

The activities listed in the **maintenance schedule** must be performed thoroughly and correctly at the specified intervals.

Our dedicated service partner will assist you with any queries about care and maintenance. We offer you the opportunity to take out maintenance contracts with us and to engage us to perform **regular testing (FEM)**.

Only regular maintenance and testing will enable you to make full use of the warranty.

## Regular maintenance

Care work does not require special prior knowledge or training and can be performed by the operator or the workshop staff at the operating company.

## Maintenance

In contrast, maintenance work must be performed only by appropriately trained personnel. Special tools and the current service software are required. Therefore, these activities are described only briefly in the maintenance schedule.

## Original parts

We recommend that you use only genuine spare parts. More information and the order numbers can be found in the spare parts list. The installation of other parts will invalidate the warranty.

## Maintenance frequencies and times

The maintenance activities are scheduled at intervals of 1000 hours or 12 months. You can use the maintenance schedule to determine what work is required. The following maintenance schedules are based on 10,000 operating hours. Once this number of operating hours is reached, the cycle starts again from the beginning. The intervals must be reduced for trucks exposed to high levels of dust and significant temperature fluctuations. A check of the function and condition of the truck must be carried out during each maintenance operation.

## Type of stress

This maintenance schedule is valid for normal stress for single-shift operation not within a cold store. For heavy-duty and/or multi-shift operation, reduce the intervals. Note the information in the section entitled **Area of application**.

### Replacement interval for lifting chains

**⚠ CAUTION**

Risk of accidents

The **main lift chains** and the **auxiliary lift chain** must be replaced when the wear limit is reached or if impermissible damage is present. The technical condition of the chains from a safety perspective must be assessed by a **competent person** using the manufacturer's documentation. Observe the current applicable guidelines for the cold store version of industrial trucks.

## Regular maintenance

| Maintenance work as required |
|---|
| Go through the **checklist before starting work**. |
| Keep the industrial truck clean and dry. |
| If damage becomes apparent on the industrial truck, have it repaired without delay. |
| Perform checks on the industrial truck after changes and damage. |
| Investigate any changes in the noise on the industrial truck. |
| Perform battery maintenance in accordance with the manufacturer's instructions. |

## Maintenance schedule

| At operating hours | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 h | | 2000 h | | 3000 h | | 4000 h | | 5000 h | | | |
| 6000 h | | 7000 h | | 8000 h | | 9000 h | | 10000 h | | ✓ | ✖ |
| **Preparatory tasks** | | | | | | | | | | | |
| Clean the industrial truck or have it cleaned by the operating company. | | | | | | | | | | | |
| Nameplate: identify the industrial truck. | | | | | | | | | | | |
| Controller: read out the operating hours. | | | | | | | | | | | |
| **Gearbox** | | | | | | | | | | | |
| Gearbox: check for noise and leakages. | | | | | | | | | | | |
| Gearbox: check the oil level, top it up if necessary. | | | | | | | | | | | |
| Gearbox: first oil change after 1000 operating hours and every 4000 operating hours thereafter. | | | | | | | | | | | |

| At operating hours | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 h | | 2000 h | | 3000 h | | 4000 h | | 5000 h | | | |
| 6000 h | | 7000 h | | 8000 h | | 9000 h | | 10000 h | | ✓ | ✖ |
| Drive unit: check the tightness of the screw connection to the chassis (ensure the appropriate torque). | | | | | | | | | | | |
| Traction motor bearings: check for operating noise. | | | | | | | | | | | |
| Traction motor bearings: replace if necessary. | | | | | | | | | | | |
| **Chassis, bodywork and fittings** | | | | | | | | | | | |
| Bearing points and joints: check and lubricate. | | | | | | | | | | | |
| Doors, flaps and covers: check function. | | | | | | | | | | | |
| Doors, flaps and covers: check the mounting and condition. | | | | | | | | | | | |
| All moving parts: lubricate with a suitable lubricant. | | | | | | | | | | | |
| Overhead guard: visually check the welded seams; use a dye penetrant procedure if you suspect there are cracks. | | | | | | | | | | | |
| Overhead guard: visually check for damage and deformations. | | | | | | | | | | | |
| Rail switch(es): check the function and condition. | | | | | | | | | | | |
| Support screws in the chassis: check the setting according to the specifications on the nameplate. Adjust as necessary. | | | | | | | | | | | |
| Battery compartment door and battery compartment hood: check and adjust as necessary. | | | | | | | | | | | |
| Battery compartment door and battery compartment hood: check and adjust as necessary. | | | | | | | | | | | |
| Battery compartment: check that the battery is securely positioned and check side stops on the battery. | | | | | | | | | | | |
| **Chassis frame** | | | | | | | | | | | |
| Drive wheel: check the condition and check for wear and any foreign objects. | | | | | | | | | | | |
| Drive wheel, wheel nuts or wheel screws and binding: check for secure attachment. | | | | | | | | | | | |
| Load wheels: check the condition and mounting and check for wear and foreign objects. | | | | | | | | | | | |
| Load wheels: check for ease of movement. | | | | | | | | | | | |
| Antistatic belt: check the condition. | | | | | | | | | | | |
| **Steering system** | | | | | | | | | | | |
| Steering: function check outside the aisle. | | | | | | | | | | | |
| Steering: check the steering angle (>90° on both sides). | | | | | | | | | | | |
| Steering: check straight line travel. | | | | | | | | | | | |
| Steering gears: lubricate with all-purpose grease. | | | | | | | | | | | |

## Maintenance schedule

| At operating hours | | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 h | | 2000 h | | 3000 h | | 4000 h | | 5000 h | | | | |
| 6000 h | | 7000 h | | 8000 h | | 9000 h | | 10000 h | | | ✓ | ✖ |
| MZF: function check. | | | | | | | | | | | | |
| IZF: check for central positioning and accuracy of the guidance in relation to the guide wire. | | | | | | | | | | | | |
| Steering angle measurement: check the level of play and the condition. | | | | | | | | | | | | |
| Steering knob, steering wheel: check for ease of movement. | | | | | | | | | | | | |
| Live ring bearings: check for ease of movement and wear. | | | | | | | | | | | | |
| Live ring bearings: check the play of the gears. | | | | | | | | | | | | |
| Steering motor bearings: check for operating noise. | | | | | | | | | | | | |
| **Brake system** | | | | | | | | | | | | |
| Service brake: check for correct operation. | | | | | | | | | | | | |
| Reverse brake: check for correct operation. | | | | | | | | | | | | |
| Drive unit: check the condition and thickness of the brake lining. Replace if necessary. | | | | | | | | | | | | |
| Load wheels: check the brake clearance by freewheeling. | | | | | | | | | | | | |
| Load wheels: check the condition and thickness of the brake lining. Replace if necessary. | | | | | | | | | | | | |
| Brake lining: blow out abrasion with oil-free air. | | | | | | | | | | | | |
| Brake retardation values: check after each adjustment (dynometer or retardation measuring device). | | | | | | | | | | | | |
| Automatic braking: check the function as per the order. | | | | | | | | | | | | |
| Components for automatic braking (inductive switch/photoswitch/magnet-operated switch): check the function, setting and condition. | | | | | | | | | | | | |
| Components of the RFID system: check the function, condition and setting. | | | | | | | | | | | | |
| **Operating devices** | | | | | | | | | | | | |
| Service brake: check for correct operation. | | | | | | | | | | | | |
| Operating devices: check the function and condition. | | | | | | | | | | | | |
| Protective devices: check depending on the equipment. Repair if necessary. | | | | | | | | | | | | |
| Information signs, warning signs, load capacity diagram: check that they are present and legible. | | | | | | | | | | | | |
| Information signs, warning signs, load capacity diagram: replace missing or illegible labels. | | | | | | | | | | | | |
| Optional and additional equipment: check the function and condition according to the order. | | | | | | | | | | | | |
| **Electrics, electronics** | | | | | | | | | | | | |

| At operating hours | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 h | | 2000 h | | 3000 h | | 4000 h | | 5000 h | | | |
| 6000 h | | 7000 h | | 8000 h | | 9000 h | | 10000 h | | ✓ | ✖ |
| Battery cables, battery connectors, battery male connectors: check the condition and check for secure attachment. | | | | | | | | | | | |
| Battery cable: visually check the insulation. | | | | | | | | | | | |
| Battery: measure the battery voltage under load | | | | | | | | | | | |
| Battery: measure the tray for short circuits. | | | | | | | | | | | |
| Battery: check the electrolyte level. | | | | | | | | | | | |
| Drive and pump controller: check the driving, acceleration, braking and reversing functions. | | | | | | | | | | | |
| Plugs and connections: check that they are securely attached. | | | | | | | | | | | |
| Openly routed cables: visually check the insulation. | | | | | | | | | | | |
| Contactor contacts: check the condition and check for erosion. Replace if necessary. | | | | | | | | | | | |
| Fuses: visually check the condition. | | | | | | | | | | | |
| Fuses: check the values. | | | | | | | | | | | |
| Heat sink and fan: clean. | | | | | | | | | | | |
| Height measuring system for the main lift: check the function and condition of the measuring tape and check that the component is securely mounted. | | | | | | | | | | | |
| Height measuring system for the auxiliary lift: check the condition of the magnetic strip and protective tape and check that the components are securely mounted. | | | | | | | | | | | |
| Displacement transducer for the load wheel: check for contamination, check the condition and check that the component is securely mounted. | | | | | | | | | | | |
| Displacement transducer for the load wheel: check the O-rings for contamination, check the condition and check for wear. Replace if necessary. | | | | | | | | | | | |
| **Hydraulics** | | | | | | | | | | | |
| Hydraulic system: check the oil level. To do this, fully lower the load support. The oil level must be between the minimum and maximum marking. The markings on the hydraulic oil tank become visible once the control compartment hood is removed. | | | | | | | | | | | |
| Hydraulic system: check for leak tightness. | | | | | | | | | | | |
| Hydraulic oil filter of the hydraulic oil tank: replace. | | | | | | | | | | | |
| Air filter of the hydraulic oil tank: replace. | | | | | | | | | | | |
| Pump motor: check for operating noise. | | | | | | | | | | | |
| Hose lines: check the pre-load. | | | | | | | | | | | |
| **Load lift system** | | | | | | | | | | | |
| Stops and limit stop: check the condition and function. | | | | | | | | | | | |
| Lift cylinder: check the mounting. | | | | | | | | | | | |

| At operating hours | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 h | | 2000 h | | 3000 h | | 4000 h | | 5000 h | | | |
| 6000 h | | 7000 h | | 8000 h | | 9000 h | | 10000 h | | ✓ | ✖ |
| Lift cylinder: visually check bearing points and their welded seams. | | | | | | | | | | | |
| Main lift load chains: check the condition, lubrication and tension and check for wear, elongation and damage. | | | | | | | | | | | |
| Auxiliary lift load chains: check the condition, lubrication and tension and check for wear, elongation and damage. | | | | | | | | | | | |
| Main lift load chains: determine wear (maximum permissible wear is 2%) | | | | | | | | | | | |
| Auxiliary lift load chains: determine wear (maximum permissible wear is 3%) | | | | | | | | | | | |
| Load chains: lubricate with chain spray. | | | | | | | | | | | |
| Chain rollers: check for ease of movement. | | | | | | | | | | | |
| Mast channels: check the surfaces for wear. | | | | | | | | | | | |
| Mast channels: lubricate the surfaces with grease. | | | | | | | | | | | |
| Lift mast rollers: lubricate with all-purpose grease. If necessary, install lubricating nipples. | | | | | | | | | | | |
| Lift mast rollers: check the condition and check the setting. | | | | | | | | | | | |
| Guide elements: check the lateral play. | | | | | | | | | | | |
| Guide elements: lubricate with all-purpose grease. | | | | | | | | | | | |
| Load fork: check the condition and function of the latches. | | | | | | | | | | | |
| Load fork: visually check for bends, measure if necessary. | | | | | | | | | | | |
| Load fork: if you suspect there are cracks, check using the dye penetrant procedure. | | | | | | | | | | | |
| Adjustable fork: lubricate sliding surfaces with all-purpose grease. | | | | | | | | | | | |

# Maintenance schedule

| At operating hours | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 h | | 4000 h | | 6000 h | | 8000 h | | 10000 h | | ✓ | ✖ |
| **Gearbox** | | | | | | | | | | | |
| Gearbox: perform an oil change (every 4000 h). | | | | | | | | | | | |
| **Hydraulics** | | | | | | | | | | | |
| Hydraulic system: oil change. | | | | | | | | | | | |
| **Chassis, bodywork and fittings** | | | | | | | | | | | |

| At operating hours | | | | | | | | | | | Carried out | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 h | | 4000 h | | 6000 h | | 8000 h | | 10000 h | | | ✓ | ✖ |
| Check that the M24 screw connection between the welded chassis, the rear of the cast and the collision protection is present and securely tightened to a torque of Ma = 660 Nm. | | | | | | | | | | | | |
| **Final tasks** | | | | | | | | | | | | |
| Test drive: check all functions and special functions according to the order. | | | | | | | | | | | | |
| Service adhesive label: attach. | | | | | | | | | | | | |

# Battery maintenance

**⚠ DANGER**

**Incorrect handling or incorrect use of batteries and chargers can cause serious damage. This can also lead to serious hazards for the operator.**

For each type of battery, the instructions provided by the battery manufacturer regarding proper use, care and maintenance, as well as the possible hazards for the operator, must be followed precisely.

Lead-acid batteries, gel batteries and lithium-ion batteries are currently used.

**NOTE**

- *Battery maintenance is **not** part of the regular maintenance*
- *Battery maintenance must be carried out according to the information provided by the relevant battery manufacturer*
- *If the battery male connector is disconnected while a consumer is switched on, the contacts can combust*

## Lead-acid batteries

Lead-acid batteries use liquid acid. The acid can be easily accessed and can therefore be dangerous.

**⚠ DANGER**

**The electrolyte (battery acid) is toxic and corrosive on contact. For newly charged batteries in particular, be aware of the risk of explosion in the area of the battery where gas may be released.**

When handling battery acid, the specified safety measures must be observed.

## Gel batteries

Gel batteries are a particular type of lead-acid battery. The usage instructions and handling instructions from the respective manufacturer must be observed.

## Li-ion batteries

To ensure safe operation, industrial trucks that are powered by Li-ion batteries must be equipped with a battery management system. The operators of such industrial trucks must be instructed in the operation of Li-ion batteries and the charging systems for these batteries.

## Battery maintenance

The battery is the energy source for the industrial truck. It must therefore be handled carefully!

| General daily maintenance tasks |
|---|
| Keep the battery clean and dry. |
| Charge the battery regularly. |
| Avoid deep discharge. |
| Visually check the insulation on the cable connections and battery female connector. |
| Check the condition of the battery connection assembly and check that it is working correctly. |

| Additional maintenance work for lead-acid batteries |
|---|
| Check the electrolyte level. If necessary, top up with demineralised water. |
| Spilt electrolyte must be siphoned off from the battery tray using a siphon. Rinse the tray if necessary. |

# Lubricants

**⚠ CAUTION**

Risk of damage to property

Trucks for cold store operation must be lubricated using different lubricants. Refer to the operating instructions for cold store trucks.

The following lubricants must be used:

**Hydraulic system**

- Hydraulic oil HLP DIN 51524/T2
- ID no..732 740 0112

The tanks are labelled with a min/max marking. After the hydraulic oil has been topped up or changed, the oil level must be between the min marking and the max marking.

**Gearbox**

- Gearbox oil SAE 75W-90 API GL-5
- ID no. 732 600 0007

The **standard** gearbox holds 4.6 litres of gearbox oil.

The **heavy** gearbox holds 7 litres of gearbox oil.

**Grease lubrication points**

- ESSO Beacon 2 multi-purpose grease
- ID no. 733 750 0200

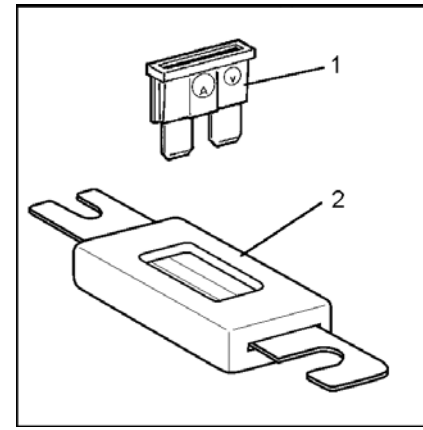
**Chain lubrication**

- Chain spray Stabylan 2100
- ID no. 8 010 100

**Lubricant for the joint between the shaft and the hub**

- Special grease Klüberplex BEM 34-132
- ID no. 8 052 709

## General information about fuses




If a fuse needs to be replaced:

- Disconnect the system by pulling out the battery male connector
- Only use fuses that are identical in size and type
- The correct fuse values can be found in the truck-specific circuitry documents

(1) Control current fuse

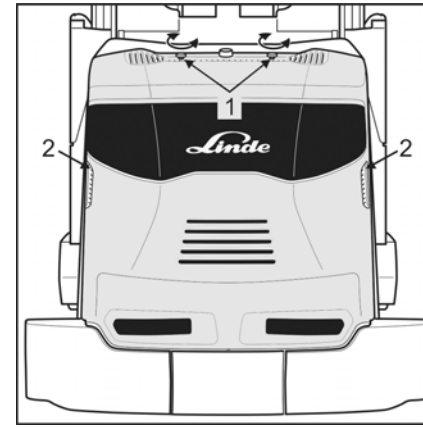
(2) Primary current fuse

## Removing the control compartment hood

**DANGER**

**Risk of electric shock**

Before the control compartment hood is removed, the battery male connector must be disconnected.




The fuses are installed in the control compartment.

To gain access to the control compartment, the hood must be removed.

➢ Open the two screw plugs (1).

➢ Hold the hood at the ventilation openings (2), lift it off and then place it to one side. The hood is very lightweight and can therefore be removed by hand without using any tools.

Proceed in the reverse sequence to fit the hood. Place the hood carefully in its guide and

latch and tighten the plastic screws until they are hand-tight only.

# 6

# Technical data

# Technical data

The technical data for this truck depends on the order. You will therefore receive a datasheet specially prepared for your truck when it is delivered. Please use this accompanying datasheet to find all the technical data.

Sound level, driver's ear 66dB(A)

# 7

# Special equipment

# Enabling options

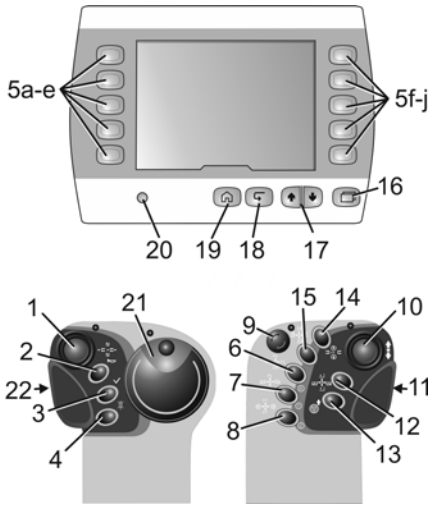
Certain options can only be permanently activated at a later time by loading a new truck configuration file.

A modified truck configuration file can be made to order, supplied and invoiced by Service Support.

The following options can be enabled:

- All options that generally do not require hardware retrofitting
- Options that can be retrofitted with minimal hardware costs

## Split operating panels




(1) Operating lever for hydraulics (in conjunction with the selection keys)

(2) Horn

(3) Enable button (for example, as a brake release button in an automatic braking system, as an override for the intermediate lift cut out and to acknowledge errors that can be acknowledged)*. Flashes red when it needs to be pressed.

(4) Manual-automatic two-way switch for inductive guidance*

(5a) Eco mode selection key

(5b) Reserved for option

(5c) Reserved for option

(5d) Reserved for option

(5e) Navigation* selection key

(5f) Lift height preselector* selection key

(5g) Reserved for option

(5h) Reserved for option

(5i) Work light* selection key

(5j) Fan* selection key

(6), (7), (8) Selection keys for additional hydraulic functions*

(9) Emergency off switch

(10) Operating lever for driving

(11) Sensor surface for two-hand operation of the main lift or for shifting in the aisle

(12) Selection key for lifting or lowering the auxiliary lift or for swivelling the forks.

(13) Reserved for special functions

(14) Selection key for automatic functions, e.g. fork cycle

(15) Selection key for lifting or lowering the cab lift and auxiliary lift at the same time. Hold this button while **pulling** or **pushing** operating lever (1). Alternatively: Selection key for synchronously swivelling the forks 180° to the left or right. Hold this button while simultaneously moving operating lever (1) to the **right** or to the **left**.

(16) Selection of a menu display

(17) Selection within a menu

(18) Go back one step in the menu or confirm a selection

(19) Back to the main menu

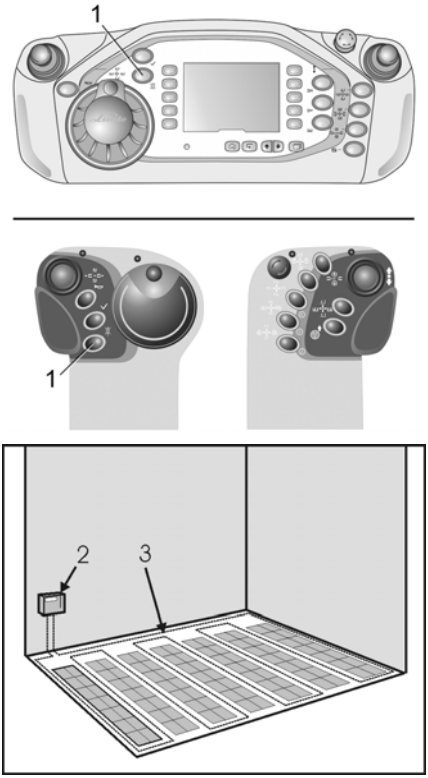
(20) Light sensor for automatically illuminating the display lighting

(21) Steering knob or steering wheel

(22) Sensor surface for two-hand operation within the aisle

*Option

# Inductive guidance (IZF) ▷




## System description

### General

If an industrial truck is guided using inductive steering control, the shift button (1) must be pressed before the industrial truck is driven into and out of the aisle. All other operation processes correspond to the standard design.

A frequency generator (2) provides an AC supply to a wire installed in the floor (3). This AC supply is registered as a signal by antennas that are installed in the industrial truck, and is used to guide the industrial truck.

The IZF controller calculates a steering angle based on the lateral deviation between the centre of the antennas and the guide wire. The steering angle is used to guide the industrial truck along the wire groove.

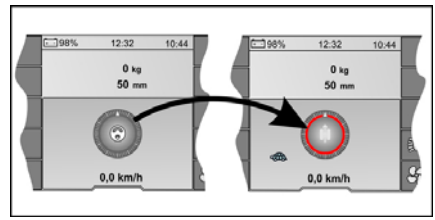
The operating devices for inductive steering control are integrated into the operating panel. The display indicates the current operating status. After the controller is switched on, a self-test runs in the steering control system. Switch (1) on the operating panel is used to switch between manual driving mode and automatic driving mode.

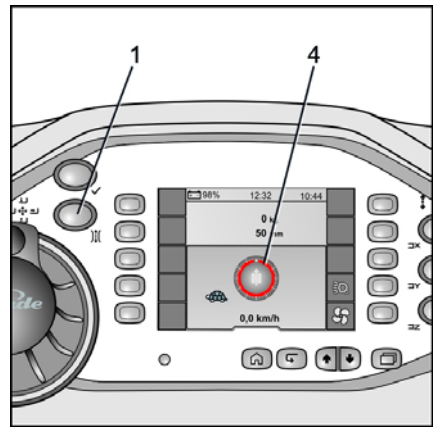
## Commissioning

Extensive safety circuits in the controller and a diagnostic program simplify service work on the system. When commissioning the industrial truck, the system must be configured for and calibrated with the customer's guide signal. Afterwards, a function and safety test must be carried out. Our diagnostic program provides the specifications for this purpose.

## Entering the aisle

### Guidance procedure




- Drive the industrial truck towards the wire groove (induction track). Stop in front of the wire groove.
- The angle of the industrial truck relative to the wire groove must not be greater than 60°.
- Set the steering to the straight-ahead position.
- Select automatic steering by pressing the "Manual/Automatic" button (1). The wire search starts.
- The coloured ring around the "guidance status" symbol (4) goes red.
- Continue towards the wire groove. The driving speed is automatically reduced.
- When the controller detects the induction track via the first antenna, the controller switches to automatic mode.
- An acoustic signal will be heard.
- The coloured ring around the "guidance status" symbol (4) changes colour from red to yellow.
- Continue driving. The industrial truck is driven automatically along the centre of the wire groove.
- The steering function via the steering wheel is now switched off.
- When both antennas detect the induction track, the wire search is terminated. The coloured ring around the "guidance status" symbol (4) changes colour from yellow to grey.
- Continue driving. After a short distance, the industrial truck is now guided to the guide wire. The coloured ring around the "guidance status" symbol disappears. Now only the guidance symbol (5) is visible.
- The truck can now be driven out of the racking at the permissible speed.

**NOTE**

*The more precisely the driver drives the middle of the industrial truck onto the wire groove, the faster the guidance procedure will be completed. This means that several of the above steps can be skipped.*

**Entering the aisle**

- Guide the industrial truck onto the induction track and drive into the aisle in automatic driving mode.
- When the sensor system of the industrial truck has detected the aisle, the maximum permissible speed within the aisle is possible.

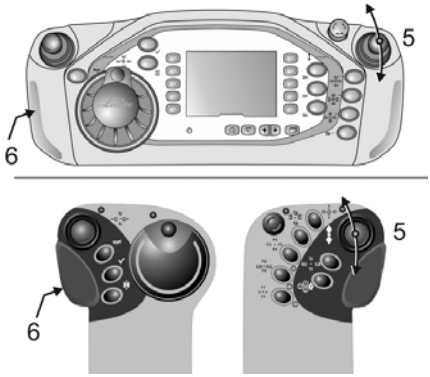
**CAUTION**

Risk of collision with the racking

Entering the aisle by steering manually is not permitted. If the industrial truck enters the aisle by manual steering, the industrial truck is stopped immediately. You can continue driving once you switch to automatic mode.

## Automatic driving within the aisle

To operate the industrial truck in automatic driving mode, the left-hand sensor surface for two-hand operation (7) and the right-hand operating lever (6) must be actuated. If the cab lift needs to be lifted or lowered at the same time as this, both operating levers must be actuated accordingly. If the steering knob is accidentally turned to its straight-ahead position (middle detent) during automatic driving mode, the industrial truck is automatically braked to a standstill.




**Switching from automatic mode to manual mode within the aisle**

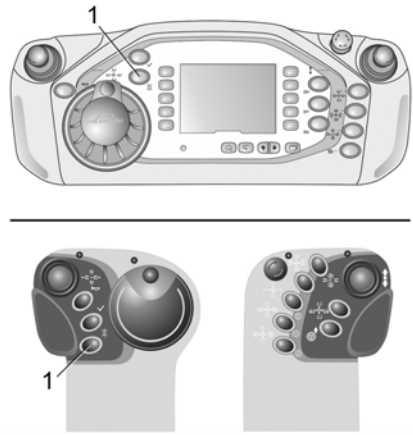
If the industrial truck is accidentally switched to manual steering within the aisle, the industrial truck is immediately braked to a standstill. It is then only possible to continue at creep speed.

**Driving speed adaptation**

The automatic speed adaptation feature adjusts the maximum possible driving speed according to the current situation. If an unsafe

situation arises, for example an error occurs, the driving speed is limited or the driving function is switched off completely.

### Leaving the induction track

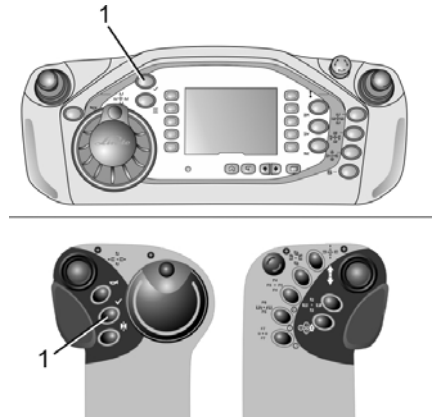



- Drive the entire length of the industrial truck out of the aisle.
- Turn off automatic steering by pushing the "man/auto" (1) button again.
- The industrial truck is braked automatically.
- An acoustic signal sounds.
- Drive the industrial truck away from the wire groove using manual steering. The maximum permissible speed outside of the aisle is possible.

#### Changing the aisle

If the industrial truck is driven from one aisle to another, it is essential that the notes in the chapter "Changing the aisle" are observed.

## Intermediate lift cut out

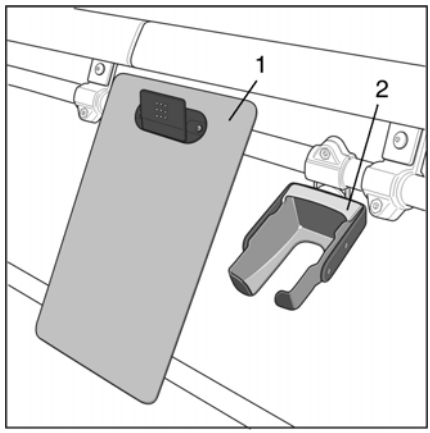



Lifting operation is stopped at a previously determined lift height. The ring around the enable button (1) lights up. This cut out can be overridden once the enable button has been pressed. This equipment is therefore necessary if the truck is used in two (or three) different high buildings, for example.

**NOTE**

*Alternatively, this function can also be modified so that it is necessary to press and hold the enable button in order to continue lifting.*

# Mounting system for auxiliary components




The driver's cab can be equipped with a system consisting of rods and support mountings in order to mount additional components.

Additional components may include:

- Writing surface with paper clip (1)
- Storage area for barcode scanner gun (2)
- Support mounting for data terminal
- Support mounting for printer

**NOTE**

*The support mountings and clamping devices must always be in perfect condition so that the auxiliary components do not move from their installed positions during travel.*

# Aisle entry assistant

## General

The aisle entry assistant can be used to make it easier to drive into an aisle when using mechanical guidance. To do this, the truck receives electrical and mechanical equipment, like a truck with inductive guidance.

A storage area in which the aisle entry assistant is to be used is therefore fitted with a guide wire for inductive guidance in the centre of the aisle and with guide rails for mechanical guidance. The induction guide extends approx. 5 m into the aisle. The trucks are also equipped with the **End of aisle slow down and stop (ZAG)** option.

## Entering the aisle

The truck is driven along the guide wire outside of the racking, according to the **End of aisle slow down and stop** information in the chapter entitled **Inductive guidance (IZF)**. This means that the truck is aligned precisely so that it can be driven into the guide rails.

Electrical aisle detection only occurs when the truck is completely within the guide rails. Once

aisle detection has been successful, inductive guidance is automatically turned off.

**NOTE**

*If the man/auto button is not switched to automatic, the truck behaves like a mechanically guided truck. Switching from "auto" to "manual" within the aisle has no effect.*

### Exiting the aisle

Switching from mechanical guidance to inductive guidance takes place automatically when exiting the aisle. To leave the guide wire, inductive guide must be deselected by pushing the man/auto button.

# Safe handling of the traction battery

The dangers described below can arise individually or collectively depending on the type of battery in use.

## Batteries with liquid electrolyte

**⚠ DANGER**

**Risk of explosion**

- An explosive gas mixture can form when charging batteries. This gas mixture can remain in the atmosphere for a lengthy period of time even after the charging process has finished.
- The gas mixture formed when charging batteries must not enter the driver's compartment.

- Pay particular attention to the risk of explosion in the void above the battery when the battery has been freshly charged.
- The openings in this void facilitate the exchange of air and these openings must not be covered or be closed.
- Do not create any openings in the battery compartment that allow the explosive gas mixture to enter the driver's compartment.
- Ensure that the room or area in which the battery is being charged is well ventilated.
- Smoking, fire and open flames are forbidden in an area of 2 m around the charged battery.
- Battery acid is toxic. Do not inhale vapours.
- Battery acid is corrosive. Avoid skin contact.
- Rinse off spilled or splashed battery acid immediately with plenty of clean water.
- When handling battery acid, wear personal protective equipment such as protective gloves and a protection suit as well as face protection.
- If contact with acid is made despite these measures, rinse immediately with plenty of clean water and consult a doctor.
- Observe the additional operating instructions of the battery manufacturer and the battery charger manufacturer.

## 80-V version

**⚠ WARNING**

In the 80-V version, there is risk of electric shock if the live connections are touched.

Before removing the control compartment cover or the battery compartment cover, disconnect the battery male connector.


## Handling the battery

The installation, removal and transport of traction batteries always involves the handling of heavy weights.

**⚠ WARNING**

Risk of crushing of fingers, risk of crushing of hands and feet, risk of damage to property

- When heavy weights are being handled, there is a risk of limbs or bodies becoming trapped or crushed. To avoid this, operate lifting gears and changeover frames with the utmost care. Prevent heavy weights from bumping against the machine or equipment.
- Be aware of pinch points and shear points when inserting the battery into or removing the battery from the battery compartment. Ensure that you keep your fingers, hands and feet out of any areas where they could be at risk from one of the abovementioned points of constriction. These points of constriction occur regardless of the tool being used (truck, crane or changeover frame).
- Provide support staff with accurate instructions.
- Remove passers-by and spectators from the danger area.
- Set down the disconnected battery cable on the battery in such a way that prevents the cable from becoming trapped or torn off.

# Battery on a roller channel

## Description

The battery rests on roller channels and can be installed and removed from the side of the truck using a battery change frame*. The battery is secured with clamping devices on both sides and held in position in this way.

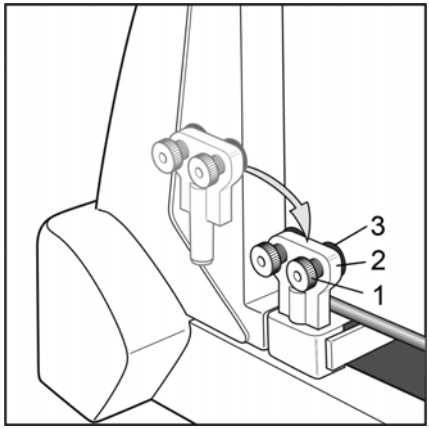
### Monitoring

The battery locks are electrically monitored. If one of the locks is not correctly locked in place an error message appears in the display and the truck will stop.

**⚠ WARNING**

Every time before starting work the battery locks (2) must be checked for perfect condition and function.

* Option




1 Knurled-head screw
2 Battery lock
3 Rubber buffer

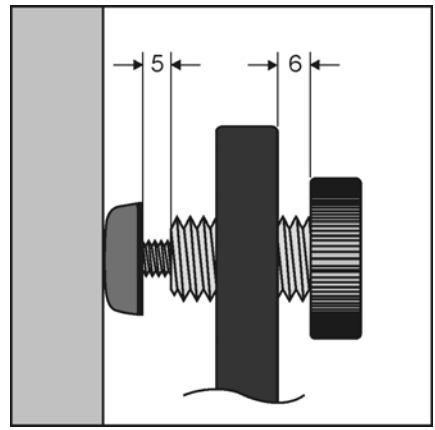
## Setting the battery lock ▷

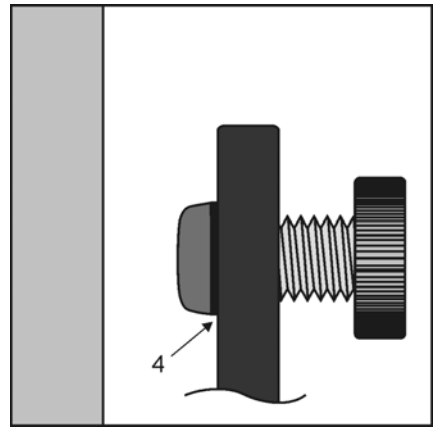
**⚠ CAUTION**

Risk of crushing and damage to property

An improperly fixed battery may fall out of the truck when cornering and put people and property at risk. If the battery cannot be clamped securely, the responsible service centre must be called. Further operation with a faultily or improperly clamped battery is dangerous.

To ensure the operational safety of this truck, the traction battery must be securely fixed in place in the battery compartment by means of clamps. To achieve this, the truck is equipped with an adjustable battery lock. The battery lock can be adjusted by approx. 30 mm on each side. Both locks must be adjusted symmetrically.




**NOTE**

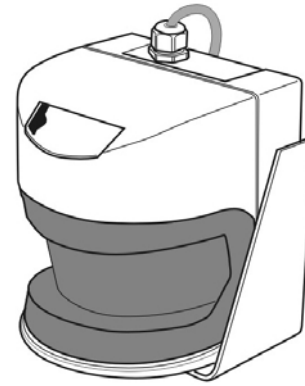
*When a battery is inserted into a chassis for the first time, it is possible that the actions described below may need to be repeated in several steps. If the rubber buffer thread (spring element) is not able to move smoothly, this must be rectified before setting.*

- Insert the battery approximately in the centre of the battery compartment. In doing so, one of the battery locks will remain as a stop in the truck.
- Rotate the knurled-head screw (1) and the rubber buffer (3) all the way back (4) on both locks (2).
- Insert the second battery lock into the truck.
- Unscrew both rubber buffers until they lie against the battery. The visible thread length should be roughly the same on both sides of the battery. Gently move the battery to the side, if necessary The maximum adjustment range for each rubber buffer is approximately 20 mm.
- If the useable threads on both rubber buffers are not long enough to fasten the buffers to the battery, the knurled-head screws must be screwed in to further increase the adjustment range. At the same time,

the rubber buffers must rotate with the knurled-head screws.

- Tension can be increased by screwing one of the two knurled-head screws in further. Tighten the knurled-head screws hand tight. The battery lock is clamped securely if the rubber buffer is clearly deformed.
- If sufficient clamping is not achieved via these steps, it is possible that a battery with incorrect dimensions has been inserted. The truck must not be used if the battery is not securely locked. Doing so would result in the risk of accidents and damage.
- When the clamping has been carried out, a thread must still be visible at (5) and (6).

# Personal protection system (MPSE)



Mobile personal protection systems help to protect people who have entered the braking area of the truck unplanned. One safety laser scanner for each drive direction scans the braking area and triggers braking in the truck as soon as a person or object is detected in this area (protective field).

As a rule, these personal protection systems are active only with the guidance function. Optionally, the functional range can also be expanded to include **front end monitoring**.

**⚠ CAUTION**

Risk of accident

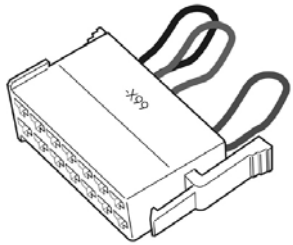
Even if a personal protection system is used, we do not permit people and very narrow aisle trucks to be in the same aisle at the same time. We have therefore allowed for a maximum of safety category 2.

**NOTE**

*The makes of mobile personal protection systems approved by us are not identical as regards functions and options. For all information about operation and maintenance, see the corresponding manufacturer's documents.*

### Interface X99

The plug X99 represents the interface between the truck control unit and the personal protection system. All signals defined by us are allocated in this plug. The scope of delivery of a very narrow aisle truck includes the **bridging plug X99**, which can be fitted instead of the MPSE connector plug if an internal defect in the MPSE controller has caused truck failure.




The interface X99 is installed on man-down trucks in the vicinity of the operating panel and on man-up trucks in the control compartment

**⚠ CAUTION**

Risk of accident

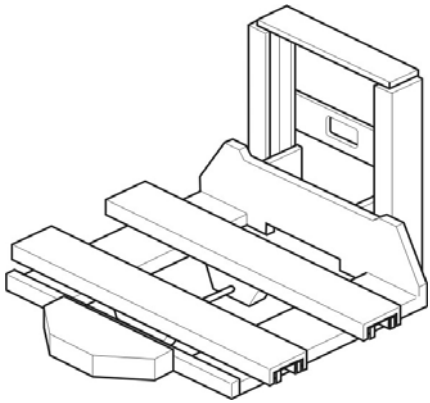
With a fitted bridging plug, all safety functions of the MPSE are suspended and the maximum driving speed of the truck is restricted to 2.5km/h. Operation with a bridging plug is therefore only permitted for the retrieval of a truck. This bridging plug must be kept locked away by the warehouse manager responsible and is only to be used under his instruction.

## Telescopic table

### Description

**NOTE**

*To ensure proper use, the information in the enclosed manufacturer's documents must be observed.*



The table unit is made up of two telescopic fork arms, connected by a mechanical coupling, and possibly a third fork, which is connected via a universal drive shaft and an electromagnet disc coupling.

Each fork consists of a top table, middle table and lower table as well as a drive gearbox.

The extending table profiles have a width of 180 mm and a height of only 60 mm (top and middle part). The drive of the top and middle profile is powered via a chain system.

WThe telescopic table has a high stability due to it being maintenance-free and having very large guide rollers and side cable guides. The top table is driven to the middle table via 2 chains.

The telescopic table is a precise machine part. The following information must therefore be considered:

- Do not subject to extreme atmospheric conditions
- The inspection and maintenance intervals are shortened in volatile and very damp environments.
- Do not subject to shear forces, e.g. shifting of the load with the fork profile extended in a longitudinal and lateral direction.

### Maintenance of the telescopic table

**NOTE**

*The information in the enclosed manufacturer's documents must be observed to ensure proper maintenance of the telescopic table.*

## Two-person cab

If a driver's cab is equipped appropriately, two people may be inside at the same time during normal operation. The additional equipment usually consists of:

- Key switch to switch from one-person operation to two-person operation
- Handholds
- Additional foot switches
- Lift ram protection against contact
- Protection against leaning out
- Other safety equipment may be available, depending on the job.

**⚠ CAUTION**

Risk of accident

The additionally installed safety equipment must not be altered in any way. If safety equipment is defective or its function is impaired, the truck must not be operated in ride-on mode until it has been repaired by a professional.

**NOTE**

*If a truck is intended and equipped for normal operation with two people (operator and passenger), two abseil systems must be kept to hand in the cab.*

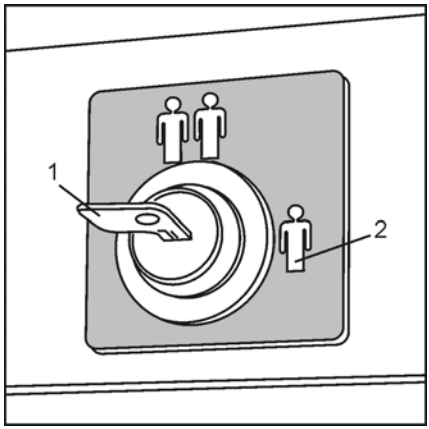
## Key switch

**⚠ CAUTION**

Risk of accident

It is the responsibility of the truck operator to make sure that this key is actually switched to the appropriate position when operating with two people. The equipment described below only becomes active if the switch has been activated. The truck operator must instruct the passenger as to the correct operation of the additional equipment and as to safe conduct when travelling. If the passenger does not comply with these instructions, the passenger must not be carried.

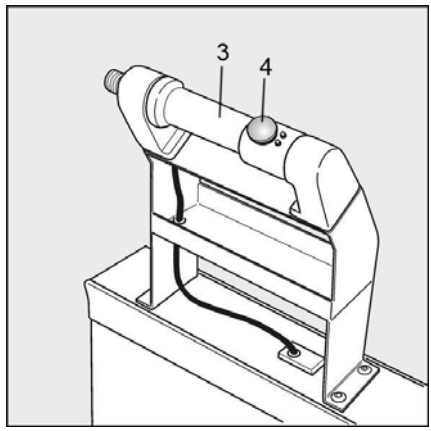
The key for switching from one-person operation to two-person operation is installed in the rear cab wall above the driver's seat. In the illustration, the key switch (1) is set to one-person operation (2).

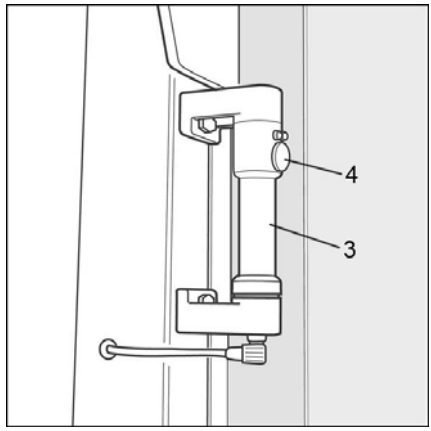


## Handholds

Two handholds (3) are provided so that the passenger is able to hold on with both hands at all times and thus keep his body in a safe position. To monitor this, the passenger must always actuate both buttons (4). Only then are the truck functions also enabled. If the passenger releases one of the buttons whilst travelling or during a hydraulic movement, this function will stop immediately.

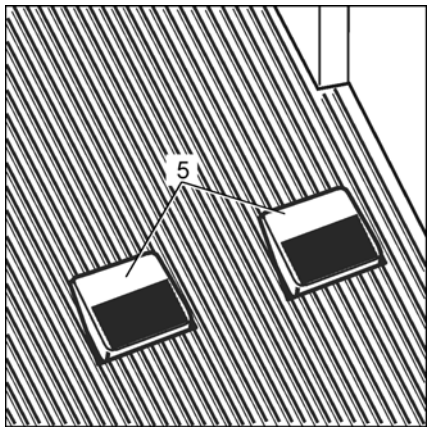
▷



### Foot switch

One or two additional foot switches (5) force the passenger to adopt a safe position. If the passenger releases one of the foot switches during travel, the truck will stop immediately.




### Further equipment

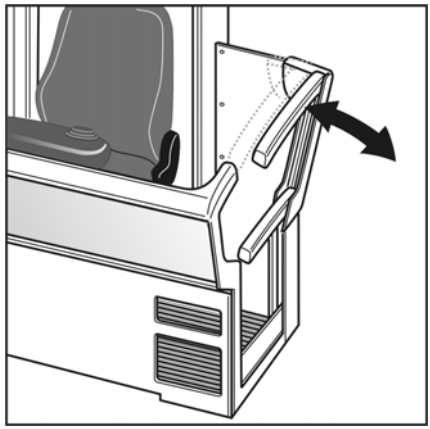
Depending on lift mast design and the cab dimensions, protection against contact can be installed for the lift cylinder situated behind the cab.

Protection against leaning out towards the rack at the side may also be required. This protection system can be installed on the barrier and is moved with the barrier when it is being opened.

## Tilt barrier

### Description

When in a reclined position, the tilt barrier opens out to the side towards the racking. This means that the distance to the racking is reduced, which facilitates order picking. If the operator releases the tilt barrier, it is automatically returned to the initial position by spring force.



The tilt barrier consists essentially of a mobile upper part, a fixed bottom part and a hinge connecting the upper and bottom parts. For safety reasons, the tilt barrier is unlocked only under certain conditions.

### Function

The barrier can only be opened if:

- The truck is in an aisle
- The barriers are closed
- The two-hand sensors are not actuated
- The operating levers for driving/hydraulics are in the neutral position
- The foot switch is not actuated
- The driving speed is v < 0.1 km/h

The barrier will be locked if:

- One of the barriers is opened
- The foot switch and the drive operating lever is actuated
- The main lift function is selected
- The truck is not in an aisle

**NOTE**

*If the truck is in an aisle and one of the two barriers is opened and then closed again, the tilt barrier is locked. It is unlocked again if the foot switch is briefly actuated once and the remaining conditions are fulfilled for it to be unlocked.*

## Mirror and lighting module

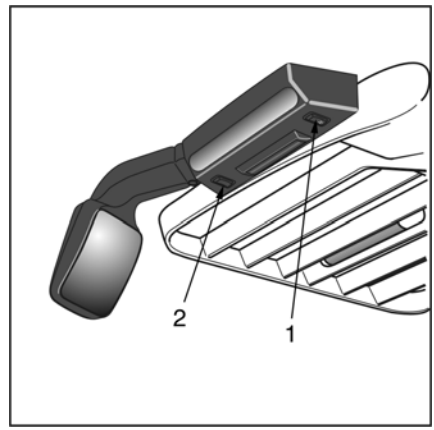
In addition to the adjustable rear-view mirror, the following can still be installed in this module as an option:

- LED workplace lighting for illuminating the racking next to the truck
- A fan motor for air circulation

**CAUTION**

Risk of accident

The curved mirror surface ensures that the field of vision is significantly increased. As a result, the objects appear further away than they actually are.




### Adjusting the mirror

The mirror can be moved into the position required by pushing on the corresponding places.

### Switching on the fan

Activate switch (1)

### Switching on workplace lighting

Activate switch (2)

# Trucks for use in cold storage

Trucks for use in cold storage are provided with extensive extra equipment, in order to guarantee full functioning at low temperatures (-30°C). Special instructions for the operation of these trucks must be observed, which are not contained in this operating manual Trucks designed for operation in refrigerated environments are marked with the adjacent symbol.

**⚠ CAUTION**

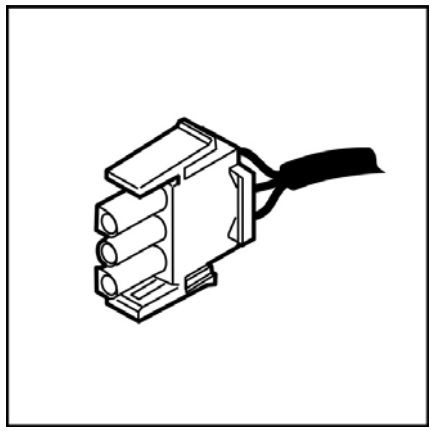
Icy floors

Icy floors have a very negative effect on steering and braking behaviour. In extreme cases steering and braking potential may be lost completely. Therefore the aisles must be kept free of ice at all times.

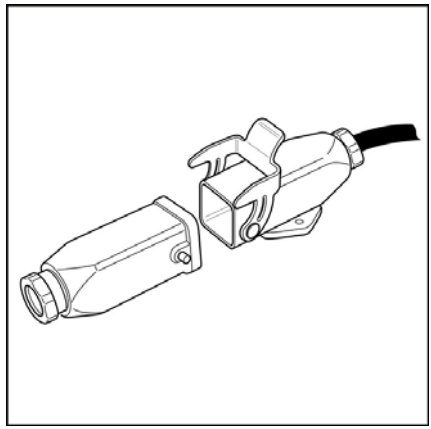
# MMS interface

Additional components in the driver's cab require galvanically isolated power supplies. Each power supply has a separate fuse.

The customer's printer or terminals can therefore be supplied with voltage. The mounting position and number, as well as the voltage supplied, are order-specific.



PIN 1 and PIN 2 +24 V
PIN 3 + 0 V
Max. 5 A



PIN 1 +12 V or +24 V
PIN 2 + 0 V
Max. 5 A

## MMS interface

## A



## B



## C



## D



## E

## F



## G



## H



## I



## L

## M



## N



## O



## P



## R



## S

## T



## U



## V



## W

Linde Material Handling GmbH

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